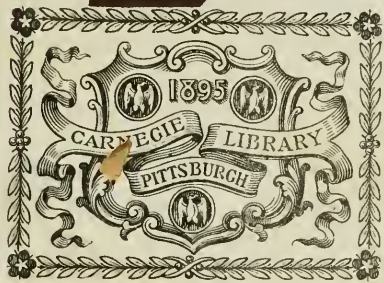




Class [REDACTED] 605 Book [REDACTED] v. 2



PRESENTED BY

Mr Andrew Carnegie



THE
STREET RAILWAY
REVIEW

INDEX TO VOLUME II

1892

ALPHABETICALLY
INDEXED
BY
WINDSOR & KENFIELD
PUBLISHERS
CHICAGO
1892

CHICAGO
WINDSOR & KENFIELD, PUBLISHERS
269 DEARBORN STREET

.. INDEX ..

| PAGE | PAGE |
|---|-----------------------------|
| Accidents in Chicago..... | 377 |
| Accommodations for Employes in New York..... | 712 |
| Administration Building..... | 156 |
| Ahearn Heater, the..... | 550-669 |
| Ahearn Heater and the Cakes..... | 565 |
| Air Brakes for Street Cars, O'Hara's..... | 178 |
| Allen's New Safety Brake..... | 36 |
| Allen's Double Acting Track Brake..... | 403 |
| All Smart in Alabama..... | 106 |
| Alley L. Opening..... | 288-289 |
| Albany, Changes in..... | 72 |
| American Car Seat Company's Street Car S at and Spring | 105 |
| American Street Railway Association— | |
| Opening at Cleveland..... | 569 |
| President's Address..... | 569-570 |
| Executive Committee's Report..... | 570-571-572-573 |
| Reminiscences by D. F. Longstreet..... | 573 |
| Report of Committee on "A Model Electric Street Railway Roadbed and Underground Wiring," by George Baumhoff..... | 573-574-575-576 |
| Wednesday Evening Session..... | 576 |
| Report of Committee on "A Perfect Overhead Elec- tric Construction," by Chas. H. Smith..... | 577 |
| Thursday Morning Session..... | 577 |
| Report of Committee on "Economy of Machine Shops for Electric Street Railways," by J. A. Bickford..... | 577-578-579-580 |
| Discussion on Machine Shops..... | 580 |
| Report of Committee on "Relative Cost of Opera- tion of Horse, Cable and Electric Traction," by Wm. Ramsey..... | 580-581-582-583-584 |
| Election of Officers..... | 584 |
| The Banquet..... | 584 |
| Friday Morning Session..... | 585 |
| Report of the Committee on "Standards for Electric Street Railways," by O. T. Crosby..... | 585-586-587-588 |
| "Standardizing of Accounts," by H. I. Bettis..... | 588-589 |
| "Experiments on the Expansion of Continuous Rails," special paper, by A. J. Moxham..... | 645-646-647-648-649 |
| Exhibits at the..... | 590-591-592-593-594-595-596 |
| Street Cars, Exhibit of..... | 596 |
| Convention Notes..... | 597 |
| Parlors, in the..... | 598 |
| Short Works, Banquet at the..... | 598 |
| Local Committee..... | 598 |
| Homeward Bound..... | 599 |
| List of Delegates..... | 599-600 |
| Suppliyen, Organization of..... | 600 |
| Anderson, Ind., Electric Line at..... | 252 |
| Ann Arbor and Ypsilanti Railway Blackmailed..... | 68 |
| Another Scheme..... | 463 |
| Angels and the Salt, the..... | 669 |
| Armature Ventilation..... | 257 |
| As Others See Us..... | 628 |
| Atlantic Avenue Road, Power House for..... | 150 |
| Bowen M. K., Promotion of..... | 223 |
| Braking Power with Electric Traction Possible..... | 413-414 |
| Bradford Electric Car..... | 316 |
| Brain System of Electric Traction..... | 560 |
| Brill's Eureka Maximum Pivoted Truck..... | 86 |
| Broad Streets..... | 310 |
| Broadway Cable Rail Joint..... | 428 |
| Broad Ripple Railway, the..... | 199 |
| Brokton, Increased Riding in..... | 642 |
| Brooklyn Electric Contracts..... | 180 |
| Brooklyn City Railway, Description of Office of..... | 624-625 |
| Brownell's Accelerator..... | 41 |
| Brownell's Trussed Trolley Bridge..... | 368-369 |
| Bucking of Motors, by Ludwig Gutmann..... | 629-630-631-632-633-634-635 |
| Bullock-Corliss Engines..... | 443 |
| Buffalo..... | 239 |
| Buffalo & Williamsville Electric..... | 709 |
| Buffalo-Tonawanda Railway..... | 479 |
| Barn Door System, a..... | 254 |
| Ball Engine Co., the..... | 372-663 |
| Bagnall's Improved Trolley Crossing..... | 619 |
| Barre Sliding Railway..... | 667-668-669-670 |
| Barnard's, President, Election..... | 166 |
| Baldwin Vacuum Tube Boiler Cleaner..... | 312 |
| Bates-Corliss Engine, the..... | 205 |
| Baltimore's New Cable Line..... | 516-517-518-519 |
| Baltimore's New Cable Line, Plans for..... | 133 |
| Baltimore Line Sold..... | 130 |
| Baltimore-Washington Electric..... | 478 |
| Baltimore Electrics, Good Business for..... | 567 |
| Baltimore, Big Deal in..... | 98 |
| Balm of Gilead..... | 493 |
| Bacteria, the Street Car..... | 27 |
| Betrayed by a Button..... | 143 |
| Belgium Tramways..... | 462 |
| Belt Hides, Breaking Strain of..... | 207 |
| Benefit Association, Prosperous..... | 175 |
| Best is Cheapest, the..... | 34 |
| Berlin, Rapid Transit in..... | 438 |
| Birthday, Our First..... | 3 |
| Bicycle Railway, a Genuine..... | 127 |
| Big Betsy..... | 714 |
| Blocking the Wheels of Commerce..... | 114 |
| Boodler Begs Bagged..... | 404 |
| Boston, the Trolley in..... | 652 |
| Boston Notes..... | 94 |
| Boston Rapid Transit Commission, Report of..... | 175 |
| Boston Fender..... | 550 |
| Bound to Bond..... | 38 |
| Bovine Motor, a..... | 639 |
| Butman Vertical Boiler, the..... | 729 |
| Cable Wheel Wagon, Monster Cleveland..... | 144 |
| Cable Road of Portland, Oregon..... | 121-122-123 |
| Cable Sleighing..... | 95 |
| Cable Road Less Expensive than Supposed..... | 88 |
| Cable Engineer..... | 64 |
| Cable Power House, Smallest in the World..... | 65-66-67-68 |
| Cable and Electric Motor Power on Street Rail- roads..... | 165 |
| Cable Car, a Capital..... | 244 |
| Cables are moved from Car to Power House, how..... | 79 |
| Caught on the Rush Trip..... | |
| 45-46-47-48-99-100-101-102-103-157-158-159-160-161-213- 214-215-216-217-218-219-269-270-271-272-273-274-328- 329-330-331-332-391-392-393-394-395-396-447-448-449- 450-451-521-522-523-524-525-526-527-603-604-605-606- 656-657-658-659-660..... | 135 |
| Cause and Effect..... | 135 |
| Car, New—Open-Closed..... | 528 |
| Cars, Shall Street Railways build their own..... | 181-182-183 |
| Car Building, Pacific Coast..... | 261 |
| Car Starting by Telephone..... | 529-530 |
| Car Coupler, a Perfect..... | 200 |
| Car Records, Simple, for Car House..... | 376-377 |
| Car Starter, a New..... | 265 |
| Car Horses in Chicago..... | 561 |
| Car Heater, New Standard..... | 457 |
| Cayadutta Electric Railway..... | 199 |
| Catskill Climb, a..... | 492-493 |
| Case of the Horse, the..... | 289 |
| Cash Fares at Albany..... | 705 |
| Caught on the Rush Trip..... | 732-733-734-735 |
| Colmbian Underground System..... | 343 |
| Combination Punch & Bell-cord Splicer..... | 695 |
| Concrete for Cable Conduits, No Patent on the..... | 799 |

| | PAGE. | | PAGE. |
|--|---------------------------------|---|---------|
| Cowles, E. H., (obituary)..... | 262 | Dr. Werner von Siemens (obituary) | 721 |
| Chattanooga Chatter..... | 208 | Duluth's Beacon Hill Pavilion..... | 568 |
| Checks, Protect your..... | 179 | Duluth's Ferry..... | 457 |
| Christ Motor Truck..... | 361 | Duluth's Ampere Club..... | 553 |
| Changed the Combination..... | 385 | Duluth's Dinner | 287 |
| Chicago Stories, a Pair of..... | 662 | Duplex Hospitality..... | 589 |
| Chicago Power House, a New..... | 639 | Duggan Rail Chair..... | 251 |
| Chicago Notes..... | 50-106-264 | Dubuque Scene, a..... | 390 |
| Chicago Zephyrs..... | 145 | Dubuque Deal..... | 357 |
| Chicago's New Power..... | 290-291-292 | East Liverpool & Wellsville..... | 231 |
| Chicago..... | 327 | Echoes From the Trade | |
| Chicago Letter..... | 453 | 39-40-107-108-109-167-168-169-224-225-226-227-279-280 | |
| Chicago Elevated, New President for..... | 235 | 281-344-345-346-400-401-402-459-460-461-531-532-533 | |
| Celebration Crowds in New York, the..... | 644 | 601-602-664-665-666. | |
| Cincinnati Fire, the..... | 183 | Echoes from Puget Sound..... | 54-162 |
| Cincinnati Cable..... | 281 | Edison Controlling Switch..... | 210 |
| Circuit Breaker, a New..... | 528 | Edison Controlling Table, the..... | 373 |
| Citizen Train on Street Railways..... | 471-472 | Editorial..... | |
| Cleveland Manufacturers of Street Railway Supplies..... | | Accidents at Crossings..... | 2 |
|508-509-510-511-512-513-514 | | Accidents in Chicago..... | 58 |
| Cleveland, the Convention City..... | 481-482-483-484-485-486-487-488 | Ashtabula, Ohio, Trouble at..... | 113 |
| Cleveland Life Guard..... | 324 | Asiatic Commerce in Street Cars..... | 545 |
| Coffin's Combination Punch..... | 314 | Augusta, Ga., Praised..... | 285 |
| Columbus Railway Lamp..... | 445 | Badge Privilege, Abuse of..... | 57 |
| Columbia Consolidation..... | 234 | Baltimore Cable, Opening of..... | 405 |
| Compressed Air Traction..... | 317 | Blocking the Track..... | 285 |
| Compressed Air Hopes, Leavenworth's..... | 246-247-248 | Boston's Problem | 57-58 |
| Compressed Air at Berne..... | 458 | Cable System, the..... | 407 |
| Compressed Air as a Street Railway Motor..... | 5-6-7 | Census Report..... | 1 |
| Compressed Air as Motive Power | 715-716 | Cleveland Convention..... | 545-546 |
| Conduit Tubing, Flexible..... | 36 | Convention, the Eleventh..... | 349 |
| Conductor, the (Verse)..... | 661 | Convention, Date of..... | 466-467 |
| Conduit Systems, Two Electric..... | 551 | Convention, Plans for..... | 229 |
| Conely Gas Motor | 724 | Convention, Delegates at..... | 465 |
| Connecticut Renaissance..... | 422 | Convention, Attendance on..... | 467-468 |
| Conventions, History of..... | 473-474-475-476 | Convention, Exhibits at..... | 465 |
| Consolidated Economy..... | 399 | Convention and World's Fair, Dates of..... | 407 |
| Continuous Rails, Experiments on the Expansion of..... | 645-646-647-648-649 | Compressed Air..... | 349 |
| Conscience Money..... | 639 | Correction, a..... | 409 |
| Coming Development of Electric Railways..... | 333-334-335-336-337-338-339-340 | Corporations, Bleeding of..... | 349 |
| Combined Switch and Fuse Box..... | 493 | Cost of Operating Street and Steam roads..... | 2 |
| Compliment, a..... | 652 | Created Travel, Value of..... | 173-229 |
| Cowles Water Tube Boiler..... | 208 | Denver Tramways, System of..... | 467 |
| Cœur D'Alene Electric..... | 471 | Details, Perfection of..... | 613 |
| Crimmins, John D. (biography)..... | 252 | Discipline..... | 286 |
| Created Travel in Minneapolis..... | 419-420-421 | Directory of Street Railways, Our..... | 349 |
| Created Travel in Rockport..... | 422 | English Trams and Steam Dummies..... | 407 |
| Created Travel..... | 44 | Enormous Profits, Fallacy of..... | 174 |
| Crossley Friction Brake, the..... | 180 | Enterprise | 614 |
| Cudahy..... | 315 | Executive Committee, Action of..... | 613 |
| Cutler Non-Indicative Ammeter | 705 | Financial Depression..... | 546 |
| Damage Claims in Bombay..... | 709 | Fire from Trolley Wires..... | 613 |
| Delaware, O., Electric Line..... | 709 | Franchises | 2 |
| Denver Tramway Power House..... | 308 | Funeral Processions and Street Travel..... | 173 |
| Denver Plans..... | 255 | Hot Weather and Horses..... | 407 |
| Dermaglutine..... | 41 | Interurban Lines, Opposition to..... | 285 |
| Detroit Rapid Transit..... | 220 | Kickers..... | 287 |
| Detroit's Power Plant..... | 310 | Litigation of Damages..... | 57 |
| Detroit Electrical Works, new Dynamo..... | 397-398-399 | Ladies at Convention..... | 466 |
| Detroit, Changes in..... | 618 | London Rapid Transit..... | 173 |
| Detroit, Progress at..... | 703 | Malicious Law-enforcers..... | 230 |
| Detroit Trolley..... | 260 | Municipal Interference..... | 350 |
| Dewey Heater Doings..... | 661 | Newspaper Advertising..... | 408 |
| Dictionary of Technical Terms, Our..... | 666 | New York State Convention..... | 545 |
| Died in the Car..... | 212 | Northern Car Company, Burning of..... | 229 |
| Died without a Fire, or the Chief's Terrible Revenge, 60-61-62 | 428 | Official Bounds Outstepped..... | 57 |
| Disposition of Manure..... | 385 | Ohio State Convention..... | 545 |
| Ditching by Electricity..... | 566 | Passengers, Grievances of..... | 113 |
| Dodge Friction Clutch..... | 497 | Passenger, Damage Claims of..... | 614 |
| Dan Dougherty at the Philadelphia Banquet..... | 422 | Passenger Traffic on Street Railways..... | 1 |
| Drain Rail, a..... | 326 | Philadelphia, New..... | 173-174 |
| Dream, a..... | 62 | Power Houses, Improvements in..... | 230 |
| Driver Won, the..... | 62 | Right of Eminent Domain..... | 1 |
| | | Room in Street Cars..... | 2 |
| | | Schemes to Increase Circulation..... | 546 |
| | | Slander Case, The St. Paul..... | 229 |

| | PAGE. | PAGE. | |
|---|------------------------|--|-------------------------------------|
| Editorial—continued. | | | |
| Snow Storms..... | 174 | Give the People a Show..... | 165 |
| Speed..... | 1 | Goddard, Calvin (obituary)..... | 196 |
| Speed, Trolley Cars without..... | 615 | Golden Again, the..... | 176 |
| Standards for Street Railway Work..... | 466-467 | Goldsworthy Friction Clutch..... | 310 |
| Straw..... | 58 | 'Good Old Days,' those..... | 136 |
| Street Railway Review, Growth of..... | 1 | Goubert Horizontal Feed-Water Heater..... | 446 |
| Strike at Meriden..... | 408-409 | Goubert Water Tube Feed-Water Heater..... | 95 |
| Strikes, Municipal government of..... | 113 | Grand Rapids..... | 184-185 |
| Subscription Price..... | 545 | Grand Larceny..... | 313 |
| Supplymen, Usefulness of..... | 409 | Grades, Assistance on..... | 236 |
| Taxes on Cars..... | 613 | Graham's Rail Chair..... | 313 |
| Taxes on Street Railways..... | 350 | Great Western, the..... | 171 |
| Taxes on Street Cars..... | 229 | Griffin Wheel, New..... | 105 |
| Thanks..... | 545 | Harvey Transit Company..... | 444 |
| Time of Stopping at end of route..... | 615 | Heard his Father's Voice..... | 282 |
| Toledo, Fire at..... | 57 | Heath Trolley System..... | 361 |
| Track, Inspection of..... | 545 | Heating Street Railway Shops and Barns..... | 700-707 |
| Tramway Regulations in Europe..... | 230 | Heavy Duty Engine for Railway Service..... | 384 |
| Transfers in Chicago..... | 1 | Heating a City with Exhaust Steam..... | 69-70-71 |
| Trolley in New York..... | 407 | Healy Noiseless Motor..... | 84 |
| Trolley in Boston..... | 408 | Held up the Inter-urban..... | 123 |
| Trolley in New Jersey..... | 57 | Hero on the Front Platform, a..... | 636 |
| Union Labor..... | 614 | High Speed on Grades..... | 197 |
| Universal Street Tracks..... | 286-287 | His First Ride..... | 257 |
| Water, Failure of..... | 286 | Horse Shoe, a New..... | 489 |
| Wages in Europe..... | 1 | Hose Bridge at Fires..... | 130 |
| Wages, Basis of..... | 465 | How to Remove Frost from Trolley Wires..... | 133 |
| World's Fair, Special Street Railway Tickets during..... | 466 | Hygiene and Veterinary..... | 137-138-198-253-254-301-302-386-387 |
| World's Fair, Street Railway Exhibition at..... | 285 | Houston Railways..... | 318-319-320 |
| World's Fair, Closing of, Evenings..... | 615 | Ide's New System of Driving Generators..... | 621 |
| Work, New..... | 173 | Ideal Oil Purifiers..... | 245 |
| Yerkes, C. T., Gift of..... | 540 | Illuminating Parades from Trolley Wires..... | 679 |
| Electricity for Steam Roads..... | 429 | Improved Governor and High Speed Engines..... | 42 |
| Electrical Supply House, a New..... | 562-563 | Improved Portable Rail Saw..... | 660 |
| Electric Special, the..... | 13 | Important Decision regarding Transfer Tickets..... | 62 |
| Electric Car Conductor (Verse)..... | 227 | Incandescent Lamps for Street Cars..... | 714 |
| Electric Railway Ordinance, Failing to Provide for Poles and Wires..... | 341 | Increase, a large..... | 134 |
| Elmira Syndicate, the..... | 251 | Indianapolis Strike, the..... | 116-117-118 |
| Engines, New Street Railway Duty..... | 703 | Indianapolis Indications..... | 221 |
| English Electric Railways..... | 553 | Indianapolis Sale..... | 696 |
| English Improvement..... | 12 | Installing Boilers at the World's Fair..... | 672 |
| English Tramway Employes and Expenses..... | 495 | Insulating Material, a New..... | 97 |
| Entering Exhibits at the World's Fair..... | 171 | Jacksonville's Progress..... | 44 |
| Europe, Tramway Regulation in..... | 209-210-240-241-322 | Japanese Street Traffic..... | 702 |
| European Tram Train..... | 43 | Jerry Simpson's Dream..... | 183 |
| Everything Goes..... | 13 | Jottings from Japan..... | 212 |
| Evolution of the Street Car, the..... | 20-21-22 | Joy for Jersey..... | 261 |
| Executive Committee, Meeting of to Arrange for 1893, 691-692 | 691-692 | Joplin Carries the Banner..... | 712 |
| Exhaust Steam Heating..... | 71-72 | Judson System in Washington..... | 248-249 |
| Exhaust Steam Heating, Progress of..... | 462 | Jump over Crossings..... | 177 |
| Exhaust Pipe Head, Lyman's..... | 267 | Just So..... | 88 |
| Exhibit Hall (Convention)..... | 533-534-535 | Kansas City Elevated Electric..... | 676-677-678-679 |
| Faithful Man, a..... | 12 | Kids and Cars..... | 197 |
| Family Party, a (Baldwin Engines)..... | 236 | Kid and Cable, the..... | 310 |
| Fare Register, International..... | 223 | Keokuk Electric in Trouble..... | 130 |
| Five Hundred-Volt Current, Some Possible Uses of..... | 717-718 | Knocked out by a Fire Engine..... | 72 |
| Foreign Facts..... | 59-195-250-263-323-458 | Labor Complications..... | 289 |
| Freight Line, an Electric..... | 564-565 | Lake Roland Electric..... | 553 |
| From the Tannery to the Dynamo..... | 124-125-126 | Iamokin Open Car, a..... | 389 |
| Ft. Scott, Changes at..... | 208 | Lancaster Lines..... | 199 |
| Ft. Wayne, Electrics in..... | 245 | Large Wooden Fly Wheel..... | 252 |
| Fusible Plug and Low Water Alarm..... | 380 | Life Giving Trolley, the..... | 608 |
| Garton's Lightning Arrestor..... | 315 | Lindell Fire, the..... | 693-694 |
| Gas Well, a Street Railway..... | 135 | Little Rock Road, the..... | 464-465 |
| Gasoline Motor, a New..... | 708 | Longstreet, D. F., (biography)..... | 547 |
| Gate Fastener, Improved Safety..... | 195 | Look out for the Old Man..... | 364 |
| Gearless Motor, the..... | 190-191-192-193-194 | Louisville Lighting..... | 268 |
| General Electric Co., the..... | 261 | Love Electric, Testing the..... | 120 |
| General Electric Co.'s Devices for Overhead Construction..... | 611-612 | Love Conduit System..... | 63-64 |
| Genett Air Brake, the..... | 609-610 | Lyon Brake Handle..... | 251 |
| Giant Clutches at Columbus..... | 302 | Law, Street Railway. | |
| Gilbert Truck, the New..... | 366 | Bridge Companies, Powers of Directors..... | 435 |
| Giving a Good Man Credit..... | 655 | Car Required, Collision with team..... | 259 |
| | | Care Required on Crossing Track..... | 711 |
| | | Change of Motive Power..... | 50 |

INDEX.

| | PAGE. |
|---|---------|
| Law, Street Railway—continued. | |
| Charter Powers..... | 434 |
| Compensation for Use of Street..... | 258 |
| Contributory Negligence..... | 710-711 |
| Control of Street, Municipal..... | 491 |
| Crossing Street Car Track..... | 491 |
| Cross Walks, Rails Projecting Above..... | 559 |
| Crossing Track of Another Company..... | 14 |
| Damages, Action against Elevated Railroad for..... | 15 |
| Damages by Elevated Railroad..... | 641 |
| Driver, Care Required of..... | 491 |
| Driver, Assaulted by..... | 558 |
| Driver, Duty of Passengers Alighting..... | 50 |
| Driver and Conductor of Cars, Ordinance Requir- ing..... | 490 |
| Ejection of Passengers, Unlawful..... | 304-358 |
| Elevated Portion of Electric Railway..... | 358 |
| Extend Tracks, Power to..... | 303 |
| Fall, Reasonable..... | 490 |
| False Imprisonment, Action for..... | 187 |
| Forfeiture of Wages..... | 50 |
| Foreclosure of Mortgage, Intervention of Stock- holders..... | 129 |
| Headlights, Failure to have..... | 304 |
| Injury from Elevated Railroad..... | 710 |
| Injury on Alighting from Car..... | 711 |
| Injury to Conductor..... | 304 |
| Injury to Car Driver, Defective Appliances..... | 14 |
| Injury at Crossing of Horse and Steam Railroads..... | 188 |
| Injury to Horse on Track..... | 128 |
| Injury to Passenger, Caused by Defective Appli- ces..... | 559 |
| Injury to Boy Stealing Ride..... | 187 |
| Injury, Personal..... | 359 |
| Injury, Personal—Entering Moving Train..... | 15 |
| Injury to Person Crossing Street..... | 559 |
| Injury by Sudden Starting of Car..... | 434 |
| Injury by Passing Car..... | 640 |
| Injury to Trespassers..... | 710 |
| Injury to Workmen..... | 435 |
| Injury Resulting from Fright..... | 558 |
| Injury to Trespassers..... | 129 |
| Interference with Poles and Wires..... | 188 |
| Joint Use of Tracks in Hands of Receiver..... | 128 |
| Judgment Against Creditor, Action by Stock- holder..... | 15 |
| Law, Corporation..... | 435 |
| Land Occupied by Railroad..... | 359 |
| Mortgage, Foreclosure..... | 641 |
| Negligence, Contributory..... | 559 |
| Negligence, Contributory..... | 641 |
| Negligence of Drivers..... | 641 |
| Negligence, Contributory..... | 49 |
| Negligence in Making Excavation..... | 559 |
| Negligence of Independent Contractor..... | 14 |
| Negligence in Passengers to Alight from Moving Car..... | 129 |
| Negligence in Crossing Track..... | 128 |
| Night, Ordinances Requiring Cars to Run all..... | 303 |
| Negligence in Entering Moving Car..... | 129 |
| Negligence of Fellow Servant..... | 129 |
| Negligence of Car Driver..... | 359-360 |
| Negligence, Presumption of..... | 258 |
| Pavement, Defective..... | 711 |
| Police, Appointment of Railroad..... | 359 |
| Power House, Location of..... | 433 |
| Private Bridge, Crossing..... | 304 |
| Property Owners, Notice and Consent of..... | 559 |
| Rail Projecting above Surface..... | 711 |
| Reasonable Time to Board Cars..... | 491 |
| Repairing, Liability of Street Railway for..... | 258 |
| Same Track, Street Railways to Use..... | 559 |
| Sewers, Contract for Building..... | 491 |
| Speed..... | 711 |
| Streets, Power of Railroad to Cross..... | 358 |
| Streets, Municipal Regulation of..... | 435 |

| | PAGE. |
|---|-------------------------|
| Law, Street Railway—continued. | |
| Streets in Repair, Statutes requiring Street Rail- ways to keep..... | 435 |
| Street, Use of..... | 188 |
| Slander, Action against Corporation for..... | 258 |
| Statute of Limitation, When they begin..... | 129 |
| Transfer Tickets..... | 640 |
| Track Wrongfully Torn up by City..... | 186 |
| Trespassers, Injury to..... | 129 |
| Use of Streets—Consent of Turnpike Companies..... | 435 |
| Unlawful Speed..... | 559 |
| Urban Transit and Expositions..... | 681 |
| Mail Service, Street Railway..... | 736 |
| Mail & Express Line, a..... | 255 |
| Main's Steel Tie..... | 88 |
| Married..... | 53 |
| Married on a Street Car..... | 501 |
| March of the Amazons..... | 661 |
| Massachusetts Roads, Annual Statement of..... | 705 |
| Massachusetts Superintendents..... | 471 |
| Massachusetts Street Railway Association..... | 166 |
| Maynard, Judge I. H. (biography)..... | 704 |
| Mason, W. R..... | 495 |
| Mayor with Sense, a..... | 478 |
| Weaker Register, the New..... | 179 |
| McGuire Truck, the Elliptical..... | 178 |
| McLean, Thos. (biography)..... | 636 |
| Medium for Return Currents..... | 719-720 |
| Memphis Merriment..... | 292 |
| Meriden Strike, a..... | 456 |
| Meeting of the Executive Committee for Convention of 1893..... | 691-692 |
| Message from the Lord..... | 315 |
| Mexican Lines..... | 404 |
| Millbury Contracts..... | 314 |
| Mileage, Increase of, in Ten Years..... | 15 |
| Milwaukee Power Plant..... | 351-352-353-354-355-356 |
| Milwaukee Appointments..... | 687 |
| Milwaukee Litigation..... | 687 |
| Minneapolis, More Resorts for..... | 478 |
| Minneapolis, New Plant at..... | 221 |
| Minneapolis' New Power House..... | 232-233-234 |
| Minneapolis Adopts Short's Gearless..... | 38 |
| Moan, J. M. (obituary)..... | 557 |
| Model Steam Making Plant, a..... | 698-699-700-701 |
| Motor as Dynamo, For Braking..... | 707 |
| Montreal Election..... | 621 |
| More Supplies..... | 681 |
| Motors Spring Eternal in the Human Breast..... | 98 |
| Mt. Vernon Contracts Let..... | 368 |
| National Fare Box..... | 324 |
| National Association, Plans of..... | 321 |
| Natural Gas at Salt Lake..... | 212 |
| Newburyport Pole Bracket..... | 37 |
| New Publications..... | 110-396-430-655 |
| New Iowa Line, a..... | 701 |
| New Jersey Trolley Law..... | 244 |
| New Jersey Railways..... | 250 |
| Newark's New Power Plant..... | 26-27 |
| New "New Departure" Bell..... | 38 |
| New Scheme, a..... | 177 |
| Newark Deal, a Big..... | 143 |
| New Rule, a..... | 308 |
| Newton & Snyder Damper Regulator..... | 312 |
| New Street Railway Switch..... | 312 |
| New Pleasure Scheme..... | 314 |
| Newspaper Comment..... | 323 |
| New Chicago City Railway Car Barn..... | 494-495 |
| New Design for High Speed Cars..... | 480 |
| New Transfer Tickets..... | 479 |
| New Clutch, a..... | 463 |
| New Electric Wire Computer..... | 515 |
| New Tie Joint and Rail Bridge..... | 663 |
| New Departure Bell..... | 387 |
| New England Electric Club, the..... | 377 |
| New York Consolidation..... | 195 |

| | PAGE. | | PAGE. |
|---|---------------------------------------|--|-------------------------------------|
| New York, Rapid Transit for..... | 680 | Proposed Electric, Connecting Seattle and Tacoma..... | 636 |
| New York State Association..... | 370 | Progressive Plant, a (The Pennsylvania Iron Works).... | 265 |
| New York State Association, Account of..... | 535-543 | Puget Sound Notes..... | 220-273-388-452 |
| New York Letter..... | 106-263-325-326-453 | Put-in-Bay Electric..... | 455 |
| New York Consolidation..... | 274 | Pneumatic Motor vs. Horse, Cable and Electric Trac- tion..... | 378 379 |
| New York Car Horses..... | 644 | Rapid Transit Defused..... | 194 |
| New Orleans Contracts..... | 265 | Rapid Transit in Rome..... | 62 |
| New Orleans Strike..... | 616 | Rapid Transit System of Nashville, Tennessee..... | 91-92 |
| Niagara Power House..... | 309 | Rapid Transit System of Cleveland..... | 498-499-500-501-502-503-504-505 506 |
| Nicholl's Elevated Walk..... | 134 | Railway Men in Politics..... | 357 |
| None but the Brave Deserve the Fare..... | 282 | Railway Equipment in North Carolina..... | 314 |
| Northern Car Company's Fire..... | 235 | Rare and Interesting Photograph, a..... | 418 |
| Notes on Power Stations..... | 276-277 | Racine Wrinkles..... | 390 |
| November, (a poem)..... | 672 | Real Estate and Rapid Transit..... | 431 |
| Oakland, San Leandro & Hayward, through Avenues of Palms..... | 436-437-438 | Receiving and Dating Perforator..... | 245 |
| Ohio Legislature..... | 207 | Recommended to the Powers that be..... | 462 |
| Ohio State Association..... | 694 | Reducing Wheel for Engine Indicator..... | 201 |
| Ohlson's Independent Truck..... | 35 | Reminiscences of Early Days..... | 80 |
| Old Dan..... | 361 | Remember Difference in Time..... | 507 |
| Old Engine, an..... | 495 | Reno Rapid Transit in New York..... | 189 |
| On Lowry's Land..... | 357 | Reorganization of the Rhombeg Lines in Dubuque..... | 115 |
| Oregon City Electric Road..... | 138 | Repair of Street Railway Tracks in St. Louis..... | 90 |
| Operating Expenses, Low..... | 25 | Review as Read in Japan..... | 488 |
| Operation of Siemens & Halske Electric System and its Future in America..... | 142-143 | Rheostat, a New..... | 637 638-639 |
| Overhead Electric at Yonkers, N. Y..... | 104 | Richards, Calvin A., (obituary)..... | 164 |
| Owosso's Opening..... | 347 | Rice Machine Co's Contracts..... | 376 |
| Pacific Paradise, a..... | 293-294 295 296-297 298-299-300 | Richmonds' Purchase..... | 712 |
| Pacific Coast Cable Procession..... | 313 | Richmond, Va., Road..... | 441 |
| Palace Vestibule Car..... | 119 | Right of a Street Railway to Condemn a Right of Way. Duluth Decision..... | 93-94 |
| Parcels Express in Detroit..... | 81-82-83 | Rochester Delegates Horses..... | 133 |
| Parsons, J. B. (biography)..... | 308 | Ropes, a chapter on..... | 139 140-141 |
| Passengers as Newsboys..... | 80 | Ropes, Measurement of..... | 222 |
| Passengers with Parcels..... | 115 | Rule Book, a Practical..... | 244 |
| Passengers in St. Louis..... | 98 | Rustic Café Resort, a..... | 636 |
| Pasadena & Mt. Wilson R'y..... | 682 683-684 685-686 | St. Joseph & Benton Harbor Electric Railway..... | 688-689-690 |
| Pass Him Around..... | 188 | St. Paul & Minneapolis, Recent Ordinances in..... | 712 |
| Patents..... | 694 | Salamander Wire..... | 697 |
| Patton Motor Rejected at Denver..... | 445 | San Francisco & San Mateo Electric, Scenes on..... | 362-363-364 |
| Patton Motor Hibernates..... | 636 | San Francisco First Electric..... | 211 |
| Paterson Scene, a..... | 626 | San Francisco Metropolitan's New Line..... | 495 |
| Paving Practice in England..... | 471 | Santa Cruz and its Water Power..... | 507 |
| Payne Henry C., (biography)..... | 430 | Samson Bridge Chair..... | 87-134 |
| Pay Wagon, Chicago City Railway..... | 16 | Salt Lake, in the Land of the Great..... | 415-416 417-418 |
| Peckham's Truck "5 A"..... | 608 | Safety Overhead Conductors..... | 44 |
| Personals..... | 51-94-147-166 222-278-327-456-617-736 | Seattle Roads Offer Percentage..... | 563 |
| Perpetual Motion..... | 44 | Schaffer Hydraulic Wheel Press..... | 431 |
| Pennsylvania Accidents..... | 314 | Schuttler Ratchet Track Drill..... | 457 |
| Philadelphia Letter..... | 23-94-177-200-262 | Scorch at Sheboygan, a..... | 626 |
| Philadelphia Story, a..... | 315 | Security Register, the..... | 620 |
| Philadelphia Trolley, the..... | 628 | Setting Poles in Rock..... | 266 |
| Philadelphia Traction Co's Luck..... | 266 | Shaking the Boxes..... | 239 |
| Pfister-Hinckley Case Again..... | 405 | Shaw, Chas. P. (obituary)..... | 111 |
| Pioneer Street R'y Builder, (Chas. Hathaway)..... | 468-469 | Short's System in Siam..... | 178 |
| Piqua Plant..... | 195 | Short's Gearless, Recent Test of..... | 68 |
| Pittsburg Pointers..... | 23 | Shoe, a New..... | 257 |
| Pittsburg Electric Club..... | 13-399 | Shock, a New Kind of..... | 138 |
| Plans Wanted..... | 462 | Shoemaker Electric Conduit System, the..... | 643 |
| Points on Power Stations..... | 374-375 | Shrine of St. Car (verse)..... | 709 |
| Police and Firemen Free..... | 239 | Siemens & Halske of America..... | 548 549-550 |
| Popocatapelt Electric Road..... | 551 | Single Reduction Motor, a..... | 202-203 |
| Pope, S. T. (obituary)..... | 196 | Single Reduction "F 30," Motor..... | 607 |
| Poor Things..... | 278 | Sioux City & Morning Side R'y..... | 438 |
| Portable Rail Saw, a..... | 176 | Sioux City's Sundays..... | 256 |
| Portland Points..... | 51-170 | Sill Trolley Base..... | 251 |
| Portland, Ore., City & Suburban Road of..... | 554-555-556-557 | Simple Signal Signs..... | 119 |
| Power Hammer, new..... | 41 | Six Say Sloan Slandered..... | 130 |
| Power House for Chicago, a magnificent..... | 152 | Sinclair, Col. W. H., (biography)..... | 372 |
| President Lewis and his Scheme..... | 635 | Smoking Car, Combination..... | 133 |
| Prizes for Faithful Employees..... | 79 | Sold Again..... | 144 |
| Price's Hollow Rail..... | 96 | South. Street Railways in, Birmingham, Ala..... | 237 238 |
| Progress in Louisville..... | 25 | South, Electric Railway in, San Antonio, Tex..... | 381-382-383-384 |
| Prospective Duluth Improvement..... | 62 | Scribner, Hon. G. Hilton..... | 80 |
| Progress of the R. D. Nuttall Co..... | 145 146 | Sprinkling, Street Railway..... | 221 |
| Progress of Today..... | 231 | | |

| | PAGE. | | PAGE. |
|---|---|--|---------------------|
| Splendid Engine Record | 152 | Transportation in Chicago During the World's Fair | 622 |
| Spliced Bar, a New | 135 | Tried to Skate | 211 |
| Square Shafts for Cable Carrying Pulleys | 714 | Trolley Wire Insulators and Brush Holders | 8 |
| Stillwell's Water Purifier | 204 | Trolley vs. Telephone | 653-654-655 |
| Stephenson, John, (biography) | 24-25 | Trolley, Perverting Truth about | 446 |
| Steam Roads Expect Electricity | 567 | Trolley in England, the | 722-723 |
| Standing in Street Cars, the Different Standpoints of | 58 | Trolleys in Winter, the | 687 |
| Statistics, Official, Street Railway | 17-18-19 | Transfer Steal, Pittsburg | 313 |
| Steam Loop, the | 28-29-30-31-32-33-34 | Trolley Decision in New York | 76-653 |
| Stillwell's Patent Close Heater | 515 | Turner's Track Break | 130 |
| Stirling Boiler | 309 | Turning Switch while Car is in Motion, Device for | 404 |
| Storage Battery System, Another | 59 | Two Horse Power Motors | 357 |
| Storage Battery, New | 88 | Urban Transit and Expositions | 681 |
| Storage Battery, Theory of Lead | 702 | Usual Way, the | 53 |
| Storage Battery at Dubuque | 73-74-75-76 | Utica Lines in the Toils | 87 |
| Storage for Villard, No | 403 | Underground Feed Wires for Electric Railways | 132-133 |
| Storage Battery Deficits | 471 | Underground Roads | 85 |
| Storage Battery Traction | 439-440-441 | Uniform, the value of | 410-411-412 |
| Stalactite Formation in Feed Water Purifier | 704 | Vacuum Gauge to Indicate Stack Draught | 422 |
| Street Railway Law | 710-711 | Van Depoele, Chas. J. (obituary) | 196 |
| Street Cars in Mexico | 704 | Van Zile's Traction Car | 552 |
| Steam Separators, Improvements in | 708 | Vestibule Roof Observation Window | 120 |
| Street Car Nuisance | 169 | Veteran Driver, a | 201 |
| Street Car Trailer Connection | 311 | Village in a Night, a | 326 |
| Storelectro Car | 151 | Visiting Magnates | 254 |
| Street Railway Patents | 54-110-163-219-274-342-396-452-528-610-649 | Wages in Boston | 12 |
| Street Railway Law | 14-15-77-78-128-129-186-187-188-258-259-260-303-304-358-359-434-435-558-559-640-641-642 | Wages in Buffalo | 252 |
| St. Louis Siftings | 94 | Wages in England | 690 |
| St. Louis Electric Club | 672 | Wages at Columbus | 366 |
| St. Louis Fire, the | 201 | Wagner Motor, the | 651 |
| St. Louis Park Season | 399 | Waiting Rooms Free | 705 |
| St. Louis and Suburban Railway | 148-149-150 | Walker Manufacturing Co. | 433 |
| St. Paul, Sand Stops Cars in | 463 | Walker, Gen. John | 589 |
| St. Paul White Bear Inter-urban | 477-478 | Wales' Snow Plow and Scraper, the | 36 |
| St. Paul and Minneapolis, Third Inter-urban Line between | 138 | Water Tube Boiler, a New | 718 |
| St. Paul's New Power House | 231 | Wauwatosa Suburban Line | 455 |
| Steepest Railway in the World, the | 626-627 | Want a Road | 380 |
| Suburban Lines | 116 | Wants a Cable Road | 86 |
| Summer Lodge, a | 310 | Washington and Georgetown Cable Plant, the | 423-424-425-426-427 |
| Surrendered | 239 | Washington | 23 |
| Swindling Schemes | 552 | Washington City | 176 |
| Supplies Wanted | 628 | Wightman's Improved Motor | 311 |
| Summer Program, a | 310 | Westward the Style of Motor Takes its Way | 37 |
| Syndicate News | 441 | Westinghouse Factory, the | 377 |
| Tacoma & Steilacoom Railway's Courageous Undertaking, the | 432-433 | Western Engine Matters | 264 |
| Tacoma, Washington, Railway & Motor Co. | 9-10-11-12 | Whale of a Wheel, a | 628 |
| Tale of Two Cities | 163 | Wheels of Commerce, the | 305-306-307-308 |
| Taxes, Cleveland's Street Railway | 553 | What is a One-Horse Car | 43 |
| Telephone System, a Railway | 692 | Wheeler, Geo. H. (biography) | 496 |
| Thawing Frozen Ground | 207 | Where Springs are Made | 507 |
| They Came Down | 256 | Where Discussers will Discuss | 472 |
| Thomson, Elihu (biography) | 136 | Where Angels Fear to Tread | 380 |
| Thrown up by the Sweeper | 267-661 | Which is the Favorite | 53 |
| Toledo, Big Fire in | 98 | Why He got Up | 53 |
| Topeka Transit | 212 | Why Not Oftener | 311 |
| Topeka's Electric Railway | 163 | Wisconsin Electric Club, the | 625 |
| Tore up the Track | 377 | Wilmington, N. C., Adopts Electricity | 104 |
| Toronto's Earnings | 235 | Wilmington, N. C. Road, Plans for the | 141 |
| Tonching Plea, a | 412 | Woman's Rights Woman, a | 622 |
| Tower Wagon, a Serviceable | 618 | Women and Rapid Transit | 644 |
| Tower Wagon, a Practical | 34 | Wood Paving | 650-651 |
| Tramway Institute of Great Britain | 370 | Wood's Trolley Wire Clamp | 428 |
| Track Wiring | 49 | Woodman Edison Spares the Trolley Tree | 43 |
| Transmitter and Ice Breaker | 52 | Worthington Pumps at the World's Fair | 619 |
| Transfer Tickets, a Few Forms of | 242-243 | World's Congress Auxiliary | 85 |
| Transfer Station at Lexington, Ky. | 442 | World's Fair Buildings, Dedication of the | 607 |
| Track Cleaners, Value of | 126 | World's Fair Electric Railway, Exhibit at | 25 |
| Transportation Temple, the | 622 | World's Fair, The Fisheries Building | 454 |
| Transportation Temple, Court of | 360 | World's Fair, Bas Relief and Emblematic Statues at | 623 |
| Traction Feat, a | 642 | World's Fair, Intramural Transit | 367-368 |
| Tramways in Holland | 489 | World's Fair Electric Building | 268 |
| | | Ye Dear Dead Past | 665 |
| | | Yerkes, Chas. T. (biography) | 696 |
| | | Yonkers Street Railway | 183 |
| | | Yosemite, an Electric Railway in | 375 |



WINDSOR & KENFIELD,
PUBLISHERS AND PROPRIETORS,
334 DEARBORN ST., - - - CHICAGO.
Published on the 15th of each month.

SUBSCRIPTION, - - - ONE DOLLAR.
FOREIGN SUBSCRIPTION, - - - TEN SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW
Caxton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR, Editor. F. L. KENFIELD, Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW,
334 Dearborn Street, Chicago.

Entered at the Post Office at Chicago as Second Class Matter.

VOL. 2. JANUARY 15. NO. 1

THIS number marks the completion of the first year in the existence of THE STREET RAILWAY REVIEW. Its rapid growth in size and popularity is without precedent in the history of technical journalism. In this, its first volume, it printed 1452 pages, of which 616 were reading matter, 594 advertisements, 228 directories and 14 full page portraits. Its illustrations stand unequalled, and numbered nearly 450 during the past twelve months. From birth to man's estate in only one year is no ordinary record for any business, and is especially noteworthy in these days in which "of the making of books there is no end."

With increased facilities in every department we invite our readers to enjoy the improvements which will be found in our pages of 1892.

THE census report on street railways, found elsewhere in this issue, will be read with great interest. We are indebted to W. W. Mayberry, of the transportation department, for the text, which is full of surprises in the growth and magnitude of the business.

NO street railway man, whatever his position in the work, can but feel that the profession has been placed upon a higher plane and dignified as never before, by the astonishing results disclosed by the recent census. Ours is now a business which in a single year earned five cents at a time, the magnificent sum of almost \$100,000,000; using 32,505 cars, running upon 8,123 miles of track, and giving employment to 70,764 men. The business represents an actual investment of \$389,357,289.

JUDGE HART, of the district court, has rendered a decision quite interesting as a precedent in street railway cases, in which he has held that the Duluth Street Railway Company has, under the right of eminent domain, authority to condemn private property for street railway lines. It is the first decision on this point in the history of Minnesota.

THOSE papers which quote the so called low rates of travel on the street cars of Europe, would do well to occasionally couple with the remark the fact that the employes of those roads receive but a bare pittance, when compared with the wages which are paid American workmen in the same line of work. In Berlin, for instance, the conductors receive sixty-two and one-half cents for a day's labor of eighteen hours with a half holiday once in two weeks. It is only by the most absolute economy they are enabled to live.

PEOPLE who fume and fret when an occasional car is delayed a few minutes should bear in mind the magnitude of the work of which this car is accomplishing a part. In 1890 the street cars of the United States carried 2,023,010,202 passengers—a greater number of people than the present inhabitants of this globe. The steam roads with twenty times as many miles of track, and passenger cars whose seating capacity is nearly double that of the street cars carried only one fourth as many people as were transported by the latter.

A PENNY paper in Chicago wants a consolidation of the three companies as a means of securing transfer facilities from one part of the city to another. As each of the roads are hauling from six to eleven miles for five cents, it would be an absolute impossibility to carry passengers the combined hauls for the one fare. The paper closes with a quotation from Carlyle, "do nothing but agitate, agitate, agitate and things will come right of themselves." People may agitate themselves into an insane asylum, but nobody will ever succeed in agitating a seventeen mile ride in Chicago out of one modest and retiring five cent fare.

IN the City of Boston, the Knights of Labor have petitioned the city council for the passage of an ordinance which shall reduce the speed of cars to five miles an hour. It is needless to add that should a measure of this kind prevail, the first ones to complain at the change will undoubtedly be in a large measure, members of this same organization. Five miles an hour for a street car in these days, is little better than for a person to go on foot. Not only would an action of this kind be unreasonable but it is unnecessary. There are undoubtedly times and places where a speed of even five miles an hour would be faster than safety would dictate, but such sections of street are rare and limited in extent even in our largest cities, while for the greater part of the route, cars can safely and should move at a speed of from eight to fourteen or fifteen miles an hour. While the petitioners mentioned desire a decrease in speed those living in the outskirts of the city are as strongly clamoring for an increase.

THE several serious accidents during the past thirty days, to street cars at grade crossings of steam roads call attention of careful managers to the necessity for extra care on the part of conductors and drivers. Experience has shown that such disasters are more numerous during extreme cold weather, and point to a relaxation of duty somewhere. The conductor generally blames the flagman, who in turn lays it on the driver, and all three concede the engineer is after all the guilty party. All of the employes mentioned should feel an equal responsibility, which is in fact a no small trust, as the fatalities at St. Joseph, Mo., and the scarcely less severe injuries in this city and elsewhere indicate.

A PHILADELPHIA philanthropist incloses his good dollar—we assume the dollar was good—to a local paper there, as a starter for a fund to bring legal proceedings against the street car companies to secure forfeiture of charter because he does not always find a seat reserved for him when he wills to ride. He says: "That an honest and impartial judiciary sitting in equity, will not find abundant legal sanction in both the common and statute law for compelling all our street railway lines to run a sufficient number of clean and comfortable cars, at suitable speed, at seasonable intervals, to accommodate all comers at all hours of the day, no man in his senses can doubt." No man in his senses but knows that one particular condition is impossible in our great cities. It is not done, cannot now nor will it probably ever be possible; for population will increase in excess of every financially possible facility.

THE Buffalo Times cogitates.—"Steam railroads that have to buy their rights of way, grade their lines and run trains at a high speed, carrying comparatively few passengers, are content to get two cents a mile for the traffic. In this city, where the only expense has been for laying tracks, equipment and operation, the people pay at the rate of three cents a mile, estimating the average ride at one and two-thirds miles." Yes, and the steam railroads own their right of way in perpetuity; they have no pavement to keep up; their passenger cars cost no more and their power machinery less than street railways; while their track can be laid for less money barring tunnels and bridges, and their chief revenue is from hauling freight. Not a steam road in the country could live on its strictly passenger revenue. Besides it is not running at high speed which costs; it is the frequent stops, to which a street car is liable every few hundred feet. The crew necessary to operate a train transporting 300 passengers is also about only one half the number required to man a sufficient number of street cars to carry that number, and an average will show the wages very nearly the same. The steam road also receives a large revenue from its mail and express cars, of which the street car is not only deprived, but in most cities has to carry a big load of dead heads in the person of police and firemen, aldermen and other city officials, some of whom will be found in nearly every load. No, the present 5 cent fare is quite small enough.

THE description in this issue, of the Tacoma Railway & Motor Company, furnishes a strong illustration of the advantage to a city of giving liberal and long term franchises to its railway companies. There the franchise was granted for a term of fifty years, and the result has been that within three years the motive power has been changed from mules to cable and electric, and not only that, but the plant which has been installed is of a most substantial and permanent character. Had the company's municipal privileges extended for only ten or even fifteen years, it needs little argument to show it could not have afforded to expend as great a sum as has been done under the protection of the longer term. And, further, the ability to raise money for construction purposes would have been greatly curtailed had the attempt been forced on the basis of a short term. The result would have been less money available with which to build,—which would have meant less lines constructed, a cheaper construction and equipment for what little was built, and the city and its citizens would have been the direct losers.

Everyone concedes the commercial value of the system in developing Tacoma, but a narrow minded treatment of the railway company would have forced a narrow policy on the company which under its present conditions has been able to anticipate the business of the future and build accordingly.

Many and many a city as far east as the Atlantic, may with profit consider the object lesson so forcibly taught, and if it will, may learn wisdom therefrom that a liberal policy with its railways will be returned ten fold.

THE history of the fight over the adoption of the trolley system in Brooklyn may be briefly stated as follows: In June, 1890, the petition was first made to authorize the change from horses to electricity, by the Atlantic avenue road. Later, other lines joined and all secured favorable reports and permits from the state railroad commission, and the railroad committee of the Brooklyn city council. On December 21st, by a vote of 13 to 4, the ordinance was passed and went to Mayor Chapin for approval. That officer, however, allowed the ordinance to remain unapproved and as Mayor Chapin's term expired December 31st, the matter went over to his successor, Mayor Boody, who, on January 2d, vetoed the ordinance. The law is that an ordinance becomes a law in ten days, if neither vetoed or unapproved by the mayor in that time. Mayor Boody's veto is under date, January 2nd, and he claims ten days from day the official minutes were delivered to the mayor's office, which was December 23rd. The various attorneys of the railway companies assure the presidents, however, the veto is illegal and will not stand in court, where the matter will go for final settlement. The several roads in interest are the Brooklyn City, Atlantic Avenue, Brooklyn City & Newtown and the Brooklyn & Coney Island. The contemplated improvements involved an outlay of \$8,000,000, which though now delayed temporarily are bound to come. The attitude of the daily press throughout the entire controversy has been vindictive and biased. The majority of property owners favor the improvement.

OUR FIRST BIRTHDAY.

The Month We Celebrate—From Infancy to Manhood in a Year—The Unprecedented Record of Twelve Months—A Short Review of The Street Railway Review, and What it Has Accomplished During its First Volume.

JUST one year ago THE STREET RAILWAY REVIEW came into existence, and now at the close of its first twelve months we deem it fitting to call attention to what it has been, and is, and is to be. Unlike other papers, its publishers adopted an unusual, an altogether too modest course—so our friends tell us—and instead of printing in these columns the flood of complimentary notices which its appearance called out all over this country and abroad, and which would have filled pages, it was preferred to refrain from doing so and the public was left to form its own opinion from a publication



JANUARY, 1891.

which in appearance and quality was abundantly able to speak for itself. At that time there were not wanting those who confidently predicted a dismal failure. Some said there was no room for THE STREET RAILWAY REVIEW, others that a paper which attempted to clothe itself in so neat a dress, and wear such fine garments, would soon be in rags and bank-

ruptcy. Others sympathetically urged the publishers' lack of whiskers and wrinkles that testify to age, as a good and final cause for an impending doom.

That there was a place for the REVIEW, and that it has occupied all the seats and standing room it is needless at this day to mention. It is found in the office of every street railway on the continent, and with the tramway companies of the old world, where its coming is watched and on its arrival read with interest. In the office and in the workshop of those institutions devoted to the manufacture of every manner of street railway supplies; on the library table of presidents and managers; in the counting room of directors and stockholders, and in all the leading public libraries and colleges in the United States, its failure to be received calls out a letter of inquiry and request to "send another." Its reception has been an overwhelming success and, it is unnecessary to add, a most gratifying one.

The publishers of THE STREET RAILWAY REVIEW did not enter the work blindly but believed that a paper which was worthy of the street railway industry of to-day must be of the highest standard in every respect. Hence, it was that instead of waiting, as publications in other lines, until it had lived five years or more before assuming an attractive and expensive dress, it boldly started out with the best that money could procure, and it has never hesitated at any expense in any of its departments that could possibly be of advantage to readers or advertisers.

A single illustration will suffice. Our readers will remember the annual convention of the street railway companies of New York State occurred on September 15th—our publication day. In order to secure a full report without delay in mailing, the entire proceedings and papers read at that meeting amounting to nearly 10,000 words, were transmitted by special telegram that night, put in type and the REVIEW mailed with a delay of only one day. It was the longest transmission by wire ever made to any publication devoted to street railway interests, if not the longest ever sent to any technical journal anywhere.

Its paper, presswork, illustrations, everything, has from the outset been of the best quality, and there is little wonder that the universal verdict has been, "It is the finest publication that comes into our office." As for being young we can't help that, and age comes to those who wait.

And what has been accomplished in its first year? A record which is entirely without a parallel in the history of trade journalism. It has built up a large and daily increasing subscription list. It has made itself felt in the vital questions that beset the ever increasing perplexities of railway management. It has fearlessly stood up for the rights of railway franchises and property. It has at one bound sprung into strength and influence. It has labored unceasingly for the interests of its patrons and has increased in volume as no other publication of its kind ever did, having more than doubled in one short year.

As an illustration of this fact note the following basis of comparison:

PAGES OF READING MATTER.

| | Pages. |
|-----------|--------|
| January | 32 |
| February | 37 |
| March | 44 |
| April | 45 |
| May | 46 |
| June | 40 |
| July | 49 |
| August | 51 |
| September | 57 |
| October | 60 |
| November | 57 |
| December | 66 |

An increase of over 100 per cent. in amount of reading matter, which constituted a good sized publication at the first, and which numbers 616 pages for the year.

THE NEWS DEPARTMENT

covers the whole country and is compiled and condensed with great care, reflecting each month the operations and intended construction of each line in every city and town. We also take special pride in the monthly digest of important decisions in all courts of record, involving street railway litigation of every nature. The pages devoted to

STREET RAILWAY LAW

are edited by one of the leading attorneys of Chicago, and one who has for years made a careful and special study along such lines. Each case is condensed to give in as brief space as possible all the essential information,—nor is it necessary for the reader to peruse the entire digest to learn its bearing, as the first few lines epitomize what is elaborated below. These reports are unquestionably the best published to-day. In addition to this each month are the

DIRECTORIES

giving the names and address of all the leading business houses in the United States, representing every branch of supplies used by street railways, and the list of all the street railway companies, with officers, miles of track, number of cars, etc. This list alone occupies 16 pages of small type and is kept corrected every issue with great care and expense.

ADVERTISERS

at once favored the paper with their hearty support and sympathy, and the REVIEW gratefully acknowledges the very liberal assistance it has received in so remarkable a degree. The value and position of a publication of this kind is indicated in no other way as plainly as in this respect. Shrewd business men know the advantage of well directed advertising, and the steady growth in this department is alone sufficient to show in what light the manufacturer looks at the REVIEW. The figures tell their own story as follows:

PAGES OF ADVERTISEMENTS.

| | Pages. |
|-----------|--------|
| January | 32 |
| February | 32 |
| March | 38 |
| April | 40 |
| May | 45 |
| June | 45 |
| July | 49 |
| August | 54 |
| September | 61 |
| October | 65 |
| November | 65 |
| December | 66 |

In the above the number of firms represented is large and are the leading concerns in the street railway field to-day. Our policy in this department has commanded and deserved the respect of all, and as announced in the first issue has been invariably adhered to. We have but one rate and from that we never have diverged in a single instance. To a new paper especially, dependent

largely on its advertising for support, the temptation is extremely strong to occasionally shade prices. But we started out on the plan that we had no moral right to ask and receive one price from one advertiser and another higher or less rate from another for a similar space, no more nor less valuable than the first. We can look every man in the eye and take just pride in the statement that every patron who uses our pages does so on exactly the same footing. We know this policy has not for many years prevailed among the majority of publishers, and even now we are in almost daily receipt of offers from reputable business houses who desire space on their own terms, and which in many cases are but a few dollars less than our schedule rates, and who, when we politely refuse "laugh us to scorn." That a straightforward, honorable policy which is right, will ultimately win, we are, assured by the increase above cited, but in any event we shall as strictly maintain this rule in future as during the year just past, and will stake our success or failure thereon.

OUR QUARTERS.

THE STREET RAILWAY REVIEW opened its business office in one small room on the twelfth floor, at LaSalle and Adams streets, which, however, at an end of thirty days was greatly improved by removal to the Caxton Building, 334 Dearborn street, an immense twelve-story building in the very heart of the publishing district. These quarters, however, were outgrown and Christmas was celebrated by moving into a fine suite on the second floor of the same building where THE REVIEW is now comfortably installed in Rooms 270—280.

Here with all the facilities that are necessary in the way of photography, engraving, printing and binding, the good work goes merrily along. The business and editorial departments are fully equipped, the latter including two Edison phonographs, by means of which this article as most of the reading matter in THE REVIEW has been prepared for the printer.

As in the past, our friends who daily honor us with their presence when in the city, are and will always be most welcome, and in completing this review of our first year, we desire to return sincere thanks for their many kindly expressions and assistance, and wish for them all continued and increased prosperity, and in which we hope to share.

It has been the uniform policy of the editorial management to refrain from filling the pages of this paper with promises of what it had in store for its readers, preferring to let the new additions from month to month herald their own appearance; hence, we will not in this instance say more than that THE STREET RAILWAY REVIEW, while maintaining its high standard, has in store a number of improvements and surprises for its readers, and of which we will leave them to be the judge in the unfolding pages of 1892.



JANUARY, 1892.

COMPRESSED AIR AS A STREET RAILWAY MOTOR.

The Mekarski System as Operating in Toledo—The Consolidated Company There Well Pleased—
A Complete Description of the System.

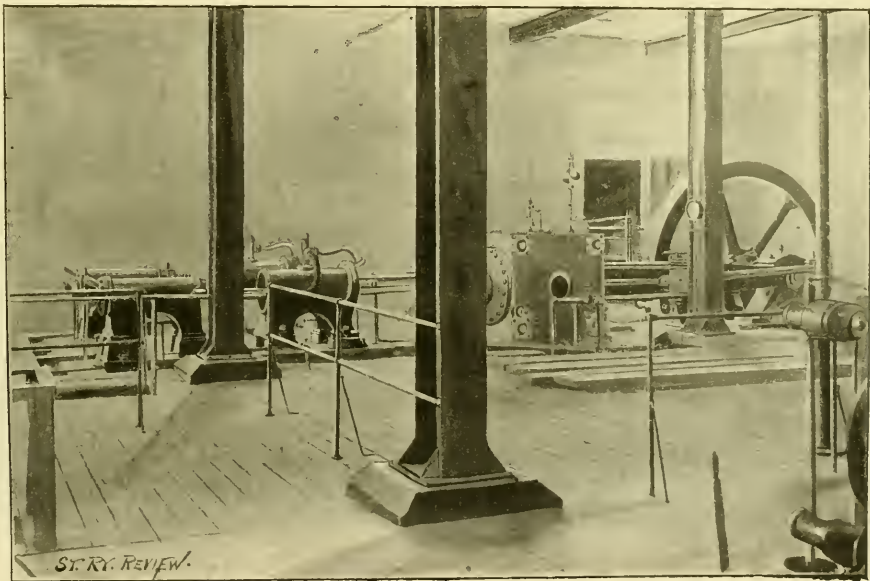
IT was a bright cold morning in December when a representative of the STREET RAILWAY REVIEW presented himself at the office of the Toledo Consolidated Street Railway and asked General Manager Lang how his compressed air motor was getting along. The answer came in the form of an actual demonstration of the working of the car on the main streets of that city.

Compressed air has never in this country gone further in the operation of street railways than brief, and hitherto unsatisfactory, experimental trips, in widely separated portions of the land and at intervals quite remote but extending over a period of more than twenty years.

It is well known that the failures in air engines have largely arisen from the freezing of valves and pistons even in the hottest weather, from condensation of moisture contained in the air, which suddenly forms ice as the air is exhausted under extremely high pressure. The time of day and its temperature therefore were not specially in favor of the motor.

THE MEKARSKI SYSTEM

has been incorporated in New York under the name of the Mekarski American Compressed Air Motor Company, is promoted by the Rand Drill Company, of New York City, and is under the immediate direction of J. F.



ENGINE FOR COMPRESSING AIR—TOLEDO CONSOLIDATED RAILWAY.

New York, Baltimore, New Orleans and Chicago have all been interested for a time, and all in turn given up in disgust. Abroad much better results have occurred, and by the system about to be described, cars have been in constant service for from two to seven years. In Nantes, France, 25 cars; at Nogent, near Paris, each motor in addition to its own passengers draws two trailers; at Marseilles, cars are operated with a storage pressure of 1,200 pounds, and at Berne, Switzerland, the system is in operation.

The morning of our visit was very cold, and snow and slush of the day previous had frozen upon the rails. It

Lewis, of that company. The work in Toledo is in charge of a French engineer, a Mr. Gregoire, who kindly did all in his power to afford us an inspection.

The car and track cut no figure, being similar to those in every day use, except possibly the body of the car, which is a few inches higher than other four wheel cars, to permit of the air reservoirs' clearing the street safely. To start with, the primal feature of interest is the

AIR COMPRESSORS.

These are two in number, placed side by side and each driven by a horizontal steam engine, the piston rod of

the steam engine extending on and through the cylinders of the air pumps; the engines in the present instance together developing 260-horse-power, and are sufficient to keep ten cars supplied by running under 75 pounds steam as many hours as the ten cars are on the line. The compression is practically the same as for other purposes, except perhaps in that the air is heated by steam while passing into the reservoirs, of which there are two. The pumps may charge direct to the car through the reservoirs, or having filled the latter may remain idle while

THE MOTOR CAR

is filled. This car is sixteen feet long inside, 22 feet over all, 6 feet 6 inches wide, with wheels at standard gauge, and 8 feet wheel base.

Entrance is made at rear, the front platform being

four wheels like a locomotive. The under frame of the car is of steel. The air brakes, placed between the wheels are very quick and effective and operated by two vertical cylinders, which raise the point of a V shaped hinge joint, and lock the wheels instantly. On the front platform stands a tank of copper quite like a soda fountain cylinder. It stands about 36 inches above the floor, and carries two gauges and the controlling valve. At the right is the ordinary lever for working the link motion—for setting a forward motion, reversing or cutting a short stroke. One gauge shows the number of pounds reserve in the reservoirs, the other the pressure in the platform tank, which is the pressure on the engines; for the supply is regulated at will and must pass through this equalizing tank on its way from storage tanks to engines. And here is the vital principal of the Mekarski system. This equalizing tank is partly filled with hot



enclosed with a dash of usual height with swinging gates, and for the exclusive use of the driver. The car must either take a loop or turn table at end of the line, or, as was the case in Toledo, make the return trip running backwards. Beneath the car, encased in sheet iron, with side doors, are the air tanks, engines and air brakes, none of which are visible. The reservoirs are cylinders, eight in number, are in two series, one of three, the other five, all connected at will of the driver. They are placed horizontally across the car, are made of $\frac{3}{8}$ -inch thick steel, and each contain 90 cubic feet of air. They are tested to 1,000 but are only charged to 600 pounds.

The two engines, each of 5-inch cylinder, with 8-inch stroke and of 15-horse-power, drive directly to the wheels of one axle, or may be connected to drive all

water, which is charged at the power station while the storage tanks are receiving air, and it is this passing of the air through the hot water which heats it sufficiently to overcome the low temperature which otherwise would occur in the engines. The hot water remains sufficiently warm for an hour or more.

THE TRIAL TRIP

was made from the power house along the principal business street of Toledo, and on tracks used jointly by the horse and electric cars of both the Toledo Electric and the Consolidated Companies. Where traffic was heavy and at cross streets the car either crept along or darted ahead to take advantage of any available stretch of open track. Upon reaching the residence street a turn or two of the valve was quickly

answered by an immediate increase in speed which was raised from four to sixteen or eighteen miles an hour in going a distance of about three car lengths. This speed was fully and uniformly maintained for three quarters of a mile, when the motor overtook a horse car and was held back.

The start from a dead stop was made easily, without any jerk or jar whatever, and a high speed quickly attained. The working of the air engines were quite a surprise in that they practically make no noise, and the exhaust is so muffled that it is not noticeable unless one is specially watching to detect it; and even then after the car is in motion the ordinary rumble of the

car drowns it. The pressure indicated by the gauge on the equalizing tank—the one containing the hot water—varied according to the necessities of the case. A full stop was made in the middle of a sharp curve and where the guard rails were badly filled with frozen mud, and at the start the pressure was raised to 280 pounds, but was allowed to drop in a few seconds to 150 pounds. On straight level track the car starts easily at 150 pounds.

After starting, an 8-mile speed was maintained with 50, and eighteen miles with 100 pounds.

Frequent sudden stops and starts were made, such as are rarely ever required in actual service, to illustrate the ability of the machinery to do its work, one stop being so sudden as to have instantly thrown down standing passengers. While moving at nearly a four mile speed, one stop was made in four feet and a few inches, the air brakes in every instance doing their work easily, quickly and very effectively. The intensity of the application of the brakes lies entirely with the driver, and should there ever be a failure of the brake, or any necessity for extra action the reversing of the engines is the work of but an instant.

The return trip was necessarily made with the car running backwards owing to the lack of loop or table at terminus but was in every way a success. On the return trip stops were made for passengers and a good load picked up.

On entering the power house after making the round trip of four and a half miles, the reserve tanks still showed a pressure of 320 pounds, while the work performed by reason of the numerous starts and stops were considerably in excess of what would ordinarily occur in daily service. The motor exhibited the same strength on entering the power station as was shown when it first went out.

The car rides smoothly and offers no objectionable features to the public or horses on the street.

The car rides very prettily, the public seem to like it,

horses pay no more attention to it than any other horseless cars, and we failed to detect any objectionable feature in its operation, either to sight, smell or hearing. It would seem then to be largely a question of cost per car mile; a question of which the manager must be his own best judge. The first cost for power plant and equipment of motor cars would not in our judgment militate against the system. The fact that the Consolidated Company at Toledo are preparing to install a complete plant, after having one car in daily operation for several weeks, would indicate their confidence in the system. The re-charging process occupies from 5 to 6 minutes. We could detect no loss of pressure from leakage while car was standing at terminus some fifteen minutes, and are informed there is no loss from this source, so that a car might remain out a week and get home again without recharging, though the cooling of the water tank would doubtless involve some difficulty. The water retains its heat easily for 60 minutes or more according to the outdoor temperature, yet at no time was the tank so hot as to prevent one keeping his hand thereon.

The manufacturers tersely say of the motor—

“The car will run between eight and nine miles without recharging, and is handled with ease and promptness all the motions being under perfect control, and requiring but a very slight expenditure of physical force on the part of the driver. It speed varies at the will of the driver from 3 to 25 miles per hour. It can be brought to a dead stop in less than its own length. It stops and starts with the same facility on heavy grades or curves, and in every instance, moves promptly with no jerky motion whatever.”

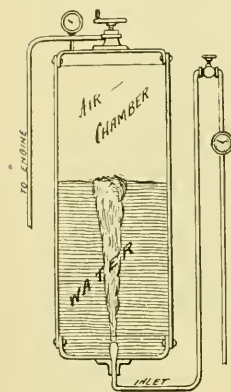
Where lines are more than four miles long, or where the round trip includes over 8 miles, an additional power station would be necessary. Power station, however, is quite simple, requiring only boilers, steam and compression engines and storage tanks. The illustration will give a good idea of this. As many cars can be charged at one time as desired, by having a sufficient number of feed pipes from reservoir.

Mr. Gregoire recommends additional power stations as against one large central station piped to the several points of supply.

Altogether, the operation of the car was full of interest and mechanically was a success; just what the expense or economy of the system is we are not yet informed.

In our judgment the operation of the car requires no greater skill or knowledge of mechanics than is required to drive a cable or electric car. Several of the company's employes in the car house have learned in a few trips so as to be fully competent to take the car out, and in fact do so daily, as the car is in service most of the day.

It pays to advertise in THE STREET RAILWAY REVIEW. One of our advertisers writes us that a few days ago he was in receipt of a large order from Australia directly resulting from his advertisement in this paper.



ST. RY. REVIEW
EQUALIZING TANK FOR
HEATING AIR.

TROLLEY WIRE INSULATORS AND BRUSH HOLDERS.

WE illustrate, this issue, two new designs of glass trolley-wire insulators made by The Wightman Electric Manufacturing Company, Scranton, Pa.

Fig. 1 shows the design intended for bridge or interior construction work, and Fig. 3 is the form used with the iron brackets and pole construction.

The Wightman Company has long been a staunch advocate of glass as an insulating material for trolley-wire

holder from the breaking of the springs and the difficulty in renewing the same. The springs would break off very close to the point of attachment and fall on the commutator, causing a short-circuit and occasionally a burn-out of the armature. In the form of brush holder which we illustrate, the points of attachment of the springs are placed so as to bring the spring out of reach of heat caused by

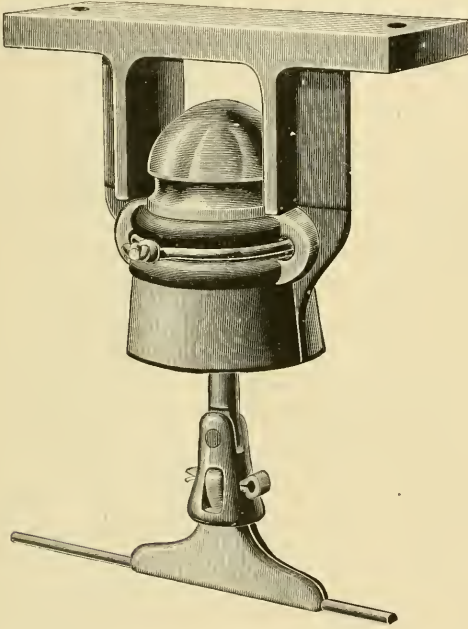


FIG. 1.

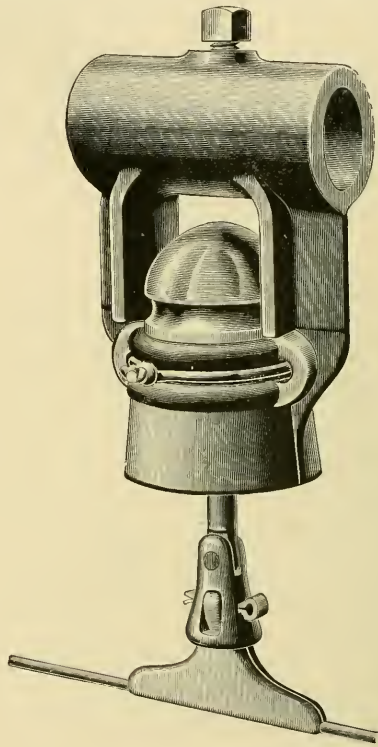


FIG. 3.

construction work, claiming that the great saving power results from its use, as the leakage is reduced to the minimum. Glass is very inexpensive material, costing only about two cents for renewals. Experience has proved, however, that no difficulty is experienced in practice on account of the breaking of the glass, the same being thoroughly and firmly held in place and protected by the metal case.

arcing, or bad contact at the brushes. No point in the spring is bent and therefore weakened, as each spring is provided with removable cast terminal eyes. These terminal eyes make a neat, mechanical construction, and the

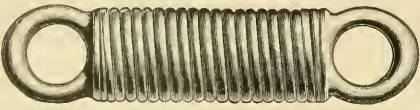


FIG. 2.

The Wightman insulators are provided with the so-called "La Grippe" trolley-wire clamp, which requires no solder or attaching of the trolley-wire. The People's Street Railway, of Scranton, is to be completely equipped with these insulators, as a trial lasting through a period of over two years has proved them to be very superior.

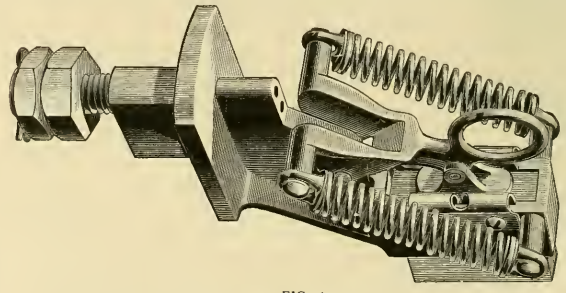


FIG. 4.

replacing of the spring is greatly facilitated thereby. Fig. 2 is a full-sized illustration of the tension spring. The springs are cut into a suitable size and the terminal eyes inserted. These eyes can be fitted to new springs in a moment's time. The Wightman Company has already booked a great many orders for its new improvements,

TACOMA, WASHINGTON, RAILWAY AND MOTOR COMPANY.

A Magnificent Plant—From One-Mule Cars to Palace Cable and Electrics in Three Years—
What the Company has done for Tacoma.

IN 1880, the population of Tacoma was 750, and in 1890 it was 40,165, according to the United States census. That this growth, marvellous as it was, has been warranted by the development of the surrounding country, and by the increase in trade facilities by sea and by land, the stability of the city as it is to-day bears witness. The present hard time wave, which has been so trying to so many young cities, has failed to retard its growth or reduce its property values, for the reason that its growth has been conservative and well within the needs of the city.

modations increased. Street railway construction has been exactly parallel with the building up of the city—accommodations have always waited upon popular need instead of exceeding it. The result of this upon the financial history of the road has been that the latter has been in marked contrast with the street railways of other new cities where long lines have been extended to nowhere, in order that certain real estate may be rendered marketable.

The system of the Tacoma Railway & Motor Company gives a service to all parts of the city and has prac-



Three years ago Tacoma's street car service on the principal street consisted of one-mule cars, and as the streets were unpaved and in the wet season the animals took too deep an interest in the real estate of the young city, the provident citizens to whom time was an object, forewent the pleasure of driving and went afoot. Now the city has one of the best appointed street railway systems in the country, and although the net mileage is 24.68, there is strong feeling on the part of citizens in all parts of the municipality to have this added to, and the accom-

modations increased. Though this is the case, the policy of the company has always been a liberal one toward its patrons, and the great feature of the management is its five cent fare, which transfers the passengers from any part of the city to any other.

The Tacoma Railway & Motor Company was organized under the laws of the territory, (now state) of Washington, on March 22d, 1889, with a paid up capital of \$500,000. The mortgage deed of trust to the Farmers'

Loan & Trust Company, of Tacoma, covering the entire property of the company, present and prospective, was executed by Messrs. Evarts, Choate and Braman, of New York.

The franchises granted to the company by the city of Tacoma and other franchises acquired, all of which run for 50 years, cover all the principal business and residential streets of the city and are exclusive.

The officers of the company are as follows: Paul Schulze, president; J. M. Ashton, vice-president; T. B. Wallace, treasurer; P. H. Kershaw, secretary; G. W. Bird, auditor; G. W. Gabriel, superintendent, and G. C. Van Amberg, assistant superintendent.

The plan of the railway system is roughly fan shape

run parallel at right angles to the cable lines, thus bringing all parts of the city within easy reach of the car lines.

The plant has been put in with a primary regard to durability; power house, machinery, road-bed and rolling stock are all of the best to be obtained or constructed. The owners of the road are mainly local capitalists, and foreseeing the growth and extension of the city they have put in such a plant as in their opinion will prove the most economical in the long run.

The power house and carshop are built on a valuable piece of property, which will admit of their enlargement as necessity requires. At the back of it, runs a track of the Northern Pacific Railway, so that fuel and supplies



MAIN ELECTRIC LINE—TACOMA RAILWAY AND MOTOR COMPANY.

with its apex at the power house. Two parallel lines connect points about equi-distant from the power house on the outside sticks, to continue the simile. The vertical lines consist of the cable-line up and down the face of the hill in front of which the power house is situated.

This symmetry of plan is explained by the topography of the city. Tacoma is built upon a commanding bluff which projects into Commencement Bay, its harbor. The power house is built part way up this on a level, which is the principal street, Pacific avenue. One arm of the railway extends along the level and then climbs the hill at an easy gradient toward Old-town or North Tacoma on the right; and the other attains an elevation by leaving Pacific avenue for Jefferson avenue, and later Center street. The cable line runs up and down the face of the hill where it is steepest; and two lines

can be easily handled. The foundations are of stone and have been laid with especial care, costing more than the buildings in either case.

The power house is two stories in height, 120 feet square with an ell at the rear for a workshop 60x60 feet in size. The basement contains the boilers, and on the floor above are the engines, electric generators and switch table. The offices are to one side of this; and across a yard utilized to store rails, etc. is the car house.

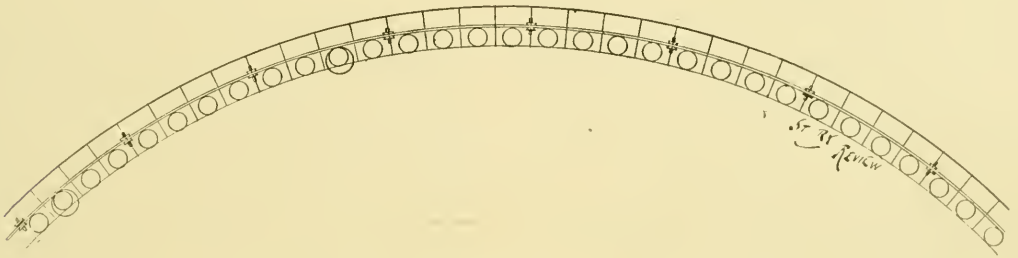
The car-shop measures 138x156 feet, having a capacity of sixty cars. At the rear is a small machine shop, and in the basement is a forge for repairing. At the entrance thirteen tracks with switches form a single line. Overhead is a beautifully symmetrical curve system of trolley wires, which is the pride of the road's mechanics.

The track of the system is as follows: of electric railway, double track, 6.14 miles and 10.76 miles of single track. The length of single track of cable road is 1.64 miles.

The steam power is generated by three Babcock & Wilcox, and four steam boilers of 200-horse-power each. There are four engines, two of which, with a capacity of 750-horse-power, were made by the Frick Company, of Waynesboro, Pa., one of 350-horse-power, made by the

the level up to that of the street planking. The trolley wires are 16 feet high ordinarily and 21 feet high at railway crossings.

On the electric lines the overhead wire system is used, the poles for the trolley wires being of wood. The electric rolling stock consists of 26 cars, 16 of which are Pullman cars run by two 15-horse-power Sprague motors each, and ten 28 foot combination (open and shut) cars,



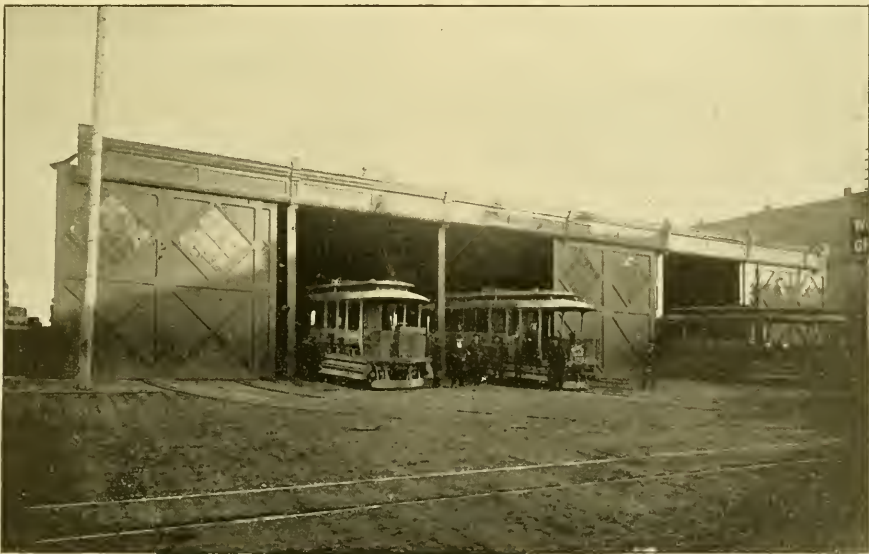
PLAN OF CURVE—CABLE LINE—TACOMA RAILWAY AND MOTOR COMPANY.

Sexton's Manufacturing Company, of Erie, Pa., and one of 150-horse-power made by Geo. H. Corliss, of Providence, R. I. The belting used is 54 inch perforated, made by Chas. A. Schieren & Co., of New York, and is giving splendid service.

The electric plant consists of compound wound dynamos and is the largest west of the Mississippi river.

also made by the Pullmans, two equipped with 15-horse-power Edison Motors. The track gauge is 3 feet 6 inches, with 40 and 45 pound girder rails, which were made by the Cambria Iron & Steel Manufacturing Company, of Johnstown, Pa.

The cable is 10,000 feet in length, has 160 wires in it, and has a diameter of $1\frac{1}{4}$ inches.



CAR HOUSE—TACOMA RAILWAY AND MOTOR COMPANY.

The 175 K. W. generators are the largest size made by the Edison Company, and were the first ones to be sent out from the manufactory at Schenectady.

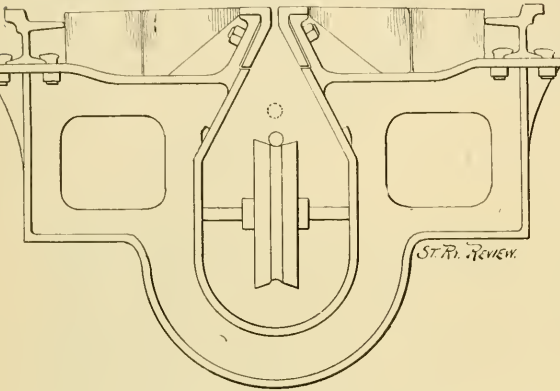
The electric road is built upon cedar stringers 12x3 inches, on which ties 5x8 inches are set 3 feet apart; and over all 3 inch plank are laid between the rails to bring

There are five grip cars and two trailers. The length of the former is 14 feet and they seat 20 passengers; the length of the latter 24 feet and their seating capacity, 50.

The speed of the cable is 7 miles per hour; and the maximum grade 15 per cent. The cost of the road per mile was \$100,000. The track is paved with block stone

and the cars run 18 hours per day. The slot rails weigh 45 pounds. The yokes are set 5 feet apart ordinarily, and 3 feet on crossings; and are of cast iron.

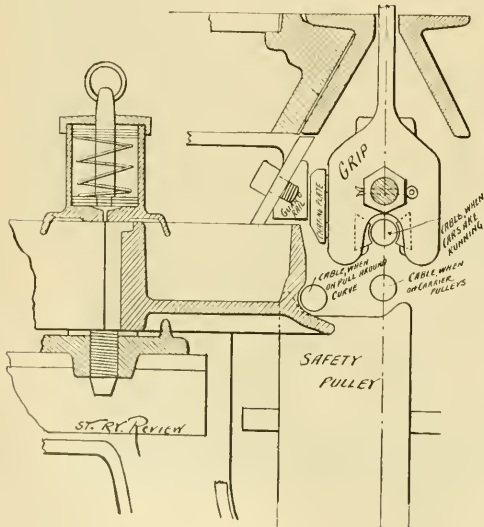
The conduit is 3 feet 6 inches deep over all; the depth of the conduit proper being 2 feet 4 inches, and is made of concrete with cast iron yokes embedded in it, and carry 66 $\frac{2}{3}$ pound rails and 45 pound slot rails.



CROSS SECTION OF CABLE TRACK.

The electric power is supplied by three 65 K. W. Edison generators and four 155 K. W. Edison generators.

The entire cost of the road, including its franchises, and real estate, amounts to \$1,242,135.47, and constitutes a plant which may well be envied by many an older and larger city. The service is excellent, the management



METHOD OF CONDUCTING CABLE AROUND CURVE.

careful and progressive, and the property becoming more valuable every day. The citizens are justly proud of what the Tacoma Railway & Motor Company is doing for their city and its promise of future usefulness. The illustrations will convey a very good idea of the superior track and overhead work.

WAGES IN BOSTON.

THE employes of the West End road have signed articles of agreement with the company by which the wage question is settled for 1892 on the following basis:

“Ten hours’ work, to be done in twelve consecutive hours, as far as possible, never to exceed ten hours and twenty minutes in 12 $\frac{1}{2}$ consecutive hours, shall constitute a day’s work for all conductors and drivers on regular cars. Time for regular men to be calculated from the time they pull out until relieved or the car puts up.

Conductors and drivers of regular horse cars shall be paid \$2 a day. Conductors and motor men of regular electric cars shall be paid \$2.25 a day. In all cases where the regular work exceeds ten hours a day, they shall be paid at the rate of 24 cents per hour, in addition to the amounts above provided, as follows: For ten minutes or less, 4 cents; over ten minutes and less than twenty-one minutes, 8 cents. Such rates to drivers and conductors of regular electric and horse cars.”

A FAITHFUL MAN.

ALTHOUGH the street railway service does not call out the latent heroism in men as often nor to as great an extent as the steam road work, there are as bright examples of faithfulness and uncomplaining patience among the street railway employes as any that can be found.

In New York City there is an old character known as “Old Iron,” a little, weazened, old man, smooth-faced and clear-eyed, who with his iron-shod-pole turns the switches.

Old Iron’s real name is Lauson Swan, and his service in steel traction began with the old stage line on First and Third avenues, with occasional changes as a hack-driver. He is full of reminiscences of A. T. Stewart and scores of other prominent New Yorkers whom he has served.

At the corner of Church and Chambers streets he has turned the switches ever since the first car went through Broadway, in all weathers, early and late.

He has had 21 sons and was the husband of two wives whom he holds in loving remembrance.

His good health he attributes to his good habits and he is noncommittal as a clam on politics.

Everyone knows Old Iron and everyone has a kind word or a nod for the faithful servitor of the people’s interests.

ENGLISH IMPROVEMENT.

THE need for second class cars is past in England and those now on the roads will not be replaced.

The only coaches that will be in use will be the first class coaches corresponding to our drawing-room cars and the third class not nearly as good as our ordinary coaches. This is a move for economy’s sake as the second class passenger is a dying species.

THE ELECTRIC CLUB OF PITTSBURG DEDICATES ITS "POWER HOUSE."

ELECTRICALLY speaking, the year 1892 has opened very auspiciously in the city of Pittsburg, Pa., inasmuch as the local Electric Club threw open the door of its own home and invited its friends to a grand reception.

The Pittsburg Electric Club has been in an embryotic state of existence for years, but owing to the fact that nobody seemed to care much to act as sponsor, nurse and godfather to this yet indefinite being, the scheme only lived in the imagination of a few enthusiasts. But fortunately, things changed, men changed and minds changed, and it is owing to this combination of changes, resulting in better times, better men and more energetic minds that Pittsburg now has the nucleus of what is probably destined to be one of the finest clubs in the country; an organization of which the electrical fraternity may justly be proud; an association of men well fitted for working untold benefits to the electrical industry itself, and who by their reputation and standing in the profession will also be able to infuse their fellow-members of the club with fresh energy and a more ardent love for their work.

At the first regular meeting of the club, after it had been organized with seventy-one charter members, the officers were elected as follows: Morris W. Mead, chief of the Electrical Bureau of Pittsburg, was made president, Eugene Ingold, of the Ft. Wayne Electric Company, vice-president; James A. Rutherford, of the railway department of Westinghouse Electric & Manufacturing Company, treasurer; J. E. Hall, of the Ft. Wayne Electric Company, secretary; H. McL. Harding, and Ph. Lange, of the Westinghouse Company, E. B. Gawthrop and D. W. Dunn, of the T. H. Company, Isaac A. Silverman and E. B. Kettle, of the Edison Company, and W. N. Dillon, of the Brush Company, were elected a board of directors.

Immediately afterward, the president appointed a committee to secure permanent quarters for the location of the club. This committee had a very arduous task, for the reason that it is a very difficult thing to find a house at once centrally located and without an exorbitant rental. However, these men have succeeded beyond the most sanguine expectations of anybody and too much credit cannot be given them for their zeal, ardor and unwavering perseverance.

The club house is situated at 302 Penn avenue, a location in the very heart of the down-town portion of the city. It is equidistant from all the railroad depots, and can be easily reached from any hotel, and cars pass in the front of the club building by which one may take a continuous ride of eight miles in one straight line.

The building itself is three stories high and it is furnished throughout with antique oak. On the ground floor are two reception rooms connected by a double folding door. In the rear of these two rooms are the buffet, the dining room and the steward's quarters. On the second floor are the billiard room, card room and reading

room, while on the third floor are three bed-rooms. The place is throughout fitted up with all the modern conveniences of a first class club house.

The reception on the 1st of January was a very great treat. It was attended by about 500 people, who were all exuberant with praise and flattery for the club and the committee of arrangements, a fact which alone stamped the undertaking an unqualified success at the very start. The club had arranged a very seductive bill of fare for their guests, and it is safe to assert that nobody came and went without being able to do full homage to the hospitality of the Pittsburg Electric Club.

The most attractive feature in the menu was "An Electric Punch," and its electrical effects were generally compared with those of the Nectar of the Olympian Gods.

THE ELECTRIC SPECIAL.

THE electric line between St. Paul and Minneapolis, besides doing a large business in regular passenger travel, and carrying local mail and express matter, has branched out into a new department, namely, that of furnishing special trains.

As an instance of this, a week or two ago, the Royal Arcanum of St. Paul had occasion to take a large party to Minneapolis, and return the same evening. The necessary number of cars were made up into several trains, and the return trip from Minneapolis to St. Paul, a distance of 10½ miles was made in thirty-three minutes, including twelve stops to let off passengers.

The experiment has worked so well that the company has decided to make a regular business of running specials, which are to be chartered as desired, and which will run from any point on the electric line in one city, to any point on the electric line in the other, and there is no doubt these will be largely availed of by secret societies, theatrical parties and the like.

We have always advocated this branch of creative travel as a lucrative one if properly worked up and managed, and we congratulate the Minneapolis and St. Paul lines upon the excellent ability of their system to undertake and carry out this interesting, and to the public most convenient branch of the service.

EVERYTHING GOES.

IN a recent number of the Rural New Yorker, a writer, who is a great admirer of electric railways, takes up the question and applies it to general use in the country. He maintains that during a very considerable portion of the year, and on certain roads at all seasons, it is impossible to load more than 50 or 60 per cent of what a team should draw, on account of the occasional bad spots. His suggestion and expectation is that lines will eventually be constructed out from the cities and along the principal roads, and be equipped with flat cars capable of transporting team, wagon and all. The idea being that in this way a farmer could make three loads a day instead of one. The article closes with the words "This thing is coming because it must."

STREET RAILWAY LAW.

EDITED BY MR. FRANK. H. CLARK, ATTORNEY AT LAW, CHICAGO.

Crossing Track of Another Company.

Injunction will not lie to restrain a street railroad company from laying a second track across the track of another, where it appears that the latter company has no exclusive right to occupy the street, and the answer of the former alleges that it owns the right of way over which the other's track is constructed, and it is not alleged that the former company is insolvent or that the injury will be irreparable.

In the opinion, the Court said:

THE contest, as disclosed by the record, is between two street railway companies, each of which is already using a thoroughfare of a city for the purpose of its business. It is plain that neither of them is vested with any property right in the street of greater dignity than a franchise for a right of way, and that such franchise cannot amount to a right of exclusive occupancy of the street for railroad purposes, or operate to clothe the possessor thereof with power to prevent the crossing of its tracks by another railroad proceeding under proper municipal license. The real controversy is as to the ownership of or authority to control the right of way at the proposed crossing. The object of the bill is to enjoin an alleged threatened trespass, without showing insufficient legal remedies for the redress of the injuries that may be caused thereby. There is no averment that the defendant is insolvent, or that the anticipated injury would be irreparable. In the absence of any such showing, it is not perceived upon what principle the right to an injunction can be maintained, unless a case is made for the exercise of the special jurisdiction conferred upon courts of equity to prevent the abuse by corporations of the right of eminent domain, and to keep them within the limits of the authority conferred upon them by the law. This special jurisdiction was recognized in the case of the East & West Railway Company vs. East Tennessee, V. & G. Railway Company, 75 Ala. 275. The exercise of it was declined in that case, the Court saying: "Though relief is granted more readily to a land-owner whose lands are entered upon by a corporation having compulsory powers to take them for its own uses, and upon a different principle than in cases of trespass, waste, and nuisances; yet, as in such cases, if the right and title of party complaining are not clear, or if the whole controversy resolves itself into a naked dispute as to the strength of the legal title, and it be not shown that an action of trespass or ejectment will not afford all necessary relief, the court will not intervene by injunction." In view of the unequivocal denials of the answer in the present case, it cannot be said that the right and title of the complainant are clear. The pleadings disclose a controversy as to the title upon which the claim to an injunction is based. That controversy is such as should be determined by a court of law. Furthermore, on the question of retaining or dissolving the injunction, regard should be had to the consequences of adopting the one course or the other. If the injunction is dissolved and the crossing is made in the manner proposed by the defendant according to the averments of the bill, and here-

after it turns out that complainant was entitled to compensation as it now claims, still it will have suffered no injury for which it will not have adequate redress at law. If, on the other hand, the injunction is retained and it eventually turns out that the defendant fully sustains its claim of right to make the crossing, the result perhaps would be to have deprived the public of increased facilities and conveniences of travel by the unwarranted interposition of a barrier to the construction of an additional line of railway, and to have entailed upon the defendant by the obstruction and delay of its work such damages as would be incapable of definite ascertainment.

In view of the situation of the parties, it seems plain that the retention of the injunction would occasion more of injury and inconvenience than could follow from its dissolution. The considerations which should have weight in the exercise of that judicial discretion with which the court is vested in such a case suggest the propriety of dissolving the injunction.

(Sup. Ct. Ala. Highland Ave. & B. Railway Company v. Birmingham Union Railway Company 9 So. Rep. 568.)

Street Railway Company.—Construction of Road.—Negligence of Independent Contractor.

Where a street railway company, having authority under its charter to construct a railway in a public street, does the work by an independent contractor, and an injury to a person passing along the street is caused by the negligence of a servant of the contractor, which negligence consisted in unnecessarily and improperly laying down loose iron rails in advance of the workmen engaged in constructing the track, the contractor is liable for the consequences of such negligence; but the railroad company is not, the latter company not having reserved any control over the conduct of the former in executing the work.*

(Supt. Ct. Ga. Fulton County Street Railway Company v. McConnell 13 S. E. Rep. 828.)

Defective Appliances.—Injury to Car Driver.—Evidence.

Where a pin holding the singletree to the drawhead of a street car came out, releasing the horse, and the driver was dragged over the dashboard, it was error, in an action for the resulting injury, to charge that it is the duty of a master to furnish such appliances "as combine the greatest safety with practical use"; since a master need only furnish appliances reasonably safe, though better ones exist; and a subsequent charge given at the master's request, which correctly states the law, does not cure the error.

NOTE.—In the case of Hackett v. Western Union Telegraph Company, 10 Ry. & Corp. L. Jour. 390, the Wisconsin Supreme Court held that in an action against a telegraph company for injuries received by falling into a hole dug for one of the poles in a public street, where it is shown that the line was being constructed under a contract with a railroad company which was to furnish labor, and the foreman was employed by the railroad company, and had full charge of digging the holes and setting the poles, the defendant is not liable.—ED.

Under Code Civil Proc. Cal. sec. 1870, subd. 9, which provides that a witness may give his opinion "on a question of science, art or trade, when he is skilled therein," it is error to allow a witness who for about two years has been a driver and conductor on the railway, to testify whether in his opinion the pin was "safe," since he should have testified only as to facts, leaving it to the jury to draw inferences therefrom.

Evidence that soon after the accident the railway company substituted a new and safer pin in all its cars, is incompetent as an admission of prior negligence.

(Sup. Ct. Cal. *Sappenfield v. Main St. & A. P. Railway Company* 2 Chicago Legal Journal 577.)

Corporation.—Action by Judgment Creditor against Stockholders.—Return of Execution.—Equitable Remedy.—Evidence as to Personal Property of Company.

A judgment creditor who has had an execution returned unsatisfied against a street railway corporation, may maintain an action against its stockholders to recover, for the benefit of all creditors who may desire to be made parties, the amount due upon unpaid subscriptions for stock.

It was not necessary for plaintiff to show that he had pursued his statutory remedy against the stockholders. The rule is that a creditor has a right to resort to the equitable remedy invoked by the plaintiff in this action, after he had exhausted his legal remedies against the corporation, and this was shown in this case by plaintiff's judgment and the return of the execution issued thereon unsatisfied.

The court did not err in refusing to allow defendants to show that the corporation was the owner and in possession of a large number of street cars and other personal property and a line of street railway and of valuable franchises within the City of San Diego. The purpose of this offered evidence was to show that plaintiff had not exhausted his legal remedy upon his judgment,—but was not competent for that purpose.

The judgment is conclusive against the company and its stockholders, and they cannot show that the indebtedness for which the judgment was recovered arose from a contract which was *ultra vires*.

One to whom stock is issued by the corporation, and who has the same placed in his name on the corporation books as the owner, is liable to the creditors of the corporation, as though he were the absolute owner; and this, whether he was in fact a pledgee, agent or trustee for the real owner.*

(Sup. Ct. Cal. *Baines v. Babcock*, 10 Ry. & Corp. L. Jour. 375.)

Elevated Railroad.—Passenger entering moving Train.—Personal Injury.

Plaintiff's husband, while entering a train on defendant's elevated railroad, was carried along by the moving train between it and the railing of the station platform and dropped to the street below and was killed. The railing was 12 inches from the car and the only evidence of defect was that about three weeks after the accident defendant

reduced the space between the car and the railing to six inches. The railing was necessary, and reducing the space did not lessen the danger. *Held*, that an instruction that it was the duty of defendant to maintain a safe structure, and that in determining whether the train was held for a reasonable time to enable deceased to get on, the jury should consider whether the railing was reasonably safe, was error.

(Sup. Ct. Mo. *Evans v. Interstate Rapid Transit Railway Company* 13 S. W. Rep. 489.)

Elevated Railroad.—Action against, for Injunction and Damages.—Compensation for Injuries from Smoke, Cinders and Gases.—Rights reserved by Grantor of Land.

In acquiring the right to maintain an elevated railway structure in the street, the company will not be bound to make compensation for the incidental injuries produced by the running of trains thereon, such as the flickering of light, noise, and the contamination of the air by smoke, cinders and gases, although for past trespasses it would be liable on account of all such injuries.

In an action for injunction and damages against an elevated railway company, which has erected its structure and is operating the road without having acquired rights in the street, it is error, in fixing the amount to be paid by it to an adjacent land owner as compensation for the perpetual right to use and obstruct his easements, to take into consideration or include items for the future passage of trains and future discharge of cinders, smoke, and noxious gases.

Where a present adjacent owner acquired title by a deed which expressly reserved to the grantor all rights, claims and causes of action for injury done to the property up to the time of the transfer, a judgment in favor of said owner cannot be sustained in face of an express finding that all damages to the fee value were sustained prior to the delivery of the land.

(Supreme Ct. N. Y. *Sperb v. Metropolitan Elevated Railway Company* 6 N. Y. L. Jour. 413.)

NOTE.—The fact that a man's name appears upon the books of the corporation as the owner of stock, is not always sufficient to render him liable as such owner. In the case of *Glen v. Garth*, decided by the New York Supreme Court, 10 Ry. & Corp. L. Jour. 369, it was stated that no person can be made a stockholder without his knowledge or consent, and in an action to charge a person as a stockholder, the transfer to him upon the books of the corporation is not conclusive of his ownership, but the actual fact may always be inquired into, and if it be shown that the transferee on the books never consented to accept the shares, the transfer to him is null and void.—Ed.

INCREASE OF MILEAGE IN TEN YEARS.

IN 1880 there were in the United States 2,050 miles of street car tracks; in 1890 there were 5,783 miles: an increase of 3,733 miles in 10 years, of which 888 miles were built from 1880 to 1885, and 2,845 miles from 1885 to 1890, inclusive. This phenomenal increase has been largely due to electric roads of which there were 2 in 1886, 6 in 1887, 30 in 1888, 57 in 1889 and nearly 400 in 1891.

CHICAGO CITY RAILWAY PAY-WAGON.

THE most extensive systems of street railways with thousands of employes are generally under the impression that the quickest way of paying their men is the best way, and that less time is consumed in taking the money to the men, than in bringing the men to the money.

The South Division Railway labors under the peculiar necessity of making the greatest expedition in the matter of payment. The six separate car barns of this extensive system are in several cases 6 or 8 miles apart and a long distance from the main offices; and the time that each man would consume in going to and from the pay roll would aggregate months every year, when it is con-

sidered to give grace in outline and ease in handling. The bed proper is 4 feet wide with an offset of 6 inches on each side over the hind wheels. One half of the back forms a door of sufficient width for easy ingress and egress. The body is 7 feet long back of the driver's seat, and about 6 feet high. There is also a seat 20 inches high, for the body guard, which faces back. Under the seat is sufficient space for the safe or money box. On the left hand side, on entering the wagon is a folding table 21 inches by 4 feet in dimension, for the convenience of the cashier. This official pays out of the little window plainly visible in the engraving in the before mentioned door.

The interior is furnished in quarter oak, with window frames to drop down to the offset in the body, thus giving



PAY WAGON—CHICAGO CITY RAILWAY.

sidered that three thousand men are paid twice every month in cash, put up in small envelopes. Besides the time consumed the crowd at the office each day would be too great to handle.

With an eye to simplifying these difficulties, Treasurer Penington has hit upon the device shown by the accompanying engraving, a pay wagon of sufficient strength to guard against highway robbery and graceful appearance.

The well known wagon and carriage makers, Studebaker Bros. Manufacturing Company, were chosen in carrying out the plan, and how well this has been done let the reader judge.

The pay wagon is built on full platform springs with $1\frac{1}{2}$ inch front and $1\frac{3}{8}$ inch rear axles, the body hanging low. The front wheels cut under the neck suf-

complete ventilation, and to preclude any attempt at sly robbery the windows are guarded by nickel screens. The handles, pulls etc., are silver, and the windows are furnished with drop curtains.

The gear is painted vermillion, the bed, bottle green with black mouldings and gold striping, in the best Studebaker style, and gives in a word, a burglar proof wagon without any appearance of "black maria." The cost of this elegant vehicle was in the neighborhood of \$425.

The wagon can also be used as an ambulance, as in the case of an employe being injured.

ELECTRICITY, that bright weekly devoted to a proper treatment of the subject whose name it bears, has moved its publication office from this city to New York.

OFFICIAL STREET RAILWAY STATISTICS.

An Advance Report and Epitome of the Result of the Census Bureau—These Figures Will Bear Careful Study by Every Reader.

THE development of street railways during the decade lying between the Tenth and Eleventh Censuses—a development both as to facilities and amount of business done—may certainly be counted as one of the most remarkable features of the whole comprehensive business of transportation. Looking first to the question of length, it is found that in 1880 there were 2,050 miles of street railways in operation, while in 1890 this number had risen to 5,783 miles, an increase in the 10 years of 3,733 miles. This increase, remarkable as it is for the whole 10 years, is still more remarkable when the decade is divided into two periods of 5 years each, for then it is seen that the most astonishing development has been during the last half of the 10 years and at a rate before unparalleled. The figures show that during the first 5 years the increase of mileage was 888 miles, while during the last half it was 2,845 miles. Looking for the cause of this extraordinary increase it can readily be found in the introduction of electric roads. These roads, which in June 30, 1890, constituted nearly one-fifth of the number of street railways, were none of them in operation previous to the year 1886. In that year two electric railways were beginning to operate; in 1887 the number had increased to 6; in 1888 to 30; and in 1889 to 57, while during the first 6 months of 1890 no fewer than 49 new electric roads were reported for. The development of cable road has also largely assisted in this increased mileage, but not nearly to such an extent as the electric railway, while, as has been shown, the year 1886 was the year of inception of the electric road, the first cable railway beginning to run in 1877. The increase by years is shown in the following table:

| YEARS. | TOTAL LENGTH. (MILES.) | INCREASE. | |
|----------------------|---------------------------|-----------|-----------|
| | | MILES. | PER CENT. |
| Ten Years | | 3,733.31 | 182.10 |
| 1880 | 2,050.16 | | |
| 1881 | 2,150.09 | 99.93 | 4.87 |
| 1882 | 2,342.20 | 192.11 | 8.93 |
| 1883 | 2,506.14 | 163.94 | 7.00 |
| 1884 | 2,680.31 | 174.17 | 6.95 |
| 1885 | 2,938.29 | 257.98 | 9.63 |
| 1886 | 3,268.58 | 330.29 | 11.24 |
| 1887 | 3,890.22 | 621.64 | 19.02 |
| 1888 | 4,499.49 | 609.27 | 15.66 |
| 1889 | 5,285.11 | 785.62 | 17.46 |
| 1890 (6 months)..... | 5,783.47 | 493.36 | 9.43 |

Looking to the urban locality of increase it is found that the most remarkable is in the smaller cities, a fact that is plainly illustrated in the following tables:

| ITEMS. | LENGTH OF STREET RAILWAYS (MILES.) | | FACTOR OF INCREASE. |
|---|---------------------------------------|----------|------------------------|
| | 1890. | 1880. | |
| | All cities..... | 5,783.47 |  | 2,050.16 | 2.82 |
| Cities of more than 50,000 inhabitants | 3,205.59 | 1,584.16 | 2.02 |
| Cities of less than 50,000 inhabitants | 2,577.88 | 466.00 | 5.53 |

When the final computations were made it was found that on July 1, 1890, the street railway companies of the United States in independent operation numbered 789 and that these, repeating the previous figures, carried on their operations over 5,783 miles of street line, or over a total track length of 8,123 miles. On this length of line 32,505 passenger cars were in use; the roads and equipment cost all told \$389,357,289, they gave employment to 70,764 men, and carried the astonishing total of 2,023,010,202 passengers. A good idea of the extent of this traffic may be realized when it is stated that the street railways of the United States carried last year a number of passengers considerably greater than the population of the globe, and when it is also stated that the steam railways of the United States with all their 157,759 miles of line and 25,665 passenger cars only carried during the same year 472,171,343 passengers, or 1,550,838,859 passengers less than were carried by the street railways.

The increase by geographical divisions will be seen by the following table:

| GEOGRAPHICAL DIVISIONS. | LENGTH OF LINE. | | INCREASE. | |
|----------------------------|-----------------|----------|-----------|---------|
| | 1890. | 1880. | MILES. | PERCENT |
| The United States..... | 5,783.47 | 2,050.16 | 3,733.31 | 182.10 |
| North Atlantic..... | 2,063.94 | 1,035.60 | 1,028.34 | 99.30 |
| South Atlantic..... | 465.93 | 135.96 | 329.97 | 242.70 |
| North Central..... | 1,867.93 | 508.46 | 1,359.47 | 267.37 |
| South Central..... | 773.05 | 242.63 | 530.42 | 218.61 |
| Western..... | 612.62 | 127.51 | 485.11 | 380.45 |

It will be noticed that the Western Division shows the greatest per cent. of increase and the Northern Central the next, although the two Southern Divisions display a rapidity of construction which is in keeping with the other forms of development marking this section of the country.

Dealing somewhat more with particulars, the 27 principal cities of the United States are next taken up and their increase shown:

| CITIES. | LENGTH OF LINE | | INCREASE. | |
|----------------------------|----------------|--------|-----------|----------|
| | 1890. | 1880. | MILES. | PERCENT. |
| Baltimore..... | 100.57 | 46.54 | 54.03 | 116.39 |
| Boston, Lynn and Cambridge | 237.83 | 95.56 | 142.27 | 148.88 |
| Brooklyn..... | 173.24 | 111.65 | 61.59 | 55.16 |
| Buffalo..... | 44.30 | 25.44 | 18.86 | 74.14 |
| Chicago..... | 193.11 | 80.47 | 112.64 | 139.98 |
| Cincinnati..... | 67.90 | 48.13 | 19.71 | 40.53 |
| Cleveland..... | 88.38 | 26.41 | 61.97 | 254.65 |
| Denver..... | 79.12 | 8.00 | 71.12 | 389.00 |
| Detroit..... | 59.25 | 26.56 | 32.69 | 123.08 |
| Indianapolis..... | 45.00 | 15.00 | 30.00 | 200.00 |
| Jersey City and Hoboken | 40.65 | 15.40 | 31.25 | 202.92 |
| Kansas City..... | 69.42 | 9.50 | 59.92 | 630.74 |
| Louisville..... | 84.42 | 39.25 | 45.17 | 115.08 |
| Milwaukee..... | 32.75 | 11.41 | 41.34 | 362.31 |
| Minneapolis..... | 58.00 | 9.00 | 49.00 | 544.44 |
| Newark and Elizabeth..... | 62.59 | 37.54 | 25.05 | 66.73 |
| New Orleans..... | 112.59 | 81.89 | 30.70 | 37.49 |
| New York..... | 180.56 | 130.55 | 50.01 | 28.31 |
| Omaha..... | 51.50 | 4.50 | 47.00 | 1,044.44 |
| Philadelphia..... | 276.94 | 258.17 | 18.77 | 7.27 |
| Pittsburgh and Allegheny | 67.95 | 38.63 | 27.32 | 70.72 |
| Providence..... | 44.03 | 35.30 | 9.65 | 27.34 |
| Rochester..... | 35.83 | 13.02 | 22.81 | 175.19 |
| St. Louis..... | 115.25 | 63.29 | 51.96 | 82.10 |
| St. Paul..... | 25.27 | 6.00 | 19.27 | 321.17 |
| San Francisco..... | 89.11 | 57.08 | 32.03 | 56.11 |
| Washington, D. C..... | 45.22 | 29.47 | 15.75 | 53.44 |

The western cities again show the largest percentage of increase, but Boston and its neighborhood show the greatest absolute increase and Chicago is second. The reason for Philadelphia's remarkable length of line lies in the fact that this is street length, it being a peculiarity of that city, and in some degree of the Boston roads, that the tracks usually occupy different streets in going to and from a terminus, instead of being laid upon the same street. The result is that roads in these two cities traverse a greater length of street in proportion to track length than in New York, Brooklyn and Chicago. The difference between the two calculations can be seen in the following table, showing street length of line and track length of these 5 cities:

| CITIES. | STREET LENGTH OF LINE. | TRACK LENGTH. |
|---------------------------------|------------------------|---------------|
| Philadelphia..... | 273.94 | 390.33 |
| Boston, Lynn and Cambridge..... | 237.83 | 377.42 |
| Chicago..... | 193.11 | 365.76 |
| New York..... | 180.56 | 351.53 |
| Brooklyn..... | 173.24 | 351.12 |

Still keeping to the same 27 principal cities, the preceding statistics of cars, employes, passengers and cost are to be distributed as follows:

| CITIES. | NO. OF CARS. | NO. OF EMPLOYES. | NO. OF PASSENGERS CARRIED IN ONE YEAR. | TOTAL COST. |
|-------------------------------|--------------|------------------|--|-----------------|
| Baltimore..... | 490 | 1,547 | 40,659,982 | \$ 6,709,450.39 |
| Boston, Lynn & Cambridge..... | 2,396 | 4,188 | 129,038,563 | 17,604,671.76 |
| Brooklyn..... | 2,862 | 6,359 | 147,500,399 | 17,711,765.51 |
| Buffalo..... | 219 | 730 | 16,685,983 | 2,012,541.46 |
| Chicago..... | 3,457 | 5,796 | 180,326,470 | 26,943,443.78 |
| Cincinnati..... | 561 | 1,213 | 37,903,370 | 8,056,031.64 |
| Cleveland..... | 730 | 1,650 | 39,164,773 | 7,156,027.89 |
| Denver..... | 461 | 866 | 21,535,735 | 7,584,400.14 |
| Detroit..... | 296 | 772 | 22,791,566 | 2,370,197.61 |
| Indianapolis..... | 205 | 4-2 | 9,833,000 | 1,683,765.13 |
| Jersey City and Hoboken..... | 317 | 880 | 24,115,322 | 2,629,759.62 |
| Kansas City..... | 652 | 1,376 | 38,000,978 | 12,344,487.44 |
| Louisville..... | 429 | 746 | 21,281,584 | 3,713,078.88 |
| Milwaukee..... | 248 | 622 | 14,512,156 | 4,208,956.24 |
| Minneapolis..... | 324 | 616 | 14,648,529 | 3,859,233.60 |
| Newark and Elizabeth..... | 244 | 525 | 20,068,884 | 3,282,381.75 |
| New Orleans..... | 527 | 876 | 30,510,662 | 5,978,464.89 |
| New York..... | 3,503 | 12,778 | 449,647,853 | 99,294,071.24 |
| Omaha..... | 200 | 469 | 11,900,000 | 6,500,000.00 |
| Philadelphia..... | 1,368 | 4,136 | 165,117,627 | 15,746,376.03 |
| Pittsburg and Allegheny..... | 378 | 1,529 | 46,099,227 | 10,077,653.83 |
| Providence..... | 349 | 787 | 18,473,722 | 2,080,068.76 |
| Rochester..... | 392 | 510 | 11,372,596 | 6,615,586.46 |
| St. Louis..... | 1,369 | 2,501 | 67,800,252 | 10,716,195.77 |
| St. Paul..... | 227 | 493 | 11,245,805 | 2,653,585.54 |
| San Francisco..... | 988 | 2,398 | 80,619,005 | 17,239,933.24 |
| Washington, D. C..... | 451 | 1,112 | 31,032,187 | 3,552,659.95 |

Turning next to motive power the following division of statistics is decidedly interesting:

| ITEMS. | ALL MOTIVE POWERS. | DISTRIBUTION. | |
|---------------------------|--------------------|-------------------|-------------------|
| | | ANIMAL. | ELECTRIC. |
| Length of line..... | 5,783.47 | 4,061.94 | 1,721.53 |
| Length of all tracks..... | 8,123.02 | 5,661.44 | 2,461.58 |
| Number of cars..... | 32,505 | 23,408 | 9,097 |
| Number of employes..... | 70,764 | 44,314 | 26,450 |
| Number of passengers..... | 2,023,010,202 | 1,227,756,815 | 795,253,387 |
| Total cost..... | \$389,357,288.37 | \$ 195,121,682.50 | \$ 194,235,605.87 |

| ITEMS. | DISTRIBUTION. | |
|---------------------------|------------------|-------------------|
| | ELECTRIC. | CABLE. |
| Length of line..... | 914.25 | 283.23 |
| Length of all tracks..... | 1,261.97 | 486.31 |
| Number of cars..... | 2,895 | 5,039 |
| Number of employes..... | 6,619 | 11,673 |
| Number of passengers..... | 134,905,991 | 373,492,708 |
| Total cost..... | \$ 35,830,949.63 | \$ 76,346,618.234 |

| ITEMS. | DISTRIBUTION. | |
|---------------------------|------------------|-------------------|
| | STEAM. | ELECTRIC. |
| Length of line..... | 524.06 | 1,721.53 |
| Length of all tracks..... | 711.30 | 2,461.58 |
| Number of cars..... | 2,113 | 9,097 |
| Number of employes..... | 8,158 | 26,450 |
| Number of passengers..... | 286,854,685 | 795,253,387 |
| Total cost..... | \$ 82,058,038.51 | \$ 194,235,605.87 |

Perhaps the most notable feature of the above table is the fact that in 1890 the railways operated by animal power were still far ahead of all others as regards their gross operating statistics. Rapid as was the advance of electric and cable roads during the latter five years of the decade, only a beginning was made in the supplanting of the older form of motive power. It is interesting also to see that although both in number and length of lines the electric railways have far outstripped the cable railways, the latter nevertheless represent twice as great an investment, operate nearly twice the number of cars and do a business more than twice as great. These relative figures point clearly to the far greater density of traffic upon the cable lines and to their large first cost. The cable lines almost without exception operate in the denser portions of large cities, while the greater part of the electric roads are either suburban or serve the people of comparatively small cities.

The following table which gives a summary of the capital stock, funded debt, dividends and interest, while it cannot be implicitly relied on as showing the condition of every road, may be accepted as being sufficiently correct and indicative for all practical purposes. The year's report ends July 1, 1890.

| ITEMS. | CAPITAL STOCK ISSUED AND OUTSTANDING. | DIVIDENDS DECLARED. |
|----------------------------|---------------------------------------|---------------------|
| All motive powers..... | \$ 163,506,544.50 | \$ 11,600,334.54 |
| Animal..... | 62,415,615.50 | 4,390,519.54 |
| Electric..... | 4,034,900.00 | 225,697.00 |
| Cable..... | 6,437,900.00 | 653,587.00 |
| Steam..... | 25,917,180.00 | 1,561,512.00 |
| Mixed and inseparable..... | 64,700,950.00 | 4,769,019.00 |

| ITEMS. | RATE OF DIVIDENDS DECLARED. | FUNDED DEBT ISSUED AND OUTSTANDING. |
|----------------------------|-----------------------------|-------------------------------------|
| | PER CENT. | |
| All motive powers..... | 7.09 | \$ 103,494,259.99 |
| Animal..... | 7.03 | 34,361,904.99 |
| Electric..... | 5.59 | 3,230,300.00 |
| Cable..... | 10.15 | 4,678,000.00 |
| Steam..... | 6.03 | 19,326,200.00 |
| Mixed and inseparable..... | 7.37 | 42,499,855.00 |

THE men who were held up at the Oak street by the Omaha Street Railway, as described in these columns recently, are much interested in the developments of the arrest of train robber Sly, as it is believed the L. F. Wilson, who is implicated, is the one who led the raid on the company's cash box.

It takes a "heap" of nickles to furnish such an article in figures as below.

The receipts and expenditures of all the street railways have been summarized as follows:

| ITEMS. | INTEREST AC- CRUED. | RATE OF INTEREST PAID. | | CABLE. | STEAM. | MIXED AND IN- SEPARABLE. |
|----------------------------------|------------------------|---------------------------|-----------------|-----------------|------------------|-----------------------------|
| | | PER CENT. | | | | |
| All motive powers..... | \$ 5,870,710.72 | 5.67 | | | | |
| Animal..... | 1,997,664.92 | 5.81 | | | | |
| Electric..... | 187,505.00 | 5.80 | | | | |
| Cable..... | 218,160.00 | 5.35 | | | | |
| Steam..... | 1,181,512.00 | 6.11 | | | | |
| Mixed and inseparable..... | 2,285,868.80 | 5.33 | | | | |
| RECEIPTS. | | | | | | |
| Grand total..... | \$ 91,731,844.74 | 38,403,749.32 | \$ 3,220,396.33 | \$ 3,798,414.36 | \$ 12,709,627.93 | \$ 33,589,637.50 |
| FROM OPERATION: | | | | | | |
| Total..... | 90,617,210.71 | 37,866,930.79 | 3,215,268.38 | 3,771,801.78 | 12,541,249.61 | 33,221,960.15 |
| Passengers..... | 89,711,829.39 | 37,536,924.05 | 3,125,871.49 | 3,718,541.80 | 12,464,962.10 | 32,865,329.92 |
| Other sources..... | 905,381.32 | 330,006.71 | 89,396.89 | 53,259.98 | 76,287.51 | 356,430.23 |
| Rentals and miscellaneous..... | 1,104,634.03 | 586,817.83 | 5,127.95 | 26,612.58 | 168,378.32 | 367,697.35 |
| EXPENDITURES. | | | | | | |
| Grand total..... | 87,388,006.65 | 37,063,110.78 | 2,994,802.27 | 3,476,075.55 | 11,700,492.06 | 32,150,525.99 |
| Operating expenses..... | 62,011,184.93 | 27,893,077.33 | 2,266,422.02 | 2,477,624.34 | 7,192,671.91 | 22,181,389.33 |
| FIXED CHARGES: | | | | | | |
| Total..... | 13,978,902.88 | 4,700,649.25 | 450,551.05 | 564,497.95 | 2,939,075.36 | 5,324,129.27 |
| Rentals..... | 2,561,342.50 | 615,232.01 | 19,436.55 | 1,525.30 | 288,631.00 | 1,636,517.64 |
| Taxes and licenses..... | 3,308,190.49 | 1,674,457.72 | 59,063.99 | 77,282.65 | 501,447.31 | 993,941.82 |
| Interest..... | 8,086,215.99 | 2,403,730.36 | 371,865.51 | 485,690.00 | 2,148,997.65 | 2,675,927.07 |
| Miscellaneous..... | 23,153.90 | 7,323.16 | 188.00 | | | 17,742.74 |
| PAYMENTS FROM NET INCOME: | | | | | | |
| Dividends..... | 10,180,726.12 | 4,039,165.90 | 188,928.22 | 333,587.00 | 1,561,512.00 | 4,057,533.00 |
| Miscellaneous..... | 1,217,192.72 | 433,218.30 | 88,900.98 | 109,366.26 | 7,232.79 | 587,474.39 |
| Total surplus for period..... | 5,400,399.07 | 1,866,194.59 | 381,980.35 | 420,335.63 | 1,167,980.43 | 1,563,808.67 |
| Total deficit for period..... | 1,066,460.98 | 528,556.75 | 156,386.29 | 97,996.32 | 158,244.56 | 724,677.16 |
| Net surplus for period..... | 4,333,938.09 | 1,337,637.84 | 225,594.06 | 322,339.31 | 1,009,735.87 | 1,491,131.51 |

In conclusion the balance sheet of 81 per cent. of the operating roads will be found in the subjoined tables:

| ITEMS. | ALL MOTIVE POWERS. | ANIMAL. | ELECTRIC. | CABLE. | STEAM. | MIXED AND IN- SEPARABLE. |
|------------------------------------|-----------------------|-----------------------|----------------------|----------------------|----------------------|-----------------------------|
| | | | | | | |
| Cost of road and equipments..... | \$315,547,761.38 | \$121,283,492.18 | \$ 7,840,482.49 | \$ 15,353,698.21 | \$ 66,319,165.49 | \$104,750,922.01 |
| Other permanent investments..... | 46,830,823.07 | 5,920,922.22 | 337,309.23 | 410,646.48 | 21,781,166.54 | 18,260,738.60 |
| Value of franchise..... | 14,597,444.00 | 4,842,362.40 | 1,225,000.00 | 1,192,581.60 | 20,000.00 | 7,317,500.00 |
| Bills and accounts receivable..... | 7,538,199.98 | 1,877,493.47 | 46,666.67 | 24,453.05 | 3,488,918.53 | 2,100,668.26 |
| Cash on hand..... | 7,774,860.61 | 4,064,015.98 | 186,323.25 | 82,524.56 | 1,030,295.21 | 2,411,701.61 |
| Supplies..... | 2,157,292.37 | 801,314.45 | 31,721.75 | 73,261.64 | 346,130.64 | 904,860.89 |
| Miscellaneous assets..... | 10,418,987.83 | 1,783,546.33 | 870,033.43 | 857,035.13 | 2,151,117.59 | 4,752,255.35 |
| Profit and loss (deficits)..... | 3,610,082.15 | 2,281,954.35 | 116,655.94 | 467,358.34 | 345,222.91 | 390,490.61 |
| TOTAL..... | 408,475,451.39 | 142,855,142.38 | 10,673,595.76 | 18,461,559.01 | 95,482,016.91 | 141,003,137.33 |
| LIABILITIES. | | | | | | |
| Capital stock..... | 211,277,798.08 | 77,492,738.29 | 5,702,687.67 | 8,775,854.53 | 44,465,533.34 | 74,840,981.25 |
| Funded debt..... | 151,872,289.01 | 49,226,234.01 | 3,486,200.00 | 5,584,500.00 | 44,369,000.00 | 49,206,355.00 |
| Bills and accounts payable..... | 16,325,347.08 | 4,926,246.03 | 1,163,032.84 | 299,633.41 | 1,525,841.55 | 8,410,589.25 |
| Interest due..... | 1,013,780.48 | 379,986.01 | 18,120.05 | 21,712.50 | 290,619.41 | 303,342.51 |
| Dividends due..... | 191,119.25 | 51,008.31 | 405.78 | | 45,268.90 | 94,435.76 |
| Miscellaneous liabilities..... | 12,888,213.52 | 3,366,366.04 | 156,284.27 | 2,754,730.59 | 2,674,488.79 | 4,886,318.83 |
| Profit and loss (surpluses)..... | 14,956,898.97 | 8,412,563.19 | 146,875.15 | 1,025,107.98 | 2,111,264.92 | 3,261,087.73 |
| TOTAL..... | 408,475,451.39 | 142,855,142.38 | 10,673,595.76 | 18,461,559.01 | 95,482,016.91 | 141,003,137.33 |

The 81 per cent. of the street railroads referred to above is all that gave any satisfactory statement in the form of a balance sheet, but it includes most of the important companies, and calculations to fill out the 100 per cent. can readily be made.

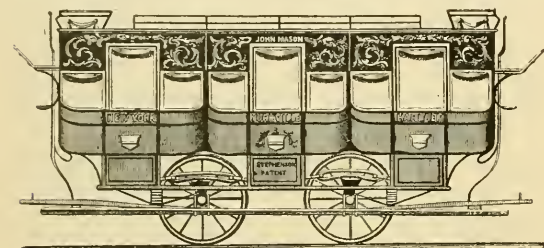
THE prevalence of "grippe," among the street car drivers and conductors of New York City during the past three weeks, has been such as to cause great inconvenience to the company in the operation of its cars, being impossible to get extra men, so many regulars are sick.

A JURY at White Plains, gave a verdict for \$10,000 damages against one of the contractors on the New York & Broadway Cable line for the loss of an eye caused by a small bit of iron flying off and striking that injured member.

THE EVOLUTION OF THE STREET CAR.

History and Progress of the Art as Illustrated in the Story of the Stephenson Company and its Founder—The Remarkable History of a Remarkable Industry.

TO think of a time when there were no street cars seems indeed like going back a good ways into history, and yet it is little less difficult to try to think of a modern city without them. But there was a time in the history of this century when there were no cars of this kind, and even when the first did make its appearance it was of such a character that to compare



THE FIRST CAR—1832.

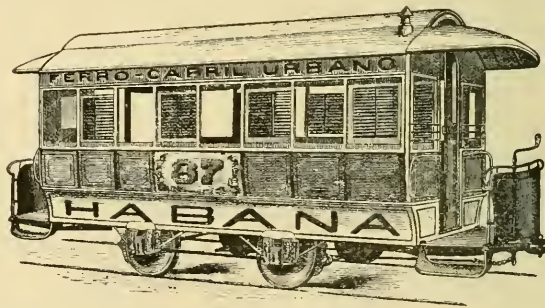
it with the modern street car of to-day, would offer little less of a contrast than the old-fashioned stage coach when set beside the modern palace car.

To trace the history and development of the street car is to tell the story of the life of John Stephenson, so inseparable are the two, and yet we have endeavored in this article to separate the interesting history of that man's life and to give a brief outline herewith, of the various stages by which the street car has been brought from rude initial form to its present condition of elegance and comfort.

It cannot but be a source of pride to every American, and every street railway man especially, that the street car was an American institution and also that the American builders have always kept far ahead of every other nation in the world in this respect: for unquestionably the street car is the greatest factor in the development of modern cities. It was in New York in 1831-2 that the circle was struck whose widening influences have expanded to include every city in the United States, and to even reach all the prominent cities of the globe. An American idea, it has ever received the best of American ingenuity and skill, and to sweep the street car from existence would be to put the world back centuries in progress. As the steam road connects distant portions of the land and binds them in one solid continuity of interest, so the street car encompasses various portions of the city and draws the whole to a common center and united interest. The subject of endless and fashionable abuse, it rolls along the avenues of business and of homes, and is ever ready to fulfill its mission. The very fact that any little shortcoming or delay however unavoidable in itself, instantly calls out a unanimous voice of complaint, better illustrates than anything else the important part the street car plays in the absolute necessities of modern life.

The improvements in the safety and comfort of steam locomotion are in no respect greater than those to be read in the development of the species, street cars. The name of "John Mason" as godfather of the first street car ever built has given to that gentleman a prominence which in these latter days he otherwise would not have enjoyed. It would not altogether be a paradox to say that the first street car was a stage coach on rails. The New York & Harlem railroad, chartered and built in 1831, was intended to do a street car service only, and the first track built was all within the corporate limits of the City of New York. It was this road which called forth the first street car, which was named after the president of the railroad company and who also at that time was president and founder of the Chemical Bank. The car was designed and built in 1831-32, and had three compartments with side doors, the driver sitting on the top like an omnibus. Its capacity was for thirty passengers within and ten on top, and the illustration given herewith will clearly show its construction.

The next year, 1833, the original car was improved upon by adding seats on top, and putting over all a sun top to protect the outside riders. This increased the car to sixty seats, thirty within and thirty without. As an incident in history, the patent, which was the first issued for a street car and which was made on the one in question, bore the signature of Andrew Jackson, president of

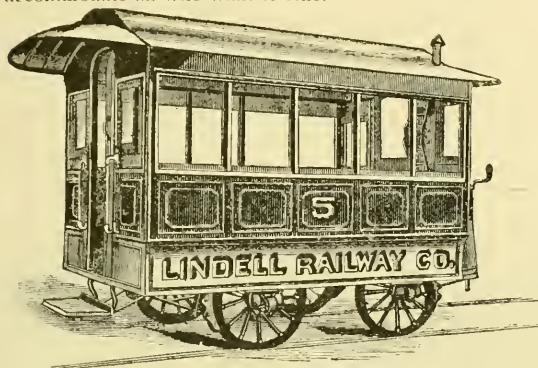


STYLE IN 1860.

the United States, and Edward Livingston, secretary of state, R. B. Taney, attorney general, and John Campbell, treasurer of the United States,—which celebrated signatures cost Mr. Stephenson the sum of \$30.

While it is true that a number of the steam roads at this date brought their cars into the heart of the city by horse power, it is still a fact that the first road which was chartered for street railway purposes proper, was the one above mentioned, in the City of New York. The first car was a transition from the then existing style of coaches, and was really the union of three old-fashioned Quaker coaches, suspended on three short leather thorough braces, which afforded an easy motion which was

not unpleasant. Cars with the top seats prevailed for a few years and then were abandoned, and it is a curious incident in the history of the art to notice that now, after an expiration of some sixty years, cars with overhead outside seats are again receiving serious consideration,—not so much as a more pleasant place to ride as was then believed, but rather as a solution of the now vexed question—how to increase the carrying capacity of the car. In early days the street railway was hard pressed for passengers. Now the companies are hard pressed to accommodate all who want to ride.



TYPE OF 1868.

That the New York and Harlem R. R. was not a financial success was in no manner the fault of the inventor of the street car, and in about seven years it was extended northward as a steam road, ultimately reaching Albany. With the displacement of horse cars on this road, eight wheeled steam road cars were hauled by horses to Tyron Row, at the North end of Brooklyn Bridge, and it was not until 1845 that the service revived, when a box car was built and put in service, weighing about four tons.

It was in 1833 that the first street car proper can be said to have been built. It was a car with the body entirely above the wheels. The entrance was at the end, it had a center isle and cross seats with reversible backs. In 1845 cars went into use with two horses, and conductors were placed upon the "short line" of the Fourth Avenue road. The bodies were hung low as at the present time, and the car had end platforms and side seats. Previous to 1852 Fourth Avenue was the only horse railway operating in New York City, but that year marks an important epoch in the history of street railway's; for, in that year, were chartered and built, the Second, Third, Sixth and Eighth Avenue roads.

Not until three years later, in 1855, were street railways commenced in Boston and Philadelphia. Even in those early days the necessity made itself felt for a reduction of expenses in operation, and in 1856 was first attempted the system of one-horse cars, which were managed by the driver alone.

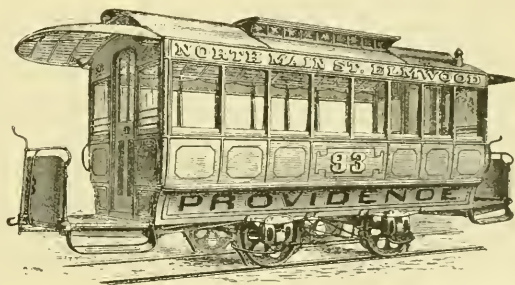
Mr. Stephenson designed one of these cars and for the five years following manufactured a large number of one-horse cars, with omnibus like bodies on high trucks. These cars were used on the Sixth and Eighth Avenue

roads and other lines, in New York. They had hinged omnibus doors and covered omnibus steps, and will be remembered by the present generation.

In 1860 Mr. Stephenson designed and manufactured what is now known as the bob-tailed car, which established the fare box system of street railroads. Until within the past six years scarcely a road was started with other than the bob-tail car, and for a long time even the larger companies used this type on outside and feeder lines. Although the one horse car has now gone into disrepute in most places, having been supplanted by the modern car, it is still found in small towns and on the outskirts of cities where the travel will not warrant a large and more expensive equipment. The cars built at this period, of which the illustration of the "Habana" car is one, were about half as heavy as those built a year or two previous, although seating as many passengers. Ordinarily all passengers were expected to be seated, the platforms were small, being only passage ways for entrance and exit, and the cars had less width without provision for standing room.

On January 4th, 1868, Stephenson made the first shipment of cars to New Orleans, which were sent to the Canal & Claiborne R. R. These cars were of the model of 1860, having omnibus hinged doors and an omnibus covered step. It was in 1870 that for the first time, bob-tailed cars were made with sliding entrance doors, operated by the driver, and with drop steel steps, uncovered. These cars were shipped to St. Louis and were put in operation in July of that year. The illustration in this article of the "Lindel" car, shows the character of the cars sent to that city.

In 1870 a marked improvement was also made in the appearance of the car, being modified from its first form, to that of the type represented by the "Providence," having ventilators on the roof, and larger platforms for standing passengers.



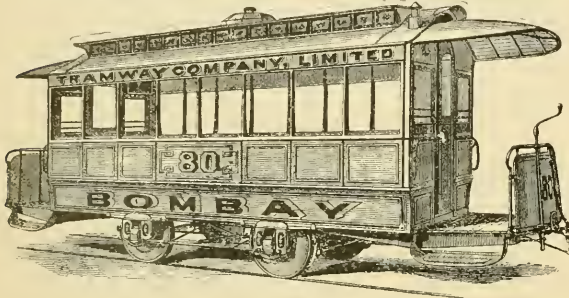
AS SEEN IN 1870.

This change was at first actuated by the desire to accommodate workmen who frequently did not wish to enter and occupy seats or even standing room within the car on account of their clothes being soiled with the work in which they were engaged during the day. The platform has always remained a favorite riding place with many.

The type of car known as the "Bombay" was brought out in 1875 and was made to fill an order for

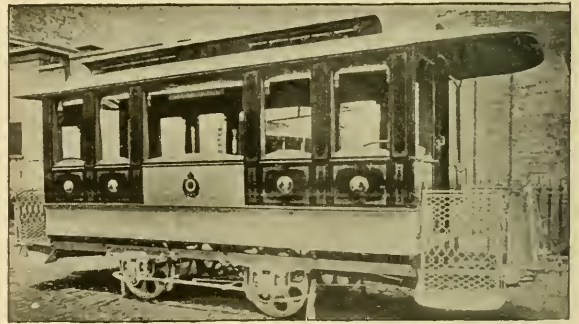
India, but was found so well adapted to our warm weather in this country, that a large number of them went into service here.

In 1878 and before the streets of New York had become so blocked with travel as at present, the idea was agitated of doubling the street railway track, that is,



SPRING OF 1875.

having four tracks in each street, the two center tracks being used for through passengers who should make stops at only long intervals, and on the outside tracks to stop at every block if desired. It was expected that by this arrangement much better time could be made and by furnishing palace cars a double fare would readily be paid. This car marked the advent of the long window which now generally prevails among all car builders throughout the country. It was elegantly upholstered, but the scheme did not meet with the favor which was expected, and so was finally abandoned. The improved style of car however filled a mission in raising the standard of construction in the eyes of companies and the public.



PRIVATE CAR BUILT FOR DOM PEDRO.



AS DEVELOPED IN 1892.

The history of the advance and improvement of car companies during the last ten years, is familiar to all our readers and is exhibited in nearly every city by the modern cars which are operated upon the various lines. The advent of the cable and electricity as a motive power has called out their own peculiar types of cars, and in this the John Stephenson Company, as throughout its entire existence, kept boldly to the front with every new improvement which could be devised.

Not only in these respects but even with those companies which are operating with horses, has the desire upon the part of the company and the public for a car superior to the old style been felt, and the demand especially during the last three or four years has exceeded anything in the history of the country.

Also with additional roads have come additional car builders to supply the new want, at the same time superior work and the faithful carrying out of every promise which has been pursued by the John Stephenson Company, has given it a rich reward, and they have had their full share in the furnishing and equipping of roads in all parts of the land. It is a matter of no small interest to note that since the company began the manufacture of cars, they have supplied in all nearly twenty five thousand, and gives evidence as realized in no other way of the magnitude and importance which the street railway industry plays in the commercial interests of the world.

The personnel of the company at present is as follows: John Stephenson, president; Leander M. DeLamator, first vice-president and secretary; John A. Tackaberry, second vice-president; Henry C. Valentine, treasurer; Stuart A. Stephenson, assistant treasurer; and Daniel W. Pugh, solicitor.

Any extended description of the John Stephenson Company would be incomplete did it not mention Daniel W. Pugh whose genial manner and kindly countenance is familiar to almost every street railway man east of the Rocky mountains and from Maine to the Gulf.

Mr. Pugh was born in Chester county, Pa., in 1833, and removed to Wilmington, Delaware, at an early age, where he lived and attended school until he was 14 years old. At that time he removed to Philadelphia and accepted a position in a fancy goods store, remaining there until he was 21. He then removed to New York City and two years later was married to a daughter of John Stephenson, and at the same time became connected with the firm, which position he has held ever since.

There are doubtless few men in the street railway field who can claim a larger personal acquaintance with the fraternity or who are held in higher esteem than Mr. Pugh, and his visits are always most welcome ones wherever he goes.

GOOD CABLE WORK AT WASHINGTON.

THE residents of the Capitol city are very hard to please in more ways than one, and are more exacting in their treatment of street railways than in almost any other city in the country. Hence, it is the following, clipped from the Washington Post, is especially gratifying to the company, the gentlemen in question and all their friends:

"The work of Mr. Edward Saxton in laying the bed for the Washington and Georgetown Cable Railway has been finished, equally to the satisfaction of the public and the company. The inconvenience and discomfort in having street pavements torn up was reduced to the minimum by the systematic and expeditious methods pursued by his army of workmen, whose perfect organization enabled the work to be done with the precision and rapidity of a

PHILADELPHIA FACTS.

THE Philadelphia Traction Company has acquired the Thirteenth and Fifteenth Street Passenger Railway Company's lines by mutual agreement.

The service of the Thirteenth and Fifteenth Streets Company has always been admired, both for speed maintained on the line and the clean, comfortable cars provided. It is said, however, that with the transfer to the Traction people quite an important change will be made, as the new management propose establishing an electric road instead of the horse-power route. A system of exchanges and transfers will be put into operation and the public will probably appreciate it when they can travel on electric and cable cars for one fare. By this method rapid transit will become a less distant hope, and if the Traction Company, as it proposes, should gain



DANIEL W. PUGH.

vast machine. To a community continually annoyed by street excavations, this has been a matter for congratulation. The work itself challenges admiration; and there is no doubt that the company and public interested in the best means of street transit, will find it equal to any of the work done by Mr. Saxton in Kansas City and other places, and whose merit is acknowledged wherever cable road is known."

PANAMA will have the glory of being the first city in South America to introduce the electric railway system on her streets. The entire plant having been constructed in Hamburg and is already in transit, and it is expected will be in operation in about three months.

THE first of the present year was celebrated in Omaha and Rock Island as marking the date when the last car horse was banished from the tracks.

possession of the other lines for which it is working Philadelphia will in all probability have as speedy a system of street railways as any other city.

PITTSBURG POINTERS.

THE stockholders of the Pittsburg and Duquesne Traction Companies have ratified an operating contract by which the Pittsburg Company takes charge of the Duquesne lines.

The Pittsburg is owned chiefly by Eastern men, the most prominent stockholders being Messrs. Widener and Elkins, of Philadelphia and Daniel Lamont and ex-Secretary of the Navy William C. Whitney, the New York street car magnates. The chief stockholder in the Duquesne is C. L. Magee. The two Pittsburg roads costs millions for construction. The Duquesne, including branches, has about thirty-one miles of track.

JOHN STEPHENSON.

A BUSY, well rounded life has been that of John Stephenson, and to few men is it permitted to be in so large a degree the keystone from which springs one of the greatest and most necessary institutions of modern life. Mr. Stephenson takes just pride in reviewing his almost 84 years of life, covering as it does a period of time crowded with many of the mightiest landmarks of history and filled with the greatest triumphs of science since the dawn of creation.

Not to the street railway reader alone but to every one who has ever seen a street car, is of interest the record of such a life, unsatisfactorily brief even though such a review must be.

To begin at the first chapter, John Stephenson was born on the day of our greatest National holiday—July 4th, 1809, in County Armagh, Ireland. His father, James Stephenson, was an Englishman; his mother, Grace Stephenson, of Scotch descent. When John was only two years old his parents came to America, and settled in New York City. He was educated at the Wesleyan seminary. His father hoped to make a merchant of John, and for about three years he assisted his father in the store, but the workshop and tools at home were not enough to satisfy the young man, who had small pleasure in mercantile pursuits and a great longing for mechanics; so at 19 years of age his father consented to his becoming apprenticed to Andrew Wade, where he remained two years, spending his evenings in drawing and designing and giving precious few moments to pleasure. This Wade did all the building and repairing for one Abram Brower, who was the pioneer in the Broadway stage lines, having started a line as early as 1827. Brower watched the young apprentice; and when in 1831 his time was up, and he for the first time felt free to act for himself, he was urged by Brower to open a shop of his own, being promised all the work of the stage company. May 1st, 1831, over sixty years ago, was the day which witnessed the first step which led to the present John Stephenson Company, Limited. The John Stephenson Company of that day was "limited," also, and consisted chiefly of a resolute heart, a progressive mind, a pair of stout arms, and \$400 cash.

Almost his first work was the creation of the omnibus, which in those days was so great an institution it was deemed fitting to give each one a name, just as locomotives and vessels have been named since. The future was opening up with every promise when, on March 29, 1832, a fire destroyed the Brower stable, in which the Stephenson shop was located, including all his stock. In one hour the original \$400, and \$1,200 he had added in the year, were totally swept away and he was once more at the bottom of the ladder with nothing but his own exertions on which to rise. May seems a helpful month however for it again marks his second start, the location this time being at 264 Elizabeth street. And here it was he designed and built the first street car, a description of which has already been given. The success of the car

was so great that in 1836 a new factory was needed which was built in Harlem, at Fourth avenue and 129th street. Railroad cars were also built here.

A large and prosperous business was now fairly inaugurated when the panic of 1837 came upon the country, and claimed among its earliest victims the steam railroads. These companies were largely indebted to Mr. Stephenson, who became a heavy loser thereby, losing all his Harlem property and being able to pay but 50 cents on the dollar, an amount, however, much in excess of most of his business friends. Undaunted by this second reverse he applied himself with unrelenting energy and in 1843 had accumulated a fund sufficient to allow of the purchase of the present property at 27th street and Fourth avenue. The price was \$400 per lot for property now worth more nearly one hundred times that amount.

Refusing to avail himself of the bankrupt law he resolutely paid off his old debts, taking all he could out of the business in justice to its growth, until at the end of seven years he owed no man anything. In this connection it is interesting to mention an incident with one of his creditors, Jordan L. Mott, who stubbornly refused to accept the debt, telling Stephenson that the failure was an honest one and that the indebtedness was legally and morally wiped out by the bankrupt proceedings. Stephenson could not force him to take the money, but when the latter ordered a truck Stephenson built it and delivered it with a receipt indorsed "Received payment by the bankruptcy debt. John Stephenson." As Stephenson could not be induced to accept the money, Mott draped the new truck in gay bunting and drove it through the streets of New York with the following legend in large white letters on both sides of the vehicle: "This is the way a bankrupt pays his debts. His name is Honest John Stephenson."

After the failure of 1837 street railroads not having proved a profitable venture in any of the cities, the manufacture of cars was suspended for a time during which he built coaches and omnibuses.

In 1852 street railways received quite a boom in New York City, and the Second, Third, Sixth and Eighth avenue companies were chartered. Orders from these lines were placed with Stephenson, who allowed the car building to gradually supplant the omnibus business.

At the same time the street car idea grew in favor in foreign cities and orders came pouring in from Great Britain, Europe, Africa, Australia, South America, and later from Japan, so that in nearly every large city on the globe American built cars, the monuments of this man's enterprise, tell their story daily to millions of people and interpreted in many a language.

The modest little shop has grown with added years until now they are so extended as to give employment to 500 hands, and have a capacity of four cars a day. Even the present facilities are to be greatly enlarged by the construction during the present year of still larger and more extensive works, the land for which was purchased last summer.

It is a matter of no surprise that a man who held in



JOHN STEPHENSON,
Inventor and Builder of the First Street Car.

such high regard the obligations of a business nature, should in his private life be an example of integrity and honor. In religious belief he is a Methodist, and until within the last two years has been an active worker in church and Sunday school. He is a man of strong religious conviction and a deep student of the Bible, one copy of which in his possession bears date of 1832. Extremely fond of music, he has gathered a valuable musical library, and was for forty-six years leader of a choir, which during thirty years was composed of forty young people. He has never taken an active part in politics though frequently urged to do so, but for twenty consecutive years held the position of trustee of one of the public schools.

During the war he rendered valuable services to the government in the construction of hundreds of gun carriages and other accoutrements, and at one time turned out 70 pontoons in 17 days.

He resides in New Rochelle, a suburb of New York, where his mansion, which is a massive granite structure 75 by 110 feet, occupied a high location in the center of grounds comprising 20 acres. In 1833 he was married to Julia A. Tieman, and has deeply mourned her death, which occurred last year. He has three children—a daughter, the wife of D. W. Pugh, and two sons, Stuart A. Stephenson and Joseph B. Stephenson, both of whom are associated with him in the John Stephenson Company.

This life furnishes a most striking example of what perseverance and energy, combined with a high sense of honor, will accomplish, and is an example which every young man may well study with profit. A man who paid \$50,000 of obligations, from which the law exonerated him, establishes his integrity beyond the need of ordinary words of comment.

LOW OPERATING EXPENSES.

THE following statement covers the last six months of 1891 and is of a road located in a Southern city of 15,000 inhabitants, the line being $4\frac{1}{4}$ miles of single track, over-head trolley system, operating five cars, (exact 4.78 average) daily, with a sixth car as reserve, double reduction motors, tubular boilers, high speed engines. Items of operating expense included are, coal at \$3.20 per ton, delivered, water at $12\frac{1}{2}$ cents per thousand gallons. Oil, grease, kerosene, and waste, superintendent's salary, monthly pay roll, of two engineers, two firemen, one helper, seven motormen and seven conductors, but does not include any fixed charges or repairs, which latter however, have not exceeded \$200 for the six months mentioned.

The rate of fare is 5 cents, with a transfer system. Cars are operated for sixteen hours daily.

Daily average for six months: Passengers per day, 1,340; receipts per car, \$13.83; expenses per car, \$6.79; receipts per car mile, 17 4-5 cents; expense per car mile, 8 7-10 cents; expense per passenger carried, 2 2-5 cents, which shows a ratio of expenses to receipts, of 49 per-cent. and makes a statement satisfactory all round.

ELECTRIC RAILWAY EXHIBIT AT THE WORLD'S FAIR.

IN a recent interesting address on matters electrical before the Electric Club of Chicago, Prof. J. P. Barrett, chief electrician of the World's Fair, gave utterance to the following, anent the display of electric ways at the great exposition: "The question of railway and other processes for transporting passengers and freight is the most vital economic issue of the present day. Steam, either by locomotive or cable, has been the only feasible motive power up to within a short time. Electricity in some branches of this service is already a success and is fast displacing other motive power. The next few years—possibly the next few months—will probably see the whole question finally settled by some new element or the further development of one or other of the existing systems. It will be part our duty therefore to give every facility to exhibitors to make displays of new systems and to exploit old ones along new lines and under new circumstances. In order to do this it is contemplated to set aside a parcel of ground at some part of the Exposition on which to build trial tracks, which may be equipped for the different systems. We should make it possible for every system to be demonstrated, so that not only the electrical people may judge of their respective merits, but that visiting capitalists and possible customers may have ready facilities for becoming interested in the subject itself, or in any of the various inventions or systems on exhibition."

PROGRESS IN LOUISVILLE.

LOUISVILLE, KY., Jan. 2, 1892.

The grading for the extension of the Fourth Avenue electric line to Kenwood, a beautiful residence suburb, has been completed and tracklaying will begin next week; the street car company will push the work to completion as rapidly as possible and expect to have the cars running early in the spring. The promise of rapid transit to that locality, has been the means of advancing the price of real estate fully 25 per cent. The terminus of this line will be Iroquois Park, giving the citizens a choice of two routes to this popular resort.

The Louisville Railway Company have a monopoly of the travel to Parkland, since the opening of the electric line to that point, there having been a notable decrease in the passengers carried by the "Daisy line" (steam road.)

Next spring will witness the change to electricity of several more mule lines in this city, and it is safe to predict that in twelve months there will not be a single line of street railway here operated by animal power.

While the operation of the street railway here is seldom hindered by snow, the company is taking the precaution to get their snow ploughs in order; several will be operated this winter by electricity.

KENTUCKY.

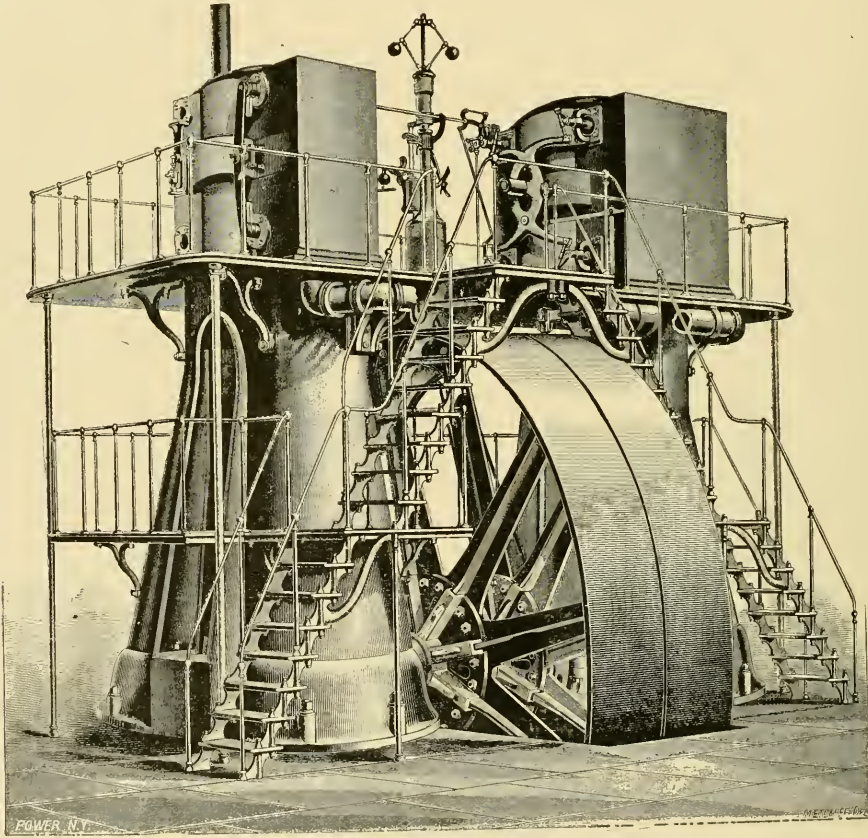
NEWARK'S NEW POWER PLANT.

IT is said that all things come to those who wait, and if this be true the good people of Newark, N. J. and Newark Passenger Railway Company, are entitled to a great deal, for they have waited long and patiently to witness the day when a better motive power would be substituted for that of horses, which for so long a time have wearily drawn the cars up and down the steep hills of that city.

But now that matters have been definitely settled, and rapid transit having been decided upon, work is going

the most important feature of the road will not be without interest.

At the works of the Corliss Steam Engine Company, of Providence, R. I., there are now building several 400-horse-power vertical cross compound engines, the first of which will be delivered soon. The engines will occupy a space upon the floor of 24 feet in length, and 15 feet in width. From the floor to the top of the low pressure cylinder the distance is 12 feet, 8½ inches. The cylinders are 18 and 36 inches long respectively, with a 36-



rapidly along toward the completion of a system which shall be one of the largest and most complete in the world, and we are glad this month to be able to give our readers some idea of the unusual magnitude of the power station, which will be used to drive the cars along the eighty miles of track now operated by this company. The illustrations which appear in this connection are reproduced from the current number of "Power" of New York.

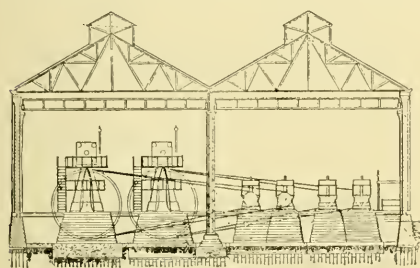
As has been the case of a number of large companies recently, the Newark Passenger Railway gave their preference to a large power unit, and the description of

inch stroke, running 90 revolutions per minute, with an initial pressure of 125 pounds. The main shaft is 13 inches in diameter at its greatest measurement, and 11 and 8-10 inches at the bearing, on which it has a resting space of 26 inches. The cranks are placed at the end of the shaft,—the low pressure crank leading the high pressure by one-fourth of a revolution. Two fly-wheels 18 feet diameter turn on the main shaft between the two cylinders, they have a 30-inch face and will carry 26-inch belts. As is usual in large wheels of this class, they are built in segments, and when complete upon the shaft, weigh 17½ tons each. With the nominal rating of 400-

horse-power the yield is at the rate of 1-horse-power for each 9-10 of a square foot of floor space occupied, which is further reduced to 6-10 when working at maximum effort, which is 600-horse-power.

There will be six of these engines used, each belted directly to a 200,000 Watt Generator, and the ultimate capacity of the plant will be 4,000-horse-power.

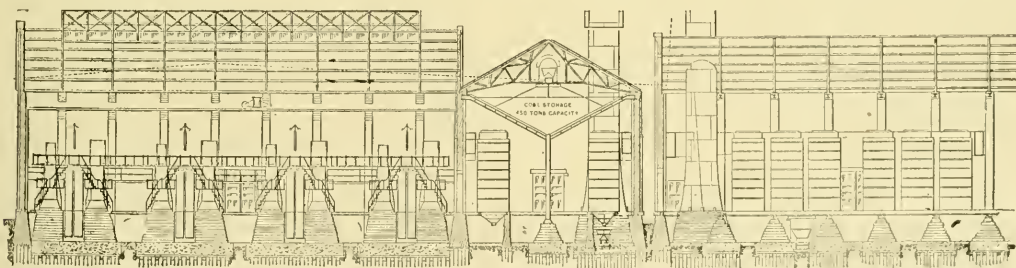
Steam is lead into the high pressure cylinder through a 6-inch pipe, and exhausts to a 10-inch pipe, while the exhaust which leads to the condensers is of 12-inch diameter. To supply these mammoth engines with steam, will require 12 vertical Corliss Boilers which will have each a diameter of 84 inches and a heating surface of 2010 square feet. Each boiler has 33 square feet of grate surface



CROSS SECTION—ENGINE ROOM.

and contains 229 tubes 14 feet long and 2 1/2 inches in diameter.

In order to locate the power-house most advantageously for the lines to be driven, it was necessary to place it in a district where real estate is very high,—hence the aim



LONGITUDINAL ELEVATION.

CROSS SECTION—BOILER HOUSE.

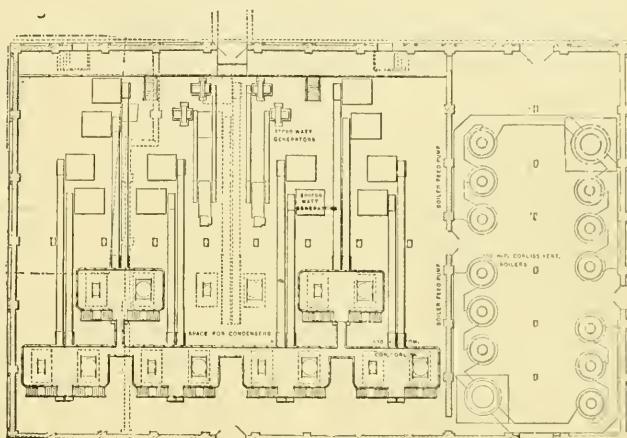
has been to secure the greatest available amount of power in the least possible space, and in a building but one story high—hence the upright type of engines and boilers and a direct drive to avoid counter-shafting. Traveling cranes will run over both boilers and generators.

The convenient and economical equipment of the boiler room is now occupying a great deal more attention than formerly, and in this plant has been carefully worked out by the Field Engineering Company, of New York, who will have charge of the installation of this branch of the machinery.

The fuel is received directly in the rear of the power-house, at the company's dock and is elevated to the storage bin, from whence it is drawn by gravity as required, and allowed to drop into the furnaces.

The entire mechanical construction throughout will be of the very best, and that most approved by leading engineers of the present day, and the power-house when complete will afford a fine illustration of the high order of mechanical engineering required and adopted by the electric railways of the country.

THE street car barns of the Parkersburg, W. Va., road burned, with a loss of \$3,300.



GROUND PLAN.

CONDUCTORS are complaining these days about the unusually large amount of pennies which are being offered. The supply is accounted for in the fact, that at this season of the year thousands of childrens' banks are opened, and the savings of a year put in circulation.

THE STREET CAR BACTERIA.

LOCAL physicians in a number of smaller town are much exercised as to the ventilation and fumigation of street cars. The ventilation is subject to the will of the passengers and as to fumigation and cleaning every company attends to that as far as necessary.

The only bacteria that is causing any great commotion is the *bacteria rapid transita* which is driving out the horse and mule at a fearful rate and making the life of the mossback unbearable.

They say that la grippe is transported by street cars—well, if we were la grippe, we believe that we would rather ride than walk any time, so these doctors may as well let it ride.

THE STEAMLOOP.

A LECTURE BY WALTER C. KERR.

THE steamloop is generally called an ingenious device, and if so, the ingenuity certainly appears at once in the name; "Steamloop," a name which, though almost meaningless, seems very consistent with its simplicity. The name has the further merit of not portraying any of its functions or peculiarities, and hence cannot be an embarrassing restraint, as is so frequently the case with names attached to mechanical apparatus.

That so simple an application of Nature's law as is involved in the steamloop should not have been turned to useful effect earlier is, at first thought, strange, but as one looks deeper into the subject, the reasons become more apparent. While no engineer is unfamiliar with the phenomena on which it depends, it has been interesting to note that even those best informed in practical steam engineering or theoretical research in thermo-dynamic science, seldom understand its action on first acquaintance, though they soon recognize in it a new combination of functions.

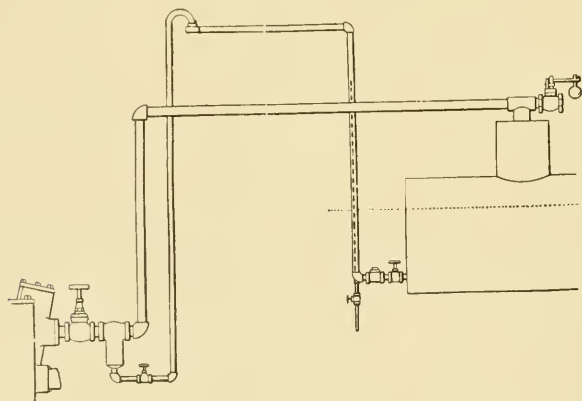


FIG. 1.

Its mission is the simple and useful one of returning water of condensation to steam boilers. Its chief characteristics are that its action is continuous, rapid and positive, and that it is a closed system operating under widely varying conditions, without valves or adjustments. Its construction is simply that of ordinary piping.

The principles on which its action depends are as follows:

Difference of pressure may be balanced by a water column.

Vapors or liquids tend to flow to the point of lowest pressure.

Rate of flow depends on difference of pressure and mass.

Decrease of static pressure in a steam pipe or chamber is proportional to rate of condensation.

In a steam current water will be carried or swept along rapidly by friction.

To these simple statements there will probably be no dissent. We have all used them in many ways, and some of them have disagreeably used us in a manner quite unwelcome. But it remained for the steamloop to collect a few of these erratic agents and from them create a useful system, combining the certainty of flow due to difference of pressure, with the quiet uniformity with which steam condenses, and with the force we see uselessly expended in the hammering of our steam-heating apparatus.

It will be evident that the steamloop, therefore, contains no mysterious factors, even though, like the steam injector, it has been called a paradox.

We have here a working model (see Fig. 1), the steam pipe passing from the boiler to a separator near the engine, which separates the water of condensation and entrainment from the steam. The drip from the separator is below the boiler, and evidently were a pipe run from this drip outlet directly to the boiler, we would not expect the water to return up-hill. Moreover, the pres-

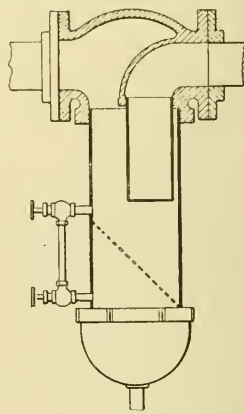


FIG. 2.

sure in the boiler is (say) 100 pounds, while in the separator it is only 95 pounds, due to the decrease in pressure in the steam pipe by reason of which the steam flows to the engine. Thus the water must not only flow up hill to the boiler, but also must overcome the difference in pressure. The device to return it must perform work, and in so doing heat must be lost. The loop therefore may be considered as a peculiar motor doing work, the heat expended being radiation from the upper or horizontal portion.

We are now prepared to examine its mechanical operation, which is best done with the model in action. The form of separator is immaterial, there being many kinds differing more or less in construction and efficiency. The one in model is simply an elbow turned down into the body of the device (see Fig. 2), throwing the steam against a perforated plate above which the dry steam is

causes damage. In performing these functions the steam-loop offers a new process in the apparently humble mission it serves.

That separators alone do not generally separate all the moisture from the steam is quite clearly shown by the fact that a loop will often return more water when the throttle is closed and the engine is idle, since the separator must then stop all moisture and the loop return it. With engine running, some moisture will always be carried over, the amount of course depending upon the efficiency of separator.

LIMITATIONS.

Generally speaking, the limits within which the steam-loop is applicable are very wide, for the principle applies quite as well to great as to small differences of pressure. Similarly, an enormous quantity of water may be handled quite as easily as a small amount. The action will continue reliably through long pipes, overhead or underground. Water may be lifted from levels far below the boilers. The use to which the steam may be applied after the loop and separator have dried it, of course has no effect upon the loop system. Wherever steam is so used that it condenses rapidly, as in dryers, steam-heating systems, jackets, steam kettles, etc., the loop can be applied to the return of this water of condensation the same as from an ordinary separator, and that, too, against any difference of pressure.

The above statements are made to illustrate how thoroughly and completely the loop can be applied to a wide range of conditions, but when we come down to the practical application, and say, how far it is expedient to apply it, the field contracts somewhat.

To take up the different limiting conditions, and comment upon their degree will show most clearly the practical range through which the loop may be made a commercial device.

DIFFERENCE OF PRESSURE.

The loop's application in this regard is limited most often by the head room for its erection. If the pressure in a separator, dryer, or return from a steam-heating system be ten pounds below the boiler, and a loop about thirty feet high is necessary to make the return, it is evident that a difference of fifty pounds in pressure would require a loop about 150 feet high and the riser, drop-leg and large portion of the horizontal being well covered with non-conductor, such a loop would operate efficiently, but generally speaking, a line of small pipe of that height would seldom be convenient, inasmuch as it would require some peculiar structure to hold it, or possibly, might need to be erected on the side of a smokestack. In high city buildings such a loop may be practicable where convenient air shafts allow easy support, but in ordinary manufacturing plants it would seldom be constructed.

While speaking of difference of pressure, attention should be called to the fact that the absolute pressure is of no importance, as a loop will work quite as well under

low pressure as high. Its construction and operation recognize only the difference of pressure. While, therefore, excessive difference of pressure is practically a limiting condition to steam-loop practice, it is not found to be an annoying interference.

DISTANCE OF FOOT OF RISER BELOW WATER LEVEL OF BOILER.

Since the system is placed in equilibrium by the drop-leg column, and this starts from the boiler, no account need be taken of the distance the riser may extend below water level in the boiler; that is, the engine, separator or drying apparatus may be anywhere below with no effect upon the loop's action except the additional work imposed. This would, however, be a limiting condition when the riser column became so long that the pressure at its lower end is insufficient to lift the total weight of mixture into the horizontal.

DISTANCE OF FOOT OF RISER ABOVE BOILER.

Evidently the foot of riser can be elevated to any required extent, but there will be a height depending upon

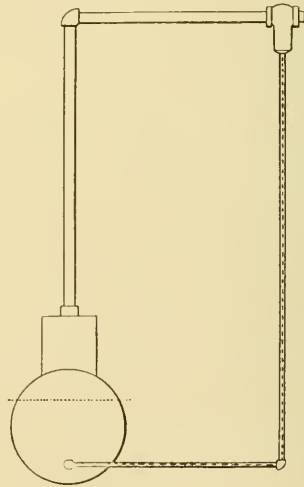


FIG. 4.

difference of pressure at which the true functions of the loop may seem to become superfluous. Consider the case where the drain is just at a height above boiler water equal to the hydrostatic head due to the difference of pressure (see Fig. 4.) Then, with no riser in the system, water collecting in the separator will run directly down a pipe, similar to a drop-leg, into the boiler. This water must collect in ordinary liquid state and exert gravity pressure before the column can move. The velocity of its exit depends wholly on the amount that has collected. Should the difference of pressure increase slightly, accumulation is necessary to cause drainage. This is simply a gravity system. It has no current carrying the water swiftly from separator and over a hill to a point of safety on the top of a water column on the other side, which may rise and fall from time to time without affecting the

flow from the point that is to be drained. A gravity system is a water pipe sufficiently high to overcome a difference of pressure. A steamloop may be called a gravity system from the boiler to the top of water column in drop-leg, but a steamloop essentially is a device extending above a balancing column, with such functions as enable it to create a circulation that is not dependent upon gravity or the incoming water of condensation, but wholly upon the flow of steam from a higher to a lower pressure, and so arranging the mechanical device that this flow will carry water with it. Therefore, even though the source of condensation is far above the boiler, the principle of the loop is just as applicable to constantly

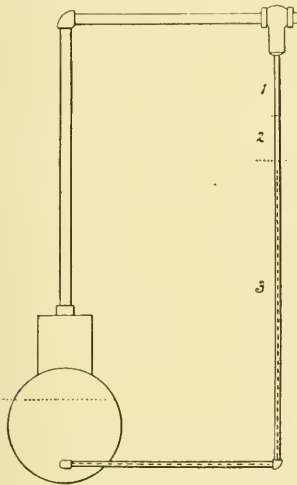


FIG. 5.

and positively remove water as though it were below and its virtues are just as essential. If the height above the boiler is far in excess of the head due to maximum difference of pressure, the loop may take the form of a straight pipe, the first section of which may be considered a riser, the second a horizontal and the last or lowest a drop-leg (see Fig. 5). Such a pipe would be a limiting case of steamloop, its shape distorted, but its functions retained. The true action occurring in such a pipe has heretofore been imperfectly understood. Indeed, it is quite probable that no one has considered it deserving of especial consideration until the steamloop was devised and explained.

DISTANCE.

It might not be unreasonable to suppose that the steamloop's application would be quickly limited by the distance of the separator from the boiler, and that the length would introduce complexity or uncertainty of action. Extreme length might impair its action, although even this is questionable, but at the greatest distances thus far met of 800 to 1,000 feet, no adverse conditions have been encountered. Great distances cause proportional drop of pressure within the loop itself, requiring proper allowances to be made in height of drop-leg. The temperature of return is also affected, due to the cooling

effect of long pipes, and can be largely controlled by proper covering. The drop of pressure mentioned above, due to the length of loop, occurs only when a horizontal is extremely long, hence is rarely met in practice. In extensive systems the horizontal is made only the functional length, turning into the drop-leg; which descends, and at a proper level can be led away through piping of any form to the boiler (see Fig. 6.) it being evident that when the drop-leg has descended to the level of boiler water, all further connection to boiler, whether one foot or 1,000 feet, becomes merely an ordinary pipe through which water will seek its level as through a pipe connecting two barrels into one of which water is poured. Thus, distance will be noted to impose no practical limit on the loop's application, for it causes no change in the loop itself.

QUANTITY OF WATER RETURNED.

This depends upon the amount of moisture entrained in the steam, the condensation in the pipe and the boiler primage. Usually there is little attempt to classify water

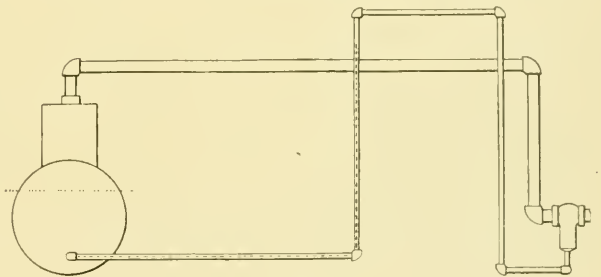


FIG. 6.

appearing in a steam system according to the causes of its existence. Its presence is simply regretted until harm results, and then it may be less considerably mentioned. If water is only to be drained out, as by drips, etc., when it accumulates in considerable volume, it matters little how it is formed, but when we come to handle it systematically, continuously, and with certainty, we must consider the source of the product on which we operate. Water of entrainment causes steam to be known as wet, and is usually constant in quantity. It may be separated from the steam in several ways, means for this being provided in the various forms of separators, and when so separated must be led away from the main steam current so continuously that it cannot again be picked up. Water of condensation is supposed to flow along the bottom or be swept along the sides of pipes, and is also usually constant in quantity. It requires no true separation, but must be led into a chamber of suitable size in such a manner as to readily leave the column of steam with which it is flowing. As most pipes afford opportunity for water to collect at certain points, and then rush on with the steam, the receiving chamber should have ample capacity. Water of primage is erratic. Its presence is accidental. We cannot estimate its probable quantity, or the nature of its passage through the pipe. It may be so received by the pipe as to cause excessive entrainment, as is prob-

ably the case when an engine labors, clicks and shows very wet exhaust. It may come over as liquid, and mingling with the water of condensation, cause an engine to slow down, pound and collapse, or spurt streams of liquid water from the exhaust. It may be constant or intermittent, and is always dangerous. It must be led away from the steam current, and received in a chamber whose capacity is considerably larger than that required for water of entrainment or condensation.

A separator must, therefore, provide ample facilities for separating the particles of entrained water from the steam and ample capacity for moderate primage. (Extreme primage is, of course, beyond control, and requires cure rather than care.) The loop must have capacity sufficient to continuously discharge the water collected from entrainment and condensation, and a maximum

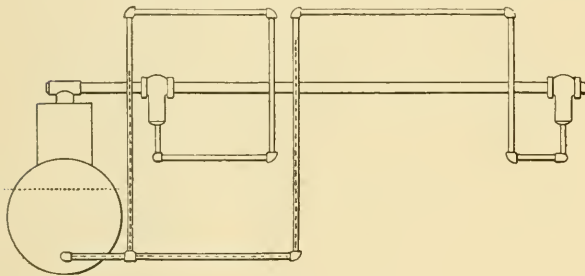


FIG. 7.

working effort, or single impulse, equal to taking in one liquid stream the contents of separator when filled up to a certain limit by sudden primage. (If filled beyond this limit, we have a flood, whose control is not within the province of the loop or any other instrument, and must be left to Providence.)

When a loop is not sufficient to give the required capacity, it is not enlarged, but duplicated, and this process may be continued to any extent. When two or more loops are applied to one source, no difficulties are met in their operation, except some competition as to which will secure the business of returning the water. A little influence exerted, in the detail of pipe connections, enables them to form a trust, in which the spoils are equally divided with satisfaction to all concerned, even the public.

Another method, when primage is excessive, is to place a separator on the steam pipe near the boiler, with contents looped back directly, thus compelling the separator and loop at the end of the system to handle the water of condensation only. This method has been used with marked benefit (see Fig. 7).

PRESENCE OF AIR.

To start the loop's action, the air must be removed by blowing out with steam, hence, it is proper to inquire whether air would not collect in the horizontal and gradually reduce the action and make it eventually become "air bound." There is certainly sufficient air in steam to produce this action, but in practice it does not.

To sum up the limitations, we find the loop action is practically independent of the distance that the source of supply is above or below boiler, and also independent of the length of return. It is not interrupted by the presence of air, and is capable of handling such quantities of water as usually exist in steam systems. It is practically limited by excessive differences of pressure and by abnormal quantities of water.

CONSTRUCTION FEATURES.

Practice has determined that 1 inch or $1\frac{1}{4}$ inch pipe is most suitable for risers, while drop-legs generally take $1\frac{1}{4}$ inches to $1\frac{1}{2}$ inches, seldom 2 inches, and never larger. Horizontals commonly are 2 inches, but, as the volume is material, they may be 4 inches or even 6 inches if very short.

All horizontal portions of the loop should pitch downward with the current. It may be well to remark here that the terms "riser," "horizontal" and "drop-leg" do not necessarily imply that risers are always vertical, horizontals always horizontal, or that drop-legs follow a plumb line. A riser is the entire run of pipe from separator to highest point of the loop, and may have horizontal portions. The horizontal is the summit level of pipe in which condensation produces the loop's action, and though usually horizontal, is not necessarily so. The drop-leg is frequently inclined, and may have almost any form.

The riser should be provided with a stop valve and the drop-leg with stop, check and blow-off valves. The check must have approximately equal areas on both sides, or when shut it will be much out of balance and become a serious obstacle to the returning water. The return must be made with an independent connection, for if connected to feed pipe, the pulsations caused by pump would affect the drop-leg, while if connected through blow-off, especially if it be in a mud drum, the loop may disturb the sediment.

The riser and drop-leg should invariably be covered with good non-conductor to prevent loss of heat, while the horizontal should be covered wholly or in part, according to its length and size, and the necessary condensation.

COMBINATIONS OF SEVERAL LOOPS.

Thus far we have considered the loop as an isolated device, returning the water from one separator attached to one steam pipe. The application may, however be extended throughout a large steam system; in fact, it is one of the important features that the entire drainage of a large system of steam pipes can be made with a system of loops forming a network of returns back to the boiler, affording ample opportunity to clear the system of water and with no chance for waste by escaping steam through faulty or open drips. It matters not whether the pipe be overhead or underground. Loops can be attached directly to the bottom of steam pipes at low spots and separators may be used at each steam outlet where engines, pumps, dryers or other apparatus operate. When the system thus extends, it is pertinent to examine to what extent the loops may be combined to simplifying piping. On first

thought it may be proposed to simply run all drains to one point, and there attach a loop of sufficient size, but the impropriety of this is at once apparent, since such loop would be liable to receive nothing but water and would be promptly flooded. Each loop is proportioned and erected with reference to specific difference of pressure and a given quantity of water, hence if the drainage of several separators into one loop is considered at all, these separators must be attached to pipes bearing such relation to each other that they will all be subject to equal differences of pressure. Consider a large and small engine side by side, the large engine having constant load while on the small one the load varies widely. If these separators be drained into one loop, there would be opportunity for a sudden drop of pressure near small engine, caused by sudden increase of load, bringing the contents of the large separator over to and possibly through the small engine.

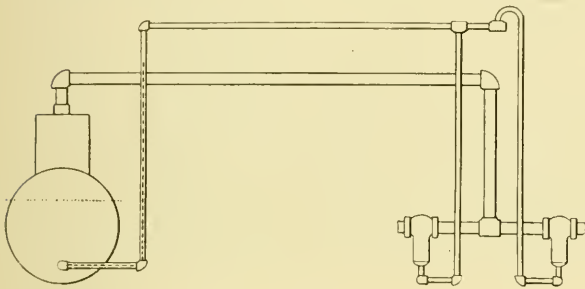


FIG. 8.

This could be obviated by introduction of check valves, but they are undesirable, and the loop system is so capable of being made to work properly on its own intrinsic principles that it would seem to be bad engineering to create a set of conditions in which the loop needed auxiliary devices to counteract effects which should not be present. Similarly, when large quantities of water are received by one drain or separator, its presence might so overload the loop as to render it inoperative with respect to the several other connected sources. Therefore, one loop should never be connected to several sources of supply, except in rare cases, where the different sources may be considered only as subdivision of one source; that is, when they are all subject to the same influencing conditions. Each source of supply should therefore have its own riser. If, now, several risers from various sources enter one horizontal, we would afford opportunity for the loop's fundamental principles to be violated. The circulation must be uninterrupted and end at the point of lowest pressure. There cannot be more than one point of lowest pressure, hence with two or more risers connected into one horizontal, an accidental drop in pressure in any riser or pipe, to which it is connected would short-circuit the loop from one riser to another (Fig. 8). Therefore, each riser must have its own horizontal. We then consider whether several horizontals can enter one drop-leg. The balancing water column whose height is due to difference of pressure

must rise and fall with the variation of pressure. Hence, one loop may have a different height of balancing water column from another, even though they enter the same boiler. At the origin of one loop pressure may be increasing, while at another it is decreasing, calling for corresponding fall and rise of drop-leg columns, and if these loops were both attempting to utilize the same drop-leg we should have the anomalous condition that a column of water is required to rise and fall at the same time, and hence two or more horizontals should not enter one drop-leg. The numerous drop-legs in a given system do not, however, require independent connection to the boiler, for they may discharge into one common manifold or header near to or distant from the boiler. The loop's action is performed when the water has been deposited in the drop-leg; hence, the method of connection beyond that point does not involve the action of the loop. Even if loops could be combined and connected in various ways consistently with safety and reliability, it would not be generally expedient or convenient so to do.

EFFICIENCY.

The operative cost being practically constant in any given loop, its efficiency must depend wholly upon the amount of water returned and the maximum efficiency will correspond to the largest quantity that it is capable of handling. This limit, however, would seldom be reached in practice, for if constantly doing its maximum work the loop would be in danger of flooding each moment. Practically; therefore, the wide margin allowed for safety and handling unusual quantities of water compels the loop to usually operate far below its maximum capacity, rendering it to that extent less efficient. This feature, however, indicates the inadvisability of making loops unnecessarily large. Since the loop puts water into the boiler against resistance, energy must be expended. This energy represents heat lost, and this loss is the cost of operating the loop. No exact determinations have been made of this loss, but it is obviously very small. That the energy required is very small may be deduced as follows:

A 100 horse-power engine using thirty pounds of water per hourly horse-power requires 3,000 pounds per hour. If ten per cent. or 300 pounds be returned to boiler per hour; and difference of pressure between separator and boiler is ten pounds, then about $\frac{1}{25}$ of one horse-power is required to do the work.

In the above it will be noted that we have assumed a very large amount of water to be returned, and have assumed a large difference of pressure against which to return it. Consequently the above figures are more than generous, and it is doubtful whether half this amount of power or say $\frac{1}{50}$ of one horse-power, is used in the average case.

An important factor in its practical efficiency is the improbability of leakage existing, while other methods involve great opportunities in this direction.

This whole question of efficiency is, however, one of curiosity rather than importance, for, as previously stated

the whole matter is relative. The mechanical features of the loop system in removing the objectional water from pipes, through a continuous closed circuit back to boiler takes precedent over any questions of efficiency, especially considering the very small quantities of power and their heat equivalents involved. Just as an edge several inches wide may be sharp for the bow of a steamship and an edge .01 of an inch broad, dull for a razor, so may the expenditure of a few thousand heat units in a lightly loaded steamloop be economical for a loop when the same number of hundreds of units would be uneconomical for a compound condensing engine furnishing the same foot-pounds of work. Loops, therefore, are simply to be compared with each other.

The useful work done by the loop cannot be measured solely by the amount of water returned to the boiler, for if this water is all condensation and primage, its removal produces less economic effect on an engine than if it were held in suspension in the steam. Thus it may be that the exertion of a small fraction of a horse-power by a loop may cause the steam which it dries to exert many times more power in its expansion in the engine cylinder. The loop to do this might be lightly loaded, so that its own efficiency becomes relatively poor, while near by there might be a loop, heavily charged with water of primage and condensation, whose efficiency is relatively high, yet whose economic effect upon an engine is of less value. Therefore, the thermodynamic efficiency of a given loop is not proportional to its value to the user, even though we make no account of its value as an assurance against accident by water.

RESULTS.

The result of steamloop action may be briefly summed as follows:

- (1) Saving the water of condensation, entrainment and primage.
- (2) Saving the heat contained in said water.
- (3) Saving the steam systems from water, thereby reducing liability to accident.
- (4) Returning pure water to the boiler.
- (5) Preserving uniform temperatures, thus obviating difficulties due to expansion and contraction.
- (6) Prevention of direct loss which usually exist from open drains, drips, tanks, etc.
- (7) Enabling engines to start promptly.
- (8) Maintaining higher pressures at the end of long lines.
- (9) Maintaining higher temperatures in jackets, dryers, etc.
- (10) Increasing the efficiency when steam is used expansively.

All of the above are more or less evident from what has preceded, except the latter, and on this there is some honest difference of opinion.

But it seems to be the general consensus of opinion that moisture is detrimental to an extent about double its percentage; that is, five per cent. moisture in steam effects the efficiency of an engine about ten per cent.

Further development and opportunity for experiment with the steamloop system will aid in determining this.

We are, therefore, entitled to respect quite highly this useful combination, whose worth can never be accurately estimated, since its chief service is to prevent certain losses and accidents of variable character, and whose extent is the only measure of the loop's value.

THE BEST IS CHEAPEST.

WE believe street railway managers, and even stockholders, whose interest in many cases does not extend beyond the expectation of a certain dividend on a certain day, are rapidly coming to realize the importance and economy of making expenditures for first cost sufficiently liberal to secure substantial and permanent work. One of the prominent street railway contractors, whose work is always of a thorough character, writes us and incidentally pens the following:

"We are pleased to note the fact that when ten thousand dollars or more per mile is cited as an approximate cost of the road-bed construction, prospective street railway owners do not 'jump out of their chairs.' They begin to see the errors of the past brought on by a too parsimonious outlay for the track and road-bed. We have found that white oak ties 7 x 6 inches x 8 feet spaced 30 inches in the clear, thoroughly ballasted with broken stone, with a steel rail weighing not less than 60 lbs. per yard, roded and spiked directly to the tie makes a firm and substantial street railway track; however, there are circumstances that alter the character of building a road. It is a poor investment not to have a road built fully as good as described."

A PRACTICAL TOWER WAGON.

SEVERAL styles of "Hurry Up" or "Tower Wagons" have been brought out, but it has remained for G. S. Blakeslee, of 1549 Wabash avenue, Chicago, to invent and build one which will enable line repairers to proceed without interfering in the least in the operation of the cars. Mr. Blakeslee's wagon while including every requirement necessary affords a roomy overhead working platform, one end of which is carried by the wagon which stands at the side of the track, and the other rests on a light but strong ladder, the bottom of which is placed between the two tracks. When a car approaches the conductor pulls the trolley down a few inches and the momentum carries the car easily past. As an instance of the demand for this new device one was shipped only a few days since to Texas, being ordered by telegraph and shipment being made by express, which, while very expensive transportation was not considered as a reasonable obstacle to the company who wanted the wagon. Mr. Blakeslee has been a successful business man here many years and whatever he undertakes is always accomplished in a satisfactory manner.

OHLSON'S INDEPENDENT TRUCK.

THE Chicago City Railway have just built at their shops, under the direction, and from designs prepared by Master Mechanic Braithway, twenty-five handsome cars, 21 foot box and 9 foot wheel base. They have gone in service on the cable lines. One of the most radical changes in these cars, is the independent

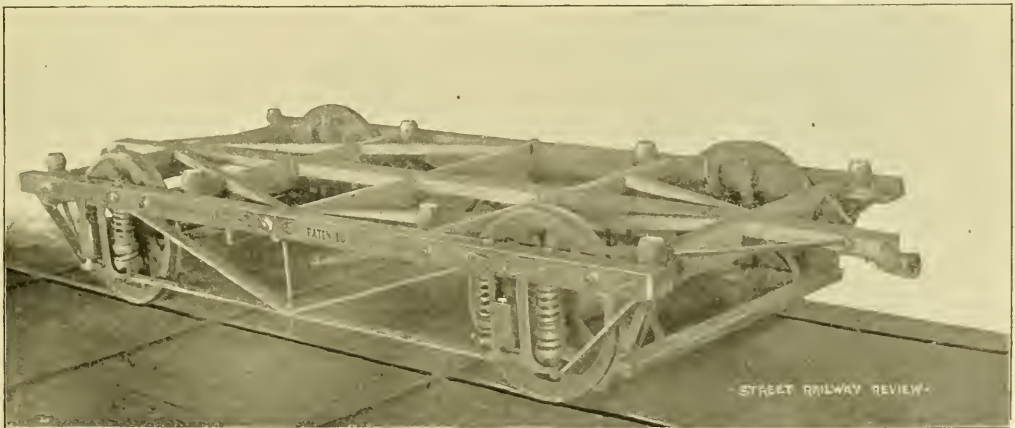
used, though rubber is preferred. At the four corners of the truck, provision is made for iron guides, which depend from the car body and keep it in place, but which are separated from contact with the truck by rubber cushions; so while simple play is allowed, both vertically and laterally, there can be no transmission of noise from the wheels to the car body. For a car of the dimensions above given, the eight rubber cushions, on which the car



CAR MOUNTED ON OHLSON'S INDEPENDENT TRUCK.

truck, the invention of Magnus Ohlson, a car builder of many years experience, and formerly master mechanic of the City Railway. The truck sills are Georgia pine 4x6 inches and thoroughly braced. The draw heads are made a part of the truck, upon which the car body rests,

rests, are placed one on either side and parallel to the wheel, and 21 inches from its vertical center. With the weight of the box so uniformly distributed, the life of car and track is greatly prolonged, and the comfort of riding immeasurably increased, as the writer can bear



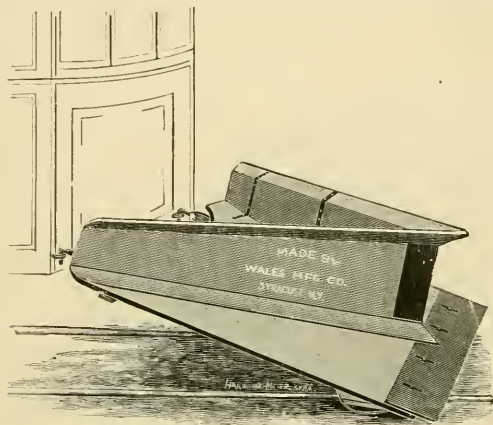
OHLSON'S INDEPENDENT TRUCK.

being separated from the sills, however, by eight rubber spring cushions $4\frac{1}{2}$ inches high. These cushions are plainly shown in the illustration, and rest above and below in cast iron sockets or corner pieces, which are fastened to the cross sections of the sills. Steel springs may be

personal witness. The extra expense of this truck is very slight compared with the advantages it gives, not to mention the saving in the prolonged life of the car. The company and the public are highly pleased with the results.

THE WALES SNOW PLOW AND SCRAPER.

THE Wales Manufacturing Co., of Syracuse, N. Y. have recently brought out a combined snow plow and scraper, of which a better description could scarcely be given than the accompanying illustration. Where the pavement will permit, the plow can be so ad-



justed as to scrape the track very closely. It will be seen that its connection with the car, is by means of two hooks which fasten into a pair of eyes which are placed at either end of the car. Two men can readily unhook and change the snow plow to the opposite end of the car, at any time. Its weight is about 350 pounds.

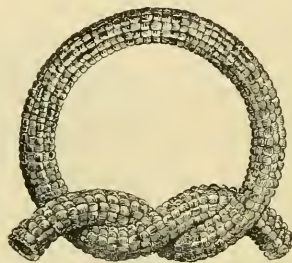
Instead of riding upon wheels, it rides upon two wrought iron shoes, which are made to slide upon the wagon tread



of the rail, and which it is said, has no difficulty in passing over switches and crossings. This plow is already in use upon several roads and with very good success.

FLEXIBLE CONDUIT TUBING.

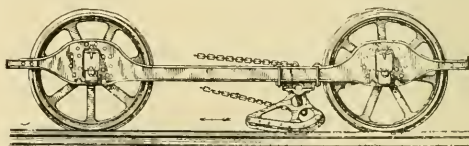
IN the introduction of the new flexible conduit tubing manufactured by the American Circular Iron Company of Boston Mass., will be seen an article of value to street railway plants for various points in car wiring or street construction. This tubing is made a spiral of insulating fibre, taped reversely, and the whole covered



with a seamless woven jacket, making a tough thoroughly water proof, and flexible tube for the insertion of electrical conductors. It is of particular value for the abrasive protection of highly insulated wires, and is designed to take the place of much of the hard-rubber tubing and common hose now used by the best railway constructors.

ALLEN'S NEW SAFETY BRAKE.

W. ALLEN, of St. Paul, whose safety brake has already been described in these columns, and which has attracted much attention and interest among managers, has just taken out a patent on an improved brake, embodying some of the best features of the first. Two cam-brake shoes are used, rocking on the same shaft which is suspended from the car sill, or from the truck frame as desired, by steel brackets. One shoe overhangs each rail, and both are applied simultaneously by a chain operated by the driver. The device

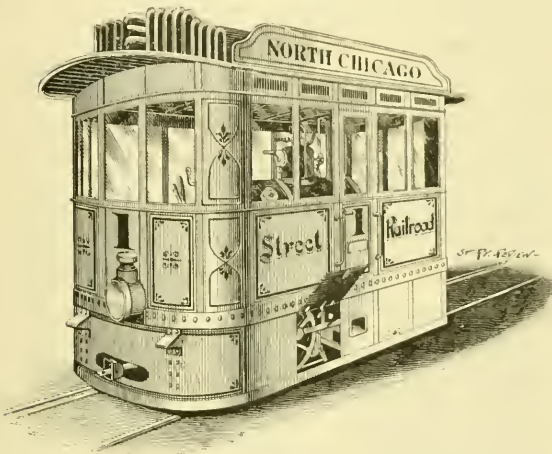


is extremely simple, and its positive action will be readily understood from the accompanying illustrations. The shoe is lined with tough rubber, which is made in blocks of 2 inches square, and dovetailed into the casting so as to allow of easy removal for replacing, though as a matter of fact, they wear a long time without renewal. The frictional surface on the track is 12 inches for each shoe, and will absolutely hold a car on any grade existing on any street railway in the country. The ordinary wheel brake may be used on levels and slight grades, and the safety or "hill stop" brake either used in addition or exclusively where the grade is heavy. The application of the brake is released by reversing the motion of the brake staff, which unwinds the chain. Companies operating on heavy grade, either by horse, cable, electricity or steam dummies, will find the brake well worth investigating.

WESTWARD THE STYLE OF MOTOR
TAKES ITS WAY.

CHICAGO is already in receipt of one of the many wonders which as shadows of coming events are daily washing up upon its shores. The latest European styles in motors has just received adoption here by the arrival, consigned to the North Chicago Street Railroad of a noiseless steam motor which President Yerkes picked up among other little bric-a-brac when over in Paris the other day.

The engraving conveys an accurate idea of the external appearance, and within there is little out of the ordinary of steam dummies. The car is of steel throughout except windows, doors and ceiling: is 12 feet long, 8 feet wide, 9 feet high and weighs 7 tons. It rides on 4 wheels of 31 inches diameter, which with the driving machinery is concealed from view. It runs in either



direction, and the exhaust steam is run through a series of mufflers which smothers the sound, and also condenses the steam and returns the water to the boiler, which occupies the center of the car.

The engines are below the floor and drive direct on the wheels. The engines are of 25-horse-power of the double cylinder pattern. The motor was built in Ghent, Belgium, and cost about \$5,000. The custom house duties amounted to \$2,000 more. It will be put on one of the outside lines in a few days. The intention is not to use it on down-town—simply on outside lines. As the machine came in “knock down” condition, Superintendent Miller of the company’s shop, had an opportunity to display notable ingenuity in setting it up.

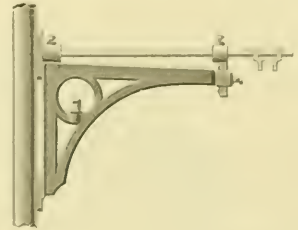
The daily papers speaks of its appearance in a very untechnical style one assuring its readers that it “looks like a nocturnal wienerwurst-and-watles-wagon” and another thinks “it looks like a railroad flagman’s shed.”

The driver can operate the motor from either end of the car, and its results will be watched with no small interest.

THE NEWBURYPORT POLE BRACKET.

IF all the people and all the trees in this world were absolutely straight, there would not be the need for many things which, however, under the circumstances become necessities.

What builder in putting up pole brackets for trolley wires, but has experienced the annoyance and loss of time in chopping the pole, to allow the bracket to hang plumb. To avoid this difficulty especially, and to allow of taking



up any sag which may occur later on, the Newburyport Pole Bracket is offered. As will be seen, the pole may be either crooked or out of line, but the arm is given a horizontal line by means of the set screw, which can be adjusted to a greater or less extent, as the case may require. There is no cutting of the pole, as the bracket is fastened with screws. A special feature is the glass insulator for feeder wires, which alone is a great saving.

THE Ball Engine Company, of Erie, Pa., have within the past few weeks sold thirty-two engines aggregating 3,390-horse-power, and dived as follows:

SIMPLE ENGINES.—John Becker, Fitchburg, Mass., 1—35; Thomson-Houston Company, Boston, Mass., 1—100; Lewis Benedict, Attica, N. Y., 2—80; William Howell Caldwell, Union City, Tenn., 1—80; Schmidt Building, Pittsburg, Pa., 1—35; Vandergrift Building, Pittsburg, Pa., 1—60; Central District Tel. & Tel. Co., Bldg., Pittsburg, Pa., 2—50; Pittsburg Iron & Steel Engineering Company, Pittsburg, Pa., 1—80; Halifax Manufacturing Company, Lake Village, N. H., 1—35; Lockport Gas Light Company, Lockport, N. Y., 1—100; S. J. Lefevre, Gibson City, Ia., 1—100; Edison General Electric Company, Portland, Ore., 3—150.

CROSS COMPOUND.—Newark Electric Light Company, Newark, N. J., 1—300; Hygeia Hotel, Old Point Comfort, Va., 1—60; Gale Shoe Manufacturing Company, Haverhill, Mass., 1—35; Kittanning Light Rt. & Pr. Co., Kittanning, Pa., 1—150; New England Conservatory of Music, Boston, Mass., 1—35; Columbia Electric Light Company, Philadelphia, Pa., 1—200; Osage Electric Light Company, Osage, Ia., 1—50; Commonwealth Iron Company, Commonwealth, Wis., 1—35; Eugene Sites, Loraine, O., 1—100; Hix, Crosby & Co., Richmond, Va., 2—60; Edison Light & Power Company, Minneapolis, Minn., 1—300; Industrial Improvement Company, Brockton, Mass., 1—300, 1—200; Palace Hotel, San Francisco, Cal., 1—100.

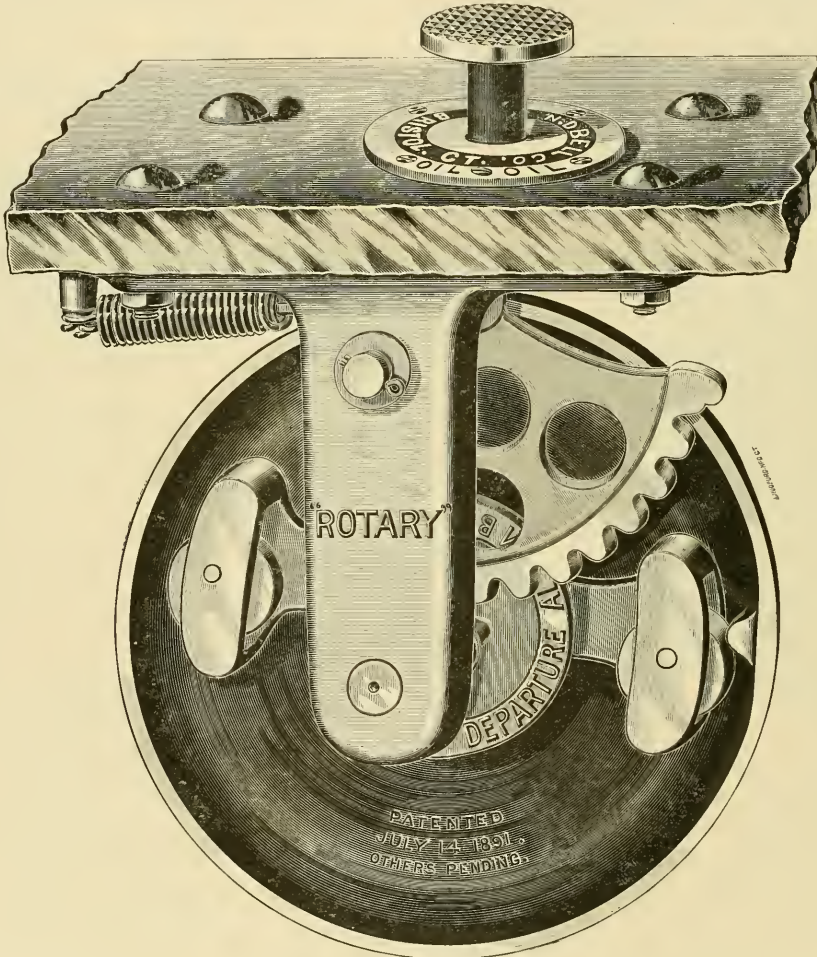
TANDEM COMPOUND.—Electric Improvement Company, San Francisco, Cal., 1—100.

THE NEW "NEW DEPARTURE" BELL.

SO great has been the demand for the new departure bell in vertical form the manufacturers have decided to make both styles and the illustration shows it in the new type. By this form the bell is adapted to any location on a car and occupies less space ever before while preserving all the good qualities which have made it so phenomenal a success.

the Short Electric Railway Works, but as well of the efficiency of the type selected. The order is to be delivered as soon as the work can go through the shops, and will go into service immediately on delivery.

THE Citizen's Line in Pittsburg have been disposing of their street car horses, and have sold upwards of 200 head, obtaining from \$17.00 to \$50.00 a horse.



VERTICAL NEW DEPARTURE BELL.

MINNEAPOLIS ADOPTS THE SHORT GEARLESS.

ONE of the most important and significant orders of the month, is that of the Minneapolis Street Railway Company, for 120 twenty-horse-power, Short Gearless motors, being the equipment for sixty cars for that city.

That so well known a careful and progressive manager as President Lowry should place an order for so large a number and specify the Gearless, not only is a high compliment to the character of the motors built at

BOUND TO BOND.

A SUIT before Judge Blodgett, of the District Court, has been watched with considerable interest by many people, particularly by Chas. Lieb, who sought an injunction restraining the Electric Merchandise Company, from the manufacture and sale of bonding wire and bolts. As everybody knew there was no more infringement in this than there is in fishing in the high seas, and the judge promptly sat down on the petitioner, and as they say in New England, "the petitioner has Lieb to withdraw," which being interpreted reads—"left."

ECHOES FROM THE TRADE.

THE ST. LOUIS CAR COMPANY will shortly bring out a new car truck for electric and other cars, which promises to be something extra good.

FRANK B. RAE has sold his patents on electric railway and other work to the Detroit Electrical works, and on January 1st withdrew from the active employ of the company.

THE J. M. JONES' SONS COMPANY, of West Troy, N. Y., have delivered to the West End Street Railway Company of Boston, 53 cars, there still remaining 97 to complete the order.

THE SCHULTZ BELTING COMPANY, of St. Louis, remembered their many friends and customers with a very handsome and elaborate calender, on which the famous Shultz Belting will run the whole year through.

THE CHICAGO RAWHIDE COMPANY, are still expanding their business, and have been obliged within the past month or two to add two additional stores to their already large factory, in order to keep up with the demand upon their business.

THE SHORT ELECTRIC RAILWAY COMPANY, has taken the contract for the construction of the electric railway at Atlanta & Chattahoochee Railway Company. The line will be 15 miles in length, and it is expected that the power house will be located at Bolton.

THE E. P. ALLIS COMPANY, of Milwaukee, have received the contract for the engines for the new power houses of the Baltimore City Passenger Railway. There will be a pair of tandem engines for each house, two to produce 1,200, and two to produce 1,400-horse-power.

THE RELIABLE MANUFACTURING COMPANY, manufacturers of the Collett Car Brake and Reliable Sand Box, of which James F. Shaw, of 53 State street, Boston, Mass., is their New England agent, have been obliged to build a new factory at Everett, Mass., owing to the increase in their orders.

THE EASTON ELECTRIC COMPANY, Brooklyn, N. Y. have just installed a 55 arc light dynamo in the merchantile establishment of Wechsler & Abraham, Fulton Street, New York. As it is the fifth machine sold this firm the merits of their dynamo hardly need further words of commendation.

THE AMERICAN ELECTRIC WORKS, Providence, R. I., have supplemented the branch of their Christmas tree with a handsome pack of playing cards, which are elaborately gotten up, and bear upon the reverse side a "full hand" of electricity, as conducted by their insulated electric wires and Faraday cable.

BUYS AN EDISON.—The Camden & Atlantic Railway Company, of Camden, N. J., recently closed a contract for a 100 kilo-watt, 250 volt Edison generator. This road is now operated by the Daft system, but it is the intention of the railway company to abandon this system in the spring, for one that is more satisfactory.

THE WESTERN ELECTRIC COMPANY, of Chicago, have purchased additional property, having a frontage of 318 feet on Congress street, and 193 on Franklin, on which is at present a three story building, which will be torn down and replaced by a large addition to their present works. The purchase price is said to be something over \$300,000.

J. C. WHITE & COMPANY the enterprising supply house of St. Louis, have recently taken the agency for that territory of the R. D. Nuttall manufactures, and as southwestern agents will carry a large line in stock and be in shape to make shipments same day orders are received. All of which will be of great advantage to roads in that district.

ERNEST L. CLARK, for several years connected with the Illinois Electric Material Company as secretary and manager of the pole department, has opened a business in his own name with office at 331 "The Rookery," Chicago, where he will pay special attention to the purchase and delivery of white cedar poles for electric construction, also ties, piling, and posts of every description.

THE BURTON ELECTRIC HEATER COMPANY of Richmond, at its annual meeting showed a very highly satisfactory report for the year, and in re-electing W. R. Mason as president of the company took occasion to pass a very complimentary vote of thanks for his untiring efforts for the advancement of the interests of the company. The stock holders are well satisfied with the success of the enterprise thus far.

THE COLUMBIA SCREW COMPANY, of Chicago, with works at Pullman Ill., have enjoyed a very prosperous year. R. W. Snowden, city agent, reports recent sales to the Chicago City Railway Company, Pullman Company, Northern Car Company, and Post & Co., of Cincinnati. The works are being operated to their full capacity and will shortly be increased. The company has been in existence but one year but have made a most enviable record.

THE FULTON FOUNDRY COMPANY of Cleveland, are very full of orders especially in their railway department. The new truck which they have recently put upon the market is meeting with perfect satisfaction. They have recently shipped orders to the Detroit Electrical works, the Wightman Electric & Manufacturing Company, and now have 22 running on the East Cleveland line, and have just received an additional order from that company.

CONSIDERING the season, encouraging activity prevails at the quarters of the Electric Merchandise Company, Chicago, which forecasts a profitable spring trade. Winter weather is bringing in many orders for Burton electric heaters which already are doing excellent service upon nearly 100 electric roads. Brand's steel wire track brooms and Wardwell's patent track broom holders, meet with large demand, and duplicate orders testify to their usefulness.

THE CUSHION CAR WHEEL COMPANY are in receipt of a letter from General Manager Jacobs, of the Calumet (Chicago) Electric Railway, stating:

"The Cushion Car Wheels are in service on this line and we take pleasure in saying that the result has been perfectly satisfactory. We notice that the wheel is comparatively noiseless and that the car rides easier than formerly, and believe that the wheel is all that the inventors claim for it. We therefore take pleasure in recommending it."

THE MINNEAPOLIS CAR COMPANY is full of work being now engaged in finishing cars for Rockford, Ill., Milwaukee and Minneapolis. They are also rebuilding a number of small cars for the Minneapolis Street railway, by converting two small cars into one large one. Similar work is also being done for the Milwaukee roads.

In addition to the present shops which are 60x150 feet and three in number, a paint shop is being added 75x150 feet which will greatly increase the facilities. President Jones is also arranging to take up the building of steam cars of every description.

A BIG SEAT ORDER.—The Hale & Kilburn Manufacturing Company, of Philadelphia, are rejoicing over the receipt of what is probably the largest single order ever given for street railway car seats. This order covered the seats for 375 cars of the Third Avenue Cable Road, New York City. Of these cars 175 are to be equipped with the latest design of the Hale & Kilburn reversible car seat, making 4,200 seats of this style. The remaining 200 cars are to be furnished with rattan seats along the sides. This order brings the totalsales of Hale & Kilburn reversible car seats up to 51,000.

THE ST. LOUIS CAR COMPANY have just issued and are sending to their friends a very handsome catalogue of one hundred and twelve pages, bound in Russia Leather. It is profusely illustrated with full page engravings, and besides showing a great variety of cars of their own construction, also illustrates other appliances required by street railway companies, such as steps, lamps, fare boxes, track brooms, trucks of ever kind, sweepers and plows for electric and other roads, and also shows their new baggage and mail car which was built for the St. Louis & Suburban Railway. Any manager who has failed to receive a copy should write for one at once.

THE GREAT WESTERN ELECTRIC SUPPLY COMPANY, No. 201 to 207 S. Canal street, reports a most gratifying increase in the demand for their electrical goods, especially

their Sun Arc Lamp, which is giving universal satisfaction wherever used. It can be used singly or in series and gives a most beautiful, steady, white light. They are also receiving large orders for a new focusing arc lamp, several of which are in various parts of the city. There is also an ever increasing demand for their celebrated K. K. wire. They are doing a large business in house goods supplies, and the sales are increasing daily. The fixture department reports very large sales in Missouri, Louisiana & Illinois. The business of this year compared with last show a big gain, while the outlook for 1892 is better than it was this time last year.

THE ELECTRICAL SUPPLY COMPANY, Chicago, have received many letters commending the high grade of railway materials handled by them. The company has at their factories in Ansonia and also in their warehouse at Chicago, expensive and elaborate machinery for testing the strength in various ways of all kinds of railway appliances. Skilled engineers make these tests and an article to receive the approval of the Engineering, and finally the purchasing department, must prove its fitness for the work intended. This process of close scrutiny enables The Electrical Supply Company to suggest and insist upon structural changes in many articles which to the inexperienced eye would seem already perfect. That it pays them to be thus careful, they have ample proof of, in the continual increase of order for the railway specialties which they have approved and offer for sale. It matters not whether the article is turned out from their own factories or that of others, it must run the gauntlet of impartial inspection, and if found lacking in any essential, back it goes for correction.

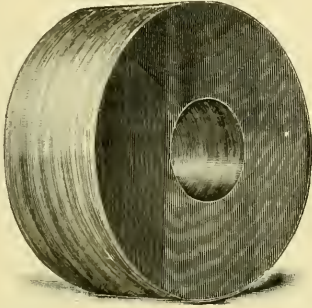
THE PECKHAM MOTOR, TRUCK & WHEEL COMPANY of Kingston, N. Y., has been favored with very complimentary letters during the past month from companies who are using its wheels and trucks. The Butte Consolidated Railway writes that the trucks are giving them entire satisfaction, and that in future they expect to use them in place of all others. From the Superintendent of the Long Island City & Newton Railway Company comes the cheerful intelligence that the cantilever truck is giving entire satisfaction, preventing the oscillation of cars, and takes curves very nicely. The Jamaica & Brookly Road Company of Jamaica, L. I. say: "We consider them the most economical wheels for electric cars, and hereafter shall not use any other kind." General Manager Minary, of the Rochester Railway Company, Rochester, N. Y., says that the Peckham wheel has been in use under ten trucks on their road for over twelve months, and not one wheel has been taken out on account of its being flat. Such pronounced letters from railway men are certainly very high testimonials in favor of the Peckham work.

THE NORTH WEST THOMSON-HOUSTON COMPANY, located at St. Paul have handled a large amount of business the past year in railway supplies, having sold 350 motors and generators aggregating in all five thousand

DERMAGLUTINE.

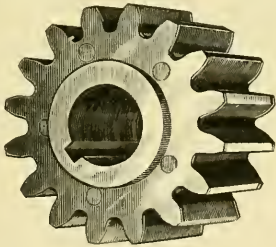
WE have already in a previous issue briefly alluded to this new product of rawhide for gear-wheels, and which needs no further introduction on our part. All those who have used it pronounce it the acme of perfection. Its wearing qualities exceed those of steel and in general adaption to the severest service it has made a record exclusively its own.

A. Groetzing & Sons, of Allegheny, are the sole manufacturers of "Dermaglutine," are to be congratulated upon the phenomenal success it has achieved even in so short a time. Its demand has increased to such an extent the manufacturers have been obliged the second



time to increase their capacity by the introduction of additional machinery, which is now ample to meet all requirements and enable them to fill orders promptly. Those who have never examined into its merits will do well to give it a trial, when in need of rawhide goods.

A. Groetzing, the senior member of the firm, is among the largest tanners in the United States and has built a trade and a plant to supply it, which have assumed very

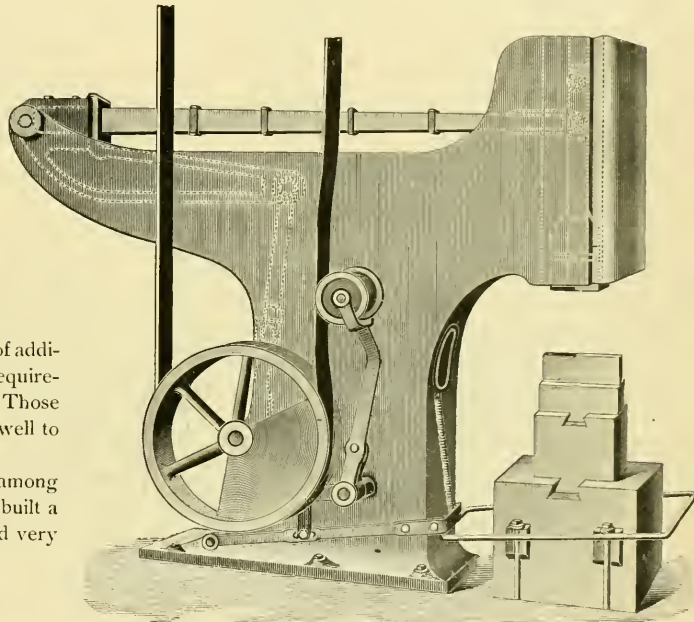


large proportions. He is now president of one of the heaviest banks and ranks among the capitalists of Pittsburg, and while a large share of the executive management of the business is shared by his sons, Otto H. Groetzing and Will, C. Groetzing, he still devotes a considerable portion of each day to the business of which he has made a careful and life study.

THE Grand Rapids Democrat discourses on one of its neighbors thusly: "When a Kalamazoo citizen steps into a car on the city's street railway, he never can tell whether the line will go into the hands of a receiver before he shall reach the end of his route. Twice this year has a receiver been appointed, and the financial gymnastics of the line are giving Celeryville additional fame."

NEW POWER HAMMER.

A NEW tilt hammer has just been put in the market by Albert & J. M. Anderson, Boston, especially adapted to the wants of street railway repair shops. It is simple in design, quick and positive in action, and strikes a blow of 200 pounds. It requires little space, is driven by a small belt running loose except when tightened to work the hammer, by pressing the foot upon the iron frame which is accessible from three sides of the anvil. In repairing track work of all kinds, and other heavy forging, it will save its cost in time in a little while, and while requiring but little power will practically never wear out.



ANDERSON'S POWER HAMMER.

BROWNELL'S ACCELERATOR.

FOR some time past President Charles T. Yerkes, of the North Chicago Street Railroad Company, has had running on his cable lines, the car accelerator, invented and patented by F. B. Brownell. This is the car which was built and exhibited at the Street Railway Convention, at Pittsburg, by the Brownell Car Company, of St. Louis, and since the close of the convention has been in severe daily use in Chicago. How satisfactory that service has been is best indicated by the fact that Mr. Yerkes has purchased the right to use the patent for the construction of the car for both the North Chicago and West Chicago Street Railroads. The fact that Mr. Yerkes is well known to be conservative and careful in adopting new devices, is a strong recommendation of the car, which, during its use in Chicago, has attracted much attention, and complimentary notices from railway managers, the public and the press.

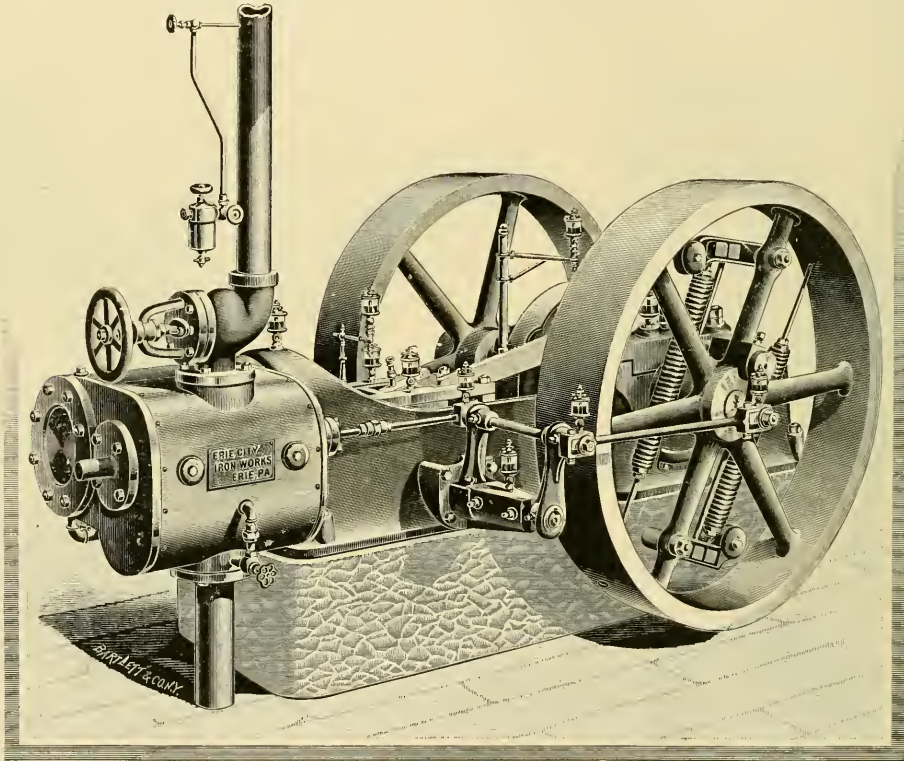
At the suggestion of Mr. Yerkes, the car has been sent to New York and Philadelphia, for the benefit of his friends interested in lines in those cities.

IMPROVED GOVERNOR AND HIGH SPEED ENGINE.

THE Erie City Iron Works, of Erie, Penn., have just brought out an improved high speed automatic engine, having a new design of governor which shows a remarkably close regulation. The governor is a recent patent—January 5th of this year—and will be readily understood from the illustration given below. The claims for extreme efficiency are fully substantiated when the indicator and speed recorder are applied and both engine and governor are models of efficiency. The Erie

by presenting, on behalf of a friend a check for \$1,000, which not only swells the fund but encourages all connected with the association.

Election of officers was as follows: President, Geo. Attig; first vice-president, Wm. Crowley; second vice-president, Joseph Ostendorf; financial secretary, John Kinney; recording secretary, J. D. Harris; treasurer, M. J. Casey; sergeant-at-arms, C. D. Thorpe, assistant sergeant, John Rooms; Dr. C. S. Mnscroft, medical examiner; trustees, Wm. Wiseman, Fred Hofsis, R. Anschultz, John Crenshaw, D. Monohan, Henry Meyers, John Coyne, Henry Smith.



ERIE IRON WORKS' HIGH SPEED AUTOMATIC.

City Iron Works are justly proud of this, their latest effort, and which shows improvement upon work previously conceded to rank among the best.

A MAGNIFICENT GIFT.

THE Street Railroad Employes Mutual Protective Association, of Cincinnati, is one of the best organized and successively managed in the country. At their annual meeting January 8th, it was shown the association had paid out \$1,600 in sick benefits, and several hundred dollars to each of three families where members had died.

Superintendent John Harris, of the Cincinnati Street Railroad, attended the meeting and was most heartily welcomed. On being urged to speak he complimented "the boys" on the success of the organization, and closed

A PAPER in a good sized western city grieves us by giving vent to its passion in denouncing one of its local street railways as the "skin 'em electric road," with a "two-for-a-cent-management, instead of buying nice new cars, put "motors on old horse cars which look as if they were used on lines before the flood and were dug up after the water subsided." And yet, if all the editor says be true, it looks as if somebody was working along a narrow gauged policy that is liable to get a short circuit in these in these lively days.

THE bold highwayman seems to be turning his attention to holding up conductors of street railways in all parts of the country. Oakland, Cal., Chicago, Louisville, New Orleans, Kansas City, have all been scenes of more or less bold attempts in some of which conductors and drivers have had narrow escapes with their lives.

EUROPEAN TRAM TRAIN.

THE accompanying illustration is of a train of cars for street railway use quite generally employed in Europe, and as shown is drawn by a steam dummy.

The train shows the style of double deck car with protected roof or canopy to keep the passengers on the upper deck from any discomfort from rain or sun. As will be noticed, the lower part of the car is divided into two compartments, one being for first, and one for second class passengers.



The recent evolution in street car building in this country whereby it is designed to do away with the end platforms, and the entrance made at the side and middle of the car, will also be seen illustrated in this car, and would seem to indicate that in this respect we are showing a tendency to follow after our foreign brethren. The train as illustrated, is after the style built for many years by the Falcon Engine and Car Works, London.

WOODMAN EDISON SPARES THE TROLLEY TREE.

IN the last number of a neat little leaflet, the official organ of and published by the Edison Company, is found an article on Mr. Edison's much discussed electrical innovation, which like a sharp scythe in tall grass was to lay low every trolley in the land and sweep away like cobwebs the overhead wires, which still continue to wear an abnormal size to some short sighted people.

That the system which is and is to be, is more expensive than the overhead is indicated in the heading which guides the reader to the statement below, and which states—"Mr. Edison's system is intended only for roads in large cities where the amount of traffic justifies expense of original installation," and then goes on to say:—

"The interviews with Mr. Edison which were recently published by the daily press, concerning his improved system of street car propulsion, seem to have given rise to a wide-spread impression that the new method is to entirely supersede the present trolley system.

This is absolutely not so.

Mr. Edison has devised the new system for roads of heavy traffic, in large cities where the expense of the

original installation is warranted by the traffic, and where the trolley system will not be permitted. For instance, the new system would not be applicable, in a commercial sense, to long roads operating less than fifty cars simultaneously. It must therefore be understood that, outside of the large cities, the best system that can be advocated is the trolley.

In order that a better understanding may be formed as to just what this new system for large cities is, we submit the following particulars, which have been furnished by Mr. Edison:

The overhead system is entirely dispensed with.

Cars, trucks, tracks and roadbed, such as are now in use, are retained, certain changes being made in the joints and cross-ties.

The power, furnished by 1,000-volt generators, is distributed to reducing apparatus placed in boiler plate man-holes, at intervals varying in accordance with the number of cars required to be operated. At these various reducing points the current is transformed from 1,000 volts to a pressure of 20 volts, and put in direct communication with the tracks. This limit of 20 volts is fixed in order to prevent horses from being affected by the current. The economy of current is about the same as with the present system of trolley.

The car motors being wound with uninsulated copper wires, and the pressure of current being so low, there is entire freedom from burning out of armatures, as water can be poured upon the armatures without any ill effect. The problem of producing a perfect rail joint, and the picking up of a heavy current from a mud-covered rail, has been solved in a practical manner. The experimental road at Mr. Edison's laboratory is a quarter of a mile long, with a 6 per cent. grade and very short curves. It is operated successfully when the rails are entirely buried in mud or in dry sand.

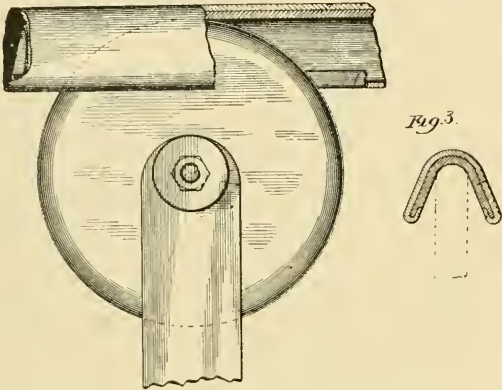
Mr. Edison is arranging to have the system placed in practical operation on a heavy traffic road in some large city, (probably New York), to demonstrate its practicability. This will be done during the coming year.

WHAT IS A ONE HORSE CAR?

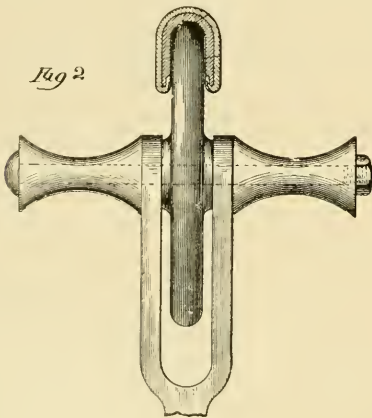
IT is not often that a judgment in the courts against a railway company is a victory, but when at the general term in New York City it was ruled that the Twenty-third Street Railway Company should pay some \$5,000 as license fees unpaid since 1881, there was rejoicing at headquarters. Under its organization act of 1858 the company was to pay \$25 per car per annum. The city fixed the license at \$50 for two-horse cars and \$25 for one-horse, of which latter class the road operated until 1881 when two horses were attached, although the same cars were retained. On this account the city claimed double fees, and the company made a test case. The court ruled that it is immaterial how the cars are drawn, provided they are what are generally known as one-horse cars. Here is an instance where a "one-horse" policy seems to have paid, but, there are exceptions to all rules.

SAFETY OVERHEAD CONDUCTOR.

A SOMEWHAT novel device has been invented and is being placed upon the market by Charles Sargent, agent for the Ide engine, of Chicago. It is a method intended to remove every element of danger from the overhead wire, which, instead of being rolled as heretofore in the shape of wire, is to be made of the same material, but in the shape of an inverted U, the upper and exterior portion of which is to



be covered with suitable insulating material, which is also lapped about the lower edges as shown in the illustration. The overhead conductor may be made in the form of the U, or if desired, in a shape more like that of an inverted V. A spool on either side of the trolley wheel, is carried on the same shaft, to prevent the trolley in flying upward from going past the wire. The device contains several



advantages not previously accomplished, one of which is absolute protection from sleet or ice, and while the new form of wire has a greater rigidity than round wire, it is not so to such an extent as to prevent its being coiled in spools of sufficient size for shipment and handling. The danger from cross wires falling upon or below the trolley wire is absolutely removed.

CREATED TRAVEL.

THE Eau Claire (Wis.) Street Railway, Light and Power Company plans an interesting thing for this winter's enjoyment of the patrons of its road. This is a skating rink 250 x 500 in dimension, within a stone's throw of the car line. It will be kept clear of snow. A ladies' pavillion is to be erected at once, and the rink will be in charge of a superintendent, who is to look to the comfort of the skaters. There is good skating on the pond now. Manager Wheeler expects to have entertainments and tournaments all through the season.

This scheme will undoubtedly have an effect on like advantages in other cities and the good rule of the greater the inducements the larger the traffic, will be borne out in still more ways.

Summer parks and dancing pavilions and winter skating rinks will further the profit and popularize the routes of many more railways when the managers become cognizant of their usefulness.

JACKSONVILLE PROGRESS.

BY early next spring Jacksonville, Ill., will have a fine line of electric traction. The work of reconstruction from horse to electricity was begun last September and now the only thing to be done is to hang the wire.

There is a project now working among the suburban property holders of the extreme west end to have the College avenue line extended in the spring south along City Place or Fair street to Mound avenue and west on Mound avenue past the elegant residence of B. F. Beesley. About half the money for the success of this plan is already pledged and it is believed that the rest can be easily secured. The equipment will be of the best and the road has flattering symptoms of success.

PERPETUAL MOTION.

THE primary battery for street car delusion has reached San Francisco, and the bold genius not only promises to run cars with a primary, but claims he has discovered a process by which, when the charge is worked out, all the original component chemicals are recovered and can be used again an indefinite number of times. When man can breathe without air and women can pass a new bonnet unnoticed, there will be hopes for the man and his process which can resolve the "original component chemicals" into their pristine vigor and usefulness. It is the old story of getting something for nothing, and which applies to the production and use of power as completely as in any other form of physics.

PUT A TACK IN NEXT TIME.—The Pittsburg Leader says of its mayor: "The mayor's powers are circumscribed, but not so very much so as to prevent him from sitting down plump on a tough street railway ordinance."

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

JOHN G. HOLMES, PRESIDENT, Pittsburg, Pa.
 THOMAS H. McLEAN, FIRST VICE-PRESIDENT, New York, N. Y.
 JAMES B. SPEED, SECOND VICE-PRESIDENT, Louisville, Ky.
 ALBION E. LANG, THIRD VICE-PRESIDENT, Toledo, O.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE-PRESIDENTS, and HENRY M. WATSON, Buffalo, N. Y.; LEWIS PERRINE, JR., Trenton, N. J.; W. WORTH BEAN, St. Joseph, Mich.; MURRY A. VERNER, Pittsburg, Pa., and THOMAS C. PENNINGTON, Chicago, Ill.
 Next meeting will be held in Cleveland, O.

Massachusetts Street Railway Association.

President, CHAS. B. PRATT, Salem; Vice-Presidents, H. M. WHITNEY, Boston, AMOS F. BREED, Lydd, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON Lawrence.
 Meets first Wednesday of each month.

Ohio State Tramway Association.

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice President; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus, Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice President, THOS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee, OFFICERS and C. B. THURSTON, Jersey City; H. ROMAIN, Patterson; LEWIS PERRINE, JR., Trenton.

The Street Railway Association of the State of New York.

JOHN N. BECKLEY, PRESIDENT, Rochester, N. Y.
 THOS. H. McLEAN, VICE PRESIDENT, New York, N. Y.
 GEO. LAW, SECOND VICE PRESIDENT, New York, N. Y.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—D. F. LEWIS, Brooklyn, N. Y.; C. DENSMORE WYMAN, New York, N. Y., CHAS. CLEMENSBRAW, Troy, N. Y.
 The next meeting will be held at Saratoga, September 20, 1892.

Alabama.

ANNISTON.—The Anniston Street Railway Company has perfected arrangements in New York for the sale of bonds sufficient to equip its line with electricity.

BIRMINGHAM.—The motor men and conductors on the street railway here have struck for 15 cents per hour, wages having been reduced to 12 cents on emergency.

Arkansas.

LITTLE ROCK.—An election of officers of the City Electric Railway, H. P. Bradford, formerly general manager was elected president, and will fill both offices from this time. Geo. P. Rows, was chosen vice-president; D. R. Brown, treasurer and W. H. Sutton, secretary. M. Allis retains his interest in the company but is relieved of active management.

California.

SACRAMENTO.—The Central Electric Railroad Company has secured the passage of an ordinance, being quite a liberal one, extending for fifty years, and allowing them to use any motive power except movable steam engines for the propulsion of its cars.

SAN BERNARDINO.—A franchise has been granted by the board of supervisors for an electric railway connecting Ontario with this city.

SAN FRANCISCO.—On January 1st, the Market Street Cable Company and the Ferry & Cliff House Company, began an exchange of transfers which is proving of great convenience to the public.

SANTA ROSA.—An eastern capitalist is here looking the ground over with a view to organizing a company for the construction of an electric line from this city to Petaluma. No trouble is anticipated regarding the right of way, and the road would handle freight as well as passengers, the intention being to put about twenty freight cars in service with a capacity of six tons each. The power plant will be erected in Petaluma on account of cheap fuel, and the intention is if the road is built to extend it further south to a distance of 10 or 12 miles.

Connecticut.

BRIDGEPORT.—The question of rapid transit is exciting no small interest here, and its present choice seems to be in favor of cable line.

FAIR HAVEN.—A representative of the Lewis & Fowler Manufacturing Company is here placing their car heaters in all the cars of the street car line.

Canada.

MONTREAL.—The employes of the street railway companies are suffering from "grippe" which prevails to such an extent as to materially interfere with the operation of its cars.

Colorado.

DENVER.—Since the opening of the cable line on Seventh Street, a very noticeable improvement has been observed in the activity and business done upon that thoroughfare which is now becoming a very busy one.

The old Park Hill Motor line will be transformed into an electric line early this year, and the power plant located at Park Hill. The plant will also furnish light for that Suburb.

The board of county commissioners have granted a franchise to F. Nicholson and others for the construction of an electric line from this city to Overton.

The Pueblo Street Railway Company have built and equipped seven miles of road with substantial improvements, and intend making further extensions during the present year. One hundred men are now carried on the pay roll.

Delaware.

WILMINGTON.—The electric line has been completed and is now in daily operation and running very satisfactorily.

District of Columbia.

WASHINGTON.—Representative Peel, of Arkansas has introduced a bill incorporating the Washington & Bladensburg Street Railway Company, with John H. Oberly, Clif. D. Maxwell, John J. Hassler, and others as incorporators. The proposed route is from Fifteenth street and Pennsylvania Avenue South, along Fifteenth street and other avenues. A bill was also introduced for the incorporation of the "Zoo" street Railway Company with E. L. McClellan, A. A. Biglow and others as incorporators. Capital stock \$100,000.

WASHINGTON & Brooklane Street Railway Company also desires to incorporate, and is being promoted by Harry Barton, T. B. Daniel, A. W. Harris and others. They seek to build a double track railway from Pennsylvania avenue and Sixth street to the district line, and have asked for the right to operate by cable, electricity, pneumatic or other mechanical power save steam on the street.

Dakota.

GRAND FORKS.—The questions of an electric road in this city is again being agitated, and promises to assume definite shape and it is hoped local capital will be interested to a sufficient extent to insure building in the early Spring.

Georgia.

BRUNSWICK.—The Brunswick Street Railroad Company has been sold to Northern capitalists, and it is intended to change the line to an electric one.

SAVANNAH.—The West Broad Street Electric Railway is making additions to its line and extension is also being made between the Isle of Hope Railroad and the present electric railway.

Illinois.

AURORA.—The proposed interest has again been awakened in the construction of an electric line from this city through North Aurora and Batavia, to Geneva, the county seat. The two principal stockholders, whose homes have heretofore been in the East, are now building residences in this part of the country, and there is every reason to believe that the line will be pushed in the early spring.

THE street railway company have contracted with the owners of the Downer Place addition to extend the electric line to that part of the city, in consideration of \$20,000 being the bonus paid. Work will be commenced immediately.

BELLEVILLE.—James Atterbury has refused to accept the electric railway franchise as offered by the city council. The mayor was authorized to open negotiations with other capitalists, with a view to securing the road, it being claimed that the conditions requested by Atterbury were unreasonable.

JOLIET.—The Joliet Street Railway Company has received a franchise for the construction of a street railway track on Raynor avenue, from Morgan street to Park Boulevard.

LINCOLN.—Christmas was celebrated in this city by the opening of the electric line which was quite successful.

MAYWOOD.—The citizens here are very anxious to secure an extension of the Cicero & Proviso Electric Road from the Des Plaines river to this village.

PEORIA.—The Peoria Rapid Transit Company, are asking for ordinances for the construction of street railway lines on a number of streets.

QUINCY.—The electric line here has been in operation one year from January 1st, and have made the remarkable record of having run constantly without an hour's stoppage or delay from any cause whatever.

Indiana.

INDIANAPOLIS.—The Citizens' Street Railroad, has issued a manifesto and hereafter will carry no more policemen, firemen, or their own employes free. A strike of several days duration was the result.

KOKOMO.—The electric railway was opened here on January 1st.

MUNCIE.—Good progress is being made in the construction of the track which will soon be completed to the suburbs of Avondale.

Iowa.

CEDAR FALLS.—The interurban proposed between Cedar Falls, Waterloo and Normal is now "looking up." The enterprise is backed by Des Moines capital under the lead of D. B. Lyons.

CLINTON.—At a special session of the city council, the State Electric Company was relieved from their obligation to build tracks on Third street and Tenth avenue, and the time was extended in which the prescribed lines must be in operation.

CEDAR RAPIDS.—The electric line between this city and Marion is now in operation and will be largely instrumental in still further uniting the interests of these two cities.

DUBUQUE.—Allen & Swiney have filed a trust deed for \$200,000 for the purpose of securing six per-cent bonds, proceeds of which will be applied to the reduction of a former issue to the extent of \$50,000 and the balance of \$150,000 to the extension of the railway and electric light plant.

INDIANOLA.—An electric line and manufacture of fuel gas are two enterprises under contemplation by the Warren Investment Company and the Indianola Board of Trade, and H. McNeil, D. W. Hartman, and W. H. Schooley are a committee to perfect organization.

SIoux CITY.—The Haakinson Street Railway has been completed to and make arrangements with the elevated road whereby their cars are run into the heart of the city.

WATERLOO.—The Waterloo, and Cedar Falls Construction Company has been organized, with D. B. Lyons, J. S. Poke, W. F. Stotts, and W. R. Humphrey, all of Des Moines. The incorporators are all business men and capitalists, and the object of this company is to build an electric line between the two cities named.

Kansas.

KANSAS CITY.—The defect which was discovered in the ordinance granted the Thayer-Enright Street Railway Company has been recited and the necessary amendment passed to make it valid. The ordinance has been signed by the mayor, and every thing is in shape now for the construction of the line. It will be distinctively a local enterprise.

Kentucky.

SOUTH COVINGTON.—Interest has been revived, in the project to change the line between this city and Cincinnati to an electric one. It is believed the traffic will amount to over \$100 per day.

Louisiana.

NEW ORLEANS.—The new car line is to be constructed beginning within 120 feet of the Canal Street Ferry and ending at Camp Street South Audabon Park. The new line will open up considerable portion of territory which now lack accommodation of any kind.

AT twelve o'clock on February 10th., at the Council Chamber in the city hall will be sold at public auction to the highest responsible bidder, the right of way for street railway purposes over a number of streets, including Canal, Wells, Rampart, Franklin, Jackson, Louisiana avenue, Howard street, and a number of others. The city reserves the right to reject any and all bids.

Maryland.

BALTIMORE.—The Stock Exchange and the Baltimore City Railway Passenger Company, are out, and the former have refused to list its securities any longer. Gov. Bowie, says it is on account of certain brokers trying to get commissions which they are not entitled to, and that he does not propose to make his policy according to the dictation of the Stock Exchange.

CUMBERLAND.—The wages of men have been reduced from \$1.75 to \$1.50 and conductors from \$1.50 to \$1.25 per day, reduction to continue for three months from January 1st, and wages will be reinstated in the Spring.

Massachusetts.

BOSTON.—President Whitney, of the West End has placed at the disposal of the railroad commissioners all necessary help, including his engineers, mechanics; shops, cars, etc., for the purpose of deciding upon some form of safety fender, which if approved by the commissioners will be adopted by the company.

PERMISSION has been granted to the West End Street Railway Company, by the aldermen of Somerville, to erect poles and wires for the electric system on all streets where tracks are now laid.

FALL RIVER.—A syndicate of Rochester, Syracuse and Boston men have taken the Globe Street Railway here and will substitute electricity as soon as the weather will permit.

LAWRENCE.—The street railway company is gradually disposing of its horseflesh. Of the 50 horses but 32 now remain. The prices received for the steeds were all the way from \$12 to \$170.

SPRINGFIELD.—The stockholders of the Springfield Street Railway Company are considering the advisability of a shorter and independent line to the Falls, which it will build this spring.

Michigan.

DETROIT.—The Springwells and Dearborn Street Railway Company wants a franchise for a cable or electric system.

GRAND RAPIDS.—J. Seligman and Senator Chauncey Wisener have purchased the Reed Lake line. The new owners are confident of success.

LANSING.—The Lansing Street Railway Company has been sold to the Continental Trust Company, of New York, and reorganized with a capital stock of \$75,000. O. M. Barnes and Nelson Bradley are the only Lansing Stockholders at present. A new power house will be erected and double track laid to the "fair" ground.

Minnesota.

DULUTH.—The electric line is now operating between this city and West Duluth, using the new viaduct for the purpose. The running time will be reduced before long.

ST. PAUL.—The abandoned street horse car barn on West Seventh street was burned recently and as it adjoined the horse barn which was burned a month ago, and itself has been on fire twice since that time indications strongly point to the work of fire bugs.

WINONA.—Work is progressing nearly to completion in the placing of the electric machinery for the street railway here, and it is expected that the road will be in operation in a few weeks.

ST. JOSEPH.—The People's Street Railway Company have commenced the erection of a carpenter and paint shop, 24 x 110 feet, and as soon as this is completed will begin a car house, 80 x 200 feet.

SIXTEEN new motor cars have been received by the People's line, to replace those destroyed by fire recently.

JOPLIN.—The city papers claim that the travel on the electric railway has increased three fold since the reduction of fares to five cents.

Montana.

HELENA.—The Union Railway Company, and the Helena, Hot Springs & Smelter Railroad have been merged in the Helena Rapid Transit Company, capital stock of the new concern is \$500,000.00. The incorporators are J. H. Lawrence, William H. Clark, A. K. Barbour.

BUTTE.—The new cable has just been received for the cable road here, from Washburn, Moen & Co. The one taken out of service was from the Roebblings and lasted 22 months.

New Jersey.

CAMDEN.—The Camden Horse Railway Company have begun the rebuilding and repainting of their entire car equipment.

JERSEY CITY.—Ground has been broken for the construction of a new electric railway between this city and Newark, the contract having been made with the Stanlee Bros. In this city the line will connect with the Jersey City and Bergen horse car system, and in Newark the terminus will be convenient for cars running to all parts of that city. The road is to be built with the Pennsylvania railroad money, and it is said to be designed as a practical test in open country, to learn what grounds exist for the prophecy that electricity will supercede steam as a motor. Running time is expected to be brought within half an hour, the cars having fifteen minutes headway, with a ten cent fare.

THE Jersey City & Bergen Railroad have purchased the old Jersey City baseball grounds for a sight for a power house. The change from horse to electric traction will cost \$800,000.

NEWARK.—The Business Men's Quick Transit Stage Company have put a line of stages in operation which run from Broad and Market street to the Mt. Pleasant Cemetery. They intend to run on fifteen minutes headway.

New York.

BROOKLYN.—The Brooklyn City Railway Company has retired bonds amounting to \$1,000,000.

THE managers of the elevated line have a project for running their cars over the bridge, and up to Harlem without change. This would be a great convenience to passengers, but in order to be accomplished would necessitate the widening of Washington street, for a considerable distance.

BUFFALO.—The North Village will soon have an electric road to the city. The contract for building the road has been taken by the United States Railroad Construction Company of Chicago, and it is to be commenced in sixty days, which will be about February 1st.

ON January 7th, the additional fare system for transfers was done away with, and the transfer ticket carried by the conductor went into use, and the passengers can now ride from one part of the city to another for a single fare.

ITHACA.—A. C. Robertson, Jesse Morgan, H. Carpenter, et al., of Wilkes-Barre, Pa., have secured control of the Ithaca Electric and will extend it to the University

NEW YORK CITY.—Conductor Hewett, of the Third Avenue Railway Company, who was arrested for violating the city ordinance in not running his car after 2 o'clock on Sunday morning, has been released, the judge holding that if the ordinance was violated the conductor was not responsible therefore.

THE demand for additional night cars on the elevated line and for night cars on the cable line is becoming very strong. The amount of business which is carried by the night cars on the "L." road since they were put on has been very surprising.

ONEIDA.—The railroad commissioners have granted the Oneida Street Railway Company permission to suspend operations during the winter months.

PORT RICHMOND.—The Port Richmond & Park Railway Company have received a franchise for the construction of an electric line on the streets of that village. The officers are: William T. Wordswell, president, Col. Alexander, F. Bacon, E. B. Clarke and A. B. Funk, directors.

ROCHESTER.—William Rosborough, formerly foreman of State street barn, has been appointed assistant superintendent of the Rochester Railway Company.

North Carolina.

WILMINGTON.—The Wilmington Street Railway has been transferred to the syndicate of which J. H. Barnard is at the head. The location for the power-house will be settled in a few days, and in the meantime specifications are being received for a steam plant and electrical equipment both in power-house and on the line. Two 100-horse-power engines, and a boiler capacity of an equal amount will be required. Girder rails will be used, and the new cars will be 26 feet long, and take the place of the old bob tails which have heretofore been in service. W. H. Howell will remain as superintendent, for the present at least.

Ohio.

CIRCLEVILLE.—An active canvass is being made to secure the right of way for an electric railway.

CLEVELAND.—An effort is being made toward an arrangement whereby the various street car company's of the city shall issue tickets interchangeably good on the other lines.

COLUMBUS.—The ordinance regulating the speed of cars, has been finally passed, and places the rate at eight miles down town, and fourteen miles on other streets. The Consolidated Company are petitioning for a franchise for an extension of its tracks on Chestnut street North which undoubtedly will be granted.

THE fight which has been going on for upwards of two months between the Consolidated Company and the new Electric Company has been decided by the board of public works in favor of the former, to whom they recommend the council for the passage of the desired ordinance. This will enable the company to go ahead and make the extensions desired which are much needed to complete the system.

FREMONT.—The Electric Railway is to be extended to Bellevue and Stony Point.

GALION.—The Suburban Electric Company, of which N. Sager is chief engineer are seeking franchises for the construction of a number of miles of electric road.

NORWALK.—City Council have passed an ordinance granting E. Blackman of Toledo, the right to construct an electric line in the streets of the city.

SANDUSKY.—The People's Electric Street Railway Company have completed the track laying from the Soldier's Home for a considerable distance towards Milan, but have temporarily suspended work on account of want of material, and inclement weather. The power will be furnished by the Sandusky Electric Light Company, who have ordered a 100 horse power engine from the Ball Engine Works, of Erie, for this purpose, and will soon place an order for another engine of still greater capacity. The project to build the line direct to Milan will be taken up for consideration this month, and it is more than likely the road will be built by the first of July, as great interest is exhibited in the project, and the people all along the line are willing to assist in the enterprise.

TOLEDO.—The Mayor has been sustained in his veto of the ordinance which requires conductors on all cars.

THE scheme is again being agitated for a line connecting this city with the villages of Perrysburg and Maumee, for which a franchise has already been granted by the Perrysburg council to John W. Barton, cars to be propelled by electricity or compressed air.

WASHINGTON COURT HOUSE.—S. N. Winn, of Zanesville, is taking up the matter of an electric railway with the city council, and is meeting with good success in his efforts among the citizens.

WESTERVILLE.—At a special meeting of the city council all the necessary rights were granted to this city for the Westerville and Columbus Electric Railway.

Pennsylvania.

PHILADELPHIA.—The Philadelphia Traction Company have an agreement for the purchase of a piece of property, 150x200 feet, at the corner of East Montgomery avenue and Ball street, which they propose converting into a building for a large car house.

ANOTHER candidate for favor in the construction of an elevated road is the Quaker City Elevated Railroad Company who desire to build from Front and Market street, to the intersection of Ninth and Market, and out to Ridge avenue on Lehigh avenue with various branches. The provision to the ordinance are about the same as those of the North Esterville recently passed.

PITTSBURGH.—The franchise of the proposed Birmingham Homestead & Munhall Electric Railway, has been purchased by the Pittsburgh & Birmingham Traction Company.

MAYOR GOURLEY, signed the ordinance making it compulsory on all street cars to come to a full stop before crossing the tracks of another line

THE Pleasant Valley Street Railway Company has restored the twelve hour basis for its conductors and drivers in place of the nine hour, with which the men were not satisfied. Under the old arrangement they received \$1.80 per day, and now are paid \$2.25.

HARRISBURGH.—The East Harrisburgh Passenger Railway Company and the Steelton, Highspire & Middleton Street Railway Company are asking for right of way on Second and other streets.

ERIE.—The stockholders of the Erie Motor Company, have voted to increase the bonded indebtedness of the company in the amount of \$50,000, to be used in further extension.

Rhode Island.

NANTUCKET.—The Nantucket Beach Street Railway Company, of which John F. Simmons is at the head, has petitioned a second time for a right to extend its tracks to Siasconset. Electricity will be used if the franchise can be obtained.

PROVIDENCE.—The Olneyville business men have asked for an extension of the trolley system to Olneyville.

THE Inter-state Street Railway which first sought its franchises in the spring of 1890, have after a long and hard fight surmounted all obstacles and hope to have their line in operation by the 1st of next June.

Tennessee.

NASHVILLE.—In the mention in this column last month that the employes of the Electric Railway & Power Company had all stopped work on account of their not being paid regularly, perhaps conveys the wrong impression and works an injustice upon the other and larger company, the United Electric Railway, to which it has in no way any connection. The company with which the trouble occurred is a small affair operating but a few cars.

NASHVILLE.—The United Electric Railway has executed a trust deed to the National Trust Company in the amount of \$200,000. A feature of the bonds being that the coupons are payable in cash or at the option of the holder, in tickets at the rate of 25 for \$1.00.

THE United Electric Railway on January first abolished the system of passes to make the same apply to its own employes and officers as well

KNOXVILLE.—The residents about Knoxville have raised a subscription to secure the extension to the electric line to their suburb, a distance of two miles.

Texas.

DALLAS.—The North Dallas Electric Railway which has been idle ever since the latter part of the summer has resumed operations.

FORT WORTH.—The Fort Worth & Dallas Rapid Transit Company has been organized for the purpose of constructing an electric line Messrs. John A. Jones, F. M. Butler, of New York, are among the incorporators and Charles F. Schuyler, of Fort Worth, Texas, is one of the promoters here. The estimated cost is \$500,000 and engineers have already accomplished a good part of the survey. It is intended to have the road in operation by July first of this year.

GALVESTON.—The Galveston City Railway, in closing their accounts for the year, find that they have carried 3,120,000 passengers, and that the net earnings for the year will be \$60,000. In view of the fact that during a large part of the year 1891, a greater or less part of the line was torn up undergoing reconstruction in changing from mules to electricity, the showing made is a highly gratifying one and reflects much credit upon the able management of Col. W. H. Sinclair, president.

Utah.

SALT LAKE CITY.—W. P. Read, superintendent of the Salt Lake City Railway Company, was presented with a handsome gold watch and chain by his employes as a New Year's present.

ELECTRICIAN A. Smith, formerly of the Ogden Street Railway Company, has left for Tacoma

Virginia.

RICHMOND.—The colored population are much stirred up over recommendation by Governor McKinney to the Legislature, to have separate cars, and mass meetings are being held to discuss the question.

ROANOKE.—The Crystal Springs Company has commenced the completion of its line begun some time ago, and expects to have the same done within a week or ten days. A 'T' rail is used, and the track is being bonded for electricity, although horse-power will be used at first.

West Virginia.

HUNTINGTON.—F. N. Fordyce, of Detroit, has petitioned the city council for franchise to construct an electric line here, which is intended to reach to Ashland. The scheme embraces the building of a bridge across the Big Sandy, and carrying of passengers for 10 cents. It is believed the line will do a profitable business from the start.

Washington.

FAIR HAVEN.—The Street car line between this place and New Whatcom will be completed in about thirty days.

SEATTLE.—The Consolidated Street Railway Company has placed insurance with the Casualty Insurance & Security Company of Baltimore, Beecher, Schenck & Benedict, on New York General Manager's to the amount of \$100,000 against all liability on account of damage to persons.

WALLA WALLA.—An electric system of street cars to supplant the present horse car line is now practically assured and the company has an option upon the Isaac Flouring Mill property, with which they intend to run the generators by water power. The stockholders have appointed a committee consisting Ex-Governor Moore, William Kirksman and W. P. Wimans with full power to act in the matter.

Wisconsin.

GREEN BAY.—Two franchises are pending in the council, one for C. H. Higgins who owns the trolley railway at Marinette, the other for Holmes & McNair of St. Louis, both of whom are desirous of securing a permit to construct an electric railway.

JANESVILLE.—C. B. Haines who built the motor line between Ann Arbor and Ypsilanti, has purchased the street railway system here and will convert it into an electric line.

LA CROSSE.—W. Cahill, D. E. Edwards, and Henry Gund have been on a tour of inspection of electric railways in various western cities, and have returned with the decision of putting in an electric system here in the Spring.

MILWAUKEE.—On January 1st, National avenue, Read street, West Water street and Walnut street lines were opened under the electric systems.

UPON January 1st the White Fish Bay Dummy Line was transferred to the Milwaukee Street Railway system, and is now in charge of Manager Lynn.

THE NORTH WEST THOMSON-HOUSTON COMPANY, located at St. Paul have handled a large amount of business the past year in railway supplies, having sold 350 motors and generators aggregating in all five thousand horse power, and numbering thirty machines. Among them were five generators for the Minneapolis Street Railway, of 335 horse power each. A duplicate order has just been placed for five more of these machines, which will be installed as soon as they can be made. The president of the company is H. M. Bylesby who has held that office since the first of last May. He was formerly connected with the railway department of the Westinghouse Company. S. P. Wells Jr. who was also connected with the Westinghouse Company has charge of the railway department, and A. J. Gifford, who will be remembered as being connected for some time with the Northern Car Company, is also engaged in railway work for the North West.

A LETTER from the Allentown and Bethlehem Rapid Transit Company, Allentown, Pa., to the Burton Electric Company is as follows:

ALLENTOWN AND BETHLEHEM RAPID TRANSIT COMPANY.

ALLENTOWN, PA., Dec., 10, 1861

BURTON ELECTRIC COMPANY, Richmond, Va.

DEAR SIR:—Please ship eight more electric heaters with switches, being the equipment for two cars same as we had before. They are giving excellent satisfaction and are liked by the patrons of the road much better than the stoves.

(Signed)

Yours truly,
A. H. HAYWARD, Superintendent.

Further orders have also been received from the Benson & Halcyon Heights, Omaha, Neb.; Edison General Electric Company, Portland, Ore.; Maschinenfabrik Oerlikon bei Zurich, Switzerland; Newburyport & Amesbury Horse Railroad Company, Newburyport, Mass.; Warrensburg Electric Light Company, Warrensburg, Mo.; The Aspen Mining Company; Aspen, Col., have also ordered four sets of electric heaters for use in the company's motor stations.

THE MCGUIRE MANUFACTURING COMPANY, Chicago, are in receipt of a cash order from Berlin, requesting the immediate shipment of one of their No. B. 19 trucks, and which will undoubtedly be adopted in that city. Among other foreign orders recently received is one from Melbourne, Australia, for which the company give THE STREET RAILWAY REVIEW credit as they have no representative there.

THE Twin City Commercial Club, composed of leading business men in St. Paul and Minneapolis, tendered Thomas Loury a complimentary banquet January 11th, as a public testimonial of his services in the construction of the electric lines in these cities.

At half past ten on the night of January 14th, a Forty-seventh street car of the Chicago City Railway, was struck by a Pennsylvania passenger train running 40 miles an hour, killing two and seriously injuring nineteen of the occupants. The safety gates were raised at the time.

TRACK WIRING.

THE Woodland Avenue & West Side Street Railway Company, of Cleveland, which a few months ago voted to change its line to electricity, has taken advantage of the good weather of the fall and have already accomplished a no small amount of work.

Six miles of new rails have been laid, of 82 pound girder on oak ties, which are 2 feet from center. The ties are 5x8 inches by 7 feet in length, and the joint ties, 5x10 inches of the same length. A tie is placed on each side of the joint within 6 inches, and tie rods are placed every 6 feet. Five difficult curves have already been laid of the same 82 pound girder rail which have been built in Cleveland under a plan which has been worked out by the company itself. The track wiring is done with No. 00 galvanized iron wire, one wire to each rail, and one rail bond of the same material inside of the rail and one on the outside, making two bonds at each joint with the necessary cross connection. The general opinion of street railway men as to the track wiring has undergone change within the last year. It was formerly believed that nothing but copper wire would answer for track work, and that there should be one wire for each track and one rail bond to the joint. Later it was thought there should be two wires to each track, or one to each rail, and one bond at joint, all of copper. A little later the company was advised to lay the wire for each rail in double bonds, to the joint, and all of galvanized iron, on account of the chemical action between copper and steel rail when each are charged with electricity, as it is supposed to eat the copper. The company are now advised from one of the largest motor firms to use no track wire at all, except to double bond the joint.

In this connection it is interesting to note the test recently made of the rails of the Duplex Street Railway Track Company in Brooklyn, as reported by Townsend Wolcott who makes the following very satisfactory report on that rail as furnishing electrical continuity without bonding. He says:

"I have examined according to your request, the section of track furnished to the Atlantic Avenue Railway Company, Atlantic and Third avenues, Brooklyn, by the Duplex Street Railway Track Company.

The track is so keyed together for the purpose of securing mechanical continuity and strength, that electrical continuity is at the same time secured, thus rendering the track a good electrical return for trolley or conduit roads, without any other bonding than that which is a part of the system and which does not involve extra expense as do the ordinary methods of bonding.

I made a bridge test of the above-mentioned section and found the resistance too small to give an indication on the bridge, although the latter showed .1 ohm very plainly. The test current had to pass through two keys and around one complete joint.

I think this track when properly laid, will be found practically equal to a continuous rail both mechanically and electrically."

CHICAGO NOTES.

L. E. MYERS, who was for many years connected with the Edison Company, has been appointed general western agent of the Detroit Electrical Works, and will open an office in this city in a few days. His large acquaintance with street railway men and thorough knowledge of matters electrical will be a sufficient guarantee that the interests of his company will be fully looked after.

THE owners of property on and abutting 75th street, have offered the City Railway a bonus of \$40,000 if it will immediately construct a cross-town line on that street. In all probability the line will be built as soon as the frost is out of the ground.

THE rate of fare from the heart of the city to the World's Fair grounds have been fixed as follows: Elevated road, 10 cents; cable, 5 cents; Illinois Central, 10 cents, each way. The round trip by water will be 25 cents.

THE alley "L" road which has been under construction for the last two years, will be in operation April 1st, the entire track from 39th street to Congress being now completed with the exception of one small gap which will soon be filled. Twenty motors have been ordered from the Baldwin Works, and the company has floated all the bonds necessary to enable it to finish construction and purchase equipment.

AT the annual meeting of the West Side Street Car and Conductors Association, Thomas Croake was elected president for the fourth time.

THE committee by the Mayor to investigate the question of rapid transit here, and suggest additional means for providing for the immense volume of passengers has done little beyond making a careful investigation and reporting that the down town loop facilities were wholly inadequate, a fact which the railway companies have known for a long time, and have and are now making desperate efforts to secure franchises for.

THE Thomson-Houston Company are understood to have practically closed a trade with the Pullman Company for land at Pullman, on which the former will erect a branch, manufacturing for all departments.

NORTH CHICAGO STREET RAILROAD.

held its annual meeting January 12th, and elected as directors, Chas. T. Yerkes, Chas. Henrotin, Chas. A. Spring, Jr., Wm. L. Elkins, and W. D. Meeker.

| | | | | |
|---------------------|---|---|---|-------------|
| Receipts, | - | - | - | \$2,304,610 |
| Operating expenses, | - | - | - | 1,691,152 |
| Net income, | - | - | - | \$613,458 |

Dividends of \$400,000 have been paid and a surplus, the accumulation of several years, amounts to \$629,864. The net profit was 12¼ per cent. against 10.3 per cent. in 1890.

WEST CHICAGO STREET RAILROAD.

The annual meeting of the West Chicago Street Railroad was held January 12th, and the following directors elected: Chas. T. Yerkes, Norman D. Frazer, John B. Parsons, Wm. L. Elkins, and R. C. Crawford.

The treasurer's report showed the following statement:

| | | | | |
|---|---|---|-------------|------------------------|
| Gross receipts, | - | - | \$4,169,200 | Increase. \$505,819 |
| Operating expenses, | - | - | 2,468,179 | 265,411 |
| Net receipts, | - | - | \$1,701,021 | \$240,408 |
| Fixed charges, leased roads, interest, taxes, | - | - | \$832,341 | \$76,592 |
| Balance applicable to dividends, | - | - | \$868,680 | \$163,816 |
| Dividends paid, | - | - | 600,000 | |
| Balance to surplus, | - | - | \$268,680 | |

The operating expenses were 59.20 per cent. of the gross receipts. The number of trips was 1,774,235; the number of miles run, 14,638,414; the number of passengers carried, 85,613,004. The number of passengers carried in 1890 was 75,152,694. Other details were as follows:

| | | | |
|--|---|---|-------------|
| Gross receipts, horse railways, | - | - | \$2,464,759 |
| Gross receipts, cable railway, | - | - | 1,704,441 |
| Operating expenses, horse railway, | - | - | 1,742,119 |
| Operating expenses, cable railway, | - | - | 726,058 |
| Miles run by horses, | - | - | 8,785,242 |
| Miles run by cable, | - | - | 5,853,172 |
| Number of horses on hand, | - | - | 3,799 |
| Average number of miles per horse per day, | - | - | 12.98 |

The former officers were all re-elected.

CHICAGO CITY RAILWAY

elected officers and directors as follows on January 15th: president, G. H. Wheeler; vice-president, J. C. King; assistant superintendent, M. K. Bowen; treasurer, T. C. Penington, and secretary, F. R. Greene. Directors are G. H. Wheeler, L. Z. Leiter, D. K. Pearsons, S. W. Allerton, E. M. Phelps, J. C. King and W. B. Walker.

| | | | |
|--------------------------|---|--------------|--------------|
| | | 1890 | 1891 |
| Receipts | - | \$ 3,436,748 | \$ 3,873,198 |
| Operating expenses | - | 2,297,651 | 2,534,316 |
| Net | - | \$ 1,139,097 | \$ 1,338,882 |
| Dividends | - | 600,000 | 750,000 |
| Interest | - | 220,270 | 216,585 |
| Maintenance track | - | ..... | 31,474 |
| Maintenance cable | - | ..... | 11,616 |
| | | \$ 820,270 | \$ 1,009,676 |
| Surplus | - | 318,827 | 329,205 |
| Net earnings, per cent | - | 18.37 | 17.27 |
| Passengers, No | - | 68,734,969 | 77,463,965 |
| Miles run | - | 17,599,680 | 19,453,610 |
| Average earnings per day | - | \$ 9,415 | \$ 10,611 |

Operating expenses per car mile was 9.369 cents for cable and 23.334 for horses. Expense per passenger on cable lines was 2.60 cents and 4.64 on horse lines. Feed and care of horses was 55 cents per horse per day.

PERSONALS.

W. R. GARTON, Superintendent, Keokuk, Iowa lines, was seriously injured by being struck on the head by a large door which suddenly blew shut.

E. W. DAVIS, who has been superintendent of the Fifth Avenue Traction Company, Pittsburgh, ever since it was cabled, is to take the management of the Marshall Foundry & Construction Company of that city. William Elkins, son of president Elkins, succeeds him, and the management of both the Fifth Avenue and the Duquesne roads will be directed by President Elkins.

W. W. BEAN, president of the St. Joe and Benton Harbor, Mich. lines, was a recent welcome caller. He intends equipping with electricity.

THOMAS LOWRY, Minneapolis, was in the city the present week.

H. H. EUSTIS, president and electrician of the Eastern Electric Cable Company, of Boston, was in the city a few days ago and favored the REVIEW with a very pleasant call.

PRESIDENT W. H. SINCLAIR, of the Galveston City Railway Company was in the city a few days the early part of the month, and called upon us to offer the kindly greeting and good wishes for which this genial representative of the "Lone Star State" is so famous.

E. E. HIGGINS, general manager of the Short Electric Railway Company of Cleveland, was in Chicago a few days, looking after the interests of his company here.

J. E. WHITTLESEY, of New York City, general sales agent of the Gilbert Car Company, Troy, N. Y., made the REVIEW a very pleasant call a few days ago.

A. S. CHASE, the well known street railway manager of Duluth Street Railway, is spoken of as a candidate for mayor of that city.

CHARLES P. SHAW, of New York, who has been very ill and undergone two operations, is slowly improving.

ROBERT G. ELLIS, junior member of the Ellis Car Company, Amesbury, Mass., was in the city a few days since, and favored the REVIEW with a call.

ANDREW WHITTON, chief engineer of the traction line in Philadelphia, is suffering from a protracted illness, from which his physician does not promise a recovery for several months.

CAPTAIN JOHN HALL, the Peoria pioneer and president of the Fort Clark road, was in the city on the 14th inst.

CHARLES WUSTENFIELD, general manager of the Elgin lines, called recently. The road there is a splendid success in every way.

A. L. JOHNSON, C. F. Morehouse and C. E. Grover, of Cleveland, were in Chicago a few days ago inspecting the Calumet Electric Railway, with a view to purchasing or building new lines here.

E. B. LINSEY, Secretary of the Sheffield Velocipede Car Company of Three Rivers, Mich., favored us with a friendly call.

PORTLAND POINTS.

PORTLAND, ORE., Jan. 5.

The different street railway companies formed an association at the close of the year, and abolished the issuing of passes. The business had grown to enormous proportions and the companies found it necessary to protect themselves in this manner.

J. E. Thielsen, superintendent of the Nuttnomah Street Railway Company, returned New Year's day from an eastern trip, but is confined to his bed with the typhoid fever.

The Columbia Car Works is building two narrow gauge cars for the City & Suburban Railway Company's Mt. Tabor Motor line. They will be equipped with the Eames vacuum brakes.

The rain of the last month has caused a great deal of annoyance to the different street railway companies here. The Nuttnomah Company had their track flooded on Twenty-first street by the overflowing of a sewer, and the Metropolitan had some bad slides on their Fulton Park line.

The new extension of the cable has ceased operations owing to the bad weather, and work has been much delayed on the City & Suburban. The G street extension East Side, has been begun and will be finished by spring.

A new use was made of a T. & H. car on the Morrison Street Bridge line a few days ago. A large amount of drift had piled up against a pier, and being found impossible to dislodge it by a straight pull, a line was made fast to it and attached by means of a pulley to the car. After a couple of pulls the drift wood was loosened and floated down the river.

H. C. Campbell, general manager of the City & Suburban Railway Company, has returned from a business trip to Boston, New York and Chicago.

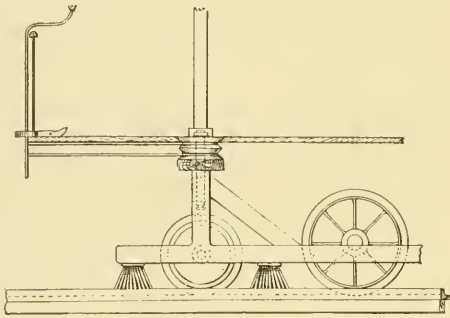
The house moving ordinance is still hanging in the council, but street railway men think it will come their way.

The papers of the city are agitating the carrying of freight by the suburban lines, there being now about thirty miles of these lines around the city which would handle a vast amount of small sized freight for the residents. At present roads are not allowed to carry freights but the benefit would be more to the residents than the operating companies; although it would have a tendency to build up outside property.

THE power house of the Uniontown, Pa., electric railway burned on the 12th inst. Loss \$30,000, no insurance.

TRANSMITTER AND ICE BREAKER.

A NEW device for electric roads has been invented by Charles Smith, of Wilkesbarre, Pa., and is illustrated below. It consists of two pair of steel brush conductors and an ice breaker for each rail and is depended from the front platform of the car. It can be raised and lowered with a screw motion by a brake-staff operated by the driver, and is intended for use when the rail is covered with snow or dirt. The sharp steel circular knives cut the ice from the rail and allow the brushes to make a good contact for the return current when the wheels may not be able to do so. When the car motor strikes a "dead-lock" on account of obstruction to the current passage, then the transmitter is brought into play and a lead is made for the current enabling the car to proceed. The device is simple, easily attached to a car and will last a long time.



SMITH'S TRANSMITTER AND ICE BREAKER.

ALWAYS DID COME HIGH.—The Seattle Telegraph says: One of the street railroads is asked to pay \$12,500 for injury to the head and left hand of a city councilman. At this estimate the total value of a councilman would be something like \$100,000. The figures seem high at first glance, but perhaps people have been in the habit of underrating our councilmen. They may be more valuable than they appear.

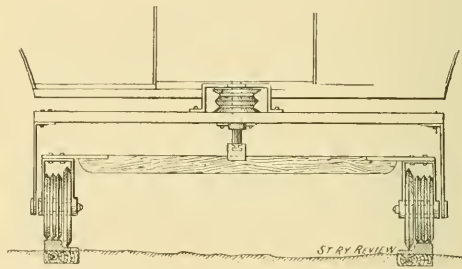
THE report of the special committee, O. T. Crosby, on standards in Electric Street Railway Practice, read at Pittsburg Convention; and the annual address of President Henry M. Watson, both of which it was voted to publish in pamphlet form to be mailed to the street railways of the country, have been sent out by Secretary Richardson, to whom we are indebted for copies.

IT is claimed that the constant climbing of stairs to reach the stations of the elevated roads in New York and Brooklyn, has induced a large amount of heart disease among passengers who are inclined to hurry at such places.

A NEWARK girl has recovered \$7,500 from a horse car company for the loss of a foot. At that rate a girl five feet tall would be worth \$37,500. It is well to have a fixed rate in these matters.

MARRIED.

In this city on Wednesday December 23 occurred a delightful social event, which will be learned with interest by the large number of the groom's friends in railway circles. It was the marriage of Mr. Robert Buchanan Pierpont, to Miss Alice Mae Cadwell. Soon after the ceremony the bridal party left for the East where after travelling a couple of weeks they will be at home during January at 119 Walnut Avenue, Boston;—the residence of the grooms parents. They will then return and reside at 6127 Sheridan Avenue, this city where they will be at home after February 10th. As western manager of the Gould & Watson Company Mr. Pierpont has made an enviable record and hosts of friends, and it is a needless pleasure to add that the bride is a most charming and cultivated young lady, the centre of a large circle of friends.



ST. RY. REVIEW

SUPERINTENDENT SAYRE, of the Jersey City & Bergen Horse Railroad Company, received recently a letter enclosing a \$50 note. The writer said he had been a conductor on the road and had "knocked down" fares. He expressed a hope that Mr. Sayre would be honest enough to turn the money over to the company.

TOM JOHNSON, of Cleveland, says he will build a standard gauge line from Wellsville to Salem via New Lisbon, in the spring, provided the county commissioners will grant a franchise and allow him to charge 25 cents fare.

THE Columbus, (O.) State Journal has a stroke, and gives vent to its feelings with:—A citizen of Chicago has just discovered, or thinks he has, that the grip is traceable to the electricity generated for lighting and running the street cars. He probably means the cable cars, as they cannot move unless they have the grip—on the rope.

THE recent snowstorm in New York City, seems to have offered as much of an impediment in the operation of the elevated line, as to the surface roads.

THE city council of St. Louis, have repealed the franchise of the old Citizens' Horse Railway Company, which has been notified to remove its tracks. Here is a chance for a new rapid transit line.

The cars of the North Chicago Street Railroad are ornamented within these days with neat signs suspended in conspicuous places as follows:

CLEANLINESS IS NEXT TO GOODLI-
NESS, THEY SAY! WE CAN'T BE
GODS, BUT WE CAN BE CLEAN. DO
NOT SPIT ON THE FLOOR.

It is to be hoped the results will follow.

R. T. WHITE, Mills Building, New York, has sent out an attractive calendar for 1892.

THE directors of the Brooklyn "L," invites bids for extension of Broadway & Lexington Avenue lines.

THE Broad Ripple Company, of Indianapolis, are again before the Board of Public Works for a franchise.

WM. E. AVERY, of Detroit, and Chas. Jay, of Kokomo, want to build a line in Indianapolis to the Fair grounds.

THE Teuscher Distillery, St. Louis, has been bought by James Campbell, who will convert it into an immense electric power house.

G. W. CUSTER, District Agent for the Edison General Electric Company, who has been stationed at Denver, Col., died recently at Schenectady, N. Y., while in that city visiting the Edison works. He took cold and was ill but a few days.

E. E. HIGGINS, General Manager of the Short Electric Railway, of Cleveland, suggests to Secretary Hornsby, of the department of electricity of the World's Fair, that the Exposition, may secure without cost, the five miles of street car track for transporting visitors on the grounds among the various electric railway manufacturing company's for equipment and operation—power to be furnished free by the Exposition and the companies to do the rest.

Why He Got Up.

He occupied a seat next the stove, before him stood a delicate woman who could only just reach the strap by which she tried to steady herself as the car lurched forward, and which threw her against the sitter's knees every half minute or so.

The two—the strong man on the seat and the frail woman suspended to a strap—occupied their relative positions until the car reached Forty-fifth Street, when the sitter essayed to rise.

"Don't, get up, I beg of you," said the lady.

"But, madam!" he expostulated.

"I can stand very well, thank you. Don't disturb yourself for me."

"But I——"

"No; I insist; keep your seat, I have really but a little to go."

"Well, I'd like to oblige you," blurted out the chronic sitter desperately, "but this is where I get off."

WHICH IS THE FAVORITE?

The Chicago, Milwaukee & St. Paul Railway takes the persimmons. A prominent railroad official declares the vestibuled limited is "out of sight."

I was in the office of the Advisory Board of the Northwestern Traffic Committee in Chicago, the other day. A prominent official, well known in the Twin Cities (St. Paul and Minneapolis) for his ability and geniality, was looking over the pool sheet for October which a clerk had just made out.

"There's quite a traffic between Chicago and the Twin Cities," the official remarked, as he produced a "Jay Gould Favorita," a high grade railroad cigar of the period, "and it is a constant source of wonder to me how the Chicago, Milwaukee & St. Paul road maintains its lead in passenger traffic, considering the immense competition. Just look at this pool sheet," he continued. I read: "The Minneapolis-St. Paul-Chicago lines carried over 13,000 through passengers in October. The advisory board after a thorough examination of the reports ordered the following percentages:

| | PER CENT |
|--------------------------------------|----------|
| Chicago, Milwaukee & St. Paul..... | 30 |
| Chicago, St. Paul & Kansas City..... | 17 |
| Albert Lea..... | 08 |
| Northwestern..... | 19 |
| Wisconsin Central..... | 19 |
| C. B. & N..... | 07 |

Total..... 100
I asked to what he attributed the fact that the "St. Paul" got more than one-quarter of the through travel between Chicago and the two big Minnesota towns.

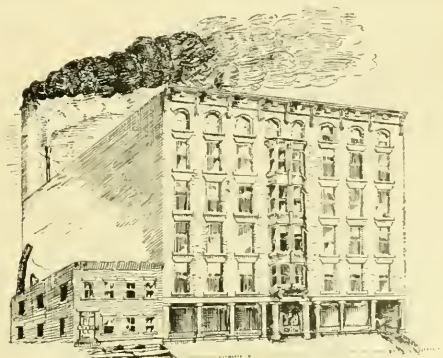
"There is only one reason after all," he replied. "The public prefer the Chicago, Milwaukee & St. Paul Railway because its management inspires confidence; because its trains are the most luxurious; because one may always rely on getting to a given destination on time. This is not the history of a day, or a week, or a month, but it is the regular thing. As you know, I got my training on a competing road, but I must acknowledge the corn: The Chicago, Milwaukee & St. Paul is first in the estimation of the people. Did you ever try their vestibuled limited train between Chicago and St. Paul? If not do so and you will understand the reason for that 30 per cent—Railway and Hotel News.

The Usual Way.

City Editor (sternly)—What do you mean by heading this item, "A Slight Mishap on the Twenty-third Street Line?"

Assistant—"Why, the man wasn't hurt: the car merely run over his wooden leg.

City Editor—Never mind, sir: head it, "Under, the Juggernaut' Wheels." I'm afraid you'll never do for the newspaper business!



DIDN'T DID
ADVERTISE IN THE STREET RAILWAY REVIEW.

ECHOES FROM PUGET SOUND.

SEATTLE, WASH., Jan. 9, 1892.

Power has changed in on the South Seattle Street Railway on Commercial street, from steam to electricity, and one car is now making trips half hourly each way. Another car will shortly be put on the line and a 17-minute service then be given. The electrical equipment was put in by the Thomson-Houston Company, and for the present the power is supplied by the wires of the Consolidated Railway Company. Transfer tickets are issued for the Front street cable road, with which the South Seattle line connects, and a joint 5-cent fare is made.

The Front street electric road is nearly completed. The Union Trunk line will supply power for the present, but the Front Street Company is planning a power house of its own.

Two fine new combination cars for the Front street cable road have just been completed by F. W. Woodman. One of them is running on the road and the other is being mounted on trucks at the power house and will be ready to run in a few days.

The Union Trunk line is arranging to transfer all its passengers at the power house, where the three electrical branches join the cable which runs up the hill. Heretofore the heavy electric cars have been coupled to grip dummies and run up and down the hill. It has been found, however, that this plan puts an unnecessarily great strain on the cable. At the power house a passenger depot covering a space 75 x 100 feet will be erected. There will be an iron roof supported by iron pillars and girders. The cars will run in there from the branch lines and the transfers be made under cover. The dummies now on the cable line will be replaced by cars that can be open or closed according to the season. These new cars will have an aisle in the middle, and on each side seats like those in an ordinary railway car, but smaller.

A recent heavy wind blew the roof from a Front street cable car and threw many trees down across the tracks of the lines running out into the suburbs.

The Rainier Power & Railway Company has executed to the Union Trust Company of New York a trust deed for \$500,000.

On January 2d Colonel J. C. Harris, counsel for the Front street and the Madison street cable companies, died at the age of 43.

The Consolidated Street Railway Company has insured for \$100,000 with the Casualty Insurance & Security Company of Baltimore.

F. M. Muldoon has sued for \$12,000 the Seattle City Railway, which operates the Yesler avenue cable line. The complainant alleges that on June 23, 1891, while rounding a curve, the gripman neglected to drop the cable; as a result the car was stopped, and he was dashed to the street so violently that he had his head, face and ear cut and wounded, his left hand crushed and his left arm driven against the stones on the street. He alleges that these injuries are permanent, and are liable to shorten his life, besides incapacitating him from following his vocation, by which, before the time of the accident, he was capable of earning \$500 a month. As a matter of fact he was riding on a pass at the time for he is one of the city concilmen.

Chin Hung, a Chinese cook, has sued the Rainier Power & Railway Company for \$2,000 damages for injuries for damages at the hands of a passenger who struck him and knocked him from the car.

Santhe Changarski, a 4-year-old boy, has sued the West Street & North End Electric Railway Company for \$10,000 damages for a broken leg. He alleges that on account of a bank of earth by the track he did not see the car, which was running at a dangerous rate of speed; and he was knocked down and run over.

The same company was denied a new trial in the case of John B. Cogswell who secured a verdict for \$10,000 damages for being thrown from a car. He offered to compromise for \$7,000, but the company has appealed.

A. Lin Blain has been appointed assistant superintendent of the Tacoma Railway & Motor Company. This company has been granted a franchise to furnish electricity and power for heating.

The Olympia Light & Power Company has closed negotiations for a loan of \$250,000 and will build four miles of railway within the city.

The rock cut of the Lake Whatcom electric road is 22 feet for 1500 feet. The cut will be used by the Blue Canyon road; and the grade is nearly 5 per cent.

The Colorado Coal & Iron Company has brought suit in the United States circuit court against Enoch S. Fowler, to enforce payment of a promissory note for \$10,299.25, and against F. W. Pettigrew for \$2,119 in payment for the rails for the electric railway at Port Townsend.

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days; reported especially for the STREET RAILWAY REVIEW, by Munn & Co., Patent Attorneys, 361 Broadway, N. Y.

ISSUE OF DECEMBER 8, 1891.

| | |
|---|---------|
| Conduit Conductor for Electric Railways, W. H. Knight, New York, N. Y. | 464,505 |
| Electric Fare Recording System, B. S. Molyneux, Minneapolis, Minn. | 464,513 |
| Electric Railway System, L. O. Dion, Natick, Mass. | 464,557 |
| Street Railway, W. L. Judson, New York, N. Y. | 464,614 |
| Street Railway, W. L. Judson, New York, N. Y. | 464,615 |
| Street Railway, W. L. Judson, New York, N. Y. | 464,616 |
| Drill for Electric Railways, H. P. Bradford, Little Rock, Ark. | 464,673 |
| Trolley for Electric Railways, J. W. Schlosser, Washington, D. C. | 464,780 |
| Removable Shoe for Cable Grips, C. Fitzgerald, Pittsburg, Pa. | 464,924 |

ISSUE OF DECEMBER 15, 1891.

| | |
|---|---------|
| Momentum Reservoir Motor for Street Railways, M. M. Bailey, Denver, Col. | 465,122 |
| Fare Registering Punch, C. H. Folger, Cincinnati, O. | 465,256 |
| Converter System for Electric Railways, M. W. Dewey, Syracuse, N. Y. | 465,359 |
| Fender for Street Railway Cars, R. H. Marsh, Boston, Mass. | 465,383 |
| Electric Railway, G. F. Green, Kalamazoo, Mich. | 465,497 |
| Electric Railway, G. F. Green, Kalamazoo, Mich. | 465,432 |

ISSUE OF DECEMBER 22, 1891.

| | |
|--|---------|
| Guard for Trolley Wire Insulators, F. O. Blackwell, Lynn, Mass. | 465,447 |
| Electric Railway Trolley, C. S. Foster, Whitesborough, N. Y. | 465,469 |
| Gearing for Electric Motor Cars, O. F. Evans, Columbus, O. | 465,592 |
| Electric Railway, W. H. Applegate, Atlantic, Iowa | 465,613 |
| Car Truck, E. R. Esmond, New York, N. Y. | 465,658 |
| Cable Grip Car Truck, E. R. Esmond, New, N. Y. | 465,659 |
| Car Truck, E. R. Esmond, New York, N. Y. | 465,660 |
| Electric Railroad Trolley, F. J. Sprague & P. F. O'Shaughnessy, New York, N. Y. | 465,806 |
| System of Street Car Propulsion, F. G. Wheeler, New York, N. Y., Re issue | 11,211 |
| Steam Generator for Street Cars, F. G. Wheeler, New York, N. Y., Re-issue. | 11,212 |

ISSUE OF DECEMBER 29, 1891.

| | |
|--|---------|
| Electric Railway, J. Emmer, Jr., Washington, D. C. | 465,844 |
| Electric Railway, H. S. Pruyn, Hoosick Falls, N. Y. | 465,886 |
| Electric Railway Switch, M. Kerstein, Boston, Mass. | 466,101 |
| Safety Guard for Cars, A. J. Brown, Chicago, Ill. | 466,115 |
| Indicator for Street Railways, E. G. Rowen, Boston, Mass. | 466,141 |
| Electric Railway Trolley and Support, W. A. Stevens, Kansas City, Mo. | 466,196 |

ISSUE OF JANUARY 5, 1892.

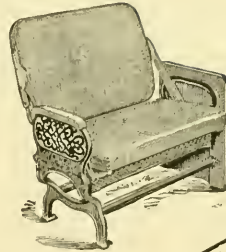
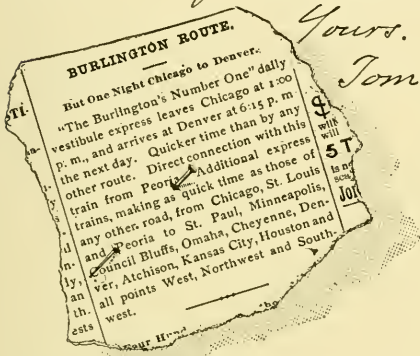
| | |
|---|---------|
| Self Acting Safety Brake, D. M. Gerhard, Minneapolis, Minn., Elizabeth D. Gerhard, Administratrix of said D. M. Gerhard, Deceased. | 466,339 |
| Cable Car, A. Martinez, Philadelphia, Pa. | 466,355 |
| Electric Railway Crossing, W. Osner, Chicago, Ill. | 466,362 |
| System of Electric Distribution for Railways, N. W. Perry, Cincinnati, O. | 466,367 |
| System of Electric Distribution for Moving Translating Devices, N. W. Perry, Cincinnati, O. | 466,368 |
| Propulsion of Street, Tramway, and other Railway Cars or Carriages, J. Hughes, Chester, England. | 466,415 |
| Extensible Electric Conductor, B. C. Rowell, Boston, Mass. | 466,427 |
| Underground Conduit for Electric Railways C. P. Tatro, Spokane, Wash. | 466,471 |
| Means for Operating the Switches of Street Railways, W. H., Farmer & T. White, Saginaw, Mich. | 466,539 |
| Lubricator for Trolleys, E. M. Doig, Denver, Col. | 466,737 |

Dear Bob

Your head's level in selecting our route to the Pacific Coast, You've only one night on the road between Chicago and Denver, & you can take every meal on the cars, and have sufficient time in both cities to "fix up" and see a man.

You're quite right. The "glorious winter climate" of Colorado is simply immense, and the "Burlington" service is a grand success.

Yours,
Tom.



A Regular Reversible Seat adapted for STREET CARS.

THE LATEST!!
FOR
ELECTRIC and CABLE
CARS.

THE HALE & KILBURN MANUFACTURING CO.
PHILADELPHIA. NEW YORK. CHICAGO.

Street Car Seats

Of Every Description, With or Without Springs, Covered in CARPET, PLUSH AND RATTAN.

Hundreds of References. Thousands in Use.
Catalogues, Estimates and Samples on Application.

HOLMES, BOOTH & HAYDENS,
FACTORIES: WATERBURY, CONN.,
MANUFACTURERS OF

BARE AND INSULATED WIRE

Underwriters' Copper Electric Light Line Wire, handsomely finished, highest conductivity.
Copper Magnet Wire, Flexible Silk, Cotton and Worsted Cords for Incandescent Lighting.
Round and Flat Copper Bars for Station Work. Insulated Iron Pressure Wire.

PATENT "K. K." LINE WIRE

FOR ELECTRIC LIGHT, ELECTRIC RAILWAYS, MOTORS, TELEGRAPH AND TELEPHONE USE.

THOMAS L. SCOVILL, New York Agent,
25 PARK PLACE, NEW YORK.

MANUFACTURING PLANT FOR SALE.

Within one hour's ride of Chicago, complete plant suitable for car building or other wood working manufacture. In first class condition; engines, boilers and machinery in place, and handsome office building separate. For sale at a bargain. Address "Manufacturing Plant," care Street Railway Review

FOR SALE 125 Tons 34 lb. Second Hand Steel Tram Rails in excellent condition. 100 Tons 25 lb. Second Hand Steel T Rails, but little used.

D. E. GARRISON & CO.,
219 N. 4th St., St. Louis, Mo.

WANTED: The address of one Gen. W. Wells, formerly a contractor at Winchester, Mass.
Address,
STREET RAILWAY REVIEW

Electric Railways.

C. E. LGSS & CO.,

219 First National Bank Building,
CHICAGO.

Contract for the Building and Complete Equipment of Electric Railways.

Correspondence Solicited. References Furnished.

KUPFERLE BROS. MFG. CO.

MISSOURI BRASS FOUNDRY,

STEAM AND GAS PIPE WORKS,

MAKE A SPECIALTY OF

Steam Pipe for Electric and Cable Plants.

600 N. Second St., Cor. Washington Ave. - ST. LOUIS, MO.

THEY were standing on the corner watching the cars on Shreveport's new belt line, says the Philadelphia Times. One was a well-dressed, well-fed looking negro, perhaps a preacher, as he wore a linen duster and carried a cane. The other was dirty, half-clad, and much bepatched, and had a woodsaw slung across his shoulder.

"Look at dat 'lectrified car," said No. 2. "Look at her, sir, how pretty she roun' dat curve. Whoopee! Look at her! Ef dese here ain' de cur'eses things ever I did see."

"Very wonderful, indeed," said No. 1, superciliously.

"I tell you dere am nothing dese here white men can't do. Dere am nothin', sir. Seems like to me heap er times dey can beat God A'mighty hisself."

"No, sir," said No. 1, more evidently a preacher, "no, sir; dey can't never do that."

"Well, dey is done it," responded the wood-sawyer, eagerly.

"Prove it, sir; prove it," said the preacher, flourishing his stick grandiloquently.

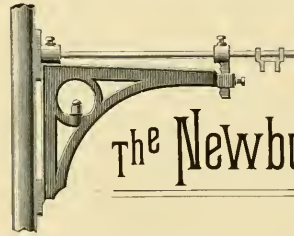
"Ain't de white man done made ice in de summer time? Is you ever hear tell er God A'mighty doin' dat?"

And the wood-sawyer watched the cars alone.

WHEN traveling between Chicago and St. Louis always take the Wabash. The most luxurious cars, polite employes and quick time.

EVERY lawyer should have the monthly digest of Street Railway law as published in THE 'STREET RAILWAY REVIEW. It is the most complete and accurate published and always contains the latest important decisions.

Boston Office, 53 State, Room 1006.



The Newburyport

Pole Bracket

SOLD BY . . .

JAMES F. SHAW,

Agent Street Railway Supplies,

NEWBURYPORT, MASS.

Screws on the pole, and is adjusted by set screws. Saves cutting the poles.

Price for Bracket and Pipe Complete, \$2.00.

WRITE FOR PARTICULARS.

Try Shaw's Self-Lubricating Trolley Wheel.

WE PURCHASE TOTAL ISSUES OF : : : :

STREET RAILWAY BONDS.

: : : : CORRESPONDENCE INVITED.

W. H. HARRIS & CO., BANKERS,

163 Dearborn Street, Chicago.
15 Wall Street, New York.
70 State Street, Boston.

H. R. PARROTT, President,

F. W. PARROTT, Treasurer.

The Parrott Varnish Co.

BRIDGEPORT CONN.

MANUFACTURERS OF

The Finest Grades of . . .

: : RAILWAY VARNISHES.

C. C. CHENEY, PRESIDENT.

C. A. CHAPMAN, TREASURER.

C. HEINEMAN, SECRETARY.

WESTERN BANK NOTE COMPANY,

New Fire Proof Building.

MICHIGAN AVENUE AND MADISON STREET, CHICAGO.

Steel Plate and Lithographic Engraving and Printing.

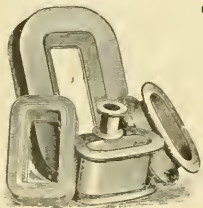
For Railways, Towns and Cities, Real Estate Bonds, Certificates of Stock, Drafts, Checks,

BONDS

For Street Railways, Water-works, Gas Companies, Letter and Bill Headings, Etc., Etc., for

Railways, Banks, Merchants and Corporations.

Bonds, and other Securities Engraved by this Company accepted on the New York Stock Exchange.



VULCABESTON

(VULCANIZED ASBESTOS.)

MANUFACTURED BY

THE JOHNS-PRATT COMPANY, HARTFORD, CONN.

For Electrical Insulation. Furnished in sheets, tubes, and molded forms of any shape.

Field Magnet Spools

20,000 now in use. Vulcabeston Packing for steam, water, acid and gas; in sheet, wick, rond and gasket forms of any shape.

H. W. JOHNS MFG. CO.,

Selling Agents, 87 Maiden Lane, NEW YORK



WINDSOR & KENFIELD,
PUBLISHERS AND PROPRIETORS,
334 DARBORN ST., - - - CHICAGO.
Published on the 15th of each month.

SUBSCRIPTION, - - - ONE DOLLAR.
FOREIGN SUBSCRIPTION, - - - TEN SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW
Coxton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR, Editor. F. L. KENFIELD, Business Manager.

CORRESPONDENCE

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW,

331 Dearborn Street, Chicago.

Entered at the Post Office at Chicago as Second Class Matter.

VOL. 2. FEBRUARY 15. NO. 2

THE Minnesota decision in the case of the Duluth Street Railway, is that a street railway may exercise the right of eminent domain for parts of line but not for its entire route.

COMPANIES which seem to be having a very hard time to secure desired privileges, should remember that where there is a will, there is a street railway. In some cities though a man ought to make his will before going to the city council.

A STRIKE on the Pittsburg, Allegheny & Manchester line in Pittsburg, arose from a disposition on the part of the employes to run the road. Many acts of violence, and the placing of dynamite on the track were features of the strike, which, however, resulted in the company maintaining its right.

OWING to an abuse of the badge privilege, the Indianapolis road called them all in and allowed its employes tickets for the badges. The men struck for the badges, tying up the road several days. The matter was finally arbitrated by a committee of three, which upheld the company in withdrawing the badges, but allowed the men an increased ticket allowance.

THE decision of the Supreme Court of New Jersey as to trolley poles and wires in public streets is that the legislature has the right to authorize city councils to grant such permission, but construes the act of the legislature as not having conveyed any such authority in its act of 1886. A digest of the opinion will be found in our legal department of this issue.

A SINGLE bucket of water at a critical moment would have extinguished the fire which became uncontrollable and destroyed \$150,000 worth of street car property in Toledo, Ohio, recently. Less than an hour before, water was flowing freely from the pipes, but which by extreme cold weather became frozen. Managers will do well during the winter months to carefully inspect and overhaul the sources of their water supply, and guard against the possible repetition of a similar disaster elsewhere.

A NEW phase has been developed in the apparently endless litigation between the New York elevated roads and the army of damage seekers. The Court of Appeals has reversed the findings of lower courts, which held that whatever benefits might accrue to the property by the operation of the road should not be taken into account in determining the amount of damages. The upper court now hands down an opinion, in which all the judges concur, that when it can be shown that property has increased in value owing to the construction and operation of the road, no damages can be recovered. In other words, where a benefit and not a damage has occurred, nothing can be recovered by reason of the presence of the road. This a most important decision, but manifestly based on equity and justice.

A MOST unwarranted and high handed exhibition of official incapacity was the act of the city engineer of Chicago, who closed the Halsted street viaduct to all travel a few minutes before 6 o'clock, and without any notice whatever to the two companies, whose cars were passing over. The result was several thousand passengers were blocked and the companies had to haul their cars back several blocks and send them around another line, and occasioning a delay of one hour. Had any notice been given transfer arrangements could have been provided, and as the viaduct was in no more dangerous condition than had existed for months there was no such public necessity for the act. In any event the cars should have been allowed to cross but had teams excluded. Companies and the public have certain rights which even those in municipal authority are bound to respect.

IN speaking on the rapid transit problem in Boston recently, E. Gerry Brown, of the Bunker Hill Times took occasion to say:

This question of a tax on corporations is an important one. Such taxes are finally paid by the people. I am against placing taxes on such corporations as are now under consideration. The idea wherever there is a corporation hit it, is running riots hereabouts. I hold that a street car is my carriage, if I take it, and has as much right in the street as a carriage: and if the street isn't wide enough, widen it."

Mr. Brown has expressed in very few words a truth whose breadth and depth the majority of the press either will not see or, seeing, refuse to understand.

STRAW in street cars is one of the relics of anti-rapid transit days. With the excellent facilities at hand for warming (not cooking) passengers, both by means of coal and electricity, this breeder of disease germs should be relegated to an illustrious but uncomfortable past. The acme of car warming is to secure a temperature which will correspond to that which would result if the passenger was outside walking briskly, clad in the same wraps which he wears in the car. Over-heating is on many accounts worse than no heat at all, but with reasonable care, cars can and should be made comfortable. Car warming pays, first as a matter of policy alone; second, by the increased riding it induces.

THE annual report of the coroner of Cook county, which is virtually the city of Chicago, is of interest as showing the comparative cause of fatalities arising from street car accidents and otherwise. In 1891, violent deaths came to 1,499 persons in this city. Of this number, 37 were due to accidents upon or arising from street cars, including employes, passengers and persons on the street. During the same time, the steam roads killed 323; there were 77 who fell from or were run over by wagons; 47 fell from scaffolds; 59 from buildings and 70 were burned and scalded. The balance are distributed through a great variety of causes. When it is remembered that the three car companies of the city carried in 1891, the immense number of 209,169,169 passengers, and the deaths arising to all classes and from all causes for which the operation of the cars could be considered contributory, the total of 37 is very low, and is at the rate of one death to each 5,653,193 passengers carried. The rate is actually much less, as the large proportion of the street car fatalities were wholly blamable to the victim's own criminal carelessness, arising from actions of the persons themselves, and over which the companies had no control whatever. Contrasted with steam roads of the United States, the difference is very marked. For the fiscal year last reported the steam roads carried 492,430,865 passengers, and show a mortality from all causes and to all classes of 6,334 persons; or at the rate of one death to every 77,744 passengers carried. Of course the ratio of employes killed by the two systems is widely separated, and largely raises the steam road list.

When one considers the comparatively small number of persons engaged in driving of wagons and that the record shows 40 drivers met death by falling from their seats, and only 37 deaths occurred all told from the operation of 4,000 street cars, the conclusion is most clearly demonstrated that with the awful responsibility of safely transporting the equivalent of the entire city's population 200 times a year, and being obliged to receive passengers in all conditions of helplessness, the review is certainly a monument to the excellent management of the several companies, and to the faithfulness of the army of their 10,000 employes.

THE Chicago City Railway has decided to use electricity on some of its outside lines.

THE DIFFERENT STANDPOINTS OF STANDING IN A STREET CAR.

IT is one of the perversities of human nature to want to do those things which are denied, and to voluntarily forego the same desire when there is no restriction placed thereon. As human nature is nowhere more clearly or honestly depicted than on the street car, the above truth naturally finds a notable illustration each hour of every day. The Milwaukee Sentinel under the title of "Curious Effect of Street Cars," philosophises and aptly presents the case as follows:

"Street car riding has a curious effect on some men. These men will stand hours at a time in the street. They think nothing of keeping their feet, on a corner, in a half-hour talk with an acquaintance. They will stand for an hour while watching the process of getting a safe up stairs, in gazing at the work on a new building or in waiting for a circus procession. They seem to prefer standing to sitting in many cases. On election night they will stand four or five hours in a dense crowd before the newspaper bulletins and think nothing of it. But if they get on a street car for a ten minutes' ride, they are frantic if they do not have a seat. If they have a seat, they surrender it very reluctantly to a woman, if they surrender at all—sometimes they cannot induce themselves to give it up and submit to the awfulness of standing for five or ten minutes.

"It is a puzzle. It does not seem to be any harder to stand for a few minutes in a street car than to stand for hours in the street or in the office, and yet it must be—otherwise men who do not mind standing anywhere else in the world would not be so wild to sit when they enter a street car. No car remains crowded for more than five or ten minutes and yet great muscular men become frail sitters while women cling to the straps. Smoking seems to overcome this ordinary effect of street car riding. If the man happens to have a cigar he doesn't mind standing on the crowded platform, for a full twenty minutes. The same man, without his cigar, must have a seat even if a woman has to stand.

"Of course some of these men, after a day's hard work, feel that they ought to have a seat on the car even if women must stand, because they want to be as fresh as possible to roll ten-pins after supper. Others do not get a chance to sit down often, because the beer saloon is crowded frequently and they have to stand with nothing but an elbow on the bar to support them. These men must be excused from giving up their seats in a street car to a woman, although the average woman has to be on her feet more than the average man and is not so well built for it. Then too, shop girls who are on their feet all day do not have to roll ten-pins after supper.

"All the same, it is curious that men who do not mind standing anywhere else, cannot endure standing on a street car for ten minutes, unless they happen to be smoking."

It is, however, doubtless true that the occupation of the mind to the exclusion of conscious physical exertion has

much to do with it. Just as on occasion of a fire or some sudden accident or disaster, weak men and ordinarily helpless women put forth physical powers of which at other times they absolutely are not possessed, or the soldier in battle roused by the enthusiasm of an attack will exert himself in desperate efforts, when a moment previous he was too tired to crawl under shelter from the rain. To the great army of daily workers the diurnal voyage to and from business or labor comes to be a positive monotony endured rather than enjoyed.

The lesson to managers in this is obviously to employ all reasonable means to make the trip as comfortable and pleasant as possible, and to this end commodious cars; the keeping of them in as cleanly a condition as possible; providing good lighting facilities for reading; an attractive interior decoration; securing good ventilation and in cold weather a comfortable temperature;—all these means unite to relieve the journey of its monotony and most likely unrealized by the passenger, still tend to induce conditions by which—

"The time may pass more gayly
And the guests be more contented."

The fact, however, still remains, and doubtless ever will, that the great majority of the male population will continue to experience a severe attack of "that tired feeling" the moment one foot touches the step of the street car.

ANOTHER STORAGE BATTERY SYSTEM.

A NEW storage battery system is offered to the public, and is the invention of Prof. Main. The car which was recently tried in Brooklyn was manufactured by the Lewis & Fowler Manufacturing Company and is a handsome and commodious vehicle. It has space for 84 cells, or 42 on each side, which are placed in trays beneath the seats. Each tray contains 6 cells and a larger or less number of cells may be used according to the size of each car.

A single motor is used, geared to both axles. The machine is multipolar, and the coils and core are stationary. The motor runs continuously when the car is in service, and the car is stopped or moved by engaging a clutch on the axle, with the motor, by means of a lever stationed on the driver's platform. A special feature of the construction is that the car, motor, battery and all, is said to weigh not over 3,500 pounds, or about half that of all previous efforts, and the claim is made, that the cars will run from 6 to 20 miles an hour, and can be maintained in actual service for 20 miles without re-charging the batteries. It is intended to run the cars experimentally in both New York and Washington.

HERE is a bright ray of hope in a sky of late full of squalls and storms. At a recent oratorical contest at the St. Paul High school, the judges and audience unanimously gave the verdict in favor of the negative speakers on the question, "Should a city own and operate its own rapid transit system?" Linnaeus Savage and Miss Julia Hess are the speakers who thus saved their country.

FOREIGN FACTS.

THERE is some talk of extending the City and South London Railway to Islington.

OVER 100,000 persons have been carried on the Leeds Electric Tramway since its opening.

THE contract for a new electric railway connecting Veyrier and Haute Savoy, France, has been let.

A LONDON firm has made a proposition to construct an underground electric railway in Paris on a new system.

THE water power of the Muhbruch, near Berne, Switzerland, is now electrically transmitted to the Bay cloth factory, six miles distant.

THE new reciprocity treaties with the British West Indies and Salvador, admit American electrical supplies and apparatus free of duties into those regions.

THE Industrial Society of Mulhouse, Alsace, offers a medal and prize of \$500 for the best article on the subject of the "distribution of power from a central station."

THE City and South Street Railway Company, have ordered a new motor-locomotive of a heavier weight and improved design, to handle their largely increased business.

THE Tramway Committee of Glasgow, has discovered that the substitution of electric for horse power would save them about \$90,000 a year, and at the expiration of the present lease will adopt that motive power.

ANOTHER in a long list of accidents at grade crossings occurred in this city, February 10th. A Pennsylvania passenger ran down a Thirty-first street car of the Chicago City Railway, killing one and severely injuring several others.

THE first electric street railway in Russia will be constructed in Kiew, a city of about 130,000 inhabitants and situated on the river Dnieper. This street railway will use the overhead system and will be ready for operation in the summer of 1892.

THE car and repair shops of the Peoples' Railway, St. Joseph, Mo., had a narrow escape from destruction from an incendiary fire which started in a pile of shavings under one of the carpenter's benches at 2 o'clock in the morning. It was discovered, however, immediately after it had commenced to burn and by prompt measures was extinguished with a loss of not over \$100.00. The burning of the Union Line Shops a few weeks ago, and which entailed a loss of \$70,000, is now believed to have been the work of an incendiary, and possibly the same person or persons who were to blame for this attempted destruction of property which would have made a loss of not less than \$30,000.

DIED WITHOUT A FIRE, OR THE CHIEF'S TERRIBLE REVENGE.

(A True Chronicle.)

NOW it came to pass that in the land of Illinois, in a certain city, the inhabitants thereof said the one to another, Behold all flesh in grass and the horse is even but as last year's stubble, an evidence of usefulness in the field but which verily hath no place beside the cars of the street. And the people said one to another, behold other cities have builded for themselves tramways of electresium whereby the cars are moved with suddenness by the unseen powers of light and the inhabitants may journey with frequency and speed, but we are drawn by horses, and the same is a weariness to the spirit.

And it came to pass that a day was set when the rulers of the city were gathered together in the hall of the city and certain men appeared and spake and gave tidings that they might be allowed to build a road, even a road of electresium. And the chief ruler of the city put his name upon the parchment and the high scribe set the great seal of the city thereon. And behold the thing was done.

* * * * *

And it came to pass that the magicians from a distant city came to that place, bearing with them ropes of very precious copper and all manner of strange works of brass, and they builded a temple of brick and iron which would not burn and they made a great horse of iron with legs of iron and the body thereof was of iron, and they set it in the temple. And also did they set trees of strong iron within the streets and the branches whereof bore cross-arms and to them the magicians fastened the ropes of costly metal. And all the people wondered.

And they sent again to a far city and brought hence strange cars, the like whereof had not before been seen by the people. And the magicians set upon the car a long rod of iron, and in the end thereof put they a small wheel which should rest against the copper rope. And they named the car "Motor," for they said verily, it shall go.

* * * * *

And it came to pass that when all the work was ended, a day of thanksgiving was set apart, wherein all the people were gathered together, and the rulers of the city and the rulers of the cities round about. And the musicians played upon the cymbals and other instruments of brass, and made a loud noise.

Then the magicians builded a great fire in the temple which they had made, and brought water from the river and cooked the water in great jars of iron and did make steam. And they placed the steam in the iron horse. And when the time was fully come behold the chief magician lifted up his voice and cried, "Let her go Galle-ager," and thereat Galle-ager made strange motions with his hand, even his right hand, and stretched forth his arm and did bid the iron horse to draw the cars. And the cars did move hither and thither where the master thereof listed, and did run with great speed. Even a man

running from battle could not run so fast, nor the hand-maidens to a special sale which the merchant could advertise. And the people were filled with wonder and astonishment, and lifted up their voice and shouted. Howbeit they marveled how these things could be, but the ruler of the city said unto them send ye unto a place which is called Chicago and buy ye a book which is named the STREET RAILWAY REVIEW, and behold all these strange things shall be made plain. And they did so, and when the book came every man took one to his own home and they did read it, even his sons and daughters and his manservants and his maidservants, behold they did all read and did understand the strange things which were done. And they all rejoiced because they knew so much.

* * * * *

Now after not many days the people began to worship the Electresium car and brought their silver and nickel unto it and cast it down into the fare box, and the owners waxed great and rich. Now other men in the same city bethought them of the same scheme, which all the people beheld was so great, and they prayed unto the rulers of the city that they might build also a road of electresium, and the scheme was known to the chief man, but the people wot not that he was in the deal; and when the rulers were gathered together he lifted up his voice and cried "One road of electresium is good but why therefore should we build another?" and the people waxed wroth and threatened to cast him out of the hall of the city and set another in his place. Then he set his seal upon the parchment, and he was fain to turn his face unto the wall lest the people see the laughter with which his heart was filled. But when he put his seal and signed the parchment he cried, "Oh, woe is such a people," and he scorned them in his face and within he mourned not. And he went out alone, and threw his hands behind him that he might not see the hand which signed the law, and as he gazed steadfastly at the stars, behold it came to pass that the desire of his heart was gratified and when he looked again into his hands behold there were large pieces of fine gold. And he said, "Verily I am but the servant of the people, and the stars have rewarded me." Albeit he counted the gold carefully to see that it was good. And he went unto his home. And it came to pass that he was arrayed in velvet and fine linen, even 4 ply linen. And his wife wore precious stones of great value, pearls and diamonds and gold. And the people wondered and said the one to another, "Is not this O'Sullivan, the sewer builder? Now wherefore is he so exalted and set up above us that he should thus array himself and his wife also?"

And they sent them again money to Chicago and purchased books of the STREET RAILWAY REVIEW, even the month of January, which was very fine, but it was not written in the book where O'Sullivan got his start. Nor

was it printed in any book. And they marvelled how such things could be. But O'Sullivan spoke of a rich uncle who died in France and left a great inheritance unto him. So the people received his words and each man knew his own thoughts what they were. And a few of the wise men whispered one to another, "At the next election O'Sullivan shall journey up the Salt Creek."

And he journeyed.

* * * * *

CHAPTER II.

And so men came again unto the city and builded another railway of electresium, even as before. And that people might look upon them both, they builded the second beside the first for a very great distance. And when it was done the ruler of the road cried unto all the people, "Come ye, ride upon our road, for verily it is the best, and the wheels are round and not flat, and our cars are warm in winter and cold in summer, and they fly like birds, and all is fine and sumptuous and very pleasant, and verily in all the land is there none so fine as ours: and we will carry you, and your children, and your children's children, and also the aged; and behold we will sell you six tickets for 25 cents, and we will do great things, and will surprise the people, and when the road which was first built of electresium shall be placed in the hands of the receiver, we then will issue bonds and buy that also; and then shall we wax greater and greater in the land, and in the latter days will we start a bank for the changing of money."

But the people knew the first road of electresium was better than the last, and believed not all they heard.

* * * * *

Now it came to pass after many days that the copper rope of the first road fell upon the copper rope of the second road, even the overhead wires, which were crossed. And when the ruler of the second road heard of this he gave instructions to his servants that they should not put forth their hands to change the wires, but that the same should remain even so forever. And he charged them, and made them swear by an oath that they should not tell any man of this thing which had come to pass. And the workmen of the second road were pleased thereat and so made merry; and they said one to another, "Now we will not burn the fires so great, and we will make not as much electresium as in the days gone by, but our enemies they shall burn coals of fire of many tons, and shall even melt their grate bars, and they shall spend much money, and we will rest ourselves in peace while they toil." So it came to pass that when the sun was set and many cars were run into the barn and only a few moved upon the street, that the workmen in the temple of the second road rested, and the fires burned not but were extinguished. But the servants at the temple of the first road toiled harder even than before, that their cars could run.

And thus it came to pass for many days.

But an evil day was at hand. The ruler of the first road looked at his bills which the coal merchant had sent

him, and he waxed very wroth and said within himself, "Behold a thief steals us blind, and I know it not." So he weighed the coal in balances for the space of 15 days; and behold the report of the coal merchant was right and there was nothing wanting. Then the ruler went into his inner chamber, and put his feet upon his desk and communed with himself for the space of one hour. And when the time was spent he came out, and his face was stern and sad. And he went away alone.

* * * * *

CHAPTER III.

Now it had been cried in the streets that day that at night all the people should gather together in the theatre while the players made merry and amused the people. And the house was filled with a mighty concourse of the people, so many they all could not find seats. However as it was a show and not a street car, many stood for hours that they might see the show, yet were not weary. But at last the congregation was dismissed and then it was they became tired and wot that they must ride unto their homes. And the cars of the second road were there. And the agents thereof shouted unto the people, "This car for Gooseberry Park; take this car for your homes." And the people filled the cars until even the car could not contain another one. And the conductor went to and fro in the car and took the people's money. And he gathered many sheckels. And when this was done he gave two bells. And thereat the car moved.

* * * * *

Now it must be known that when the ruler of the first road went out alone, he encompassed the whole city in his walk, and lo it came to pass that as he looked he saw where the two ropes of copper, even of the first road and the second road were crossed the one upon the other. And he was mightily wroth within himself. And he took him to the temple of the second road and behold the fires upon the altar burned low, as he beheld it from afar off, for the sun had set. Then he smote himself three times and laughed aloud in his mirth. And he returned to his own temple and took two men servants and they tied ropes upon the wires but they disturbed them not. And the ruler said, when all the congregation rush out of the theatre and upon the cars of our enemies behold I will give you a sign and then do ye pull apart the wires and their cars shall not go, but our cars shall run and wax great with their loads.

* * * * *

And so it came to pass when the cars of the second road were full, and the people had paid their tithes, and the cars had moved the space of one block, that the ruler made a sign, even two blasts upon his trumpet. And the men servants pulled mightily upon the ropes, and the wires came apart and behold the cars of the enemy could not move, and the lights therein were put out, and they were in the hole, for there was no electresium. And the captain of the car persuaded them, verily a belt hath broken itself in two in the temple, but tarry ye

here a little longer while I send word and bring you tidings. But the servants at the temple had shut too the door and had gone home, for the hour was late, and there was no man there, neither was there any fire and the iron horse was dead.

And so the people tarried for there was no other way. And the young men and maidens were joyful to sit there in the dark, and made no haste and persuaded the elders that the Electresium would soon come and bring them home. But it came not, and after a long space of time the captain of the car returned. But he spake not and the people became very wroth and cast him out into the street and the men profaned and even the old men reviled the company which had robbed them of their money. And while they waited the ruler of the second company went unto the ruler of the first and fell upon his knees before him and begged of him that he would give him succor, and bid the servants to permit the wires to again be crossed until his cars might make a trip, for he said, "The altar fires within my temple are extinguished, my iron house is dead and verily my men servants have all gone unto their house." But the ruler laughed him to scorn and told him to go hence, and would none of him.

Meanwhile the people stormed, and while they wot not what to do, the cars of the first road returned for a second load. And the people entered them and were brought to their homes in peace, and they said, "We will have no more of the enemies road."

And so the wicked ruler was cast out of the city, and the second road was sold unto the first, and all the cars do now belong even unto the first company. And they wax fat and even now consider whether or not they must not buy them more cars and a new dynamo.

THE END.

THE DRIVER WON.

A SUIT has been pending for the past three years, brought by a driver of a Detroit horse car against the Lake Shore road, to recover for injuries received by the street car being run down by a steam train. The flagman signalled the driver to cross and while doing so a train dashed against the car to the manifest inconvenience of the driver. The supreme court of the state maintained the judgment of the lower court, which was in the amount of \$3,000.

RAPID TRANSIT IN ROME.

NOT old Rome, but Rome, Ga., is about to experience a change from mules to electricity, through a contract which the street car company has made with the Thomson-Houston Company, whereby the latter construct the lines and power station. Six miles of track will be put down at once, and the contract calls for their completion within 90 days. Everything connected with the construction and equipment of the road will be of the latest improved pattern, and the opening of the road is expected to enhance the value of a large amount of real estate.

IMPORTANT DECISION REGARDING TRANSFER TICKETS.

THE St. Paul City Railway has just won a case in which a passenger, Luke W. Buzzell, sued for damages in the amount of \$1,000, for having been ejected from the company's car for refusing to pay fare in addition to a transfer slip which he had received a few moments before from the conductor of another car, and who had by mistake punched September 8th, the date previous, instead of the 9th, the date on which it was issued. It was clearly a mistake on the part of the conductor issuing the slip and the conductor who refused the the same was simply obeying orders. In this action the court held that the order to refuse transfer slips of other than the current date was an eminently proper regulation for the company to make, and that it was incumbent upon the passenger receiving same to examine it, and satisfy himself that the ticket was properly punched.

The suit was brought, which in legal parlance was for damages sounding in tort, or for a wrong done. During the progress of the trial, the plaintiff asked to be allowed to amend his complaint, so as to allege a breach of contract, instead of being one for the wrongful act of ejecting him from the car. This the judge declined to do, and the decision was made upon the issue first named. Before the order was made to instruct the jury to decide in favor of the defendant, the plaintiff asked leave to dismiss his case and was so allowed to do. This of course will permit him to bring a new action, alleging breach of contract for failure of the conductor on the first car to give a proper transfer check.

PROSPECTIVE DULUTH IMPROVEMENTS.

THE Duluth Street Railway Company have decided upon improvements which will cost in the neighborhood of \$100,000. The old barn adjoining the present power house will be torn down, and on its site erected an addition 50 feet wide. This will be of brick and handsomely finished in hard wood in the interior. The building will cost \$20,000. The company have ordered from the E. A. Allis Company, of Milwaukee, a cross-compound horizontal engine of 1000 horse power, having a high pressure cylinder of 30 inches diameter, and a low pressure cylinder of 58 inches diameter, with a 60 inch stroke. The fly wheel will be very large, having 10 foot face and being 28 feet diameter and weighing 65 tons. Two generators of the multipolar type have been ordered from the Thomson-Houston Company, each of 345 horse power. Additional boiler capacity will also be placed, and the order has been given for 22 cars, which increases the rolling stock of the company to 54 motor cars.

The Highland Improvement Company have not yet ordered cars but expect to use the rolling stock of the Duluth street railway when their line is first opened, and until they have placed their order and received new rolling stock. The entire improvements when made will give to the city of Duluth an electrical system which will be in every way complete and of the best quality.

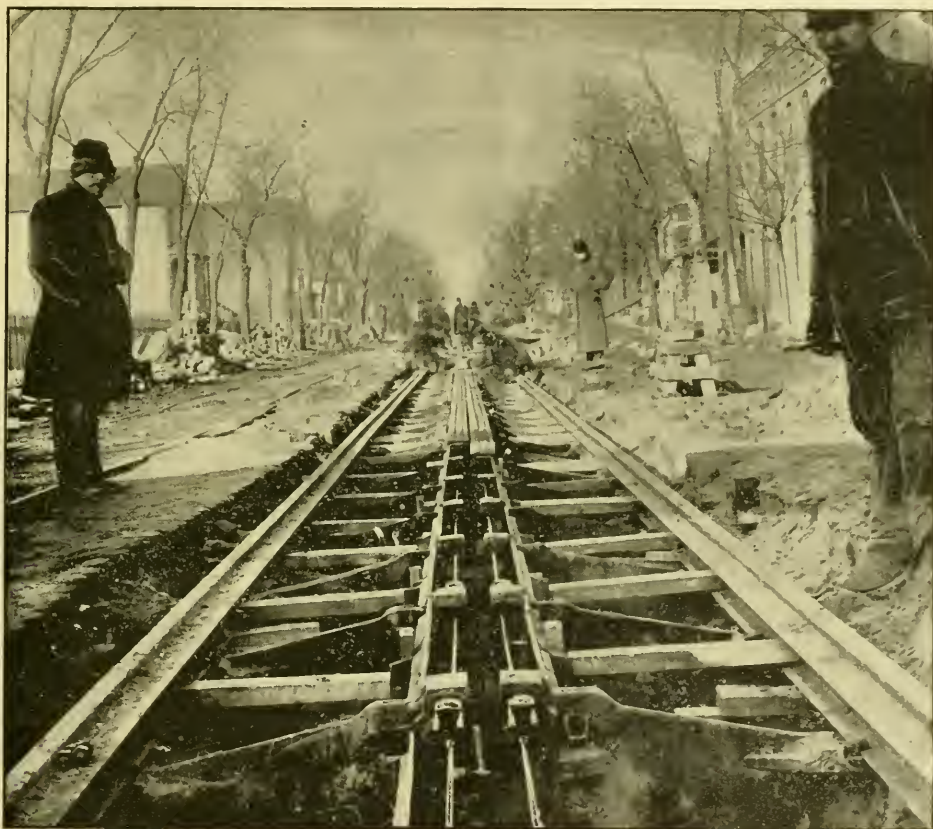
THE LOVE CONDUIT SYSTEM.

THE most interesting feature in street railway matters in Chicago this month centers around the approaching completion of the Love Electric Traction Company's system, which is being installed on one of the lines of the North Chicago Railroad Company.

A description of the general plan under which this company operates, was given in our July issue, last, and it is with pleasure that we are able this month to record, the nearly completed results of what was at that time only outlined on paper.

They are placed at intervals of every 4 feet, and at every 25th yoke, a 6 foot catch basin drains into the sewer. The conduit is not as deep as that ordinarily used in cable construction; being but 20 inches, and the sides of the conduit are made of iron plates, which extend from one yoke to the other. The bottom of the conduit is entirely clear; the trolley wires of which there are two, being placed directly under the slot rail, and protected by a "U" shaped rail in which the wire is suspended and insulated, and which is held in a jaw fastened to each yoke.

The wires are of hard drawn copper of 9-16 inches in diameter. One wire conducts the positive, and the other



LOVE ELECTRIC RAILWAY—LAYING THE CONDUIT.

The line was formerly operated by horses, and is a single track loop, $1\frac{1}{2}$ miles in length. It starts from Lincoln and Fullerton avenues, runs west on Fullerton avenue to Racine, then south on Racine to Webster, east on Webster to Halsted, and finally north on Halsted to the starting point on Fullerton avenue. When in operation it will take trailers which are dropped on the Lincoln Avenue Cable line, and haul them around this loop back to the cable lines again.

As will be seen by the accompanying illustration, the track construction is quite similar to that of the cable road. The yokes are of cast iron, and weight 350 pounds each.

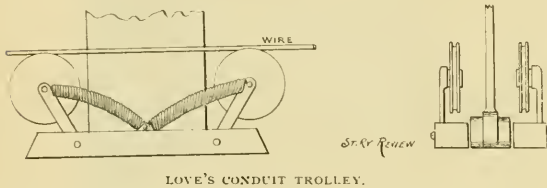
the negative current, so that there is no passage of current to and from the power station, other than through the medium of these conductors. The track rail is a Johnson, 78 pound girder, and the slot rail weight 85 pounds to the yard. On curves 100 pound Johnson rail is used. There are no feeder wires, other than the two above mentioned. On the line there are four curves, three railway crossings and eleven switches.

The cars which are being specially built for operation on this road are 24 feet in length, and mounted on McGuire 19 B steel trucks. The generator is of 130-horsepower, Eddy type, and is placed in the Lincoln avenue

power station, where it will be driven by a McIntosh, Seymour & Company high speed engine. The Westinghouse motor has been adopted, and one 20-horse-power will be placed on each car.

The track work was completed on February 11th, and it is expected that all the electric construction will be finished by the 16th, and it is hoped to have the road ready for operation on March 1st.

The trolley is an ingenious device of Col. Love's own invention, and consists of four trolley wheels, two of which run upon each side, and all are held tightly in contact against the wires by a spiral spring. A glance at the accompanying illustration will fully show the manner of its operation. The trolley not only admits of a vertical but of a lateral motion, so that no difficulty whatever is expected in passing around curves, or in crossing other lines, or in fact in any of the exigencies which arise in



LOVE'S CONDUIT TROLLEY.

street railway operation anywhere. The system is attracting a great deal of attention and its final test is being waited with much interest by electricians and street railway men.

E. G. Wheeler, the general manager of the Love Company is entitled to great credit for having prosecuted the street work under the difficulties of numerous storms and frozen ground.

The months of March and April are not at all conducive to favorable tests of any system in this latitude, but the company say the bad weather of our spring months is just what they want to demonstrate under the most adverse conditions that the system will operate in unfavorable weather as well as at any other time of the year.

AN ACTIVE CABLE ENGINEER.

THE chief engineer, S. Potis, of the West Chicago Street Railroad Company, and whose portrait appears herewith, is one of the brightest, hardest working, and best informed cable engineers in the country. He was born in Venezuela, where for a number of years he was engaged in gold mining. Upon coming to the United States, he became connected with the Continental Iron Works of Brooklyn, N. Y., and afterwards with a large iron firm of Philadelphia, after which he went to South America and installed a large amount of heavy machinery. He afterwards came to Chicago and was in the engineering department for Messrs. Fraser & Chalmers, and had charge of the foreign correspondence and catalogues. Mr. Potis speaks and writes four and reads several other languages. When this firm took the contract for a considerable part of the driving

machinery of the North Chicago Cable Road, Mr. Potis informed himself upon cable matters, and had charge of the construction and installation of this driving machinery. It was in this way that he became known to the United States Construction Company who were building the West Chicago road, and he held the position of constructing engineer for them and afterwards for the North Chicago Cable Road, for a period of two years.

When the Clybourn Avenue Cable Line of the North Side road was completed his services were required by the West Chicago Street Railroad, and he has held the



S. POTIS.

position as chief engineer ever since, and is constantly employed in construction work and planning improvements for their extensive system. He is still a young man, and is very popular with all his acquaintances, and has a bright future reaching out before him.

THROUGH the courtesy of W. J. Richardson, Secretary of the American Street Railway Association, we have received opinions rendered by the higher courts in the cases of Patrick Fenton, vs. Second Avenue Railway Company, New York, the plaintiff's son having been run over and killed. O'Connell, vs. St. Louis Cable Company, action to recover for injuries received. Margaret O'Neill, vs. Dry Dock & Battery Company, New York, plaintiff, a passenger injured in a collision.

SMALLEST CABLE POWER HOUSE IN THE WORLD.

The New Auxiliary Plant of the West Chicago Street Railroad—Boilers, Driving Machinery and a 1000-Horse Power Engine in a Building only 25 Feet Wide—

The Acme of Multum in Parvo.

UNDOUBTEDLY the smallest cable power house "for its size" in the world is that now almost completed by the West Chicago Street Railroad Company. The building faces west on Des Plaines street, and has a frontage of exactly 25 feet, and extends the full length of the lot which is but 150 feet.

The station is directly in the rear of the large power house at Jefferson and Washington streets, which drives the cable for the Washington tunnel and down town loop, and which propels all the West Side cable cars through the heart of the city. The south wall of the new building is however, on a line with the north wall of the large station, which it serves as an auxiliary.

Had anyone been asked if it were possible to house in so small a compass the massive machinery and boilers which are now planted there, the answer would certainly have been "no." And yet the accomplishment of this very same and intensely difficult feat has been brought about by an absolute necessity.

POWER HOUSE.

The big power house occupies a corner 75x150 feet and when the company made overtures for the purchase of the corresponding corner in its rear, the owner stubbornly refused to sell under any circumstances, and conducted himself in any but a public spirited and business like manner. The only alternative was to purchase the adjoining inside lots, but only one of these could be had, and this contained the insignificant width of 25 feet. Surely it was not an imposing site for the power house of a large cable road which must move 2,500 cars per day, and under the adverse conditions of passing through a tunnel with a $6\frac{1}{2}$ per cent. grade, and around ten severe curves, and in all over a loop 10,000 feet in length. And it here was that chief engineer S. Potis, of the West Chicago Street Railroad Company, found an opportunity to display his ingenuity; and though small in stature he unhesitatingly tackled one of the biggest pieces of mechanical engineering in the city, and indeed in all the field of cable work. How he succeeded, further description will explain.

The construction of the building itself presented difficulties, which however, were easily solved. The foundations were necessarily strong and sufficient to carry the stack, weighing 600 tons, 150 feet high. The foundations for the engine and driving machinery are built of brick and Portland cement, and extend to a depth of 17 feet, holding the anchor bolts which secure the bed plates.

They were laid with great care and allowed to perfectly harden before placing any weight thereon.

THE ENGINE

The engine is a giant of 1,000-horse-power, with a 36x72 inch cylinder, and is of the high pressure horizontal type. It was made by the Corliss Steam Engine Company for the Pennsylvania Iron Works Company, and is a very handsome product of engineering skill.

The arrangement of the intake and the exhaust steam pipes for the engine is so both of them are placed below the floor in order not to interfere with the movement of the traveling crane overhead. Hence no pipes are visible in the room, which greatly adds to its appearance and also serves to keep the room from becoming overheated. The live steam pipe is 12 inches in diameter and the exhaust 14 inches.

The exhaust leads back beside the live steam pipe for a distance of 70 feet and is carried to two 750-horse-power Berryman feed water heaters, and is finally disposed of through one of Warren's Acme exhaust heads at a height of 15 feet above the roof.

A more intelligent idea of its magnitude will be gathered from the statement that the crank disc alone is $7\frac{1}{2}$ feet in diameter and weighs 8 tons. The distance from the floor to the top of the cylinder is 6 feet, and the engine complete tipped the beam at 100 tons. The crank shaft is 20 inches in diameter and 14 feet long and carries the immense fly wheel which is of 20 feet diameter and 18 inch face, and weighs 40 tons. The farther end of this shaft carries a pinion 84 inches in diameter, which drives a spur wheel 244 inches diameter, 6 inch pitch, and 24 inch face. All cut gears.



POWER HOUSE 25 FEET WIDE.

The drums are 12 feet in diameter and 18 inch face, contain 6 grooves, each of which are $2\frac{1}{2}$ inches deep, and each drum weighs 17 tons. Of course they are equipped with Walker's differential rim, without which no cable plant in these days is complete.

It will be noticed that each drum is made a driving drum, a plan which is now approved by the best cable engineers, and has manifold advantages over the system employed some years ago, of driving with one drum only, and using the other for an idler.

The engine will make 50 revolutions per minute, and the drum 17 revolutions. The illustration will give a suggestive idea of the size and power of the machinery above described, although it is impossible in such restricted quarters to get a sufficient distance from the object on any side to allow of a good focus for the camera.

THE ENGINE ROOM.

The engine room is 22x65 feet inside of walls, and 33 feet to the roof, which is corrugated iron, with large skylights. By even the most careful planning it was found impossible to reduce the space occupied by engines and drums to such an extent as to admit of a passageway on both sides, so for a distance of 12 feet above the ground and for a length of 35 feet, a great breach was left in the wall, like a massive doorway, and the wall continued overhead to the top by resting on a strong horizontal steel girder. The extreme outside of the building line was then filled in with steel plate and the inside covered with hard wood, presenting a good appearance and the arrangement permitting of an additional passageway around the driving machinery, equal to the thickness of the wall.

Above the machinery, at a height of 23 feet, is one of Walker Manufacturing Company's traveling cranes, capable of lifting 40,000 pounds, and which runs on a steel rail track resting upon piers projecting from the brick wall. The entire weight of the engine and driving machinery in this small room is upwards of 200 tons.

The basement floors are of concrete, carefully made, and very smooth, while the floors in the engine room are of double flooring, the upper layer being alternate strips of oak and maple and highly polished.

An ingenious arrangement has been adopted to carry a light iron bridge and steps over the large gear. The supports are $1\frac{1}{2}$ inch gas-pipe, part of which are screwed into the bell plate and one rests upon a babbitted bearing which rests upon the gear wheel shaft.

THE BOILER ROOM.

Passing from the engine room which is separated from the boiler room by a heavy fire proof brick wall, we pass the stack, which is 150 feet in height, and 22 feet square at the extreme base. It is a 12 foot octagon at the floor line and has a diameter of 10 feet at the top. It contains 200,000 brick, and is one of the best built and most slightly in the city. The diameter of the flue is 6 feet. At the foot of the stack the available room is utilized by placing a large pump of sufficient capacity to supply the entire battery of boilers, and which was built by the Snow Pump Company, of Buffalo.

The battery of boilers comprises six vertical Corliss, each of 200-horse-power, occupying an outside space of 84 inches and rising to a height of 20 feet. They are placed close together as to almost touch, and are in line close to the north wall of the building. The inside diameter is 74 inches, and their construction is similar to others of this make and style having steam circulation in the water leg which is the patented feature of these boilers.

THE FUEL USED IS OIL.

The oil is pumped from underground tanks many feet removed from the building, into a standpipe in the power house, from which it descends by gravity and feeds the burners. The oil burning device is

similar to that already in use by the same company in its other power plants, and with such good success. The oil is forced into the fire box in a high pressure spray, and directed against a set of upright fire brick, which spreads the flame and gives it an upward direction, and the stack draught does the rest.

The floor is of smooth solid concrete, and where occasion requires trap doors or other openings, they are all of metal, at once fire proof and always clean. The top of each boiler opens into a breeching 3x8 feet, which leads into the stack at a point 18 feet above the floor line. By the means of this fuel both ashes and dust are wholly avoided, and the saving in labor, both of firing and the removing of ashes is considerable. Not only this, but an absolute uniformity of heat is secured which can be closely and quickly regulated. As shown in the illustration, on the opposite side of this room which is 22 feet wide by 84 feet long, is the run way for the tension carriage, which is in line with the driving drum of the engine room, and the construction of which is similar to the other tension carriages used by this company in its power houses.



BOILER ROOM DURING CONSTRUCTION.

As there was no opportunity for the construction of large reserve reservoirs for water supply in the boiler room, engineer Potis set his ambition and the water tank high, and at a distance of 25 feet above the floor is a system of steel tanks capable of containing a sufficient amount of water to supply the boilers for 18 hours.

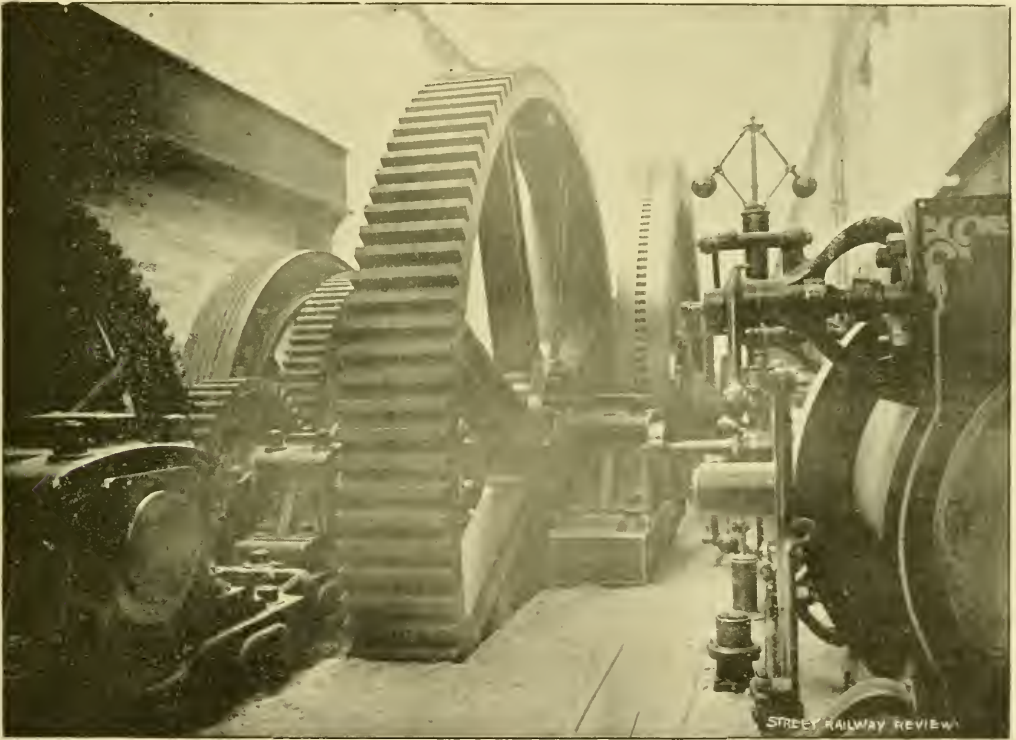
THE COURSE OF THE CABLE

Is one of the most interesting, and presented one of the most severe engineering difficulties of the whole plant. It was, however, solved in the following manner: The rope is conducted from the drum diagonally across the alley, through a 24 inch steel pipe, and passing around a 48 inch sheave is turned due east. This course led

the pickup. It then goes out down through the tunnel under the Chicago river, and back again to the last named vault, from which its course is identical to that already described. The rope is 1 5-16 inches in diameter.

The design of the plant is an auxiliary to the main loop driving station and the arrangement is such, that it will be possible to change the drive from one station to the other in an extremely short period of time.

The contract for the machinery for the entire plant was placed with the Pennsylvania Iron Works Company, of Philadelphia, who have taken great care and pains in its construction. The work is massive, strong, and yet neat and attractive, and the admiration of every engineer who inspects it.



1000 HORSE-POWER ENGINE AND DRIVING MACHINERY OCCUPYING FLOOR SPACE ONLY 21 FEET IN WIDTH.

directly through the side of one of the boilers of the present and larger plant, and offers a sight no where else to be seen in the world, of a cable passing through a steam boiler. It does so through a steel box, and is carried out through the boiler and also through a 2 foot brick fire wall into the engine room of the large plant. From here it is conducted in still a straight line until it reaches the vault beneath the sidewalk of the building, where it passes around another sheave and is turned south under the sidewalk until reaching the street corner where it is diverted and carried out through two small tunnels for a distance of 100 feet, crossing a street in so doing, and finally emerging in a large vault where it is elevated for

The fact that this company was selected to build the machinery is a strong indorsement of the character of their work, having previously supplied the driving plant in the other power stations of this road.

The new power station is a little gem and of high quality, and President Yerkes and General Manager Parsons are justly proud of this their latest acquisition. Ever since these gentlemen assumed control of the West Side lines there has not been a day in which important construction work was not being carried forward, and although they are still planning important measures for the future, have already accomplished an immense amount of improvements, the advantages of which are enjoyed

by hundreds of thousands, in the rapid transit facilities provided, and the greatly enhanced value of real estate, reaching into the millions.

It is impossible in this brief article and with a few illustrations, to present a really adequate idea of the surprise which cannot fail to impress the observer who visits the plant and sees for himself what has been accomplished in housing such vast forces in so small a room. It is like a giant intellect in the body of some diminutive dwarf, and effectually denies the impression that a cable power plant necessarily requires a large ground space.

THE ANN ARBOR AND YPSILANTI RAILWAY BLACKMAILED.

BY reason of an injunction issued by the Supreme Court of Michigan, January 21, the Ann Arbor & Ypsilanti Street Railway is tied up, the employes discharged and the rolling stock stored. About a year ago Charles D. Haines, of New York, succeeded in enlisting the interest and capital of the leading business men of Ann Arbor and Ypsilanti in a scheme for connecting the two towns—eight miles apart—by a motor line. The stock was subscribed, the right of way secured and the line built. The concern started off with a big business and while the boom was on Mr. Haines unloaded his stock at a nice profit. The line had been built upon the frozen ground and with the opening of spring the track settled to such an extent that it was found necessary to rebuild nearly the entire line. By this time some \$60,000 had been spent on the eight miles of track. However, business increased, until from 12,000 to 18,000 passengers a month were carried and the stockholders began to see daylight ahead, when the career of the company was cut short by an injunction.

It seems that in securing the right of way the consent of all the farmers was obtained except that of one of the heirs to the Nicholls' estate, which owns a farm near the city limits of Ann Arbor. This heir, Mrs. Dr. Granger, of Bay City, petitioned the Circuit court for an injunction, claiming that her property was damaged by the motor line passing along the highway. The Circuit court refused to grant the injunction, and the case was appealed to the Supreme court, which reversed the finding of the lower tribunal. The Board of Directors immediately called a meeting and decided not to contest the case, and they positively assert that unless the matter is amicably settled they will tear up the rails and sell the entire plant.

It is said that the feeling on the part of the press and people is almost unanimous in the belief that it is simply a scheme of blackmail. Before the building of the line the Nicholls' property was held at \$6,500. They have refused \$10,000 and now value the place at \$12,000, yet in case of the final suspension of the road the value of the farm would depreciate fifty per cent. The company have always shown a liberal disposition in the matter of settlement of legitimate damages, but in this case it is so manifest that no damages have resulted by reason of the existence of the railway that they utterly refuse to consider the demands, which are simply extortionate.

The city council of Ann Arbor has voluntarily taken the matter in hand and at its last meeting passed an ordinance granting the company a franchise by another street that will permit the dodging of the Nichols' property. Here the matter rests, the railway company not having decided what action to take in the matter.

A RECENT TEST OF THE SHORT GEARLESS.

A SERIES of interesting tests has just been made in Cleveland in order to determine the relative merits of the various new types of street car motors recently put out by the different companies. A prominent engineer of the West was sent by his clients to report particularly upon the Short Gearless motor and the single reduction motors of other makes. The tests were made by attaching two motor cars together and running the train with each alternately over a measured stretch of track. The power consumed was measured by the Thomson-Houston watt meter. Dynamometers were placed between the cars and the readings taken, showing the power required to pull each car as a trailer. The utmost care was taken to secure reliable results. The full results of these and other tests will shortly be given to the public, but it is interesting to note that the doubt in the minds of many street railway people concerning the power consumption of a gearless motor was proven absolutely without foundation. The Gearless motor was nearly at the bottom of the list, showing a high efficiency, greater even than several of the Double Reduction motors, which were also tested as a basis for general comparisons.

Much to the surprise of all concerned, it was found that the gearless motor car was slower in speed than any of the single reduction motor cars, showing that Mr. Short's efforts to make a slow-speed motor have been entirely successful; in fact it has been found necessary to wind the motor for a higher speed in order to meet existing conditions of street railway work, which are demanding more rapid travel through the city streets than was thought feasible a year ago.

Another feature of the Gearless motor car was the fact that the power required in drawing it as a trail car was less as shown by dynamometer readings than that required for the single reduction motors. The Short Single Reduction motor showed a very high efficiency in all the tests made.

A CONDUCTOR named Martin T. O'Laughlin, of Minneapolis, met with a curious accident recently, by being struck on the forehead by the trolley wheel, which became detached while he was endeavoring to place it under the wire by means of the depending rope. The wheel fell and struck him with considerable force, and although the accident was not considered serious at the time, he died from its effects in about one week.

A SCHEME is already on foot to build a great electric railway, connecting the cities of Alliance, Salem New Lisbon, Wellsville and East Liverpool, O.

HEATING A CITY WITH EXHAUST STEAM.

A Description of the Ottumwa, Iowa, Electric Railway and how it Increased its Dividends.

IN the very heart of the soft coal region of Iowa lies the city of Ottumwa, boasting 18,500 inhabitants, the home of the far-famed coal palace and one of the most interesting electric railways in this state, which is well supplied with electric transit facilities.

The Ottumwa Electric Railway is unique in its methods and a description of the system and particularly of their exhaust steam heating plant will be of interest to managers everywhere and may be productive of similar efforts in other cities.

The entire length of the line of the Ottumwa railway is $4\frac{5}{8}$ miles, radiating into three branches as follows: the east branch 2 miles, the west line $1\frac{1}{4}$ miles, and the north division $1\frac{3}{8}$ miles. Besides this the right of way



THE POWER PLANT.

is already obtained for a 2-mile extension across the river to South Ottumwa, where 3,500 of the "400" of Ottumwa dwell.

From the nature of the case it is our duty to first pay our respects to the very complete railway system, and one feature of its fine

ROAD BED

is the foundation. The streets for $3\frac{1}{2}$ miles of the distance are paved with vitrified brick a very popular method in this and adjacent states, and the widely known macadam system. This latter in the bottomless soils of the prairie states is not so substantial as other styles of road, but the vitrified brick gives the best of satisfaction in all these parts. The railway company is required by the municipality to pave $3\frac{1}{2}$ feet each side of the track center.

On this bed then we find the well known Johnson girder rail for $3\frac{1}{2}$ miles and T rail the remainder of the trackage.

THE ROLLING STOCK

consists for the greater part of closed cars 16 feet in length and a number of open cars used as trailers in summer. The closed cars are all provided with Burton electric heaters. Of these, Mr. W. R. Daum, the competent manager, says that their work is very efficient, and by his own method of placing them, parallel with the panel foot board instead of at right angles with it, keeps them in better working order than when exposed to the rather muddy boots of the patrons of the line. The cars are from the La Clede Car Co., of St. Louis. The motor cars are provided with Thomson-Houston motors of the double reduction type, 15-horse-power and two motors to each car. These motors can be run doubly or singly.

THE POWER STATION

s housed in a substantial brick building next to the Rock Island Railway tracks and from this location the fuel used is easily transferred from the cars to the coal-bin. The building here, is fire-proof, iron-roofed, and its dimensions are 88x62 feet, with repair shop and car barn 34x66. Beside this ample room, Manager Daum says that they will erect an addition to their car barn 54x75 feet and will add three or more cars to their equipment this season, and will also add largely to their power equipment.

THE ENGINES

whose ceaseless work, lights, carries and heats the citizens of Ottumwa, are made by the well known firm of E. P. Allis & Company, of Milwaukee. Two of these engines are the Corliss type, of 150-horse-power each. The boilers are tubular, of McDaniel's make: three are 75-horse-power, and one 150-horse-power, all furnished with Brightman Stokers, made by the Brightman Stoker Company, of Cleveland, Ohio.

THE ELECTRICAL POWER

is generated by one 80-horse-power Thompson-Houston dynamo and one 135-horse-power Edison. Another generator will probably be added as needs demand.

THE GEARING

is both shaft and belt, with Hill clutches, and the Charles A. Shieren perforated electric belts.

Along the route of the road are a number of points of interest. The road passes all public buildings, the magnificent government building, the coal palace now in the course of demolition, and all the principal hotels, schools and places of amusement.

At the end of the eastern route, toward a locally famous health resort is Franklin Park, owned by the railway company, a pretty piece of land, 15 acres in extent, which will be improved by the company into the pleasure ground of Ottumwa.

This attempt at creating travel mentioned above, will undoubtedly bear good results, as the number of pleasure seekers from the various packing-houses and factories is large.

The hilly contour, with simply killing grades, makes the line of interest in another way. One grade on the north line which leads to the cemetery is a 10 per cent. maximum for 675 feet, which immediately follows 800 feet at 7 per cent. and in this stretch is a 50-foot radius curve. The wise rule of Mr. Daum, that cars going down must come to a full stop at the head of this grade has obviated any serious accidents.

We now come to one of the most shining examples of economy and thrift to be observed anywhere in that state, the Yankee land of the west.

THE EXHAUST STEAM HEATING

method in vogue here was the outgrowth of careful study and is the pioneer in the matter of exhaust steam heating. The Holly System is used, and the plant was put in by the American District Steam Company, of Lockport, New York.

There is an electric light plant in connection with the street railway system, part of which light is furnished from the street railway power station. The cars run 18 hours per day and the electric lights 12 to 14 hours, which includes all the time the cars are idle, thus furnishing a large amount of exhaust steam for 24 hours every day. The Iowa soft coal slack can be delivered at 70 cents per ton into the bins.

The exhaust steam is conveyed in underground mains aggregating $2\frac{1}{4}$ miles in length, laid and placed 5 feet below the surface. This is at a sufficient depth to defy the rigors of the winter and very little of the heat is lost when the pipes are properly protected.

This is the third year of the enterprise and that it grows in public favor is shown by the great increase in patronage. The first year the new method found 33 consumers, the second gained 36, making a total of 69, and this season 119 edifices are supplied.

THE PRESSURE

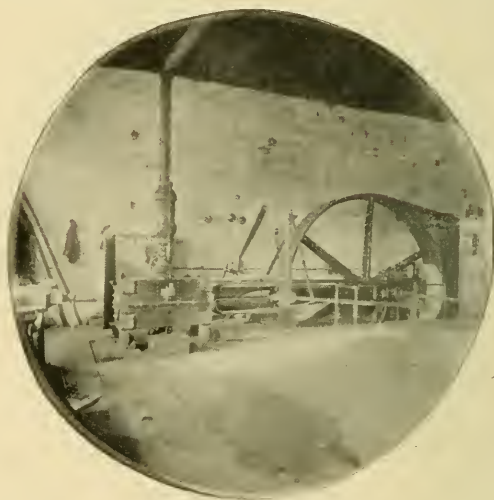
required is an initial pressure of 15 to 16 pounds and the pressure at the extreme limits is 8 to 9 pounds, showing therefore an expenditure of 7 pounds.

This of course throws a back pressure on the engines, but as they are of ample capacity for the required work, it does not cause any difficulty. The steam exhausts through feed-water heater and separator which delivers the steam dry into

THE MAINS.

These are of 10, 8, 6, 5 and 4 inches diameter according to the amount of steam to be conducted on the street, and grow smaller on those streets where fewer customers are supplied, just as gas mains. They are wrapped with asbestos board and encased in pine logs that are bored out leaving an air space around the steam pipe. The logs are tapered at one end and are driven solidly one into another in a manner similar to the early system of waterworks,

using bored logs for pipes. These wood pipes or "wood log," as it is called, is made by the Michigan Pipe Company, of Bay City, Michigan, and are coated with asphaltum at the mills, making the log when finally laid thoroughly water and damp proof. Smaller service pipes similarly protected connect the street mains with the radiators in the buildings and residences, each house taking care of its own condensation by discharging through a trap to the sewer. There are no return pipes to the power stations—only the one line of main and diverging branches. No traps are required in the street except where a pipe lies between two elevations so as to form a sag or low place, they also have drip valves connecting with the sewers which can be opened if necessary. There are but few of these, however, and even they are seldom touched. Steam does not escape at any point along or at end of mains except such as is drawn into the buildings for heating purposes. In mild weather the exhaust is ample to furnish all the heating, and the first two years



INTERIOR POWER STATION.

the system was in use, was almost sufficient even in cold; but since then consumers have increased so rapidly as to require in severe weather additional live steam, which is taken from the boilers by means of an automatic regulating valve which allows only enough live steam to pass to make up the deficiency existing, and as soon as the demand falls, the live steam is cut off and only exhaust delivered.

The increase in the number of consumers has been so great that at the present writing, during cold snaps, the amount of live steam exceeds that of the exhaust. During the present season additional engines will be installed which will increase the amount of exhaust and which would be all sufficient to supply present consumers. But so many new ones have made request for heat that the company will add considerably to their boiler capacity to keep up with the demand. The furnishing of the live steam alone is a profitable undertaking but all that is received from the exhaust is readily seen to be clean profit.

During the winter not a vestige of exhaust steam is to be seen around the power station. During the summer the engines exhaust into the air. It may be said the "season" of exhaust steam heating begins about where the ice-man leaves off and continues until again supplanted by that artist whose scales are such abject servants of gravity.

The cost to consumers is regulated by meter, per thousand heat units as follows: $\frac{1}{2}$ -inch meter 7 cents, 1-inch meter 60 cents, $1\frac{1}{2}$ -inch meter \$1.75, 2-inch meter \$4.00. Of course the exact amount per house is hard to calculate, but for example, the Government building is heated for \$450 per year, and a residence containing 12 to 15 rooms costs from \$90 to \$135 for the season, which includes all the time that heat is required.

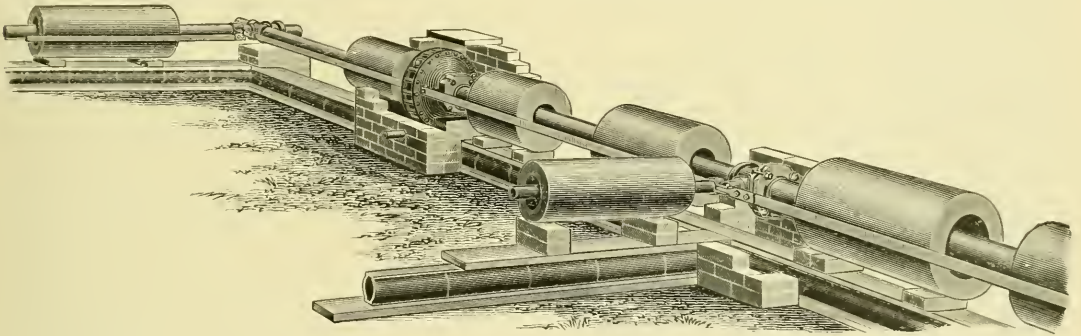
All the churches located on the lines, regardless of denomination, also school houses, numerous private residences, business houses and public buildings have taken advantage of this great relief from dirt smell, and smoke.

The cost to consumers is below that of anthracite coal and but little greater than that of soft coal, which can be retailed at \$2.00 to \$3.00 per ton for the best.

We have only now to pay our respects to President W. R. Daum, Vice-President Chas. F. Blake and C. H. Brampton, secretary and treasurer. We learn that at the annual meeting of the company held since our visit, Mr. George P. Daum retired from the position of secretary and treasurer in order to devote his entire attention to the business of the Eldon Coal & Mining Company, of which he is also secretary and treasurer, and that Mr. Charles H. Brampton was elected to succeed Mr. Daum. Mr. Brampton for the past 7 or 8 years has been the popular and efficient secretary of the Cedar Rapids (Iowa) Electric Light & Power Company, and is well informed in electrical matters.

EXHAUST STEAM HEATING ELSEWHERE.

During the past few years a large number of steam stations have been constructed, some of them of great magnitude, with the primary object of supplying the necessary power to generate electricity, for the lighting of cities and villages and to run motors and street cars, and to perform other industrial service.



SECTIONAL VIEW OF A LINE OF STEAM MAINS, SHOWING IRON PIPE, WOOD LOG COVERING, ANCHORAGE, VARIATORS AND STREET ANGLES.

The extra cost to the company is principally for the little additional fuel and water used, as but little additional help is required.

Goubert's famous feed water heater and a separator of their own device are used.

"The Westinghouse-Church-Kerr steam loop is utilized," says Mr. Daum, "to the extent of saving several times its cost every year."

Although not in our line it would be of interest perhaps to say that the "concern that runs the town" also lights it.

The Railway Company has two electric light stations, one at the power plant already mentioned, and another in the west part of the city, operated by water power. Here are 2 Edison machines for 1,200 incandescent lights, and 5 arc light dynamos. The arc lights from this station are used principally for lighting the streets of the city. The power is leased from the Iowa Water Company.

Taking it altogether the Railway Company is a most important member of Ottumwa society: it carries its people all the year and 18 hours per day. It lights them all day and all night and warms them from September to June.

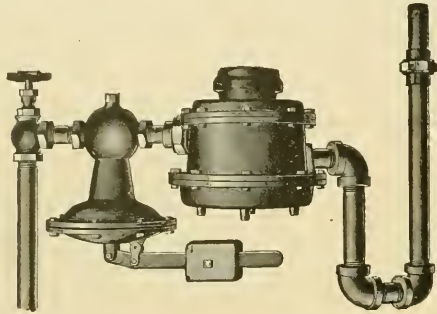
The steam from most of these stations, after passing the engine, is exhausted into the atmosphere and its service to the company is completed. Now, it is an established fact that only about one-tenth of the amount of heat energy is lost in passing a given amount of steam through an engine, and that nearly nine-tenths of the heat is still available for heating residences, stores, offices, and public buildings; and all that is required to accomplish this is to construct a system of underground pipes through which to distribute this among the various customers in a city or village. It will thus be seen that a medium is hereby afforded through which a company may add materially to its income.

In generating power the wear and tear of machinery is expensive, but in distributing steam from a central station for heating, the few pounds pressure per square inch causes it to circulate to the extremities of the system of pipes in use. It is thus delivered with but little friction or cost.

In a steam heating system proper it is calculated that 100-horse-power of boiler capacity will heat 1,000,000 cubic feet of space, and that \$3.00 to \$4.00 per 1,000

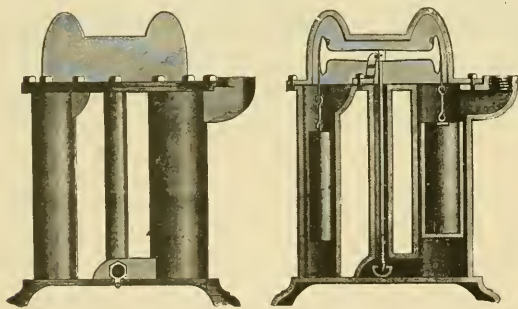
cubic feet is a fair commercial rate for the consumer to pay. It will thus be seen that batteries of boilers erected for the generating of power may, through the sale of exhaust steam for heating, be an important source of income outside and beyond the original purpose of their erection.

This plan of underground steam distribution is not entirely new. Some fifty or sixty cities and villages are now supplied with heat from central stations, and as we



HOLLY'S REDUCING VALVE AND STEAM METER.

learn, are in satisfactory operation. Quite a number of electric plants have already adopted this plan for exhaust steam distribution and are deriving handsome revenues therefrom. It seems to us to be a proper and feasible adjunct to the work of an electric station, and may in a good many cases assure the success of these enterprises.

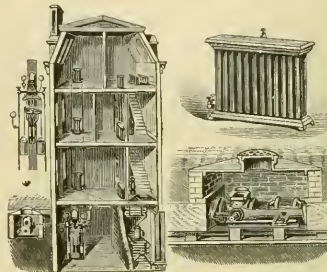


HOLLY'S STEAM TRAP.

This plan of heating was invented some twelve years ago by Mr. Birdsell Holly, the inventor of direct pumping for water works, and the enterprise has since been prosecuted by the American District Steam Company, of Lockport, N. Y. The earlier construction of steam mains has been materially improved, and by the use of the "variator" no packed joints are used and no man-holes are required in the streets. In the construction of steam mains the question of protection from undue radiation is important, otherwise it might offset all legitimate profits. By the most approved methods in use, we are told that the loss by radiation does not exceed 3 to 5 per cent. of the steam passing through the pipes.

The Holly system differs from the ordinary house system of heating, as it prefers not to return the water of condensation to the boilers. The steam is first conveyed into the basement of the building, passes through

the "regulator," which reduces the steam to a low and uniform pressure, and then through the steam meter, which records the amount of steam used by each customer. The water of condensation goes from the radiators to a trap, and then to a cooling coil in the basement, where all heat is abstracted and passes through a register in the floor above; the water then passes to the sewer; or, being chemically pure, may be used for any purpose desired.



In the foregoing we have attempted to give but a brief outline of this plan to utilize the waste product of power stations, which we believe proprietors and managers will do well to study up. These companies have all the machinery for a steam heating plant, requiring only the mains through which to distribute the steam to their patrons.

CHANGES IN ALBANY.

THE Albany N. Y. Railway Company has leased the lines of the Watervliet Turnpike & Road Company. The Broadway line which connects Albany with Troy, will be improved and ten large excursion cars placed in service early in the summer. Motors will run every 15 minutes, and the service will be otherwise improved. This acquisition of the Broadway line gives to the Albany Railway control of all the lines in the city. The leasee guarantees the payment of the interest on the first mortgage bonds, and the interest and principal of the second, and pay a rental equivalent to one-half of one per cent upon the capital stock. The line was changed to electricity in March of 1889.

KNOCKED OUT BY A FIRE ENGINE.

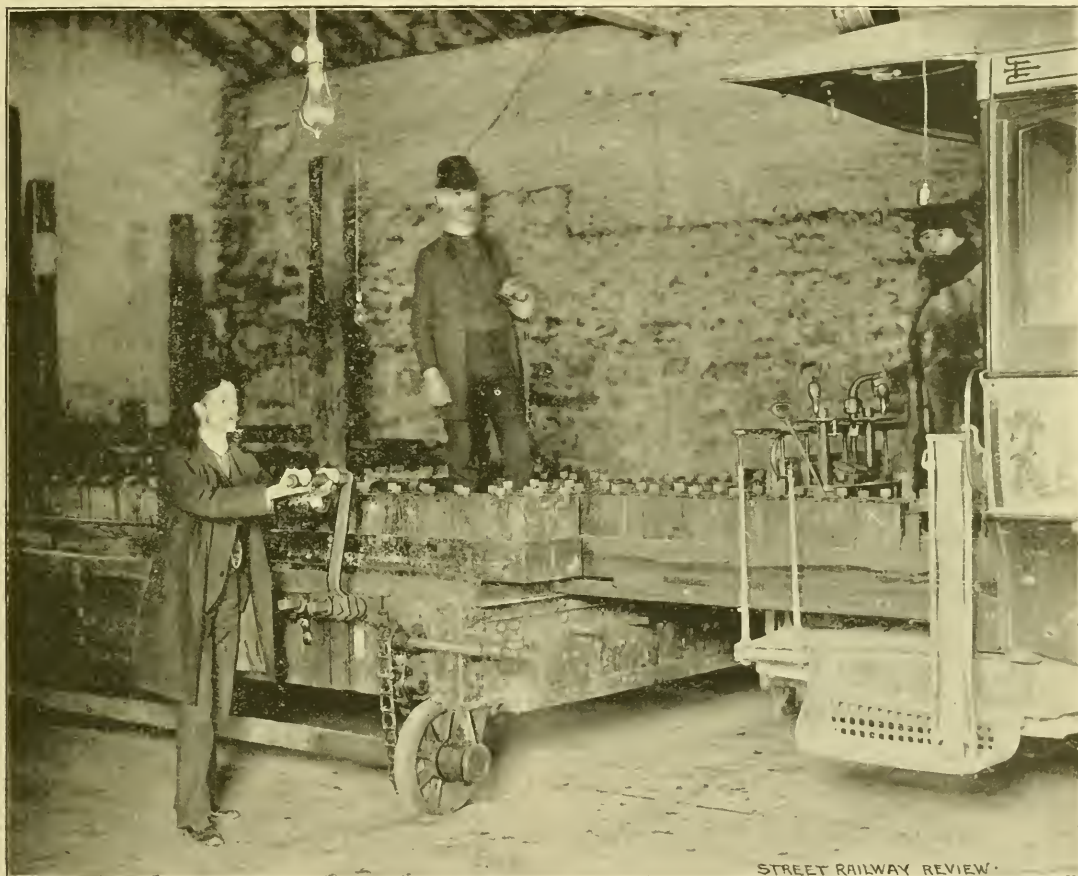
WHILE a five-ton engine in New York City was recently running to a fire, drawn by three powerful horses, it approached a street occupied by car tracks and on which a car filled with passengers was approaching at a good jog. The car driver endeavored to cross in front of the steamer, but failed to do so, and the pole of the engine passed directly through the car, overturning it, and the momentum of the steamer served to raise the car partially from the ground. All the windows were broken, the car was badly smashed and the occupants were bruised and cut by broken glass. No arrests were made, as it was conceded to be an accident which under the circumstances could scarcely have been avoided.

THE STORAGE BATTERY IN DUBUQUE.

ON the twenty-ninth day of May 1891, the storage battery system blossomed out in Dubuque, Iowa. Other cities from time to time had seen one or more solitary cars traverse the streets for a time and then were lost to view. Hence it was that the adoption of the storage system as the exclusive motor power for all the cars of one company was a previously unrecorded event in the history of this country, and the fact was duly pub-

Nine handsome Brill cars (only six put in service) were purchased and each equipped with two 15 horse power double reduction Edco Motors, and 80 cells of the "23m" type, of the Accumulator Company of Philadelphia. The generators were Grisoni's and the electrical equipment throughout that of the storage company's own make, or selection.

The railway company made the purchase of equipment



TRANSFERRING CELLS FROM CHARGING TABLE TO CAR.

lished through the agency of the Associated Press, not only all over the United States but also abroad. There had not been such a stir in electric railway matters for a long time, and hundreds of electricians and managers and the public generally said "at last it has come."

But although the ascent was like a rocket, the stick has just come down. However, as people cannot hear too much of a success but have no time or sympathy for failures, comparatively little is said about the decision now arrived at, to cast out the storage and install the more reliable overhead system.

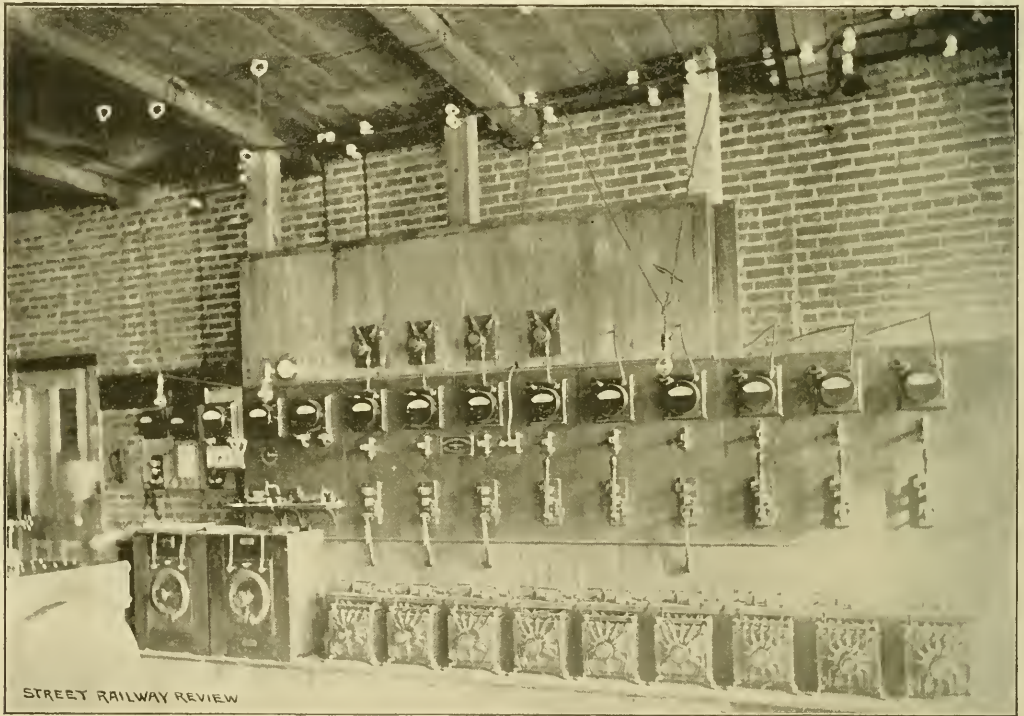
under one contract and held another covering a guarantee that the cost of maintaining the cells should not exceed \$2.50 per cell per year. And here came the rub.

Before adopting storage batteries, President J. A. Rhomberg, made a European trip, inspecting the operation of cars abroad, and as he stated to our representative, has been for several years, and is now an earnest advocate of the system. He states, however, that while it is possible to operate cars in daily service with storage batteries, he is fully convinced that the system has not yet reached that

degree of perfection, which places it on the plane of a commercial success. He hopes and expects that eventually this will be achieved.

When the system was first installed, suitable appliances were wanting for placing and removing the cells from the cars. This was provided for, however, by a mechanical device. (see illustration), which was built at an expense of \$3,000. Mr. Rhomberg further states he is ready and has at all times been anxious to settle with the accumulator company, if they would furnish him acceptable guarantee to bear all the additional expense over \$2.50 per cell per annum, 80 cells to the car. This

beginning up to the 1st of December, excepting a couple of weeks when there was only one, and one electrician until after January 1, 1892. These three electricians were operating the plant; they were looking after the batteries, of which they had full charge, and they had likewise entire control over the men that handled the batteries, whereas during all this time we had nothing whatever to do with the batteries. On my having notified Mr. Griscom, president of the Accumulator Company, that the batteries were giving way, he wrote and telegraphed me that he would come at once. When I saw him on his arrival at the Julien, I told him that the



THE SWITCHBOARD—DUBUQUE STORAGE BATTERY SYSTEM.

was the figure named him as maximum when the system was installed. Mr. Rhomberg makes a full statement of the case in which is as follows:

PRESIDENT RHOMBERG'S STATEMENT.

"We commenced running the six cars on or about the 29th of May, 1891, and to our knowledge the batteries had already begun to give way at about the beginning of July, of which I at once notified the Accumulator Company. The Accumulator Company had, however, already been apprised of this by their superintendent, who was here at the time and who knew that the batteries were giving out during the latter part of June, of which we were not aware, nor were we informed to that effect. The Accumulator Company had three of their own electricians here to superintend the whole plant from the very

storage battery system had already proved to be a failure. But he remarked that this was only a mishap and that the system would surely be a success in the end, that he would make it so. The results since, however, have shown that it is utterly impossible to make it a success, as the second and also the third set of positive plates have given out in almost the same way as the first, notwithstanding the fact that they were treated quite differently from the first set; they being permitted to make only one and two trips, or six and twelve miles with one charge, whereas the first sets of positive plates were allowed to make three trips or eighteen miles. With one charge, however, if we have the least bit of snow, the batteries are scarcely able to make a trip of four miles, or from the car house to the I. C. R. R. depot and return, and in many instances they could not do that and had to be

towed to the car house. The original cost and maintenance of batteries since the latter part of May up to date amounts to over \$25,000. Anybody who wished to operate the storage battery system would require the Bank of England to back him.

"The Accumulator Company has given us a guarantee that the maintenance of the batteries should not exceed \$2.50 per cell per annum. But the maintenance per cell is about \$4.00 for every 60 days, if one runs the cars regularly as they ought to be run. These \$4.00 include new positive plates, freight, pins, acid and labor and breakage. This makes the cost of maintenance \$24.00 per cell per annum, instead of \$2.50 as per their guarantee, which would amount to \$3,840 per car per annum. However, making it only \$4.00 every 90 days would bring it up to \$16.00 per cell per annum or about 2,560 per annum for each car. Everybody must see that it is an impossibility for the Accumulator Company to keep up our plant for four years as per guarantee, for it would cost them to keep nine cars running regularly, about \$25,000 a year, or \$100,000 for four years. Besides the negative plates will wear out in this time, which will be an additional item of expense. We should be very glad to have the Accumulator Company continue operating the plant for the next four years. And, as I have informed the Accumulator company, Mrs Linehan and myself are ready to pay every dollar, and we would individually guarantee the payment for the plant if they gave an indemnity bond in Dubuque that they would keep up the plant according to their guarantee for the next four years.

"The Accumulator Company was after us and did their utmost to obtain our company's notes; but I refused to give any more paper after having found out positively that the batteries were a failure. We have given the Accumulator company notes aggregating about \$23,000, together with which they hold \$24,000 worth of our bonds as collateral, which was according to contract.

"It is useless for the Accumulator company to talk of our having old boilers which is untrue. We have the best kind of eighty flue, new steel boilers, manufactured by the Iowa Iron Works. At first we had an engine of not quite sufficient capacity, but which, it appears, has not injured the batteries, as the Accumulator Company claims, for since using the new Corliss engine the batteries were effected in exactly the same manner as here tofore. Consequently the engine can not have had anything to do with injuring the batteries.

"The Accumulator Company further says that we have only an old snow plow for cleaning the tracks, although we have three just as good snow plows as can be anywhere. Besides, they claim that our motor-neers are men unfit to run cars. Our men, I think, are as good as can be found on an average all over the country, which the people of Dubuque will confirm.

"The people of Dubuque, particularly those living near and above the car house, know what an intolerable nuisance the storage battery system is, as they have been daily run into the car house and have been obliged to

wait while the batteries were being changed. And this happens almost every trip. One hears people daily saying that they would prefer to have the horses and mules back again rather than have the storage battery system continue, so disgusted are they with the way the latter has been running during the last four or five months.

"People often wondered, too, why the Accumulator Company was keeping three electricians here to watch five or six cars. These were not supposed to be ordinary electricians, but the Accumulator Company claims them to be electrical experts. Mr. Miller especially was considered an expert in everything relating to batteries.

"The Accumulator Company's own men had charge of the plant and yet the company says the batteries were abused and not treated according to instructions. If such had been the case the plates would have buckled and the active material would have fallen out in lumps, but would not have worked itself out gradually as it has invariably done.

The facts of the whole matter are that the Accumulator Company knew nothing about traction with accumulators when they made the contract with us, as they had only one or two experimental cars running before.

"I do not pretend to say that all storage batteries are a failure, but ours most certainly are. There may be batteries having a much greater efficiency.

"I am sorry that we are compelled to install the overhead system on our road, for we should by all means prefer the storage battery system if it could be made a financial success."

The following letter explains itself :

THE ACCUMULATOR COMPANY, 224 Chestnut street,
PHILADELPHIA, January 6, 1892.

EDITOR STREET RAILWAY REVIEW :

Dear Sir.—We are in receipt of your letter of the 31st ult., saying your representative has been to Dubuque where he carefully investigated the operation of our street railway system "and found it was not considered a commercial success," and asking us what we "may have to offer as extenuating circumstances in explanation of its failure."

Your paper goes to press too early for us to prepare a detailed report of the operations of the road, which we would like to do, but we will say now, and promptly, that we have nothing to say to explain away a "failure," as we consider that our cars have demonstrated that the system can be run at a less cost per car mile than by the trolley system and that it can be shown without doubt that it has done this on the Dubuque Street Railway. Our representative has just returned from Dubuque, and the data which he brings us in addition to what our books show, prove this beyond question.

Mr. Rhomberg, the President, and half owner of the road was loud in his praises of the system so long as we would extend the time of payment for his equipment. He alone now speaks of the system as a failure, because the road does not pay dividends. The question of patronage

for his road is one which does not enter into the economy of the system as compared with other electric systems, although Mr. Rhomberg himself admits that the patronage of the road has increased more than 50 per cent. since the cars were put on.

An approximate figure for the cost of running the Dubuque Street Railway for seven months, ending December 25th, is 6 9-10 cents per car mile run, exclusive of motor men. This covers renewal of batteries, labor at station, cost of power, repairs of electrical equipment, handling of batteries, freight on material, and in fact everything but interest and motor men.

We submit that this can not be called anything but a great success, notwithstanding the road has been run in the most unbusinesslike way, which we were powerless to prevent.

We hope soon to present a statement showing costs in detail, which will, we trust, show that our system is not only economical, but the most economical of all.

Thanking you for your courtesy in giving us an opportunity to make this statement,

We remain, yours truly,

THE ACCUMULATOR COMPANY,
W. W. GRISCOM, *Vice-President, pro tem.*

We leave our readers to draw their own conclusions. The fact however, remains that no other managers have adopted storage from having inspected the Dubuque system, although it was visited by a large number. Nor does it seem likely that was the operating expense so low, that Mr. Rhomberg could afford not to accept and pay for the plant, rather than go to the expense of installing the overhead system and purchase other and new motors for his cars.

In these days a valuable and economical appliance does not go begging, but is quickly adopted by large companies and the fact that none of the leading roads which are spending thousands every year in the effort to secure any improvement on present methods, have seen their way clear to adopt the storage system is a telling argument to the fact that it has not as yet reached a point which warrants its adoption for the severe and extraordinary demands of a daily street car service.

Hundreds of thousands of dollars have been spent in experimental work, and the best electricians maintain the problem will yet be solved. When it is THE STREET RAILWAY REVIEW will be among the first to chronicle the event.

A BELIGERENT citizen of Uniontown, Pa., who was put off a car, waited until the car returned and at the point of a shot gun demanded the return of his fare from the conductor. He got it, and also an arrest on four charges and a heavy fine.

THE Buffalo News spreads itself on the front door fiend as follows: "Let him be perpetually banished to the Arctic regions appalled in nothing but a linen duster, and that snowballs and frost be his diet for ever."

TROLLEY DECISION IN NEW JERSEY.

Street Railway Using Trolley Electrical System.

The provisions of the New Jersey Act empowering street railways with the consent of the municipal authorities, to use electric motors as the propelling power for its cars, do not legalize the erection of poles and the stretching of wires in a public street as a part of a system of electrical railroading.

An ordinance of the city of Trenton granted permission to the Trenton Horse Railroad Company to use electric motors on all its lines within the city, to be supplied by overhead wires supported by poles at least twenty feet high, etc.

In the opinion, the Court said:

The ordinance is attacked on the ground that the common council of the city of Trenton did not possess the power to enact it. The defendants rest their claim that such power exists upon the terms of an Act of the legislature passed in 1886. Supp. Revision, page 369. The second section of that Act is in the following words: "That any street railroad company may use electrical or chemical motors, or grip cables, as the propelling power of its cars instead of horses; provided, it shall first obtain the consent of the municipal authorities having charge of the public highways or streets on which it is proposed to use such motors or grip cables." The question propounded is, whether by the terms of this Act the common council is invested with power to grant to a street railway company the privilege of placing obstructions in the street in the shape of poles and wires.

The conclusion is that the act of 1886 expressly grants only a right to use an electrical machine attached to some part of the car for the purpose of transmitting electrical energy into car movement. The act contains no implied grant of power to obstruct the ordinary use of a public street by posts, wires, or any other apparatus designed to be used in connection with any electrical motor. The ordinance pretending to vest, as is done, in the defendant corporation a right to place posts and string wires in the public streets, is a nullity. It is perceived that this result does not rest upon the want of power in the Legislature to authorize these erections, but rests upon the intention of the Legislature as expressed in the act.

As against the public grantor, the grantee must rely upon express words in the statute, or upon necessary implication. The point to be now ascertained is, what was meant by electrical or chemical motors as these words were employed by the Legislature. There is nothing to indicate that it was intended by the use of the term "electrical motor" to include any apparatus outside of the car which would cause an additional obstruction to public travel and an additional inconvenience to abutting land owners. Construing this act in the light of the condition of electrical railroading in March, 1886, and of the views of the experts, I think it clear that the word "motor" meant the motion-producing contrivance in the car.

(Sup. Ct. N. J. State v. Inhabitants of City of Trenton, et al. 23 Atl. Rep. 281.)

STREET RAILWAY LAW.

EDITED BY MR. FRANK H. CLARK, ATTORNEY AT LAW, CHICAGO.

Street Railway Crossing, Street Occupied by Another Railway.

The location of a street railway track for a distance of 165 feet, on a street already occupied by another street railway, to connect the track of the first railway company on two other streets not opposite, was allowed as a diagonal crossing under the Pennsylvania statute. The test is, whether the crossing can be made without invading the rights of the other railway to the exclusive use of the street under its charter.

MAGEE, J.:—The first question for consideration of the court suggested by counsel is, is the alleged extension under which the defendant company claims to be constructing its railway, illegal and void? In passing upon this question it seems to me sufficient to say that the defendant company has obtained from the state, in the mode prescribed by law, the right to construct its railway upon and over a designated route, not involving the exercise of an indefinite power to construct necessary branches in connection with its designated route or main line. This grant to the defendant company is good throughout its entire length, provided it does not come in conflict with state privileges theretofore acquired and possessed by the plaintiff company.

The next question suggested is, is the proposed connection between the tracks on Eighth and Burton streets a crossing? The law provides for a crossing either transversely or diagonally. The right claimed by the defendant company is to connect its tracks by crossing Main street, a street occupied by the tracks of the plaintiff company.

An agreement has been entered into by the companies, that if the right to connect the tracks of the defendant company exists, it shall be made in a specified way and location.

Can this crossing be accomplished by a transverse or diagonal crossing? There is no question that the crossing is necessary for the enjoyment of the defendant's franchises. It is very evident that a transverse crossing cannot be made, as Eighth street and Burton street are not directly opposite to one another. Are these streets so far apart that a diagonal crossing cannot be made? The distance from the center of one street to the center of the other street is given as 165 feet, and from the line of one street to the line of the other street is 115 feet.

I am of opinion that, under the facts in the case, a diagonal crossing can be properly made within the limits mentioned, without invading plaintiff's rights under its charter.

I do not think it important to discuss the question of priority in the grant of charter, or municipal privileges, to these companies. Priority of grant does not affect the right of one road to cross another. If it were a question of the use and occupancy of a street, not by way of a crossing, but for the purpose of constructing a railway thereon, the priority of grant of corporate and municipal privileges would be essential to the determination of the controversy.

In considering the case, I have accepted as law and the facts, that the plaintiff company has the exclusive use of Main street, but have decided that such exclusive use was not invaded by a mere crossing of its tracks by the defendant railway company.

In deciding that the defendant company has the right to connect its tracks on Eighth and Burton street by a diagonal crossing, I do not mean to say that the plan agreed upon by the parties has been regarded as a diagonal crossing. If the parties see proper, however, to agree upon the manner in which the crossing is to take place, I see no objection to their so doing.

(U. S. Dist. Ct. Pa. Braddock & Turtle Creek Ry. v. Braddock Electric Ry. 1 Dist. R. (Leg. Intel.) 45.

Corporations—Action to Forfeit Charter—Constitutional Law—Remitting Forfeiture—California Statute.

Const. Cal. Art. 12, s. 7, provides that no act shall be passed extending the charter of any corporation or remitting the forfeiture of a franchise. During the pendency of an action to forfeit the charter of a street car company operated under a city ordinance, Acts Cal. 1892 cc. 19-20 were passed, one amending Civil Code s. 497 so as to invest municipal corporations with power to authorize street railways to use electricity as a motive power, the other ratifying existing ordinances granting such power. Held, that the Acts did not extend the company's franchise or charter, and, as there had been no decree of forfeiture, there was none to remit, and therefore the Acts were not repugnant to the constitution.

Civil Code Cal. s. 502, provides that work on the construction of a street railway must be commenced within a year from the date of the ordinance granting the right of way and the filing of the articles of incorporation, and must be completed within three years thereafter. Held, that where the complaint in an action to forfeit the charter did not state when the company commenced the construction and thereby show that the three years had elapsed within which the work must be done, it failed to state a cause of action.

(Sup. Ct. Cal. People v. Los Angeles Electric Ry. Co., 10 Ry. & Corp. L. Jour. 395.

Eminent Domain—Conflicting Rights—Rapid Transit Railway—Public Park—New York Statute.

The New York "Rapid Transit Act," provides that, after the public necessity for a railway shall have been determined by the commissioners to be appointed under the Act, they shall fix the route of the railway, decide on the plan for the construction of the road, fix the time when it must be completed, and prepare articles of incorporation, which shall contain a clause forfeiting the company's franchise if it does not comply with the conditions presented by the commissioners. Held, that the proceedings under the Act, resulting in the organization of a company that is bound to construct and maintain a railroad on

the route fixed by the commissioners, confer on the company a vested right to take and use the land covered by the route as located by the commissioners, which right is not impaired by the fact that the work of actual construction had not been commenced on a portion of the route when the legislature devoted such portion to park purposes.

Laws N. Y. 1884, c. 522, authorize the city of New York to lay out a designated tract of land for a public park, which includes within its limits a strip of land in which a rapid transit railroad had previously acquired a vested right for its right of way. Held, that as the Park Act did not expressly confer on the city of New York the power to take such strip to the exclusion and deprivation of the Rapid Transit Company, such a power would not be inferred from the general language of the Act dedicating the land as a "public park for public use," but that such dedication would be assumed to be subject to all rights previously acquired by the railroad and to the operation of its franchise.

(Ct. App. N. Y. *Suburban Rapid Transit Co., v. Mayor, etc.*, 10 Ry. & Corp. L. Jour. 494.)

Passenger thrown from Platform of Street Car—Degree of Care—Instructions.

While it was plaintiff's duty to place himself in a safe position on the car, and in remaining outside he assumed the risk, yet the fact of his riding on the platform did not sever his relation of passenger to defendant, and he had a right to the same care of defendant that he would have been entitled to if he had taken a seat inside the car.

There was evidence, though conflicting, that while the car was being driven at a dangerous speed it struck an obstruction on the track, and the jolting caused thereby threw plaintiff off and injured him. Held, that defendant was not entitled to a nonsuit.

Where plaintiff alleged that the injury was caused by the negligence of defendant's driver, and defendant denied this, and alleged contributory negligence on the part of plaintiff, it is error for the court in instructing the jury not to present the effect of contributory negligence as well as the carelessness of defendant.

(Sup. Ct. Mo. *Willmot v. Corrigan Consolidated St. Ry. Co.*, 2 Chicago L. Jour. 681.)

Eminent Domain—Public Use—Elevated Tramways.

In condemnation proceedings by an elevated tramway corporation, it appeared that the southerly terminus of petitioner was accessible only by a private road, and that up to the date of the petition the road had been used solely for transporting stone for a private corporation in which the incorporators of petitioner were interested. It was claimed that it was the intention to carry freight for any person offering the same to the extent of the surplus capacity after supplying the private corporation. Held, that in view of the object of its corporate existence and the manner in which it had been and was to be operated, the evidence failed to establish that the taking sought was for a public use.

(Ct. App. N. Y. *Matter of Split Rock Cable Road Co.* 11 Ry. & Corp. L. Jour. 20.)

Accident at Railroad Crossing—Injury to Street Car Driver—Contributory Negligence.

A gate-keeper at a street crossing, while opening a switch for an approaching engine, left the open gate in charge of a bystander, who signaled to a street-car driver to cross. The latter, mistaking him for the gate-keeper, who was in the habit of so signaling when there was no danger, drove on, notwithstanding one company's rule that required the conductor, when the gate was open and the gateman absent, to first go forward and report whether the track was clear. As the driver neared the crossing, but before he was aware of the engine's approach, he was told by the bystander to hurry up, and he did so. When the horses were within a few feet of the track, and the car could not safely be stopped, he discovered the engine and attempted to get across before it; but the engine and car collided, and he was injured. Held, in an action by the driver against the railroad company for damages, that defendant was negligent since when such gates are open the public have a right to presume, in the absence of knowledge to the contrary, that there is no danger.

Whether or not under all the circumstances, plaintiff was guilty of contributory negligence, was a question for the jury, and the court erred in directing a verdict for defendant.

Grant. 7. Dissenting.

(Sup. Ct. Mich. *Evans v. Lake Shore & Mich. So. Ry. Co.* 11 Ry. & Corp. L. Jour. 45.)

Street Railway—Injury to Passenger—Proximate Cause—Damages.

Evidence held to justify a finding of negligence in respect to the condition of operation of a train of cable cars which while carrying passengers, ran down a steep declivity at very great and dangerous speed, and apparently beyond the control of those operating the train.

Evidence held to justify a finding that injuries received by the plaintiff, manifested immediately by temporary unconsciousness, by headache, nervousness, sleeplessness and some impairment of the mental faculties, were also the cause of his paralysis, although that did not supervene until seven months after the injury. If the injury is the direct cause of a diseased condition which results in paralysis, the latter may be ascribed to the injury as a proximate cause.

From the mere fact that by their verdict the jury assessed the plaintiff's damages at a specified sum "plus" another specified sum, which latter amount was the same as that demanded in the complaint for special damages, it is not to be conclusively inferred that this was awarded by the jury as special damages.

(Sup. Ct. Minn. *Bishop v. Street Ry. Co.* not yet reported.)

NOTE.—As to injuries to passengers riding on the platform of a street-car, see 1 STREET RAILWAY REVIEW 272 and 445.—ED.

HOW CABLES ARE MOVED FROM CARS TO POWER HOUSE.

THE transfer of a huge reel of cable rope, such as is used by the various cable roads in the country, from the cars on which it has come from the factory, to a suitable place in the power house, ready to be drawn into the conduit and be put to work, is a task of no small account.

It will be of interest therefore to note how a number of the leading cable railways in the country solve the difficulties of this kind which confront them when it is necessary to replace an old cable with a new one.

The Mount Auburn Cable Railway, of Cincinnati, makes a contract with one of the large teaming companies of that city, who have a wagon for that purpose, thus relieving them of all trouble.

The Citizens' Traction company, of Pittsburg, are able to bring their cables upon railroad tracks to a point within 500 feet of the power house. A car is then placed across the street, and the reel skidded down onto the street and then with blocks and tackles it is rolled to the power house, where it is lowered by a hydraulic elevator to the tension run, and there placed upon pedestals to be used when needed.

The Providence Cable Tramway Company have their cable hauled upon a low gear, 17 feet long, the forward wheels of which are 6 feet in diameter, with a 6 inch tire and hind wheels $4\frac{1}{2}$ feet in diameter, with a 6 inch tire. The axles are $4\frac{1}{2}$ inch steel. The wagon is built of oak and capable of carrying 30 tons. It belongs to the Harris Engine Company of that city.

The Cleveland City Cable Railway have heretofore brought their cable from the depot to the power house, a no small distance, on skids with rollers under them, which of course is a very slow and tedious process. They have now secured a wagon built especially for the purpose, and capable of hauling 50 tons.

The Metropolitan Street Railway Company, of Kansas City, are fortunate in having two of its power houses located on railroad switches and the cables are unloaded from the cars at those points. At the Twelfth street power house however, not being located upon a railroad switch, the cables are unloaded from the cars, underneath a viaduct which passes over the railroad yard, and on which is the cable track. The reels are swung up at this point, and the cable spliced to the old cable and thus pulled into the power house.

The Chicago cables are handled upon huge trucks by transfer companies who make a specialty of hauling heavy machinery and loads. The Chicago City Railway Company have their cables which average 24,000 feet in length, shipped in halves, and each of the halves is reeled on two spools. When hauled from the cars to the power house a reel is placed upon each of two wagons and a half of the entire cable thus transported. When it is desired to put the cable into use, first one half is drawn into the conduit, and the machinery stopped and the other

half spliced to the first, and the work is then completed. Each reel of which four are required to make one cable, will weigh 9 tons.

At Denver, the Denver Cable Railway Company receive their ropes on spools and after taking them from the car, they are placed upon a skid and moved by means of rollers and a windlass to the power house; a somewhat tedious, but under the circumstances probably the best arrangement that can be made.

At Seattle, Washington, the cables are drawn on heavy trucks with small wheels, and sixteen horses are required to draw the load, as the grade is heavy.

The Third Avenue Railway Company of New York whose main cables are 32,000 feet in length and weigh 50 tons, were formerly moved by putting a steel tire upon the wooden rim of the spool upon which the cable was wound, rolling the same along by means of a windlass and horse power. This however, was found too severe and racked the spools so that the load is now placed upon a cradle skid which is on rollers, using a windlass and horse power to draw the same. For a run-way for the rollers, planks are put down in the street, and on them are laid iron bars $\frac{1}{4}$ inch thick by 12 inches wide. The iron and bars are taken up and carried ahead as fast as the rollers have passed over them. This method is found to work successfully and with reasonable expense.

PRIZES FOR FAITHFUL EMPLOYEES.

IT has been decided by the Rochester (N. Y.) Railway Company, says the Post-Express, to award \$1,000 in prizes to its conductors and motor men. The idea is to increase the interest of the employes in their duties and insure a more efficient service of the road. Eight prizes will be given in all, four to conductors and four to motor men. The first prize for the conductors will consist of \$200 to the one making the best record in neatness of personal appearance and gentlemanly conduct, in neatness and good condition of car, courtesy and politeness with passengers, temperance and strict observance of rules, registering and accounting for the tickets and cash fares, freedom from accidents by collision and otherwise, and running on time. The same conditions will apply in the awarding of prizes to motor men, except that the latter will be given credit for good condition of motors and freedom for burning and flat wheels, and care and judgment in emergencies. The second prize will be \$150, third \$100 and fourth \$50. The competition began with the present year and the prizes will be awarded next Christmas day.

SECRETARY THOMPSON, of the Brooklyn City Railway recently received an anonymous letter enclosing 20 cents, in which the writer said that when a boy he had taken a ride on the company's line and defrauded it out of the amount named. It is said that the receipt of such letters is not uncommon, and that once as high as \$300.00 was received by the Brooklyn road from one person, for the same account, which is put into a fund called "conscience money."

HON. G. HILTON SCRIBNER.

MR. SCRIBNER is by birth a New Yorker, from Monroe county, in the western part of the state.

After a thorough course of common school training, he took an academic course at the Genesee Wesleyan Seminary at Lima, New York, and received his collegiate education at Oberlin College. Upon leaving Oberlin, he chose the law for his profession, removing to New York City, and after admission to the state bar, was made a proctor, solicitor, and advocate in the United States courts in 1855.

His practice was an extensive one, and he became the senior counsel for many corporations and moneyed institutions. He also organized not a few of the large insurance companies of New York City, and held official connection with them.

In 1867 he retired from his profession and traveled for more than a year in Europe, making the jurisprudence and art of the various countries visited his special study. In 1870 he was elected to the state legislature by the Republicans of his district, and, while there, joined in the movement against the methods of Tweed and his following, which culminated, a short time after, in their downfall and expulsion from power in both the city and state of New York.

In 1871 he was made president of the Young Mens' State Republican Association, and, later in the year was, by acclamation, nominated for secretary of state on the Republican state ticket, and elected at the November election by a majority of about 20,000.

At the close of his term of office he declined a renomination and has never since accepted a political office, though three times offered a nomination to the State senate, twice to Congress, and once to a foreign mission.

In 1873 he associated himself with a party of gentlemen who set for themselves the task of rescuing the Belt Railroad Company of New York City from impending bankruptcy.

This road, traversing the streets of the city adjacent to the rivers, had been most unfortunate, both by reason of the difficulties to its operation incident to its location, and by reason of inefficient management; and Mr. Scribner, accepting upon its official corps the position of vice-president, showed such skill in counsel and thoroughness in execution that in two years the road's credit was restored, many of its difficulties removed, and it was put upon a paying basis.

Though desirous at that time of retiring from the further care of this line, always difficult to manage with profit to the stockholders, he was prevailed upon in 1880 to accept the presidency of the company, which position he has since held, piloting most successfully its fortunes through the great labor troubles of 1886, and through a fire in 1887 which destroyed its depots and shops, burning in a single night 1,150 horses, 165 cars and for the time being paralyzing its business operation.

To rebuild its large depot and equip anew the road required the expenditure of more than \$400,000 over and

above the amount of insurance, yet this was accomplished so speedily and successfully that the bonds of the company only depreciated 2 per cent. during the whole period of rehabilitation.

The stock, during his official connection with the company rose from 10 to 150 cents on the dollar and only declined to 85 after the great calamity of the fire. Since that time it has again risen to 125, which is about its present selling value, and bids fair, under his management, to again resume highest former quotations.

Within a week after his last election as president of the Belt Railroad the stock rose ten points in the market, owing to the assurance that the old board and official corps would continue to manage the affairs of the company. As a practical railroad president his management has stamped him as of first rank, if success may be taken as a criterion.

Despite his close attention to the demands and interests of his company, Mr. Scribner has given his leisure hours to literary and scientific studies. His investigations in several departments of science have been extensive. A monograph by him entitled "Where Did Life Begin?" attracted the most favorable attention of scientists, both in this country and in Europe.

Mr. Scribner is a member by election of several scientific associations, of England, France, Sweden and Norway, and also many others in our own country.

A man of deep and accurate thinking, he is nevertheless in touch with all the social refinements of the day, and his home is the center of a cultivated, literary and artistic circle of visitors. Nothing has ever, however, diverted either his time, attention or efforts from the interests or welfare of the railroad, to which he has given eighteen of the best years of his life, and whose complex affairs and exactions command his earnest thought and endeavor as fully as it could do if all its good and bad fortune were actually his own.

PASSENGERS AS NEWSBOYS.

ARATHIER unique innovation has been introduced by the Newark, New Jersey, Street Railway, whereby they have placed in their cars neat boxes, which are filled each morning with copies of the daily papers, and the passengers help themselves, dropping the requisite number of pennies back into the box, which is emptied at the close of the day. The arrangement is to avoid the nuisance of newsboys on the car, and at the same time enable the passengers to be supplied with the daily papers at all hours of the day. It is said the public accept the arrangement in good faith and the news company operating the scheme is seldom defrauded.

THE lone passenger on a night car in this city recently, was held up and robbed, and the Daily News in speaking of the event, says that of all public conveyances the average street car can be held up with the least inconvenience to the passenger. They already have their hands up holding to the straps.



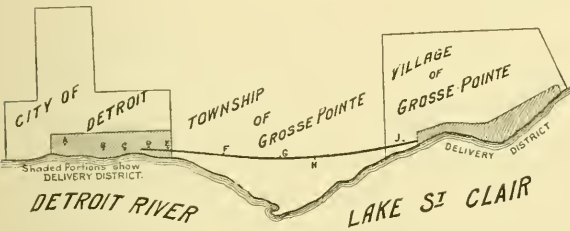
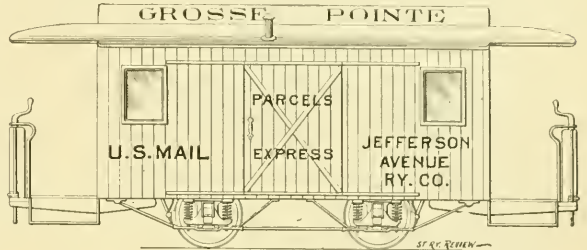
HON. G. HILTON SCRIBNER,

President Belt Railroad Company,
NEW YORK CITY.

PARCELS EXPRESS IN DETROIT.

A FEW months ago THE STREET RAILWAY REVIEW offered a prize for the best article on the operation of an express service by a street railway company, and while the articles published at the time were all suggestive and interesting, the following description of the service as now in practical daily operation in Detroit is more complete in detail. To Straithorn Hendric, one of the brightest among the many bright young men in railway management, belongs the credit for working out and putting in operation the express service. That the reader may the more intelligently understand the situation, attention is first directed to the outline map, showing the line as extending from near the Michigan Central depot and running 8 miles to a summer resort along a thickly populated toll road. The train is drawn by a Healy Motor, and consists of the motor, the express car and the passenger car. The mail is carried in locked pouches, under a star-route contract

stations, in denominations of 10 cents each. The number of stamps on a parcel will indicate how far it is to be carried. One stamp will carry a parcel between two stations on the line of railway, but will not secure collection or delivery at either end. Two stamps will insure carriage



in the car, and either collection or delivery but not both. Three stamps will insure collection, carriage and delivery between the limits shown upon the map and the shaded district. The stamps must be fixed before the parcel is given to the agent, as unstamped parcels will under no circumstances be received.

The limitation on parcels to be carried at the above rates are, not to exceed \$100 in value nor 25 pounds in weight, or in size, 8 cubic feet, which is the size of a bushel basket. Rates on bulky, heavy or valuable parcels will be furnished upon application and will be graded according to the work performed.

The cut shows one ticket with the words "car cancelled" meaning that the stamp has been cancelled by the express agent upon the car. One other stamp still remains uncanceled, which is to provide for the delivery at terminus, and which will be cancelled when handled by the driver of the wagon. The engraving of the two stamps represents a supposition parcel from station "E" numbered by agent No. "3" to "Jones" of Detroit. One stamp has been cancelled in the car, and the other awaits cancellation at the hands of the wagon driver who will deliver the parcel at Detroit.

with the United States government between the Detroit Post Office and two offices on the line of the road, and one office beyond, which latter is also station M of the express service. The express and mail car is a 16 foot box, with two windows and a sliding door on each side. The service was inaugurated on the first day of the present month and has already demonstrated its popularity and that its field of usefulness will be large.

Five stations for the receiving of packages are established in Detroit, and an equal number of Grosse Pointe and from these as well as from the entire district represented by the shaded line upon the map will be delivery wagons, one of which operates Detroit and the other Grosse Pointe, make collections for forwarding. Where a special collection is made by the wagons a charge of 10 cents is made, for the transportation of the package over the road in the express car, a uniform charge of 10 cents is made, and also 10 cents for delivery at either terminus, making the entire charge for collection, forwarding and delivery, 30 cents. In case it is desired to simply have the package forwarded, one 10-cent stamp alone is attached.

Where parcels are addressed to persons living outside the delivery district, the package is left at the nearest station and a postal card or telephone message is sent to them to call.

Payment is made by means of stamps attached to the parcel. These stamps are furnished by the company and sold by its conductors, express messengers and at express

JEFFERSON AVENUE RAILWAY CO.

FO. 8. 1, 2 '92. 500.

PARCELS EXPRESS.

DEAR SIR _____ Date, _____ 1892.

This Company has received a parcel addressed to you, and will hold the same at the above named Station _____ for three days, subject to your order Please call or send for it.

Charges, \$ _____ Station Agent

THE OFFICE WORK.

The book-keeping in this system has been made of the most simple character, and yet such as to amply take care of all the many transactions of the company. A ledger

only is used. The stamp account is debited with stamps received from the printer, and credited with those issued to the man in charge of their distribution. In his account a charge is made for those stamps received by him, which he receipts by his initials. He then issues them to station agents and others on requisition, and puts in his receipted

stations, a receipt is given, therefore, and the station agent enters it upon his way-bill. The way-bill and all the packages thereon, are delivered to the express agent when the car reaches his station, and the way-bill is blocked in alternate sheets with a carbon sheet between, with a receipt which the station agents holds, and which the messenger signs when taking away way-bills and parcels. A receipt is given for the way bill from one employe to another on Form 2. For par-



Thos. Jones Esq.
40 Fort Street
Detroit
Station F.

requisitions from the station agents and others and gets credit for them. The station agents are then charged with amount of stamps sent them and when they in turn

cells dropped at intermediate stations, the agent there receipts to the messenger on the way-bill. He then takes a receipt from the consignee on Form 5, which is seen herewith.

We have taken frequent occasion to emphasize the possibilities of this department for street railway service and have observed that wherever put in operation the

Form 3. 1-2-92-1M.

READ CAREFULLY THE CONDITIONS BELOW.

NOTE.—The Consignor, in accepting this receipt, acknowledges that the value of the parcel is LESS THAN \$100.

JEFFERSON AVENUE RAILWAY CO
PARCELS EXPRESS.

Date 1892.

PARCEL, BASKET, BOX, UNCOVERED ARTICLE,

This Company acknowledges the receipt of a _____
properly stamped and marked for transmission to _____
numbered by the Agent _____

Which we undertake to forward to the nearest point of destination reached by this Company, subject expressly to the following conditions, namely: This Company is not to be held liable for any loss or damage, except as forwarders only, nor for any loss or damage by fire, by the act of God, or of the enemies of the government, the restraints of government, mobs, riots, insurrections, pirates, or from or by reason of any of the hazards or dangers incident to a state of war. Nor shall this Company be liable for any default or negligence of any person, corporation or association to whom the above described property shall or may be delivered by this Company, for the performance of any act or duty in respect thereto, at any place or point off the established routes or lines run by this Company, and any such person, corporation or association, is not to be regarded, deemed or taken to be the agent of this Company for any such purpose, but, on the contrary, such person, corporation or association shall be deemed and taken to be the agent of the person, corporation or association from whom this Company received the property above described.

It is further agreed that this Company is not to be held liable or responsible for any loss of or damage to said property, or any part thereof, from any cause whatever, unless in every case the said loss or damage be proved to have occurred from the fraud or gross negligence of said Company or their servants, nor in any event shall this Company be held liable or responsible; nor shall any demand be made upon them beyond the sum of One Hundred Dollars, at less than which sum said property is hereby valued; nor upon any property or thing unless properly packed and secured for transportation, nor upon any fragile fabrics, unless so marked upon the package containing the same; nor upon any fabrics consisting of, or contained in, glass. In no event shall this Company be liable for any loss or damage unless the claim thereof shall be presented to them in writing at this office within ninety days after this date, in a statement to which this receipt shall be annexed. And it is also understood that the stipulations contained herein shall extend to, and inure to, the benefit of each and every company or person to whom, through this Company, the above described property may be intrusted or delivered for transportation. Deliveries at all points reached by this Company are only to be made within the delivery limits established by this Company at such points at the time of shipment, and prepayment in such cases shall only cover places within such delivery limits. The party accepting this receipt hereby agrees to the conditions herein contained.

For the Company;

Agent

Telephone for Agent to Examine Heavy, Bulky or Valuable Articles, and give Special Rates on them.

remit cash for sales, are then credited with the amount, and the cash is turned into the general receipts.

The process of handling the package and keeping of its record has also been made a very simple one. When the consignor delivers a package to any one of the

plan has proved a success. We congratulate the good people of Detroit and Grosse Pointe on the many advantages which the Parcels Express will afford them, and in a few weeks they will wonder how they ever managed to get along without it.

TELEPHONE 568 or 2528-2 R.

RAPID transit methods are not the only ones in which accidents occur, as will be seen from the fact that one of the worst street car collisions that has occurred in a long time, was in the city of Brooklyn recently, in which two horse cars going at full speed undertook to cross tracks at right angles, and met with such force that one car was completely lifted from the track and turned almost around. Although no fatalities occurred, quite a number of the passengers were cut from flying glass and bruised by being thrown down.

FORM 3. 1-2-92-1M.

STATION AGENT'S RECEIPT FROM CONSIGNEE

JEFFERSON AVENUE RAILWAY CO. Parcel Express.

Received from JEFFERSON AVENUE RAILWAY COMPANY

at good orders parcel numbered 100

* Erase one title.
Note—If goods left at station are not called for within three days, they must be delivered to car messengers for removal. Shippers. If they are called for the person taking them must sign this receipt on the Way-Bill. Send receipts as soon as signed to main office.

THE FINAL RECEIPT

FORM 1. 1-2-92-1M.

JEFFERSON AVENUE RAILWAY COMPANY—PARCELS EXPRESS. W. B. No. _____

NOTE.—Each Agent or Messenger handling this way-bill, must sign his name on the back. A way-bill must accompany shipments from each station. Messengers will check parcels with way-bill, and receipt to Station Agents and each other for them on Form 2 or Form 4.

From _____

Date _____ 1892.

| NO. PARCEL. | CONSIGNEE. | ADDRESS. | STAMPED FOR | | | RECEIVED BY | REMARKS. |
|-------------|------------|----------|-------------|------|------|-------------|----------|
| | | | COLL. | CAR. | DEL. | | |
| | | | | | | | |

WAY-BILL.

FORM 2. 1-2-92-1M.

RECEIPT FOR WAY-BILL.

JEFFERSON AVENUE RAILWAY COMPANY. Date _____ 1892.

PARCELS EXPRESS.

RECEIVED OF _____

Way-Bill No _____ and the _____ parcels described therein not already received for on way-bill.

* Erase one title.

* } STATION AGENT.
} MESSENGER.

RECEIPT FOR WAY-BILL.

FORM 4. 1-2-92-1M.

JEFFERSON AVENUE RAILWAY COMPANY—PARCELS EXPRESS. W. B. No. _____

STATION AGENT'S RECEIPT.

Station _____

Received the following Articles : Date _____ 1892.

| NO. OF PARCEL. | CONSIGNEE | ADDRESS. | RECEIVED BY | REMARKS AND EXTRA CHARGES. |
|----------------|-----------|----------|-------------|----------------------------|
| | | | | |

STATION AGENT'S RECEIPT.

A PASSENGER on the Camden Horse Railway, properly named, Sharpless, was sued by one of the conductors on account of the passenger accusing the conductor in the presence of the other passengers of not registering his fare. The conductor explained that he was instructed not to register certain transfers, but this important patron of the road undertook to instruct the conductor, which resulted in a suit in which Sharpless was defeated.

The electric road of Saginaw, Mich., earned \$30,000 more in 1891 than in the previous year. The road is twenty-five miles in length.

THE Detroit Free Press says: Battle Creek has reached the point where she heats her street cars by electricity. Detroit has not started in on the lightning yet, but is running along under the pressure of a good many big promises.

THE HEALY NOISELESS MOTOR.

NOT an experiment but a demonstrated success is the Healey Motor, which has now been running for several months in the city of Detroit and elsewhere, and giving the most excellent satisfaction.

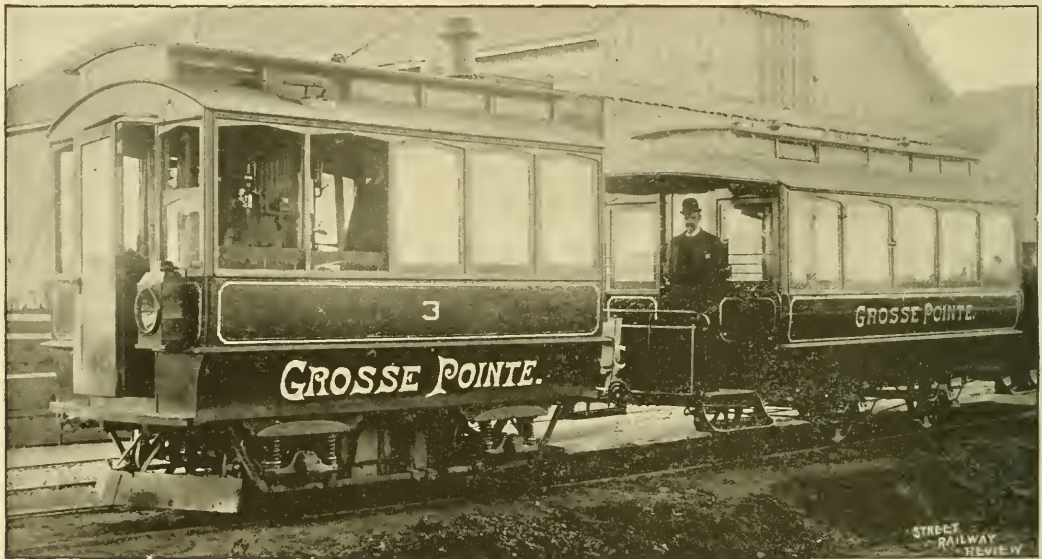
The accompanying illustration will give a very fair idea of the external appearance of the motor, and a few figures in detail will not be without interest. The motor cab is but 12 feet long, and has no platforms, the entrance being at the end as shown in the illustration. The height and shape of the car body corresponds to that of ordinary cars now in service.

The motor complete weighs 5 tons; the boiler is an upright marine of steel, 59 inches in height, and 32 inches in diameter. There are two cylinders each $3\frac{1}{4}$ inches

emanating from the exhaust is lost. The steam is so dry that outside of extreme cold weather the construction and heat of the stack hides all exhibition of escaping steam. An interesting application of steam is also made to operate the brakes, which work upon all four of the wheels. This brake is very prompt and powerful, and will stop the car in a very few feet. Many people would at first thought imagine that a highly skilled engineer would be required to operate a motor of this kind, but such is not the case, and ordinarily it is possible to select the engineers from the drivers and conductors, as the matter of instruction is neither a long or serious undertaking.

The engines are duplex, of high speed and of very great power.

The motor car weighs less than the trail car when loaded, and really makes less noise than the other cars



THE HEALY MOTOR.

in diameter with a 6 inch stroke, and piston-rod and connections are 16 inches long. They drive directly on two wheels which are connected with the other two by steel roller chains on axle sprockets. For ordinary work a steam pressure of 160 pounds is amply sufficient and seldom if ever runs over 200, although the boiler is tested to 300 pounds.

The speed varies according to the conditions of track and load, but will easily make under ordinary circumstances 15 to 18 miles an hour and the engines are capable of making if desired, 700 strokes per minute. The disposition of the exhaust steam was one of the most carefully worked out features of the motor—as this has been the great objection to steam motors upon the streets—the sight and noise of escaping steam.

Mr. Healey has wholly overcome this, and taken care of the exhaust by enlarging the pipe through which it passes and changing the direction till every bit of sound

which are drawn in the train. The pop-valve escape is completely hid. The motor is quick in operation, easily controlled and is absolutely safe, and fully governed at the lowest speed possible to be desired. It has been well received in Detroit, and during the Grand Army of the Republic Encampment there, one motor drew two loaded cars $2\frac{1}{2}$ miles in 13 minutes, including many stops and drawing a load weighing fully 25 tons, and which showed 241 fares collected. Its economy in operation is one of its main points.

The engine and machinery are located in a dust proof box below the floor and midway between the axles and the vibrations of the axles have no effect upon the power.

The double engine weighs 250 pounds, and costs a little more than a good street car horse, and is made in duplicate so as it can easily be replaced, either in whole or in part.

A new device has also been introduced by which the engineer may at any time change the relation of the

piston travel to the traction wheel, enabling him with light power to start heavy loads, or go over grades. During the encampment already referred to, the operation of the motor was successfully made, and without a single accident or the frightening of horses.

One man at 20 cents and about 75 pounds of coal and coke, with a trifle added for oil and waste cover the operating expense for one hour. The motor has stood the severest tests on curves with heavy loads, and is now in regular service on the Detroit & Grosse Pointe Line, the express system of which is described elsewhere in this issue.

UNDERGROUND ROADS.

AS SEEN BY JOHN E. FITZGERALD, OF THE BOSTON RAPID TRANSIT COMMISSION.

IN a recent report by John E. Fitzgerald, one of the Boston Rapid Transit Commissioners, the impressions of underground travel are given as follows:

"The Electric Underground Railroad of London, I must confess, though it be treason perhaps to say so, did not impress me favorably as a passenger traveling along it, and that impression was shared by nearly every person to whom I spoke in my desire to get the passengers' views about it. I went to London to inspect it, and with a partiality rather in its favor, I rode through it a dozen times or more. By the courtesy of the officers I inspected it from a rear platform by the aid of a lamp, and the oftener I traveled over the road the less favorably it impressed me as a system for Boston.

I found that the air is fresh enough in the tunnel, with a temperature of fifty degrees; that the cars are invariably closely shut to exclude the great draught, and the air in them is not good. This keeping of windows and doors closed is necessitated by the great draught which the single-track tunnel has. Then in addition there is a noise like the roaring of the ocean mingling with that which electric cars usually give, making the short trip of one-quarter of an hour a very disagreeable one indeed. I asked the engineer if it were possible to do away with the sound. He answered, of course, no; but it could be lessened by lining the tunnel with some substance that absorbs sound. If such a tunnel were built in Boston the temperature in it, I am informed by our engineer, would be fifty degrees—not a very inviting place for delicate persons on a summer's day with the thermometer outside in the nineties.

As a piece of engineering I presume it is perfection, but as a mode of conveying human beings from one part of a great city to another I should much prefer some other method and some other feeling when traveling than the buried-alive feeling which one experiences in this tunnel. * * * The noise is like the roaring of the ocean after a storm, and many persons whom I interviewed told me they always experienced a headache for some time after leaving these cars. I must confess I

experienced a similar sensation myself, and though I rode through the tunnel a dozen times I always experienced the same disagreeable results."

Of the Berlin system, which was so fully illustrated and described in these columns last year, he also says:

"Of all the railroads which I have seen and which afford facilities for urban, suburban, and also through traffic, and in whose construction there seemed to be a design to transport travelers by the shortest route from the suburbs to the heart of the city, and through the city also, the elevated railroad of Berlin is unsurpassed. It divides Berlin in halves, from east to west, is about 8 miles in length, crosses the Spree three times, and was seemingly built regardless of cost, and made its own highway independent of existing streets, parks or gardens. It is twenty feet above street levels, has four tracks, and a half a dozen or more handsome stations, about three-quarters of a mile apart, with arched glass roofs, and cost, I am informed, over \$2,000,000 per mile, including land damages.

What the underground system does for London the viaduct system of Berlin does more completely for that city. By how much light is above darkness for a traveler, in the same measure is the railroad viaduct of Berlin above and beyond any of the other modes of conveyance which I have seen. Its perfection is not alone in its workmanship and its elegant stations and the fact that it is in the sunshine."

WORLD'S CONGRESS AUXILIARY.

THE "World's Congress Auxiliary," has completed arrangements for an Engineering Congress, to be held in the month of August, 1893, and to continue six days. The object of the gathering will be to enable the engineers of this and foreign nations, to inform each other concerning the latest, best and most economical practice in methods of construction and operation, machines, experiments, etc., and a general interchange of ideas and plans. The congress will be divided into seven general divisions as follows:

- General Division A—Civil Engineering.
- “ “ B—Mechanical Engineering.
- “ “ C—Mining Engineering.
- “ “ D—Metallurgical Engineering.
- “ “ E—Electrical Engineering.
- “ “ F—Military Engineering.
- “ “ G—Marine and Naval Engineering.

It is expected that each division will organize in advance with a chairman, vice-chairman, secretaries and advisory council, and select subjects for discussion. Under Division B, will come the subject of cable railways—pneumatic and rack. Division E will include railways—single and double wire systems, rail transmission systems, geared and gearless motors, generators, trolley, underground, and storage battery systems.

THE street railway company of Cairo, Ill., refuses to carry the mail carriers free of charge.

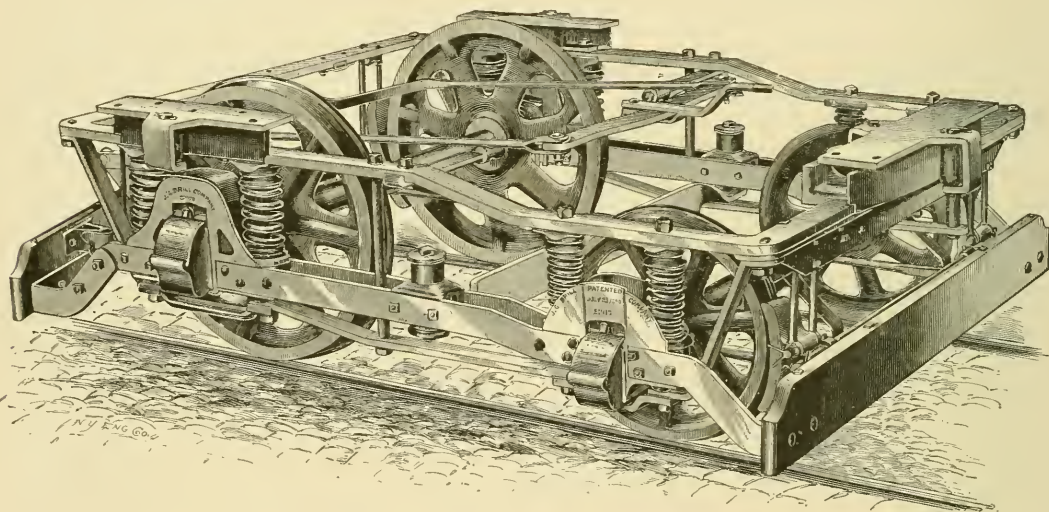
BRILL'S EUREKA MAXIMUM PIVOTED TRUCK.

THE advantages of the pivoted truck are more and more coming to be understood, and the increasing demand for larger cars requiring more than four wheels, is forcing the subject before managers who once thought they would never require such devices, and hence, heretofore, may have paid but little attention to the matter. Undoubtedly one of the greatest inventions in the line of pivoted trucks was John A. Brill's Maximum Traction Truck. In this truck all of the disadvantages of other pivotal trucks were overcome and a gain made of 42½ per cent. in traction. A reduction in the height of car body 10 inches and thus the necessity for double steps was obviated; a shortening of wheel base and also reducing amount of power required by as high as even 30 per cent. The only objectionable feature, and that not a serious objection, was that the pivotal center or

tion of height of the car to the extent of 1½ inches is obtained, and the weight of the truck reduced by 150 pounds.

The pivoting in this truck is accomplished by the combination of rollers on the side of the rub plates on the upper part of the truck. The drawing (draught) of the truck and car body is done from the small end of the truck, and this feature affords additional means of keeping the small wheels from climbing the rails. Since the introduction of the "Maximum-Traction Truck" several hundreds of them have been sold and are in operation.

ONE of the lines in Albany, N. Y., runs down a steep hill, at the bottom of which is the post office building. A passenger recently asked a driver what would be the result if a car should ever run away, to which that employe replied, "the car is a large package but it would go through the post office without stamps."



BRILL'S EUREKA MAXIMUM PIVOTED TRUCK.

drawing point, which came over the axle, was in the way in removing the motor, and had to be taken off; this trouble was solved by use of the movable spider.

But being the pioneers and still at the front in the great field of electric trucks, the J. G. Brill Company determined not to stop in improving until they had approached more nearly to perfection. This point they have reached in their new model appropriately named the "Eureka Maximum-Traction Truck." In this truck the above named objection has been overcome. It has no mechanical pivot, and is especially adapted for the "waterproof" and "ironclad" types of motors, which have their upper portion hinged, so that they can be raised when it is necessary to get at the armature, or other parts of motor. The space above that occupied by the motor is free and clear, so that when the trap doors in the cars are raised, the whole of the motor can be reached, and the armature taken out without removing or disturbing any part of the truck. Also a further reduc-

WANTS A CABLE ROAD.

AN effort is making for a street car line on Fifth avenue, New York. Certain persons are endeavoring to checkmate the plan by securing the passage of an act in the State Legislature dedicating the thoroughfare as an exclusive driveway. To this the public will never consent. At present a line of antiquated old stages lumber back and forth, drawn by horses which the superintendent of the society for the prevention of cruelty to animal brands as "the worst horses in own."

The New York Advertiser says: "These wretched old vehicles and animals should be expelled, and a good cable road laid down which would sufficiently serve the public, especially on Sundays."

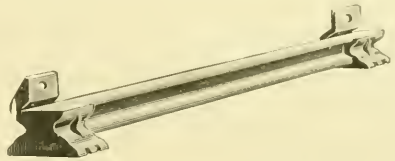
The construction of a cable road on Fifth avenue would be a boon to thousands, though local hostility to any line on the street makes the undertaking well nigh impossible.

SAMSON BRIDGE JOINT CHAIR.

OF the many devices which have been put on the market for supporting the joints of street rails, probably none have ever before been entirely effective, and the great majority have been utter failures. They have been heretofore either light and insufficient or complicated, in many pieces, and expensive. The more pretentious of these joint chairs have endeavored to secure the result by extending the splice bar downward to form the chair, which throws a duty upon the splice bolts which they were not intended to bear, and deprives the splice of the correct fit which it requires to make it effective. Having all these failures in mind the Samson chair was designed to meet every objection that has heretofore existed.

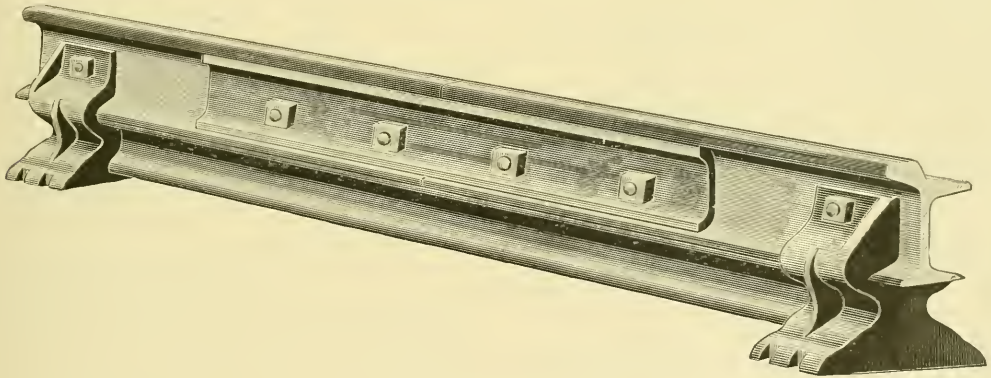
The chair is made as follows: A piece of steel tee rail of sufficient length to reach from tie to tie (in the illustration here shown, the distance being 3 feet) is placed in the mould and upon both ends are solidly cast of semi-steel, the brace chairs shown in the illustration. The semi-steel in cooling, shrinks upon the ends of the piece of tee rail, and the result is a long bridge chair actually in one piece with nothing whatever about it to work loose or

recommends it at sight to every practical street railway man, and large orders for it have already been received. It is a very economical device, as the Bridge Chair takes the place of other chairs at no greater expense, and the



extra wide tie under the joint is dispensed with. In fact the economy secured by its use is so great that it adds practically, but a trifle to the cost of the construction, and, it is believed, settles the troublesome joint question.

The joint chair is simplicity itself; it is hard to conceive how it could be stronger, and is readily laid with inexperienced labor, a no small advantage. Ends of rail cannot lift at joint when wheels approach or recede, and the chair gives to the joint the same strength and resistance powers that exist in any portion of the rail. The Samson Bridge Joint is rightly named, and the illustration above will tell its own story of strength and lasting qualities.



THE SAMSON BRIDGE JOINT CHAIR.

break. Holes are left in the brace portion of the chair, through which bolts pass, holding the rail securely up against the brace, and preventing any lateral motion or tipping of the girder rail. In track laying, the usual extra wide ties placed under the joints to receive the customary 7 inch joint chair are done away with, and the ties are spaced precisely as if no joint existed. When the rails are placed in position, the two ends of adjoining rails are caused to come in the center of the bridge and the heavy splice, having either 4 or 6 bolts, is adjusted precisely as it would be, were there no chair underneath. The piece of tee rail which forms the bridge of the chair, being turned upside down, furnishes a wide, level and unyielding support to the ends of the rails, and when the splice bar is properly bolted to its place, it would be impossible to concentrate sufficiently heavy weight on top of the girder rail to cause it to sink. The great strength and absolute simplicity of the Samson Bridge Joint Chair

UTICA LINES IN THE TOILS.

THE Utica Belt Line Street Railway is in financial straits, and the hands of a receiver. The company was capitalized at \$150,000, but the records show mortgages against it to the extent of \$575,000, and its floating obligations will swell the amount \$50,008 more. The actual value of all available assets is only \$150,000. The Thomson-Houston Company is one of the heaviest creditors. Two or three years ago, the railway did a profitable business, but latterly it has been unable to meet current obligations.

A FAT woman entered a crowded car, and, seizing the strap stood on a gentleman's toes. As soon as he could extricate himself he arose and offered her his seat. "You are very kind sir," she replied. "Not at all, madam," he replied;—"It's not kindness, it's self-defense."

MAIN'S STEEL TIE.

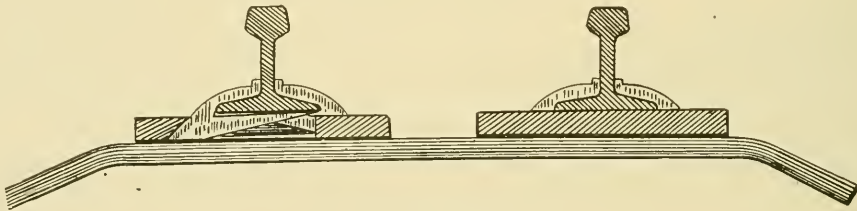
THE accompanying illustration shows the tie construction invented by F. F. Main, of Bristolville, Ohio.

The tie is of channel steel, 8 feet long, 8 inches wide, with flanges $1\frac{7}{8}$ inches, and it weighs 10 pounds to the foot. It is placed flat side up and the ends bent down to form anchors, as shown.

Each chair is 1 foot long, 8 inches wide, and 1 inch thick, with beveled parts as shown, and it is fastened with four hot rivets. The opening is as wide as three dogs, and the middle third is about 2 inches longer than the sides, so that a dog dropped in the long slot can be moved forward until it engages the rail, when it is moved along the rail so that its heel rests against the beveled shoulder.

A thin bar with offsets near each end to engage the ends of the long slot to prevent its working out, is driven between the dogs to keep them in place.

The tie complete weighs 118 pounds, and the fastenings for one tie weigh 9 pounds. The thrust of the nogs brings the lower arms slightly above the chair, where they support the rail when not loaded, as shown in the left fastening, but when loaded the lower arms of the



MAIN'S STEEL TIE.

dogs' spring to a level with the chair, as shown in the right fastening, which causes the dogs to firmly grasp the rail.

The first complete tie was laid at Ashtabula, Ohio, August 20th, under the direction of Chief Engineer Handy and Road Master Houghton, of the Lake Shore Railroad. The track is under very heavy traffic, and the rail can be seen to rise by the reaction of the dogs between the trucks of a moving train, so that no wheel strikes it with a solid bearing. The spikes were drawn from the ties on each side to more thoroughly test its strength.

The joint is suspended, and the splice-plate, with two dogs, may be made in one piece, or the dogs shortened to allow for the plate. The entire absence of all bolts with burs, nut locks, blocks, or fine adjustments, together with its simple arrangement, makes it impossible to put it together wrong, as all parts are interchangeable. Ties enough for a thorough test are now being laid under steel railway track to demonstrate its usefulness.

RAPID transit in the city of Boston seems to have fallen into rather hard lines, as it now appears it cannot be procured without first obtaining an amendment to the constitution of the state.

JUST SO.

A MOTIVE power which will do the work well now is worth two whose chief claim to usefulness lies in promises of future deeds. The Rochester Herald says: "Some day the storage battery will be perfected, or a method of conveying electricity underground to the cars will be found, but progressive cities cannot wait for the perfect thing; they must take what is most advantageous at the moment or be left behind in the race."

NEW STORAGE BATTERY.

A TRIAL experiment of a new storage battery will be made on the South Orange, New Jersey Street Railway Line, about March 1st. The inventor, C. P. Elieson, makes claims of substantial improvements over anything in storage batteries yet produced. A complete battery for a car, he says, will not weigh to exceed 1,800 pounds, while those heretofore used bear down to the extent of from 5,000 to 7,000 pounds. The charged battery, the inventor claims, will run the car ten miles, when it can be changed by a peculiar device accomplishing the work in less time than is required to change horses.

Mr. Elieson says that he would run the cars with a low potential (100 or 200 volts), and that the current could vary from ten to fifty amperes suddenly without the slightest injury to his batteries.

CABLE ROAD LESS EXPENSIVE THAN SUPPOSED.

A T a recent meeting of the stockholders of the City Passenger Railway of Baltimore, President Bowie announced that the Blue Line will be cabled at once, and that from contracts made already for the Red and White Lines, the fact was revealed that the cost of cabling is not nearly as expensive as the directors had been led to expect, and that the more consideration they gave the matter, the better satisfied had they become that notwithstanding the cable system is more costly than others to construct, it was nothing like as expensive as supposed, and they believe it the best system for the city, the company and its patrons.

A BILL is pending in the Kentucky legislature, aimed it is said against the Covington and Cincinnati street car lines, providing for a single 5-cent fare as a maximum charge.

REMINISCENCES OF EARLY DAYS.

BY ELIHU THOMSON.

I WELL remember taking my first ride on an electric car, the car being equipped with one of our earliest motors for that purpose. The road was a short stretch in Woonsocket, R. I. The track led out of town and was chiefly up grade. The trolley wires were two wires—outgoing and return—mounted rather clumsily on brackets suspended from wooden sticks, and in turn suspended from the span wires, and the trolley consisted of a little carriage with four wheels, riding upon the upper side of the two wires, and was connected by a double cable to the rear end of the car. The car connections were made with a slip joint, so that should the trolley catch, the car could go ahead without taking the trolley, and the trolley might drop in the street and be free of the car, after which it was the conductor's business to climb up and readjust the trolley on top of the wires and re-connect. I noticed on the trip I made that this device was quite effective, as it was called into action at least once. The effect of the arrangement was somewhat ludicrous, as it seemed to be in the nature of a race between the trolley wheel above and the car on the track, sometimes one running faster than the other, there being a general exchange of velocities.

But solicitude for the safety of the motor was the chief thing in hand, as that was the part of the equipment for which we were responsible, and in climbing up the grade going out of town, it can be imagined that our feelings were far more disturbed than in coming down grade back to town. The brushes did not even spark when we were coming down grade, for the evident reason that the current was then at its minimum, that is, there was none of it on the motor. I am happy to say that the motor did its work very well considering the fact that it was not equipped with carbon brushes.

The current for the running of this short line was supplied, I believe, by the electric lighting station, and the working, even though it was in a large measure a crude experiment showed sufficient of the possibilities to enable one to see the great field soon to open for electric railways. In the early days of electric railways, it would have been proper to have advised on account of the chances of disablement being very considerable, that the car house or station be located so that the road was graded up in all directions therefrom, which would make the chance of getting back to the station by running down grade a good one, provided, of course, that the run could be made without stoppages, which would require current to be applied. Fortunately, this time is all past, and no one who has not been familiar with the development can know the amount of time, effort, and close attention which has been needed to bring the equipment to that high state of efficiency and reliability, to which, in spite of the ever present adverse conditions of use under the car, such equipments have attained.

I well remember also listening in the early days to the tales of difficulty (I may even say woe) which were

brought in from the outside concerning the operation of the early apparatus. Sometimes a bolt would work out here or there, or the commutator would get covered with mud, or the field magnets get covered with water, or slush, or some part give out in one way or another because it had not been understood just how hard the conditions of use would be. The engineer in charge would be put to his wits' end and exhaust all his resources in keeping the plant in operation. I have listened to accounts of short circuits occurring in some of the early conduit experiments, and for which the small boy and his piece of wire has often been made responsible, without being really so.

In the early days the electric cars in Boston were connected with one or two trail cars, all heavily loaded with passengers, climbing 5 per cent. to 7 per cent. grades, and one wondered whether the motors would live until they got to the top. I have, indeed, noticed a thin vapor and the odor of hot shellac and other insulating matter burning, just as the motor reached the top of such a grade. This was at the time when motors of quite limited horsepower capacity were to do everything but think and were expected not to perish in the endeavor. This was before any discrimination was made by the railway people as to the amount of work to be done, and before they had been educated to the fact that a 7-horse-power motor was not capable of giving 30 horse-power or 40 horse-power without suffering in consequence. Fortunately, the motor was not a sentient being, or its suffering under such circumstances would have made those of the proverbial car horse seem insignificant. A more just notion of what is to be expected of it, or what is the proper duty for such machinery, is of course now the rule.

The upward pressure trolley, which caused Dr. Holmes in his recent poem to characterize the electric car as the "broomstick train," has removed the difficulties of the early trolley systems, and this improvement, I believe, was due to Mr. Charles J. Van Depoele, to whom also is due the introduction of the carbon brush, which has had so important an effect on the running of the motors themselves. I well remember the collections of metallic brushes brought in by the engineers from the various roads of the systems in operation, which brushes were to be seen in all states of decrepitude, due to fusion, wear, sparking, burning, etc. I well remember the early commutators which had been subjected to use with these various brushes. It would have taken a veritable copper mine to have kept them supplied with the material burned away and dissipated, had they been very numerous. It was while discussing these difficulties that Mr. Van Depoele recommended the use of his carbon brush, which he had found so satisfactory on certain of his stationary motors and dynamos. This led us to make a trial of it and the result of that trial was that the other forms of brush went out of use and our example was very soon followed in the other systems.

REPAIR OF STREET RAILWAY TRACKS IN ST. LOUIS.

THE charters that were granted to the different street railway companies since the scheme and charter of the City of St. Louis were formulated, require, says the St. Louis Star Sayings, that they keep a certain special portion of the street adjacent to their tracks in good condition, and bear the expense for such space when the street is being reconstructed.

The Mound City, Missouri (to Grand), Lindell, Bellefontaine and Baden and St. Louis street car lines received their charters before this scheme and charter of the city were established, and they are not required to repair or reconstruct any portion of the street adjacent to their tracks, or to bear the expense thereof. The roads established later, however, were granted the right to lay tracks under condition they keep a certain space in good order.

The St. Louis Railroad Company is required to keep in good repair the space between the tracks and one foot on each side of them, as are also the Missouri road on its extension from Grand avenue, the Jefferson Avenue, St. Louis and Suburban, Forest Park and Laclede and Northern Central roads.

The Citizens', People's, and the Union Depot line from Ninth to Twelfth on Pine, and on Twelfth from Pine to Clark avenue, are required to care for a space of one foot on each side of each of their tracks.

The Union Depot, Tower Grove and Lafayette and Tower Grove lines must keep in order only the space between the tracks. The Cass Avenue line is required to keep the space between the tracks repaired, but according to a decision of the courts is not compelled to pay for reconstruction.

The Union line must care for the street between its tracks and a foot and a-half on each side of them, while the South St. Louis line must attend to the space between and a two-foot strip outside.

A CAR horse in New York balked the other day and all efforts to induce the stubborn beast to move were unavailing, and the car was removed from the track. A horseman, speaking of the matter, said to a Sun Reporter: "Taking a balky horse by the head and poking him in the ribs with one's fist or the butt end of a whip is neither proper nor humane treatment any more than using the butt end of the whip across the horse's hind legs. The horse should have been unhitched and walked around the car, patted and treated gently, and then hitched on the other side of his companion, as he may formerly have been hitched on the side opposite the one he was occupying in the car team, which will always cause some horses to refuse to work. If the horse then refused to work he should have been tied to a car going the other way, as a balky horse will quite often go if it is allowed to turn around and go in the opposite direction."

THE Scientific American say that a simple and effective way to keep sheet iron pipes from rusting, is as follows: The sections as made should be coated with a coal tar and then filled with light wood shavings, and the latter set on fire. It is declared that the effect of the treatment will be to render the iron practically proof against rust for an indefinite period, rendering future painting unnecessary. It is suggested that by strongly heating the iron after the tar is laid on the outside, the latter is literally burned into the metal, closing the pores and rendering it rust proof in a far more complete manner than if the tar itself was first made hot and applied to cold iron, according to the usual practice. It is important, of course, that the iron should not be made too hot, or kept too hot for too long a time, lest the tar should be burned off. Hence the direction for the use of light shavings instead of any other means of heating.

WILL any solution of the transportation problem be permanent which provides for surface road only, asks the Chicago Times? New York found no relief from overcrowded and slow street cars until the elevated roads were built. London had to go underground for rapid transit. Paris is the only city of a size commensurate with Chicago's which has neither underground nor elevated roads, and that annoyance is not experienced there is due partly to the leisurely habits of the residents and more to their custom of living directly above their shops. In Chicago it is not fashionable for a merchant to live in apartments above his store, though he may go uptown and live over some other man's store with entire propriety.

THE NORTHERN CAR COMPANY, of Minneapolis, held its annual meeting February 9th, under the most auspicious conditions. During the year that has passed the company has had great prosperity. Its shops have been entirely rebuilt, remodeled and enlarged. They are now running over with orders and pressed to their full capacity. The officers elected, were as follows: A. B. Robbins, president; W. E. Steele, vice-president and treasurer; D. M. Gilmore, general manager; G. P. Stearns, secretary; D. M. Gilmore, W. E. Steele, A. B. Robbins, C. P. Jones, C. P. Lovell, E. S. Corser, J. M. Bartlett and T. B. Walker, directors.

IN the suit for \$20,000 against the Baltimore Traction Company for causing the death of E. C. Ringold, a colored man, the court ruled that the company was blameless and the evidence showed he attempted to board the car while it was in motion, and death resulted from his own carelessness.

A BAD Pittsburg boy, much sought after by the police, gave the blue-coats a lively chase, recently. He jumped upon a wagon and from there to a passing car, from whence he was finally induced to descend, when the car was stopped after going two blocks.

THE RAPID TRANSIT SYSTEM OF NASHVILLE, TENNESSEE.

THE steel railway system at Nashville is not only the finest for excellence in the south, but it rivals that of any city in the country, and is perhaps the most complete and extensive of any city of its size in the United States; and it is the more remarkable that in the change from horse power to electricity was effected within a year and a half after the idea first took hold of those interested in the undertaking. The population of the city is in round numbers 80,000, and the United Electric Railway Company carried last year 8,000,000 passengers, including 1,400,00 transfers which is explained below, and exclusive of a free list which amounted to 13,000 a month throughout the year and which was entirely and absolutely abandoned January of this year. The first line was equipped with electricity in May, 1889, and the last horse car was taken off in July, 1890. There were at the beginning

trailers are employed and made by the J. G. Brill Company at Philadelphia. The motor cars measure 24 feet over all, fifty-six have 16 feet bodies, and three have 18 feet bodies, while four are eight-seat, open carriages. The trailers are the former horse cars.

The boilers are 1,200-horse-power. The engines are 10 75-horse-power and high speed, 7 of them were made by the Phoenix Iron Works Company at Meadville, Pa., and two are Beck engines, by the Taylor Manufacturing Company, at Chambersburg, Pa. Seven of the dynamos are 80-horse-power Thomson-Houston, and two Edisons. The boilers were made by the Phoenix Iron Company and the Taylor Manufacturing Com-



pany, horizontal tubular boilers.

The majority of the cars have two 15-horse-power motors. They are the Thomson-Houston and the Edison, and the Westinghouse make, the first mentioned predomi-



numerous horse car companies, which were first consolidated and the present company now operates 52 miles of the track every day from 5 a. m. until midnight; the track gauge is five feet. The girder and the T rails are used, weighing, the former from 32 to 45 lbs. per yard, and the latter 35 lbs. Sixty-three motor cars, and 13

nating. Hoyt's belts are used in the power house. There is one main power house and car shed, 150 feet front and 150 long, in the exact center of the city's circumference, and another smaller one in the suburbs, the latter holding 25 cars, the other about 40.

The company operates eighteen lines, under the one

management, radiating from the public square in every direction out into the extreme suburbs, tapping every section of the city and suburbs in an exhaustive manner. Every line transfers passengers free, under a city ordinance, from any other line, and a passenger may thus ride a limit of six miles for 5 cents. This transfer is made by tickets issued by the conductors, but the company is now constructing a transfer depot on their own property near the public square and connecting with the power house, where the transferring will be done by a well devised system and the issue of tickets by conductors will be dispensed with. The lines are so arranged that every car in the system will pass through this central station.

the operators in Nashville had demonstrated the practicality of introducing electricity into the street car systems of smaller cities, and their being run with success, that other cities in all directions seized upon the idea and began to put it into operation, at first only here and there and then rapidly, as the idea took, from city to city. The first day the local papers published the fact that the company had handled 10,000 people in one day the public was incredulous, but when a week or two later they published that 20,000 persons had boarded the cars between 5 a. m. and midnight they were stupified with amazement. It has since become an accepted fact and has ceased to cause surprise.



SCENE IN NASHVILLE, TENN.

The officers of this splendid organization are T. W. Wrenne, the president; Isaac T. Rhea, vice-president; E. G. Conettee, general manager and Geo. W. Cunningham, secretary and treasurer.

The company is operating upon 52 to 55 per cent of its earnings.

The system has attracted universal interest from all quarters and owing to its having been a pioneer far in advance of almost every other city in the country, has had the honor of inspection from projectors of similar enterprises in many of the larger cities of the north, including such cities as Philadelphia and Baltimore. The undertaking was begun after a visit of the incorporators to the electrical systems of Boston, Kansas City and Richmond, and for some time after Nashville's system was in full operation, Boston was the only city in the United States having an electrical car plant at all comparable to Nashville's either in extent or perfectness. Indeed it was after

The typography of the city is rolling, with many long but not excessively steep grades. The cars run at a maximum speed rate of 15 miles per hour, although the city ordinance has fixed it at a maximum of six miles. Accidents occur, but not frequently, and very rarely with fatal results. The populace has adopted the system as its own, and hundreds ride now habitually where ten rode formerly. The working classes, especially are the liberal and grateful patrons, and the universal verdict is that under no circumstances would the people go back to the horse power system. The rates remain in effect during school months only.

The street railways of Tacoma have agreed to carry school children at half rates, which arrangement will be carried out by books containing forty coupons each, sold for \$1.00, through the direction of the superintendent of schools.

RIGHT OF A STREET RAILWAY TO CONDEMN A RIGHT OF WAY—TEXT IN FULL OF THE "DULUTH" DECISION.

WE have had so many inquiries regarding the now somewhat celebrated "Duluth" decision, wherein Judge Start ruled that the Duluth Street Railway Company possessed a right to condemn certain lands for right-of-way, that the text is given below in full:

In the matter of the petition of the Duluth Street Railway Company for the appointment of commissioners to ascertain, determine assess and award, the compensation to be made to the owners, respectively, and to all tenants, incumbancers, and others interested in the lands described in said petition, on account of the taking of a portion thereof for the purposes of petitioner's railway as set forth in said petition.

The above named petitioner, which is a railway corporation, duly organized under and by virtue of the provisions of Title 1, Chapter 34, of the General Statutes, 1876, of Minnesota, having at the time and place set forth in the notice to land owners, hereinafter referred, duly presented to this court its petition, signed by the president and secretary, setting forth the enterprise to be prosecuted by it, and describing with reasonable certainty and accuracy, the lands, property and estate which it will be necessary for it to acquire for the purpose of such enterprise, in said St. Louis county, also setting forth the name of each and every owner incumbancer, or other person interested in the same, or any part thereof, so far as the same can be ascertained by the public records and by view of the premises and other inquiry touching the occupation thereof, and praying the appointment of three disinterested and competent persons as commissioners, to ascertain and determine the compensation to be made to such owner or owners, and to all tenants, incumbancers, and others interested for the taking or injuriously affecting such land and real estate: and it appearing to the satisfaction of the court that a notice stating briefly the objects of the petition, and containing a description of the lands proposed to be acquired, and stating that said petition would be presented to this court at the time and place in said notice mentioned, was duly served on each of the persons named therein as owners or otherwise interested in said land, at least ten days previous to the time designated in said notice for the presentation of said petition, in the manner prescribed by the statute, and this court having duly heard the said petition and the proofs and allegations of the parties, William W. Billson, Esq., appearing for the petitioner and R. R. Briggs, Esq., for the land owner, William E. Richardson: no others appearing; and this court being satisfied from the evidence and proofs in the matter that the public interests require the prosecution of said enterprise by the petitioner, and that the lands and real estate proposed to be acquired are required and necessary for the purposes of such enterprise, and that the said petitioner is duly authorized by law to prosecute the same.

Now, therefore, on motion of William W. Billson, Esq., attorney for said petitioner, it is ordered that the enterprise set forth in said petition may be prosecuted by said petitioners, and that M. R. Baldwin, B. F. Myers and

William E. Lucas, three competent disinterested persons resident in said county, be and are hereby appointed commissioners to ascertain and determine the amount to be paid by such corporation to each of such owner and persons interested as compensation for his or her damages, by reason of the taking or injuriously affecting any such lands, property, estates or interests: that the first meeting of such commissioners shall be held at the office of the clerk of this court, in the city of Duluth, in said county, on the 25th day of January, 1892, at 11 o'clock a. m., and that the compensation of said commissioners be and is hereby fixed at the sum of \$10 per day, for each of them, for actual service.

Let this order be recorded in the minutes of this court.

Dated January 4th, 1892.

CHAS. M. START,

Judge of the 3rd Jud. District, acting for a judge of the 11th Jud. District.

MEMORANDUM.

1. While the petition contains all the allegations required by S. 14 Ch. 34 G. S. 1878, yet the court must be satisfied by competent proof, before it can appoint commissioners, that public interests require the prosecution of the proposed enterprise. This is a material matter upon which land owner may join issue. S. 17 Ch. 34 G. S. 1878.

Chic. B. & N. R. R. Co. vs. Porter, 43 Minn. 527.

It would therefore seem that it should be alleged in the petition. However this may be, it is evident from the course of the trial that the rights of the land owner cannot be prejudiced by allowing the request to amend, and the petition may be amended to conform to the proofs, by inserting in the petition after the word "That," near the top of page 2 thereof, the words "public interests require the construction and operation of said double track line of railway."

2. Chap. 31 Gen. Laws 1881, referred to in the land owner's answer, has no application to the case at bar. The statute was intended to authorize railway corporations to conduct extensions and branches which they were not authorized by their original charters to build.

3. Has the petitioner the right to exercise the power of eminent domain for the purposes set forth in the petition?

If it has not, it is because and only because of the provisions of its articles of incorporation, for it is a corporation organized to construct and operate railways under Title 1, Ch. 34 G. S. 1878, which authorizes such corporations to exercise the power. But the petitioner by its charter is limited to the construction and operation in and along the streets and highways. It is not authorized to build an ordinary commercial railway over private property, for its roadbed is to be in the streets.

Under the expressly prescribed and limited purposes of its incorporation, it may be conceded (without so deciding) that the petitioner is simply a street railway corporation whose fundamental business is to build and operate rail-

ways along the streets for the accommodation of the local street travel, and hence is without the power of eminent domain to the same extent as ordinary railway corporations possess it.

Thomson & Houston El. Co., vs. Simon 23 p. 147.

Matter vs. S. B. R. R. Co., 119 N. Y., 141.

But authority to use the means necessary to attain these objects of its incorporation is conferred upon petitioner by necessary implication, therefore, if as an incident to and for the purpose of enabling it to safely and efficiently discharge its duties to the public as a common carrier of passengers, it becomes necessary for the petitioner to acquire private property by condemnation, it has the power to do so. If, it is reasonably necessary, in order to safely accomplish the purpose of its creation, and public interests require it, a railway corporation organized under Title 1, Ch. 34, although it is an ordinary street railway, may acquire by condemnation the right to elevate or lower its tracks, above or below the surface of the streets, or a *right of way over private property from one street to another*.

Now it appears from the evidence in this case, that the petitioners railway line connects with that of the Motor Line Improvement Company's line, which together make a continuous line of railway in the public streets of Duluth, from the central and business portions thereof to Woodland Park, a suburb of and within the corporate limits of the city of Duluth, that the petitioner operates this line, using electricity as a motive power in moving its cars thereon, that this line is one of public utility and necessity, but that by reason of a heavy and dangerous grade in the street at a given point on the present line, it is at some seasons of the year unsafe and impracticable to keep within the street with said line over and up this grade, and that the safety of the traveling public and proper operation of the line require that this grade should be avoided. This can only be done by a change of the line, by diverting it from the street at the point indicated in the petition and intersecting the street again at the point of the termination of the proposed line over private property. This proposed and necessary change is fairly within the powers of the petitioner, as limited by its charter, and for which it may exercise the power of eminent domain, even if it be conceded that the petitioner has not the general power of condemnation possessed by ordinary railway corporations.

ST. LOUIS SIFTINGS.

THE projected Central Electric Railway seems to be meeting the approbation of council and people. Thus far no objections to the line have been made, and it will probably be built. The line will cover parts of the city heretofore without railways, and 5 cents will take a passenger over the entire system.

THE application of the St. Louis Electric Railway & Power Company for a franchise to construct a line from the city limits to Kirkwood, has been rejected by the County court.

PERSONAL.

ODEN BOWIE has been elected president for the twentieth time, of the City Passenger Railway of Baltimore.

GEORGE F. WOOLSON, general manager of the Butte Consolidated Railway Company, was in the city a few days since.

M. S. ROBINSON, Manager of the Cleveland City Cable Railway, visited Chicago, for a week, during the past month.

E. B. EDWARDS, "the father of railroad presidents," was elected for the thirty-second time president of the Bridge Avenue Railroad Company of Philadelphia.

GEORGE B. MERRILL has been appointed general manager of the Falls Rivet & Machine Company, of Cuyahoga Falls, Ohio.

E. E. WOOD, of New York city, vice-president and general eastern manager of "Electrical Industries," favored us with a friendly call a few days since.

J. E. LIVINGSTON, formerly general manager of the Chicago and Ohio River Railroad, has been elected general manager of the City Railway Company of Topeka, Kansas.

D. H. LOUDERBACK, who has been managing director for the Chicago syndicate, owing to the tri-city lines in Davenport, Rock Island and Moline, was elected president at the recent annual meeting.

W. L. ADAMS, a well known electrician, and possessing a large acquaintance among the trade and the street railway men of the country, has been elected secretary and treasurer of the Electric Merchandise Co., of Chicago, in place of A. L. England, who resigned.

BOSTON NOTES.

THE rapid transit commissioners have decided upon a loop and tunnel to relieve Boston's overcrowded streets. The underground will be double-tracked, with frequent openings to the surface, under a portion of the Common as far as Bowdoin Square, thence by elevated road through Blackston, Congress, Atlantic avenue, around by New England, Old Colony and Albany station to Park square.

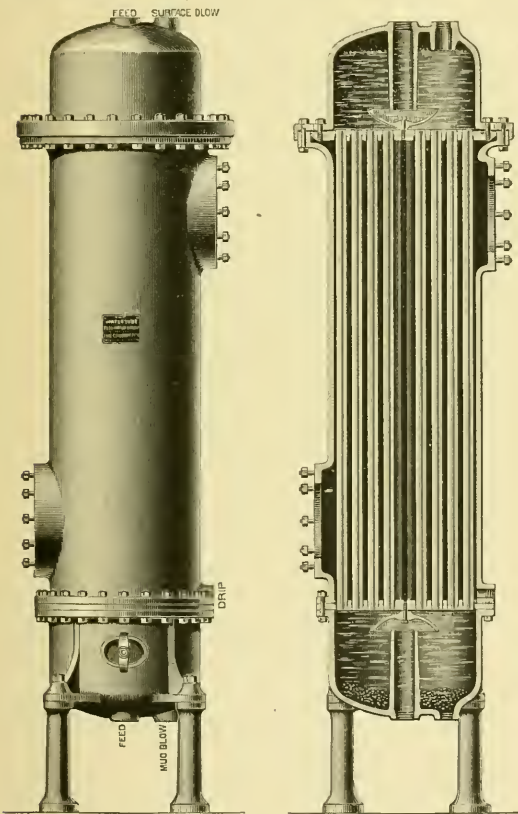
THE West End Street Railway Company earned during the first 26 days of January over \$378,000. The month as a whole will about maintain the average increase of \$1,000 per day.

PHILADELPHIA FACTS.

It is said the Traction Railway Company will experiment with the overhead electric system in west Philadelphia, and if the trial is successful, will furnish all its lines, except those using cable, with this system. An electric company is alleged to have offered to build the lines and operate them for a certain length of time if the company will purchase the plant if satisfactory.

THE GOUBERT "WATER-TUBE" FEED WATER HEATER.

OUR illustrations show the latest construction of one of the best known and most popular feed water heaters on the market. In its present form the Goubert "Water-Tube" Feed Water Heater is practically as perfect an apparatus for the work sought to be accomplished through its agency, as engineering skill could devise. It is essentially composed of two cast-iron water chambers connected together by a cluster of seamless drawn brass tubes, rigidly secured at their ends to the tube-plates by means of a roller tube expander in the same manner that boiler tubes are connected to the heads. These are the only parts of the heater under boiler pressure.



The lower water chamber rests on legs on the floor, while the upper water chamber is free to move vertically as the tubes expand or contract. The tubes are surrounded by a cast-iron shell, provided with inlet and outlet nozzles, to which are connected the exhaust pipes. This shell is bolted to the lower water chamber, but is free to expand independently of the tubes; its only connection at the top with the upper tube-plate being made by means of a flexible corrugated copper expansion plate. This serves to close up the space between the upper tube-plate and the shell, and has no pressure to

withstand but that of the exhaust steam, although it is protected and backed up in such a manner as to easily resist any pressure that may come upon it.

At the extremes of temperature this corrugated copper expansion joint never has to spring more than three sixty-fourths of an inch either way and is practically indestructible.

The water inlet and outlet pipes are made to project inside of the water chambers, and opposite them are placed dish shaped deflectors, the purpose of which is to deflect the current and thereby promote the separation of scum and sediment.

Suitable surface and mud blows and also a hand-hole are provided for cleaning.

Among the advantages claimed for this heater are the following: The tubes are of brass and are free to expand; the pressure being from the inside they cannot collapse, neither can they leak at the ends, as the greater the pressure, the tighter it makes them. By simply removing the head, all the tubes can be easily cleaned. The area for the passage of steam between the tubes is from eight to sixteen times as large as that of the exhaust pipe, and consequently it cannot cause back pressure.

The water being divided up into small columns and in immediate contact with the heating surface, is quickly heated to the highest point. Being made entirely of cast iron and brass, it does not pit or corrode. In short, the manufacturers claim that the Goubert feed water heater, is the most effective, durable and most easily cleaned of any heater made.

The Goubert Manufacturing Company, 32 Cortlandt street, New York, are the sole manufacturers.

CABLE SLEIGHWAY.

NOT a son of "Old King Cole" but W. P. Cole, is the name of a Montreal, Canada man, who wants to rescue that city for rapid transit by the new system of cable railway, in which he places the rope overhead suspended from poles, instead of in the conduit on the streets.

The cars are to run upon a track as under ordinary circumstances and the driver is to seize the rope by a sort of over-head grip, which is controlled in a similar manner to that on cable roads in use to-day. A novel feature of his plan is that he expects to be able to place his cars upon sled runners during winter months, at which time the tracks in that city are usually covered with from 1 to 2 feet of snow, and so by changing his wheels to runners, he will have the cars glide merrily along after bob-sled fashion. Just how the gentleman expects to apply brakes on the sleighride business is not stated, but it is to be presumed that the small boy would find the system a delightful means of hitching on.

In the advertisement of the Newburyport pole bracket advertised last month, the printer set the notch too low, and made the price \$2.00 when it should have been \$2.25. This bracket is proving very popular, and orders for the same have been received from a number of large roads since our last issue.

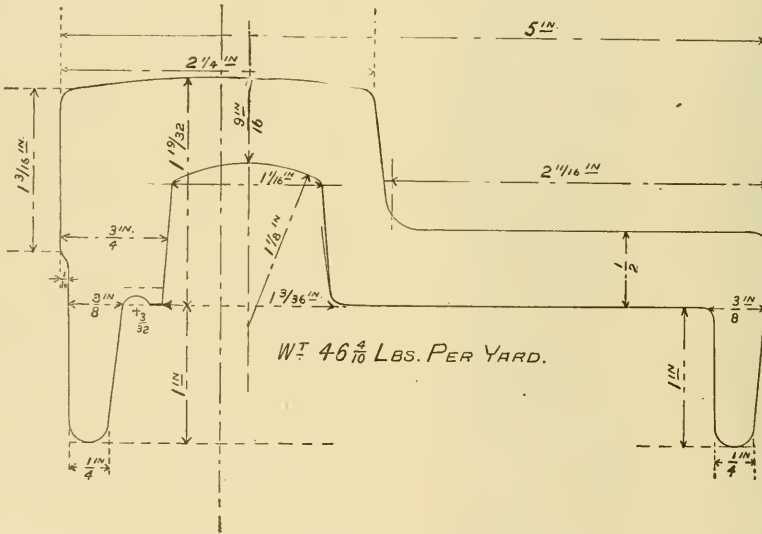
PRICE'S HOLLOW RAIL.

THE aim in all the various types of track construction, invented by James M. Price, of Philadelphia, has been to lessen, in as large degree as possible, that amount of metal, which at the best, must in a very considerable amount go to waste in the scrap heap. Mr. Price's latest invention preserves the best feature of his other sections and presents when laid the necessary features of a girder rail. It is not, however, proportionately as heavy throughout, as nearly all the weight is utilized in these parts which must wear, and therefore need renewal. In other words, the inventor aims to offer a greater per cent. of servicable material in any given weight than is found in any other section now made. This is accomplished by a hollow under the tread, but so placed as not to lessen strength or wearing qualities, while the hollow may be utilized, if desired, as a conduit

A NEW INSULATING MATERIAL.

RECEIPT for a composition which is said to possess excellent insulating properties, appears in Light, Heat and Power, and is as follows: Sulphur, 7 pounds; pipe clay, 1½ pounds; slate dust, 1½ pounds; paraffine wax, 2 ounces, and a variable quantity of oxide. The amount of oxide to be added depends entirely upon the color which is desired to be given to the mixture, and this may vary from a half to a fourth of the total weight of the combined ingredients.

The clay and slate dust are first thoroughly ground together, the materials being first heated. The paraffine wax is then added, and the mixture is made into a paste. After exposure for a time it will become hard and dry, and the mixture is then ground to a powder and mixed with the above mentioned quantities of sulphur and metallic oxide.



for a wire. As in his other sections, there are no openings in the top of the rail, the spikes being driven horizontally through the depending flanges on either side into the wooden sleeper, to which the rail is fitted and on which it rests.

As there are no openings at the surface, rain and wet is excluded, and the life of the stringer prolonged. The base of the stringer is wider at the top by ¼ inch on each side, so that the rail does not overhang the stringer, which affords a firm and unyielding support. This also permits of an ever increasing tightening of the rail in the wood, as the latter wears in the course of time.

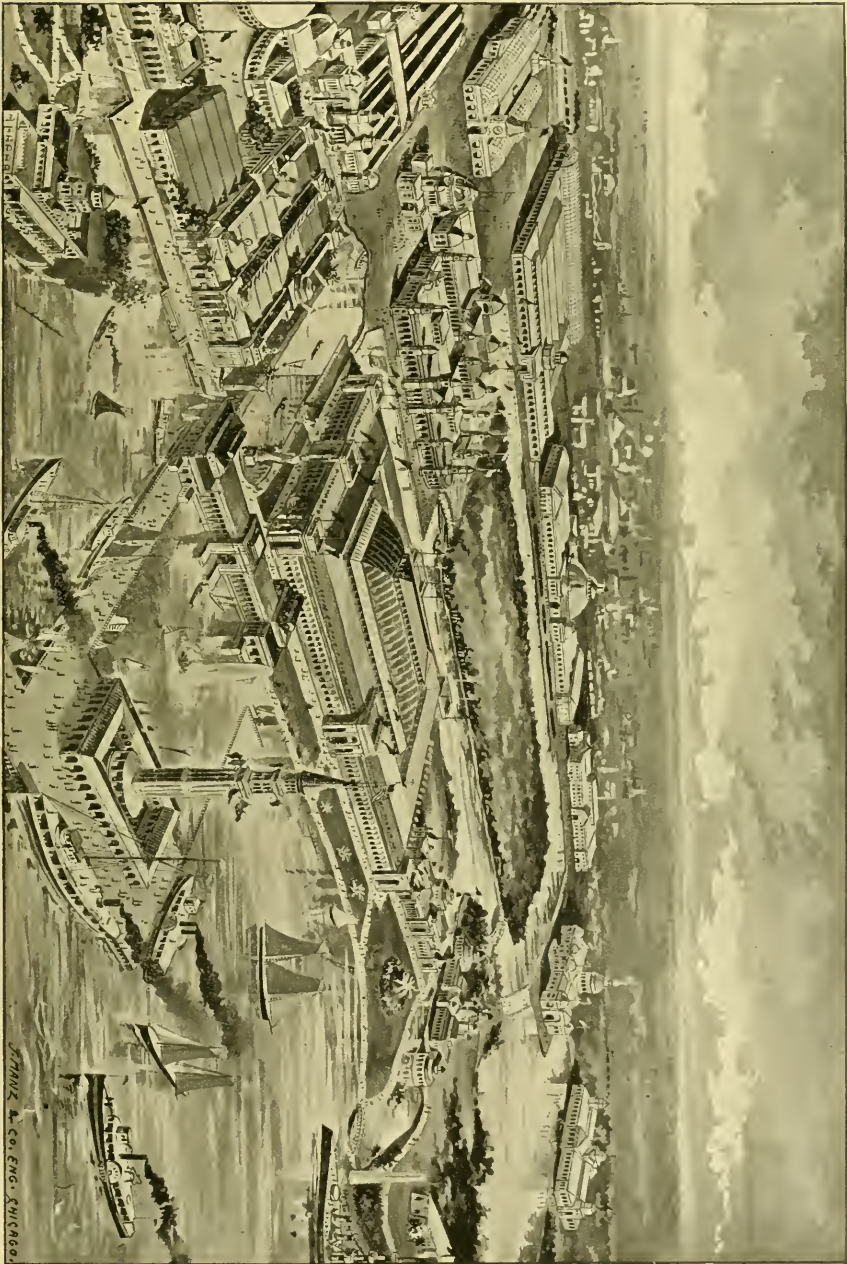
THE J. G. BRILL COMPANY, of Philadelphia, have just delivered six new cars to the Multnomah Street Railway Company, of Portland, Oregon, which are 31 feet 10 inches over all, and 10 feet wide. They are mounted on two four-wheel trucks, and seat forty passengers. They are driven by two motors, and are attracting a great deal of attention.

"THE tobacco-spitting animal that infests street cars must be abated as a nuisance," is the cry of the daily papers. Railway managers and car cleaners say, Amen!

GENERAL Manager Parsons, of the West Division Railroad, has ordered that transfers be given to all blocked passengers of that line.

MAKE preparations to raise joints as soon as frost comes out of the ground. A raise in time save two rails.

GEORGE F. HOLLINGSWORTH, of Waltham, Mass., has just delivered his first car to the Newton Street Railway Company, who are much pleased with it. The car is built after ideas furnished by Superintendent Henderson. The aisles are 46 inches and interior finish all of oak except door panels which are cherry. The car is heated with a Burton Electric Heater, while all the trimmings are from Lewis & Fowler. Bemis Car Box Company's truck carries the car, all of which reflects much credit on this new candidate for car orders.



THE WORLD'S FAIR—BIRD'S EYE VIEW OF BUILDINGS.

BIG FIRE IN TOLEDO.

ONE of the most disastrous conflagrations which has occurred in street railway lines in many months was that of the Toledo Electric Railway, of Toledo, O., which suffered a loss of its large car barn on Canton avenue, on the morning of January 20th. The fire broke out at a little before 2 o'clock, and originated by the overturning of a small lamp which had been left burning in one of the Belt Line cars after it had been run into the barn. The oil in the lamp soaked the cushions and wood work of the car and was quickly ignited by a small blaze from the lamp.

The employes discovered the fire when it first started and rushed to the fire stand for a pail of water, but on account of the extreme cold the pipe had become frozen and no water could be obtained. Before water could be brought from other sources the fire was beyond their control.

The fire department responded promptly, but were unable to save the building, and were obliged to confine their efforts at last to those of the surrounding structures. Thirty-eight double motor cars were destroyed and all the mechanical appliances and other operating implements in the house. The building was 100x150 feet in dimensions, and one story in height, but was one of the best arranged and most convenient in the country. The fire temporarily affected the operation of the Belt, Forest Cemetery and Indiana Avenue Line, though the balance of the system which was operated from the Galna avenue barn was not affected.

The Robinsons immediately telegraphed to the leading manufacturers of cars throughout the country, and speedily made arrangement for rolling stock and equipment.

The drivers and conductors on the other lines, had their run temporarily reduced, so as to give employment to the 100 men thrown out by the fire until new cars can arrive, and their run be replaced. The fire involved a loss of \$125,000, on which there was an insurance of \$108,000, and the Robinsons have the sympathy of the fraternity in the loss and inconveniences which the disaster occasions. They are not the men, however, to waste any time in complaining but went actively at work to replace the rolling stock and restore to the lines full and regular service.

PROGRESS IN ATLANTA.

THE Short Electric Railway Company are putting in a fifteen-mile road at Atlanta, Ga., and which is to be equipped with twenty single reduction motors and the new four-pole Short Generators.

The construction work is progressing rapidly and very satisfactorily under the supervision of R. L. Caldwell, of the Short Company, and the prospects are now good to have the road in operation by the first of March. When completed it will be one of the best equipped in the south, and will be of very great advantage to the city of Atlanta.

PASSENGERS IN ST. LOUIS.

THE annual report of the several roads show the business last year to have been heavy, and was as follows:

| | | | | |
|----------------------------|---|---|---|------------|
| Missouri Railroad | - | - | - | 13,551,997 |
| Lindell Line | - | - | - | 10,944,585 |
| Bagden & St. Louis | - | - | - | 214,987 |
| Benton Bellefontaine | - | - | - | 1,765,186 |
| Cass Avenue & Fair Grounds | - | - | - | 3,303,856 |
| Citizens | - | - | - | 8,864,232 |
| Fourth Street | - | - | - | 433,723 |
| Jefferson Avenue | - | - | - | 1,838,047 |
| Mound City | - | - | - | 4,143,942 |
| Northern Central | - | - | - | 2,207,707 |
| People's | - | - | - | 4,367,652 |
| St. Louis | - | - | - | 10,811,100 |
| St. Louis & Suburban | - | - | - | 4,027,888 |
| Southern | - | - | - | 4,270,105 |
| Union | - | - | - | 1,810,270 |
| Union Depot | - | - | - | 8,443,330 |
| Total for the year | - | - | - | 80,997,767 |

MOTORS SPRING ETERNAL IN THE HUMAN BREAST.

LAST month we chronicled the organization of the Southern Street Car Company, of Pensacola, Florida, and which it now appears, is preparing to push a spring motor. This motor may be attached to any ordinary car. It has a combination of six coils of springs confined in barrels similar to those used in clock mechanism, and is placed under the car and so arranged that they may be wound singly or all together, and the force expended in like manner. The springs are wound at a station, and by the use of clutches the power is expended at the will of the manipulator. Each spring exerts 1-horse-power, and will drive a car of a maximum load of sixty passengers 1½ miles. When the power is all expended from one spring, another may be employed, and so on, thus driving the car about 8 miles without rewinding. The manipulator stands on the platform and controls the car with a lever coming up through the floor. It also has an indicator, which shows at all times the power unexpended in each spring. It is the intention of the company to have cars manufactured with the patent spring motor and lease them upon royalty.

A BIG DEAL IN BALTIMORE.

ONE of the most important street railway deals that has taken place in a long time, was consummated January 30, the Baltimore Traction Company purchasing the entire North Baltimore Passenger Railway system, the price paid being \$1,080,000. The Traction Company by the deal, comes into possession of more than 22 miles of road, covering that entire portion of the city.

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

JOHN G. HOLMES, PRESIDENT, Pittsburg, Pa.
 THOMAS H. McLEAN, FIRST VICE-PRESIDENT, New York, N. Y.
 JAMES B. SPEED, SECOND VICE-PRESIDENT, Louisville, Ky.
 ALBION E. LANG, THIRD VICE-PRESIDENT, Toledo, O.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE PRESIDENTS, AND HENRY M. WATSON, Buffalo, N. Y.; LEWIS PERRINE, JR., Trenton, N. J.; W. WORTH DEAN, St. Joseph, Mich.; MURRY A. VERNER, Pittsburg, Pa., and THOMAS C. PENNINGTON, Chicago, Ill.

Next meeting will be held in Cleveland, O.

Massachusetts Street Railway Association.

President, CHAS. E. PRATT, Salem; Vice-Presidents, H. M. WHITNEY, Boston, AMOS F. BREED, LYNN, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON Lawrence.

Meets first Wednesday of each month.

Ohio State Tramway Association.

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice President; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus, Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice President, THOS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee. OFFICERS AND C. B. THURSTON, Jersey City; H. ROMAINE, Patterson; LEWIS PERRINE, JR., Trenton.

The Street Railway Association of the State of New York.

JOHN N. BECKLEY, PRESIDENT, Rochester, N. Y.
 THOS. H. McLEAN, VICE PRESIDENT, New York, N. Y.
 GEO. LAW, SECOND VICE PRESIDENT, New York, N. Y.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—D. F. LEWIS, Brooklyn, N. Y.; C. DENSMORE WYMAN, New York, N. Y., CHAS. CLEMENSHAW, Troy, N. Y.
 The next meeting will be held at Saratoga, September 20, 1892.

Arkansas.

MOBILE.—The Mobile Street Railway Company with 20 miles of track has suffered a foreclosure of mortgage and sale, and the probability now is that the road, passing into new hands, will be converted into an electric line which is greatly desired by all the citizens.

ARGENTA.—In the suit of the heir of C. G. Gist, versus the Little Rock & Memphis Railway, and the Argenta Street Railway Company, for the killing of Gist about a year ago, the jury returned a verdict against the defendants jointly for \$25,000.

California.

EUREKA.—The Eureka Street Railway has had a very successful year and is contemplating the extension of two or more of its lines in the near future.

HANFORD.—Great interest is being taken here by the prominent business men in the contemplated electric line to Fresno. Fulton G. Sperry of Fresno, and F. W. Van Sickler, of San Francisco, are also interested in it.

LOS ANGELES.—James Brown, an employe of the Temple Street Cable Road, was instantly killed recently by being drawn into the machinery while oiling the same.

OAKLAND.—The Oakland Railroad Company is preparing to change its Telegraph Avenue Road from horse to electricity.

SAN BERNARDINO.—The city has won the case against the street railway company, which must now proceed to pave.

SAN FRANCISCO.—C. L. Willcutt, secretary of the Market Street Railway, states his company has purchased all the necessary material for changing the Mission Street Horse Car Line into a cable road. The gauge will be changed to 4 feet 8½ inches the same as that of the Market Street Line.

THE franchise for an electric railroad from Market and Sixth streets to the Potrero, lately obtained from the board of supervisors, has been assigned by the grantees to the Market Street Railroad Company, which proposes to commence the construction of the road as soon as the streets now under contract are graded.

THE Metropolitan Railway Company, of which Wendell Easton is president and C. A. Fletcher secretary, and which is now engaged in constructing an electric road under a franchise granted by the last board of supervisors, has applied to the present board for an extension. The company desires the right to build a block of road on Eddy street, between Powell and Mason, to connect with the lines for which they already have a franchise, and also the right to erect poles for electric wires on the portion of the road east of Van Ness avenue.

THE Market Street Company, which now controls the Geary Street Cable Road, is about to change its gauge to correspond with the Market Street Line and will also extend the present terminus a considerable distance to the northern boundary of the park. Combination cars instead of grips and trailers will be adopted.

SANTA ROSA.—Judge Dougherty has decided the case of the Santa Rosa Street Railway Company vs. The Central Street Railway Company in which the former asked a perpetual injunction of the latter, in favor of the Central Company, holding also that the other company had no legal rights, and only such as were vested in possession.

Canada.

HAMILTON.—The Hamilton, Beamsville & Grimsby Electric Railway will be extended to the Stuart street station, if the right of way can be secured.

THE street railway company has agreed to substitute electricity for horse power for propelling its cars, on condition that the city grant an extension of its charter, which expires in 1892. The proposition has been accepted.

OTTAWA.—The electric railway has equipped its cars with the Burton Electric Heater, with good results.

THE Ottawa Street Railway is now owned by a syndicate that includes P. and W. Shires, David Miller and J. P. Harris.

TORONTO.—At an exciting election held January 6th, it was voted that street cars shall not be allowed to run Sundays. It is thought, however, that with the advent of the electric system, which is promised within the year, the objections which have brought about the present state of feeling will be dispelled and the electric car will run seven days a week.

NIAGARA, Ont.—W. C. Jennings is surveying a route for the proposed electric railway from Niagara to Port Erie. A syndicate to construct it is composed of B. B. Osler and H. D. Hammond of Toronto, W. Hendrie of Hamilton, and R. B. Angus of Montreal.

WINNIPEG, Manitoba.—The city council has decided to re-open the street railway question and will give Austin & George Campbells' Company another chance to make tenders. The best offer will then be accepted.

PETERBORO, N. B.—The Town Council passed a by-law, granting the franchise of the streets of Peterboro, for twenty years, for an electric street railway, to the Edison syndicate, composed of John Kreusi, H. M. Francis, John Langton and M. D. Barr.

WINNIPEG.—The city council recently passed an ordinance granting an electric railway franchise to the Ross-McKenzie syndicate, of Toronto.

Colorado.

DENVER.—The large building known as the Union Depot of the Denver Street Car Company, and formerly used as a car house, has been sold and will be converted into an immense manufacturing establishment, being equipped throughout with small electric motors for the purpose.

OURAY.—A franchise was granted the latter part of January, to the Ouray and Ironton Electric Railway Company, to build a line between Ouray and Ironton, with branch line to Mount Sneffles and other points. Millions of capital are behind the scheme. Surveys will be commenced at once.

Connecticut.

HARTFORD.—The Hartford Street Railway Company is extending its electric line into East Hartford.

NEW HAVEN.—The Horse Railroad Company has decided to extend its tracks from Howard street bridge to Sea street. The company would be glad to propel the cars by electricity, but is afraid of the city council and will wait until the legislature gets down to business, when a charter will be asked for.

The vigilance of the night watchman saved the Horse Company's entire outfit of cars and stables from destruction by fire, January 29th. The last car run in was rapidly burning when discovered, but was pushed out of the house where it was soon consumed.

The West Haven Railway will petition the common council for permission to equip the line with electricity from the Green to Savin Rock Shore. If the right is granted, work on the plant will begin April 1st.

Delaware.

WILMINGTON.—The City Railway Company has petitioned the Street and Sewer Department for permission to lay tracks for an electric railway about a mile in length.

The Wilmington & Northern Railroad, through President du Pont is making arrangements to build an electric railroad from Joanna, on its line, to New Holland, in Lancaster county, a distance of 15 or 20 miles.

District of Columbia.

WASHINGTON.—An order has been entered in court for the sale of the patent right of the Judson Pneumatic Street Railway Company, which has been held by the National Bank of the Republic, unless the payment of some \$5,000 with interest and cost, is made within 30 days.

SEVEN drivers on the Anacosta & Potomac River Railway struck February 1st, claiming they could not do the work required by the rules of the company. Their places were immediately filled.

Georgia.

ATLANTA.—The Metropolitan Street Railroad has gone into the hands of a receiver, and will probably pass into the hands of the Consolidated Street Railway Company, which holds a claim against it amounting to about \$40,000.

The electric line from Atlanta to Marietta, is expected to be in operation by April 1st. It is said the Legislature has chartered another line known as the Collins Park & Belt Railroad Company, to run from Marietta to Boulton, connecting with the Atlanta & Chattahoochee Railroad.

MACON.—Receiver Winters, of the Macon Street Car System, has petitioned the court for authority to either sell the road at receiver's sale or that he be allowed to issue receiver's certificates to build a new power plant. The line is greatly crippled for want of power, and the company should own its own power station.

SAVANNAH.—The City Railway will not at present be able to substitute electricity for mule power on account of the refusal of the trustees of bondholders to release sufficient real estate held by the company to allow of the necessary purchase of electric appliances.

Illinois.

KANKAKEE.—Great interest is manifested in this city in the proposed electric railway which is to connect Kankakee with Waldron and Mokence. The road will be 12 miles in length and will carry both passengers and freight. A company has been formed with \$150,000 capital, and stock is now being taken rapidly.

ROCKFORD.—The West End Street Railway Company has secured the required money to give them right of way on a number of streets and the lines will no doubt be built this spring.

The Rockford City Railway Company in 1891 expended \$20,000 on the increase of its power and equipment, and \$39,000 on 7.4 miles of new lines. The West End Street Railway Company has expended \$38,000 on 4.6 miles of new lines and on its power and equipment, a total for both lines of \$97,000.

Indiana.

FORT WAYNE.—It is authoritatively stated that the entire stock of the street railway company has been sold to F. D. Robinson, of Cleveland and that it will shortly adopt electricity as a means of propulsion.

SHELBYVILLE.—An electric railway has been organized with a capital of \$100,000. Judge L. J. Hackney, will be president, Hon. E. Scott Ray, treasurer, and Hon. S. A. Major, who is the city clerk, will be secretary. Work will commence at once and it is hoped to have cars in operation by July 1st.

WANATAH.—The management of the new electric railway will begin track work as soon as material arrives, if the weather permits.

Iowa.

DAVENPORT.—At the annual meeting of the Davenport & Rock Island Railway, a satisfactory report was rendered, and the statement was made that Messrs. Harris & Co., of Chicago, had succeeded in floating the bonds of the company in the amount of \$600,000.

Kentucky.

COVINGTON.—O. J. Wiggins, one of the prime movers of the Rosedale Electric Road, says there is no truth in the rumor that the road has been purchased by the South Covington & Cincinnati Street Railroad.

ROCKLAND.—The Thomaston, Rockford & Camden Street Railway Companies have secured the franchise of the Rockland Street Railway, and will begin work on the line as soon as the frost is out of the ground. The line will be electric and a mile and a half must be completed by July 1.

WESTBROOK.—The city council has granted permission to the Portland Street Railroad Company to lay its tracks through this city.

Louisiana.

NEW ORLEANS.—The directors of the Carrollton & St. Charles Railway, have accepted the terms of the city council, and have sent a committee north to investigate the various electric systems with a view to determining which may be most suitable.

AT the annual election of the St. Charles Street Railway, the following directors were elected: William A. McClellan, Alden McClellan, A. R. Brousseau, Henry Ellermann, C. H. Heckard, H. T. Bennard.

SHREVEPORT.—A force of men have commenced construction work on the Shreveport Electric Railway & Power Company as preliminary work toward the conversion of the line from horses to electricity.

Maryland.

BALTIMORE.—The directors of the City Passenger Railway Company, at their annual meeting, elected Oden Bowie, president; A. B. Clarke, treasurer and S. L. Bridge, secretary.

THE Union Railroad Company stockholders re-elected the directors of last year to serve during 1892, with the exception of Mr. George Small, deceased, Mr. Henry James being elected to the vacancy. The board organized by re-electing B. F. Newcomer, president; Frank Thomson, vice-president; J. P. Kerr, secretary, and J. S. Lieb, treasurer.

AN ordinance has been submitted, which, if it is passed, will permit the Baltimore, Canton & Point Breeze Railway Company to build an electric overhead road.

Massachusetts.

AMESBURY.—An electric car on the Amesbury & Merrimac line, jumped the track and plunged into the Merrimac river, February 5th. Spreading of the rails on a down grade curve was the cause. Nine passengers were injured.

BEVERLY.—Trolley wires will enter quite largely into the spring elections in the matter of selection of aldermen.

BOSTON.—The carrying of large parcels on the street cars has become so great a nuisance that the company has issued instructions that hereafter no baby carriages, trunks, tool chests, gas and water pipes, rolls of carpet, etc., will be allowed on the cars under any circumstances.

COTTAGE CITY.—The Dukes County Street Railway has perfected its organization with a capital of \$200,000, for construction of an electric line to Gayhead, a distance of 25 miles. When the road is complete it will be one of the longest electric roads in the United States.

FALL RIVER.—The Globe Street Railway Company has petitioned for an increase of capital stock from \$300,000 to \$700,000 and to issue \$800,000 in 5 per cent. 20-year mortgage bonds.

HOLYOKE.—The old officers were re-elected at the annual meeting of the stockholders, and it was voted to petition the legislature to increase the capital stock \$100,000. A new power-house will soon be built.

SALEM.—It is reported here, that the West End Company, of Boston, intend to build a line from Chelsea to Lynn and thence to this city by Highland avenue.

WORCESTER.—The North End Street Railway Company intend to have an electric line from this city to Clinton in operation by early summer if it can secure franchises from the township through which the road must run. The overhead system will be used unless the Storage Battery is perfected by that time.

The Consolidated Street Railway Company has been granted permission to increase its capital stock from \$350,000 to \$700,000, the added funds to be used in the purchase of land, buildings, appliances and payment of floating debts.

WALTHAM.—A franchise has been asked for, and probably will be granted, to build an electric line from this city to connect with Watertown. Five of the eight miles are now in operation, the gap being between Newton and Watertown. The extension will cost \$50,000.

WESTBORO.—The Marlboro Electric Railway Company has petitioned the Legislature for permission to extend its line to Westboro and Hudson.

Michigan.

DETROIT.—The Fort Wayne & Elmwood Street Railway have paid \$1,427 to the city treasury, being 1 3/4 per cent. of their gross earnings for the past six months.

By the terms of agreement entered into between the street railway company and its employees, 10 hours will constitute a day's work; 17 and 18 cents per hour the scale for week days and 20 cents for Sundays and overtime. The agreement runs until December 31st, 1892.

At the next meeting of the city council two petitions asking for street railway franchises, will be presented. One is backed by eastern capital, the other a purely local enterprise.

IRON MOUNTAIN.—The franchise for an electric railway granted to J. H. B. Stephens, was forfeited on account of his failure to deposit \$5,000 within the 60 days given.

PORT HURON.—The street railway is to be extended westward and southward to the new Grand Trunk depot.

SAGINAW.—The receipts from Saginaw's 25 miles of electric road were \$30,000 more during 1891 than during the preceding year.

ST. JOSEPH.—Under the progressive management of President Bean the lines in this city and connecting with Benton Harbor, have been brought to a condition of most excellent service. Recently a small company headed by Mr. English has been endeavoring to secure franchises in the two places, and build an opposition line. The city council, however, of both cities are so well satisfied with the progressive spirit exhibited by Mr. Bean, that they refused to consider the new applicant, but promptly granted Mr. Bean his desired extensions.

Minnesota.

MANKATO.—An electric line will be built in this city this spring even if the eastern parties now figuring on the scheme fail to do so.

WINONA.—The electric railway at this place was formerly opened with great display on January 21st. The entire plant has cost upwards of \$100,000. St. Paul parties own the controlling interest.

ST. PAUL.—The story that was telegraphed through the country of a motorer being frozen to death on the interurban line between this city and Minneapolis is without foundation.

The Supreme Court has ruled in the case of W. W. Bishop who was injured in an accident which occurred on the day in which the line was opened, that the verdict of the lower court awarding the plaintiff damages in the amount of \$15,000 shall stand. This is one of the largest amounts ever awarded for a street railway accident in the state of Minnesota, or even in the West.

Missouri.

ST. LOUIS.—Representatives of the St. Louis & Kirkwood Rapid Transit Company state that work will commence on their proposed electric railway from the limits of the city to Kirkwood, by way of Webster Grove, in the very near future.

The rumor that Julius F. Walsh was to resume active work in street railway lines is emphatically denied by that gentleman. Mr. Walsh was formerly president of the Citizens' Railway and was president of the American Street Railway Association in 1886.

ST. JOSEPH.—Three additional cars have been ordered from the Brownell Car Company, of St. Louis, for use on the lines here. The order calls for large cars with all the latest improvements.

KANSAS CITY.—The South Suburban Railway Company, has been incorporated by R. E. Shyrock, G. K. Wheeler, D. J. Hall and C. A. Ross.

The contract which has been enforced for several months, whereby the Kansas City Cable Road, have transferred passengers with the elevated railway, has been renewed for the coming year. Passengers will be given transfers going either way at the Union Avenue terminus of the North Street Line.

The city council of Argentine, a suburb of this city, have instructed the city council to enter proceedings to annul the franchise of the Metropolitan Street Railway unless it proceeds at once to heat its cars.

Montana.

HELENA.—A proposition is on foot to construct an electric railway to Woodlawn Park.

Nebraska.

OMAHA.—At the annual meeting of the Omaha Street Railway Company, the former officers were all re-elected and the general manager was authorized to spend as high as \$200,000 in improving the road and new construction work.

New Jersey.

CAPE MAY.—The Delaware Bay and Sewells Point Railroad are to be changed to an electric line and it is expected the construction will cost upwards of \$75,000. The property has been transferred to Major J. Henry Edmunds who will transfer it to a new company, which will consolidate the two and carry on the improvements.

ELIZABETH.—John P. Berry, the first superintendent of the Elizabeth & Newark Horse Railway, and for many years past one of the leading veterinaries in the country, died recently.

HOBOKEN.—The North Hudson County Railway has decided to adopt the trolley system on its line from Hoboken limits to Union Hill, and to use a modified trolley on its elevated system.

NEWARK.—The new trolley electric line between Newark and the Oranges was put in operation February 1st.

PATERSON.—Electric cars now run the entire length of the line down Main street to the Broadway stables. The delay has been occasioned by objections of property-owners and store-keepers. The merchants along Main street now admit that the electric road has greatly increased their business.

TRENTON.—The Trenton Passenger Railway have given notice that they will carry the electric railway case to Court of errors.

New York.

BUFFALO.—The Crosstown Street Railway Company of this city has a number of extensions in contemplation which will undoubtedly be put through this spring.

The Tonawanda council has granted right of way for a number of streets for electric lines, and the company in which county clerk Brayton and others are interested, propose to construct tracks; also a road is contemplated on Elmwood avenue, of which L. F. W. Arend is the chief spirit, and a Mr. Sikes, chief engineer.

CANISTEO.—A company has been organized under the name of the Canisteo Valley Electric Railway, with a capital stock of \$20,000.

DUNKIRK.—A. J. Mars, formerly assistant superintendent of the Jamestown Street Railway, has become superintendent of the Dunkirk and Fredonia Street Railway Company of this city.

LONG ISLAND CITY.—The franchises, rolling stock etc., of the Horse Railway were sold at auction January 29th, under foreclosure. William Steinway purchased the outfit for \$75,000, assuming all debts.

LEWISTON.—A joint meeting of the commissioners of Victoria Park and the representatives of the new electric railroad on the Canada side, between Clifton and Queenston, was held recently at Niagara-on-the-Lake. The final location of the road was agreed upon. It will run close to the Whirlpool on an iron trestle. The rails are now arriving at Clifton. It is reported the road will be ready for operation by April next.

NEW YORK.—The Harlem & Kingsbridge Railroad Company was incorporated recently, with a capital of \$300,000, to construct and operate a street railroad in the annexed district. The incorporators and directors are Charles E. Runk, Henry L. Phalon, Charles Trelemies, G. P. H. McVay, H. M. Hoar, Wm. Forster, J. C. Hegelein, Wm. P. Lowe, Wm. E. Whitney, P. J. Moran, Robert B. Saul, Arnold B. E. Schramm, J. G. Prague, Thomas E. D. Power and J. P. Allen, all of this city.

In addition to the scheme to place horse cars on Union street, a company of property owners have organized with a view to putting in either storage battery or cable system.

A TERRIBLE accident was barely averted recently on the Second Avenue Elevated Road, whereby one of the cylinder heads of the engine was blown out, and falling upon the track in front of the wheels, derailed the forward truck, which ran 20 feet upon the ties and was only stopped by the wooden guard.

In the case of E. A. Collins, who sued the Brooklyn Railroad Company for \$10,000 for alleged injuries sustained by being thrown from one of the company's cars, the jury concluded that \$400 was a liberal allowance, and allowed him that sum.

North Carolina.

NEWBERN.—The contract for the construction and operation of an electric street railroad in this place has been perfected by the filing of an acceptance bond by the company. William B. Clarke, of Wakefield, R. I., is one of the principal promoters.

WILMINGTON.—The street railway company has purchased the site for their steam power plant. Work on buildings will begin April 1st.

Ohio.

BELLAIRE.—The Bellaire Street Railway Company was recently offered for sale, to liquidate unpaid taxes. The real estate and other property was sold, but there was no bid made for the tracks.

CINCINNATI.—The Consolidated Street Railway Company has purchased a large stable, which it will rebuild at once, to be used for wagons and electric material, and as a depot from which to send out hurry wagons in case of accidents.

CLEVELAND.—The guardian of a twelve-year-old boy named Michael Berschofsky sues the Brooklyn Street Railroad Company for an amount proportionate to the length of the boy's name, and claims \$100,000 for the loss of a portion of his anatomy situated in his right leg, which was injured and amputated.

THERE are still some uncompleted portions of sewer work upon the street, which will have to be attended to before the Cleveland City Railway can begin its work on the St. Clair street cable. The expectation, however, is that the city will finish this work early in the spring, so that cabling can commence in early summer.

The city council has passed an ordinance compelling the street railways to pay \$10 a year for each car in service. This will make the receipts from this source \$3,110 for 1892 against \$1,200 for last year.

COLUMBUS.—The contract for the new street car line has been let and work begins at once. It will be a dummy system, and connect outlying districts with the center of the city. The line must be in operation in three months.

The recent conflagration here covered a considerable portion of the Consolidated Company's tracks with ruins, and blockaded the line for some time.

The Consolidated Street Railway has received permission to extend its tracks from High to Fourth, and Chestnut street and thence over the Fourth street viaduct to Chitenden avenue. The ordinance provides that the company pay \$250 per year for the use of the viaduct. The extension will be ready by September.

DAYTON.—The Fifth Street Railroad Company elected directors as follows: A. A. Thomas, E. B. Corwin, Robert I. Cummin, J. C. Peirce, P. E. Reach, W. L. O'Brien and J. P. Ellison. Mr. Corwin is president, and Mr. Peirce secretary and treasurer.

MARIETTA.—Walter Kirby, Superintendent of the Marietta Street Railway Company, has resigned and was succeeded February 1st, by Mr. H. W. McMaster.

MANSFIELD.—Reid Carpenter has been elected superintendent of the street railway company to succeed G. M. Massey, who resigned to go into other business.

NEWARK.—At the annual meeting of the Newark & Grandville Electric Railway, the old officers were re-elected and the treasurer's report showed that in addition to passenger earnings for the year, there has been received for the carrying of freight, \$924; from the United States Express Company \$414, and from carrying United States mail \$337. Secretary Christian recommended the purchase of three motor cars and three open cars and one closed car, and also a 125 horse power dynamo.

LIVERPOOL.—Thos. Casey has resigned his position as superintendent of the street railway, and will return to Cleveland. His successor is also a Cleveland man.

MISSILLON.—J. W. McClymonds was the only bidder for the city's proposal for the construction and operation of a street railway on East Main street and other routes.

NORWALK.—It is promised that all the material for the construction of the new electric line will be on the ground by the 15th of March, and work will be rapidly pushed thereafter.

OHIO FALLS.—The Ohio Falls Car Company have filed a suit to foreclose the mortgage which they hold against the Ohio Falls Street Railway Company for claims amounting to \$11,000. Thomas Sparks has been named as trustee for the creditor.

POLAND.—The citizens of this place are seriously considering the construction of a street car line to Youngstown.

PORTSMOUTH.—The city council has passed the electric railway ordinance that has been pending for some time.

SPRINGFIELD.—The Springfield Electric Railway Company increases its capital stock from \$50,000 to \$100,000.

SANDUSKY.—Election of officers of the Sandusky Street Railway Company resulted as follows: J. O. Mann, president; A. J. Stoll, vice president; George F. Anderson, secretary and treasurer; Emil Schmidt, superintendent. A dividend of 2 per cent. was declared, and the company has decided to buy three additional cars this spring.

TOLEDO.—The franchise of the electric railway to Maumee was extended another year by the County Commissioners.

THE Consolidated roads have just ordered 20 new cars to be delivered in time for the opening of their belt line on May 1st.

THE employes of the Toledo Electric Railway Company gave a ball and supper recently for the benefit of the employes who were thrown out of work by the burning of the street car barn. 2,000 tickets were sold, and the occasion was a success in every way.

ZANESVILLE.—The office of the street railway was broken into Jan. 27, and \$100 secured.

Pennsylvania.

ALLENTOWN.—The Allentown & Bethlehem Rapid Transit Company have entered into an agreement with the new Street Bridge Company of Bethlehem for the use of the latter's bridge, and thus secure entrance into the town of Bethlehem.

AN electric railway from Franklin township, through Weissport, Leighton, Packerton, first and second wards, Mauch Chuck and East Mauch Chuck, will be built this spring if the right of way can be secured.

BETHLEHEM.—The City Council, after a year's deliberation, has at last granted the Bethlehem and South Bethlehem Street Railway the privilege of extending its lines to the city limits.

CHAMBERSBURG.—Alfred E. Hay, of Philadelphia, is seeking a franchise for an electric line here, and promises to have the road in operation by May 15th, if permission is granted at once.

DUBOIS.—At the annual meeting of the Dubois Traction Passenger Railway, W. D. Wayman was elected president, to succeed Mr. Lane.

ERIE.—The Erie Electric Motor Company has purchased two 500-horse power dynamos of the Edison Company, and 13 open summer cars. Two big boilers are also being built for the plant.

FITZBURG.—The West End Street Railway Company has decided to change the motive power to electricity. It is hoped to have the road in operation by July next.

HARRISBURG.—A movement is on foot to extend the lines of the East Harrisburg Passenger Railway Company to Paxtang. The Citizens' Street Railway Company also desires to make a number of extensions if they can secure the desired franchise.

THE drivers and conductors of the East Harrisburg Passenger Railway gave an entertainment on March 5th, for the benefit of an associate who has been sick for a long time.

THE Citizens' Passenger Railway has been incorporated with a capital stock of \$100,000, and will endeavor to secure franchises for the construction of a number of miles of track in that city. Among the stockholders are: J. A. Dunkle, Steelton, Pa., W. H. Seibert, of the same place, and M. F. Snavely, of Harrisburg.

THE Punxsatawney Electric Railway, capital \$15,000, was chartered February 1st.

MCKEESPORT.—At the annual meeting of the McKeesport & Reynolds Traction Passenger Railway, J. E. Smith was elected president, and E. B. Douglass, W. E. Peters, Dr. Powers and Thomas Reynolds as directors.

PHILADELPHIA.—Since the absorption of the Peoples' and Thirteenth and Fifteenth street lines by the Traction Company, there is a disposition on the part of some lines to form an agreement for self protection. An alliance may be formed by the Lombard, Fifth, Sixth and Hestonville lines.

READING, PA.—The City Passenger Railway Co., has increased its capital stock from \$300,000 to \$400,000, and \$50,000 of this amount will be issued this year.

SCOTSDALE.—The electric road between Scottdale and Broad Ford is in a fair way to being built. The estimate cost is \$50,000, nearly all of which is subscribed. N. Miles is president, J. R. Byrn, secretary, and W. M. Porter, treasurer.

WEST CHESTER.—Prominent citizens of Coatsville and Downingtown are seriously considering a scheme to build an electric railway connecting the two towns. It is thought the project will succeed.

WILKESBARRE.—At the annual meeting of the Wilkesbarre & Suburban Railway Co., M. W. Williams was elected president, C. A. Miner, vice president; Walter Roberts, secretary and treasurer, and W. A. Armstrong, Jr., superintendent.

DURING 1891, 624,399 passengers were carried, an increase of almost 300,000 over the year previous. The mileage made 154,100 miles, an increase over the year before of 54,856 miles. The number of passengers per round trip in 1891 was 198.10, and as each car seats but 21 people, it represents a business largely in proportion to the carrying capacity of the road.

YORK.—The York Street Railway Company elected directors for the year as follows: W. H. Lanier, president; C. S. Wieser, John Fahs, G. Hersh, George Schmidt, Capt. Geise and D. R. Trinser.

Rhode Island.

NEWPORT.—Last year the Newport Street Rail Road Company carried 808,150 passengers. At the annual meeting directors were elected as follows: A. T. Titus, J. S. Sherman, T. T. Pittman, D. Baker, J. T. Sanborn, J. R. Chase, and G. B. Reynolds. Mr. Titus was elected president, and J. T. Burdick treasurer.

WOONSOCKET.—The Interstate company has petitioned the Legislature for the right to extend its street car service into Woonsocket.

Texas.

DALLAS.—L. S. Garrison has resigned the superintendency of the Dallas Consolidated Street Railway Company, to accept the agency of the Pacific Express Company in this city.

FORT WORTH.—The Fort Worth & Dallas Rapid Transit Company has been chartered to operate between the two cities by either steam or electricity. Capital \$500,000, and the promoters are Eastern capitalists.

SAN ANTONIO.—J. S. Ross, an electric railway lineman, fell from the wooden frame used in reaching the trolley wires, Feb. 1, and was killed.

WACO.—The Hobson street railway gained its point in the suit against the Citizens' street railway. The Citizen's company objected to two lines on the same street, but it was found that both trolleys worked all right.

Utah.

BRIGHAM CITY.—Movement is on the way on the part of the citizens here to construct an electric railway to Hot Springs, or to secure the Union & Hot Springs Railway Co., to extend their road to this place.

SALT LAKE CITY.—The Salt Lake City Street Railway has asked for an extension of time in which to comply with their ordinance, which was granted on January 20th.

THE West Side Rapid Transit Company has received a franchise, and will now make an earnest effort to complete arrangements for the building of the road.

THE Salt Air Railway Company, of which N. A. Clayton is president, promise to proceed at once with the road as soon as franchise is granted. President Clayton will soon make a trip east for the purchase of rolling stock and equipment.

Virginia.

ALEXANDRIA.—The Alexandria & Fairfax Passenger Railway Company are asking for a franchise.

CHARLOTTESVILLE.—The Street Railway Company will shortly extend its line from Main street to the Opera House and in other directions. The investment has been a very profitable one, the stock being worth several times its face value.

LYNCHBURG.—The Rivermount Electric Railway Company contemplate the extension of their line to a point on Diamond Hill, work to begin as soon as spring opens.

West Virginia.

PARKERSBURG.—Capt. W. H. McCosh has succeeded J. R. Fox as general manager of the line here.

Wisconsin.

JANESVILLE.—Charles D. Haines, of Kinderhook, N. Y., is going to proceed with the construction of the road at once, having purchased the necessary material for an electric line.

RACINE.—The City Street Railway has filed a bond of \$10,000 as a guarantee that it accepts the ordinance for an electric road.

MILWAUKEE.—The Milwaukee & Wauwatosa Rapid Transit Line will be operated as a part of the Villard system, and as soon as the line is completed the Walnut street cars will run through it to the town of Wauwatosa.

CHARLES F. FINK is the architect for a handsome new car house 61 x 150 feet, which is being erected by the Milwaukee Street Railway on National avenue and the corner of 22nd avenue.

T. W. BURRETT, who has been assistant superintendent of the Belle City Street Railway Company during the past 8 years, has resigned and will probably go to Indiana.



THE WORLD'S FAIR—TRANSPORTATION BUILDING.

Dimensions, 960 by 250 feet; Height to top of Cupalo, 165 feet; Annex (not shown) covers 9 acres; Cost, \$300,000.

WILMINGTON, N. C., ADOPTS ELECTRICITY.

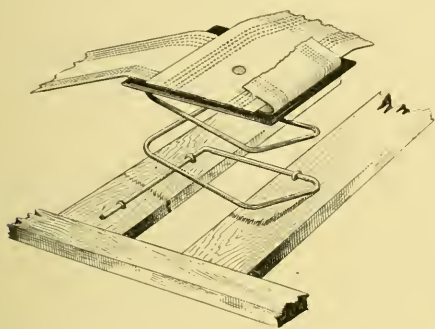
THE formal transfer of the street railway company has been made to the new organization, which has elected the following officers: President, E. L. Hawks; vice-president, J. H. Barnard; secretary, B. F. O'Connor; treasurer, J. G. White. Mr. Barnard also acts as general manager. A suitable location has already been purchased as a site for the power house, which will be a two story brick structure 45x68 feet. The lower story devoted to engines and dynamos, and the second story will contain the offices of the company. Two horizontal boilers of 100-horse-power each, and two high speed engines of 100-horse-power each will be installed.

OVERHEAD ELECTRIC AT YONKERS, N. Y.

ARRANGEMENTS for the new electric railway at Yonkers, New York, are completed, and the various contracts for engine, boilers, dynamos and appliances awarded. The system will be the overhead trolley style. The Edison Company will furnish two dynamos, with a capacity of 300-horse-power; Russell & Co. will place two special engines in the machinery room, and the boilers will probably be of the Sterling water tube style. The overhead appliances are to be of the Thomson-Houston make, while the John Stephenson Car Company provide the cars. The line is to be in running order April 1st.

THE AMERICAN CAR SEAT COMPANY'S STREET CAR SEAT AND SPRING.

THE American Car Seat Company, of Chicago, manufacturers of spring seats and backs for street cars, make and use a spring, which for simplicity and comfort will readily recommend itself to every street railway manager, by examining the illustration herewith. The spring is the result of careful experiment extending over a number of years and the delicacy and perfection of elasticity attained is astonishing to one not familiar with this form of spring. The objections to the old style of conical or hour glass shape of spiral springs are well known, and one of the chief of which, is that the large coils are weaker than the small coils, and under compression the larger coils are



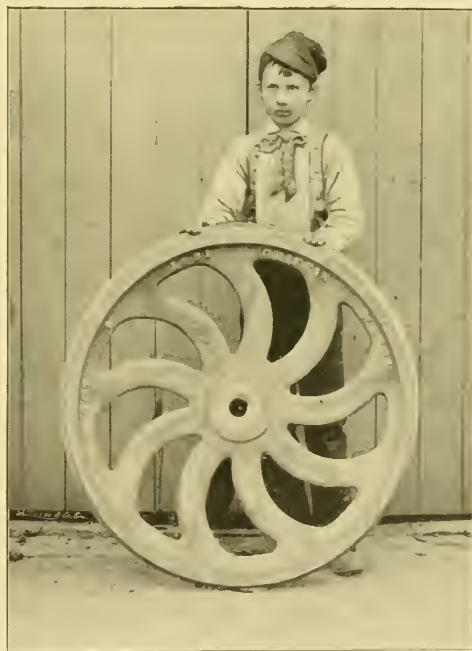
brought together and the only elasticity obtained is from the small stiff coils in the center. This spring on the contrary, is a straight sided torsion spring, and is perfectly self-adjusting. None of the coils are brought together until the whole elasticity of the wire in the spring is used. The street car seats manufactured by this company have been used largely for the past two years by the Pullman Company, and most of the other western car manufacturers. They have just completed seats for fifty cars for the Chicago City Railway which have been so satisfactory, that they are to be used in forty new cars to be built at once for this same company. The seats are of much higher grade than those usually put in street cars, being more like the seats of fine upholstered furniture, and this result is attained by not detracting at all from the durability, in fact, the manufacturers claim that these seats excel in agreeable action and durability, and that the plush or other covering will last twice as long as when used on the ordinary car seats. They are upholstered with the best curled and moss instead of hair felt as is the practice of other seat makers. While the springs used in these seats cost more than those used in the ordinary cushions, and the construction has been necessarily more expensive in realizing the high order of merit which they have attained, the manufacturers have by improved machinery overcome this difficulty, and are prepared to furnish them at a price that will be satisfactory to parties desiring a superior article. It is poor judgment in a manager to

purchase a handsome car and have it attractively ornamented within and without, and not take into careful consideration the qualities of his seating apparatus, which contribute so largely to the comfort or discomfort of the passengers.

A NEW GRIFFIN WHEEL.

THE Griffin Wheel & Foundry Company, of Chicago, have been at work experimenting for some time on a new wheel, especially adapted to endure the severe service required under electric motor cars. The result is now offered in a greatly improved and perfected wheel, an illustration of which is given below. The aim was to construct a wheel of greater strength and elasticity, and in this they have been extremely successful.

In the wheels of the ordinary pattern, the spokes join the rim at a distance of 8 to 10 inches apart, leaving between each spoke a long narrow strip of cast iron without support or backing. This is an element of weakness, and causes uneven chill on the wheel.



NEW GRIFFIN WHEEL.

In the new pattern the spokes are brought within about $3\frac{1}{2}$ inches of each other where they join the rim, affording full and almost continuous support to the rim, all around the entire circumference of the wheel, and all curved in one direction, greatly increasing the strength, adding to the elasticity of the wheel, and rendering it capable of sustaining a much higher chill, and consequently of giving greater mileage service. The improvements in the construction and wearing qualities of these wheels are fully in keeping with the general advance in other branches of supplies.

CHICAGO NOTES.

THE Calumet Electric Street Railway has accepted the ordinance, granting a franchise to extend its lines on numerous streets south of Seventy-fifth street.

THE West Chicago Street Railway paid duties on over 11,000 feet of cable February 2. The cable is one and five-sixteenths inches in diameter and was made in Hull, England.

THE Jackson & Sharp Company, of Wilmington, Del., has received the contract from the South Side Rapid Transit Company, for fifty new cars. The cars will be 46 feet long by 8 feet, 8 inches wide, weighing 12 tons, and are of the latest design.

GEN. TORRENCE, of the Chicago Elevated Railway Terminal, deposited a certified check for \$200,000 with the City Treasurer, Feb. 2., a guarantee that 2 miles of the road will be built within three years.

AN ordinance recently introduced gives Mr. Yerkes a line on Grand avenue, from Chicago avenue to 40th street. On this line the steam motor will probably be used.

JUDGE TULEY recently decided, that the city may open streets across the Illinois Central Railway Company's tracks, and dissolved the injunction. The Court holds, that corporations must yield to public exigencies and the safety of the community.

THE new motor, imported from Belgium, by the North Side Street Railway Company, was given a trial Jan. 28. The test was remarkably successful and the day's run was made without a hitch. No smoke or steam was thrown out and very little noise was produced.

THE South Side Alley Elevated Road are making satisfactory progress with their right of way on 40th street, and between Calumet and Prairie avenues, and south as far as 63rd street.

THE West Chicago Street Railway Company has bought five acres at the corner of Springfield and Ogden avenue for \$30,000, on which in the future they will erect a large car barn.

THE deposit of \$100,000, which has been in the hands of the City Treasurer for the past three years as a guarantee that the West Side Rapid Transit Company would construct its mile of elevated road, has been returned to the promoters, the necessary amount of track having been constructed.

A FORTY Seventh street car, a few evenings since, while passing over a man-hole cover, escaped by about 6 feet from being blown up, as the heavy iron cover was thrown fully 50 feet into the air by an explosion of gas in the sewers.

TREASURER THOMPSON and Superintendent Lamon, of Grand Island, Nebraska, called at our office.

NEW YORK NOTES.

RAPID express trains are now running regularly over the middle track of the Manhattan Elevated Railway. There are fifteen trains now running, making fast time.

THE Rapid Transit Commissioners have asked the Court to appoint a committee of three to determine the question, whether or not the tunnel shall be built without consent of property owners.

It is probable the elevated railroad will be extended from Washington Heights to Kingsbridge.

THE scheme to construct a surface line from Hamilton Ferry, Brooklyn, through Union street, to Prospect Park, is being agitated again. Two Syndicates are after the proposed road.

THE Railroad Commissioners have granted permission to the Brooklyn City Railway Company, to use the trolley system. Work will be begun on the new line as soon as the frost is out of the ground, and will probably be completed by June 1st.

MISS MINNIE SPRINGLE, 45 years old, of No. 162 Monroe street, gave birth to a child in a Grand street car, on the morning of February 4. Miss Springle is evidently not possessed of the spirit governing the eternal fitness of things.

ALL SMART IN AMERICA.

THE New York Sun says: As a belated Fourth avenue car driver drove recklessly over a specially rough piece of road the other day, a handsome young German on the front platform turned to a fellow passenger and said, with a slight accent: "None but American horses could do that. It is wonderful," he continued, the sense of these car horses. They stop and start at the sound of the bell. European horses ten years in the service do not learn that. You'll see no such whip as that in all Europe. It is not a whip; only a reminder. German horses are heavy and lazy. There are some smart horses in France, but not like yours in America. Everybody in this country is smart, and so are even the horses."

BROWN, MARSHALL & Co., of Saltley, have recently constructed for the Liverpool Overhead Electric Railway, a car of somewhat new design. It is 45 feet long, 8 feet 6 inches wide and has a gangway running the entire length. There are three compartments, one for first-class, accommodating 16 passengers, and two second class compartments that will hold 40 people. The car weighs 14 tons.

THE Chicago Mail says: When the new double deckers invade Chicago, we trust that the street car men will be worthy of their higher.

OUT in California, these days are just specially adapted to track laying, and the electric road from East Oakland to Hayward will be opened April 1st.

ECHOES FROM THE TRADE.

THE MOFFET JOURNAL BEARING COMPANY, of Chicago, have increased their capital stock from \$100,000 to \$1,000,000.

THE AMERICAN ELECTRIC WORKS, Providence, R. I., have mailed their friends a very handsome calendar for the present year.

THE J. A. ROEBLING'S SONS COMPANY suffered a loss by fire of \$300,000 the early part of this month, at their Trenton, N. J., works.

THE WIGHTMAN MANUFACTURING COMPANY of Scranton, Pa., have just furnished some 20-horse-power motors for the electrical railway at Wheeling, W. Va.

THE MCGUIRE MANUFACTURING COMPANY, of Chicago, have received within the last few days orders for their steel frame truck, for Duluth, 25 trucks, and from Grand Rapids, Mich., 20 trucks.

THE R. D. NUTTALL COMPANY of Allegheny, are noted for doing things up handsomely, and their desk calendars, one of which adorns our office, is no exception to the rule. It is very attractive and is printed on celluloid.

HENRY JAMES, for many years connected with the Parrot Varnish Company, has become a partner of the varnish house of Poland, Bond & James, of Newark, N. J., and will make his headquarters at the New York office, 29 Broadway.

THE NORTHERN CAR COMPANY have shipped the new cars for the Winona, Minn., Street Railway Company, and the citizens of that place are highly pleased with the handsome appearance and the comfortable and attractive arrangements.

THE RAILROAD CAR JOURNAL, now published at 132 Nassau street New York, and which was formerly the "Railway Car Heating Journal," has greatly improved since its change in name, and is reaching into new departments with great success.

THE JOHN STEPHENSON COMPANY, of New York, among other orders recently received, have taken a contract for 100 large combination cars for the Broadway Cable Line in that city. They are to be finished in the highest style known to the art, and will be models of beauty, strength and of roomy proportions.

ALFRED F. MOORE, manufacturer of electric wires and cables, has withdrawn his Chicago agency, lately controlled by C. H. Harmount, at 149 Wabash avenue, and until further notice will manage his business from his general office, 200 North Third street, Philadelphia.

THE MILWAUKEE STREET RAILWAY COMPANY have ordered in all some 25 sample cars, both open and box, which will be given a trial by actual service, and the

large order for 150 will be decided after a trial of sufficient time has been made. The order will be given to that company whose cars are considered in all points the most desirable.

THE rapidly increasing business of the Pond Engineering Company has necessitated the securing of more commodious quarters, and it is now comfortably installed in handsome apartments on the ground floor of The Rookery. The main room is 14 x 56 feet, the front being used for office purposes and the rear portion for storage.

THE J. G. BRILL COMPANY have equipped eight handsome cars to be used on the Fair Haven & New Whatcom Street Railway Company's line. They will be put in service as soon as the line is completed between the two cities. This is one of the best electric systems on the Pacific coast.

J. F. SHAW, 53 State street Boston, has added a tie department to his line of electric railway furnishing goods, and has a desirable line of 25,000 hack ties from which to select. He has also taken the agency for the Burton Electric Heater, in which, as with the Newburyport Pole Bracket, he is meeting with excellent success.

THE NEW PROCESS RAWHIDE COMPANY, at its annual meeting, elected the following officers and trustees: T. W. Meachem, president; Wm. B. Kirk, vice-president; A. C. Vosburgh, secretary; J. C. Kenyon, treasurer. Trustees: T. W. Meachem, W. B. Kirk, E. Laass, J. C. Kenyon, J. Amos, C. L. Stone and A. C. Vosburgh.

THE CHICAGO RAWHIDE COMPANY, at 75 Ohio street, Chicago, has been compelled to run over time, and their sales for last month were the largest in the history of the concern. The company are exclusive manufacturers of rawhide goods, and its rawhide gears for electric railway and motor service have received very many testimonials as to their excellence.

THE EDDY ELECTRIC COMPANY of Windsor, Conn., have recently installed a number of their large generators, among them being one of 130-horse-power for the new "Love" underground system, being built at Chicago. Also a 50-horse-power generator for the New York State capitol, 60-horse-power generators and 80-horse-power motors for a central power station at Kalamazoo, Mich.

W. A. GILES, with headquarters at 416 Lewis block, Pittsburgh, Pa., a contracting electrical and mechanical engineer of prominence in that city, has been appointed by the Goubert Manufacturing Company, New York, as their agent for eastern Ohio, western Pennsylvania and Virginia, and will push the sale of their popular feed-water heaters in that territory. Both parties will doubtless find the connection a profitable one.

BEACHER, SCHENCK & COMPANY are the successors to Beacher, Schenck & Benedict, Mr. Benedict having withdrawn his connection from that firm, managers of

American Casualty Insurance and Security Company of Baltimore. They are making a specialty of insuring Street Railway companies against accidents, and have recently appointed Mr. Wm. Nye, who is one of the best known business men in Chicago, as manager of their office here.

THE BALL ENGINE COMPANY, of Erie, have recently shipped a 300-horse-power cross compound to the Edison Light and Power Company, of Minneapolis; New England Conservatory of Music, Boston, 1 35-horse-power; Columbia Electric Light Company, Philadelphia, 1 200; S. J. Lafevre, Gibson City, Iowa, light station 1 100; Palace Hotel, San Francisco, 1 100 tandem compound, 2 100 and 2 200 cross compound engines.

THE STRATTON SEPARATOR COMPANY, 32 Cortlandt street, New York City, have recently furnished to the Columbian Iron Works & Dry Dock Company, of Bal-

THE ELECTRICAL SUPPLY COMPANY, Randolph street and Michigan avenue, Chicago, are selling large numbers of Wood's Span Wire Ratchets. They also carry in stock a complete line of parts and repairs for the Boston Trolley. Mr. Wm. Taylor, who has charge of the Railway Department, reports a largely increased demand for construction tools and railway material in general. A recent order covered two car-loads of 0000 Shield Brand Moisture-Proof Wire. This is one of their leading specialties, being made in their own factories at Ansonia, Conn.

THE CHAS. A. SCHIEREN COMPANY have scored a signal victory in securing a large order which was hotly contested for, and will furnish the electric belts for the Benton-Bellfontaine road's new power house in St. Louis. Two 50-inch double belts each 116 feet long, will be required. Chicago Manager E. A. Burrell, to whose untiring efforts the credit belongs, is keeping the interests of



"THE TROLLEY IN BROOKLYN."

timore, Md., several large separators for use in the new cruisers Nos. 9 and 10, which are now constructing for the government. The separators are of the naval type, especially constructed, with steel shells and brass heads, to meet the requirements of the United States Navy.

THE CONSOLIDATED STREET RAILWAY COMPANY, of Grand Rapids, Mich., has just placed an order with the Short Electric Railway Company for twenty 40-horse power gearless equipments to be used on their lines which are being changed over to electricity. The contract was made after very careful personal investigation of all the leading systems by the general manager of the company, Mr. J. R. Chapman, and is significant as showing what direction engineers and practical street railway men are looking for the most improved railway practice.

the Chas. A. Schieren Company constantly to the front. He has also just closed a contract for delivery to the Columbus Consolidated Street Railway of Columbus, Ohio, of 4, 34-inch double electric belts each 100 feet in length.

ALBERT FISHER, of Chicago, general western agent for the Ball Engine Company, of Erie, has been especially active in the interests of his company of late, and has within the past week or two closed a contract for one 35-horse-power engine for Grand River, Ky.; one 50-horse-power engine for a large apartment building in this city, two of 130-horse-power each for Lexington, Ky., and one of 100-horse-power for the Freeport Electric Light Company, of Freeport, Ill., also a 300-horse-power, cross compound condensing, and a No. 6 Worthington condenser, for Independence, O. One 100-horse-power for Princeton,

Ill., at which plant this company furnished engines, boilers, pumps and heaters, also one 250-horse-power for the Des Moines Water Power & Electric Company, and two 125-horse-power boilers.

H. WARD LEONARD & Co., electrical engineers, New York are at present installing, as contractors, electric plants for the following: Mail and Express building, New York city; Catherine Bradley building, N. Y. city; Geraldine building, N. Y. city; Germania Insurance building, N. Y. city; Du Vivier & Co. building, N. Y. city; F. O. Du Lous building, N. Y. city; Franklin Trust building, Brooklyn; Fifth Avenue Theatre, N. Y. city; Columbia Theatre, Brooklyn; Graham Hotel, N. Y. city; Mr. John H. Inman's residence, Fifth avenue, N. Y.; Curtis residence, Greenwich, Conn. Among the leading concerns for whom they are acting as consulting engineers are the following: Otis Elevator Co., N. Y. city; Wm. Sellers & Co., Philadelphia; Ingersoll-Sergeant Drill Co., N. Y. city; Eastern Electric Co., limited, St. Johns, N. B.; Providence Journal Co., Providence, R. I.; Middletown Music Hall, Middletown, Conn.; Rock Hill Electric Light Co., Rock Hill, S. C.

SPRAGUE, DUNCAN & HUTCHISON, LTD., of 15 Wall street, New York, is a title of a new firm, each member of which is well and favorably known in the electrical world. Mr. Sprague has had special prominence recently, by reason of his connection and interest in matter of rapid transit in New York. He was also for a long time consulting engineer of the Edison General Electric Company.

Dr. Hutchinson was connected with the Sprague Company as electrical engineer, and at the time that company was absorbed by the Edison he went with them.

Prof. Duncan was formerly a professor at Johns Hopkins University. The business manager of the firm is Alfred G. Mason, and companies or individuals desiring expert electrical opinions will do well to consult them.

DUPLEX COMPANY ELECTS OFFICERS.—On the second day of the present month the Duplex Street Railway Track Company held its annual meeting, at which the following officers and directors were elected. Of course John D. Elwell, whose efforts have contributed so largely to the success of the undertaking, was re-elected secretary and general manager.

George Coppel, president, of Messrs. Maitland, Phelps & Co. Hon. Carl Schurz, vice-president, resident director Hamburg American Packet Co. Wm. H. Male, treasurer, president Atlantic Trust Co. R. L. Edwards, president, Bank of New York. Eustace Conway, attorney, 16 Exchange Place. Wm. B. Rankine, general manager Niagara Power Co., Mills building: Capt. F. V. Greene, vice-president Barber Asphalt Co.; Peter Notman, president Niagara Fire Insurance Co.; John D. Elwell, secretary and general manager, 51 Wall street. The full paid capital is \$1,500,000, and the report of the directors to the shareholders showed, for the first six months of the company's existence, most gratifying re-

sults; the president reporting some financial negotiations pending likely to result in orders during the coming year of upwards of one hundred miles of track. In addition to which many proposals have been made likely to result in favorable consideration.

The company is now in position to undertake desirable orders on a bond basis where the security offered is undeniable, and will be pleased to entertain propositions under such conditions.

TO BE honored in your own country and abroad is a no small thing. When England sends to America for belts, the undeniable inference is they must be most excellent in quality. Just read this:

THE ROUNDHAY ELECTRIC TRAMWAY,
146 ROUNDHAY ROAD, LEEDS, ENGLAND,
January 16, 1892.

MESSRS. CHARLES A. SCHIEREN & CO.,
47 Ferry Street,
New York, U. S. A.

GENTLEMEN:

We are ordering to-day from you, a supply of your Electric Belt Stuffing; also a supply of your Belt Cement

Will you kindly send us full instructions for splicing your Perforated Belts? It may interest you to know that the two belts furnished by you for this plant, are giving every satisfaction, and have elicited considerable admiration from English engineers.

Yours truly,
THE ROUNDHAY ELECTRIC TRAMWAY,
J. E. WINSLOW,
Manager.

Hot Springs, Arkansas.

Until further notice a double daily line of sleepers will run between St. Louis and Hot Springs, in connection with Wabash morning and evening trains out of Chicago. For a quick, comfortable trip to Hot Springs, take the Wabash. Berths in our compartment sleepers reserved in advance.

This is a sample of the many letters received by the New Process Rawhide Company:

AUBURN CITY RAILWAY COMPANY,
AUBURN, N. Y., February 4, 1892.

T. W. MEACHAM, PRESIDENT.
The New Process Rawhide Company,
Syracuse, N. Y.

DEAR SIR:

We wish to state to you our approval of the patent rawhide pinions furnished by you and now running on our motors here. We have had a nine months' experience with them, and find they fill all requirements. Motors equipped with them run a great deal more quiet, and they will, with ordinary care, outlast the metal gears used. They require to be kept free from oils, and the ordinary car equipments can be kept much cleaner in that respect. You are at liberty to use our recommendation, and may refer any parties to us whom you may see fit,

Yours truly,
AUBURN CITY RAILWAY COMPANY,
A. H. UNDERWOOD,
Secretary

[Signed.]

To Hot Springs with one Change.

You can leave Chicago any night in one of the famous Wabash compartment sleepers and make direct connections next morning at St. Louis, with a through sleeper for Hot Springs, Ark. The Wabash morning train from Chicago (with free chair cars), also connects with a through sleeper for Hot Springs. See?

NEW PUBLICATIONS.

"LETTERS OF CREDIT" is the title of a very attractive little bundle of fac simile letters testifying to the superior qualities of the Stanwood step has been sent out by the Stanwood Manufacturing Company of Chicago. If you have not seen one, write for a copy.

"NOTES ON POWER PLANTS" for electric railways, electric lighting, etc., is the text of a very attractive pamphlet issued by Westinghouse, Church, Kerr & Co., and which, like all other printed matter, is carefully compiled and handsomely printed.

"THE STREET RAILWAY GAZETTE" is now issued weekly, and is edited by M. J. Sullivan, who was for a long time in charge of the advertising department of the Edison General Electric Company, of New York city.

"EDISONIA"—A survey of the Edison light and power industries—is replete with handsome half-tone illustrations and special designs, and printed on heavy coated paper.

THE TRAMWAY & RAILWAY WORLD, is the comprehensive title of a new monthly issued in London, England, and of which Frank X. Cicatt, of Chicago, is the managing director. It contains a complete directory of the steam and tram railways in the United Kingdom, and is gotten up on the American plan. The illustrations are good, the reading matter comprehensive, and the advertising patronage large. While the number of street railroad companies is limited, their capitalization is large, and should heartily support what they have never before possessed—an organ devoted exclusively to their defense and interests. We wish the new "World" every success in the old world, and everywhere else.

WE acknowledge with thanks, receipt of a copy of the rules and regulations of the Syracuse, N. Y., Consolidated Street Railway Company, compiled by A. Bartlett, superintendent. It is very complete and covers all the duties of employes in every department, both horse car and electric. A list is given of all cross streets on every line for the reference of conductors thereon, and the rules make a neat little book of 70 pages.

THE Street Car Employe's Gazette, will be started in the interest of the Detroit street railway employes.

CHARLES A. SCHIEREN & Co., have just issued a most attractive little pamphlet, fully illustrated, showing belt making in all degrees of progress, and containing also much information of value to every belt user. Full page illustrations of scenes in their factories also add greatly to the booklet.

A Popular Winter Resort.

Are you going to Hot Springs, Ark? Takè the Wabash Line. Everybody does. Line of sleepers morning and evening from St. Louis to Hot Springs. Practically a through line from Chicago. Don't forget our compartment sleepers. Berths reserved in advance.

National Electric Light Association Meeting at Buffalo, Feb. 23—26th.

Any who contemplate attending the above meeting will be interested in knowing that the committee in charge of transportation has selected the Lake Shore Route as being the most desirable, on account of its superior train service. A rate of one and one-third fare (\$18.00) on the certificate plan has been made for the round trip, and the party from Chicago will leave on train No. 8, at 3:10 p. m., Feb. 22nd. Those who may find it more convenient to leave later in the day, will take the 5:30 p. m train. For reservations and other information apply to Mr. Jno. L. Martin of the Transportation Committee, care Chicago Electric Club, Chicago.

C. K. WILBER, W. P. A.

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days; reported especially for THE STREET RAILWAY REVIEW by Munn & Co., Patent Attorneys, 361 Broadway, New York, N. Y.

ISSUE OF JANUARY 12, 1892.

| | |
|---|---------|
| Fare Box, H. C. McEncry, New Orleans, La | 466,797 |
| Wire Support for Electric Railways, W. Q. Prewitt, Lexington Ky..... | 466,800 |
| Electric Trolley, E. A. Sperry, Chicago, Ill | 466,807 |
| Truck for Vehicles, E. A. Sperry, Chicago, Ill..... | 466,808 |
| Electric Motor Car, E. B. Phillips, Cleveland, Ohio | 466,832 |
| Railway Electric Motor, C. F. Winkler, Troy, N. Y..... | 466,914 |
| Bracket for Trolley-Wire Supports, E. P. Russell, Newburyport, Mass | 466,956 |
| Trolley for Electric Railways, J. Kellhule, Detroit, Mich | 466,981 |
| Electrically Controlled Car Switch, B. J. Potter, Boston, Mass..... | 467,050 |

ISSUE OF JANUARY 18, 1892.

| | |
|---|---------|
| Attachment for Street Rail Brooms, F. S. Wardwell, Duluth, Minn | 467,213 |
| Trolley for Electric Railways, E. R. Harding, Winthrop, Mass..... | 467,250 |
| Street Car, G. W. Baumhoff and A. H. Hagemeyer, St. Louis, Mo | 467,392 |
| Electric Railway, C. J. Van Depoele, Chicago, Ill..... | 467,448 |
| Transferring Cable Cars from one Line to a Crossing Line, J. E. Morris, Chester, Pa | 467,457 |
| Pull Gong for Street or other Cars, E. W. Vanduzen, Newport Ky | 467,693 |

ISSUE OF JANUARY 26, 1892.

| | |
|--|---------|
| Trolley Wheel for Electric Cars, L. A. Simons & G. R. Roof, Omaha, Neb | 467,583 |
| Motor Mechanism for Street Cars, R. W. Thickens, Minneapolis, Minn..... | 467,693 |
| Electric Railway, W. B. Hutchinson, Passaic, N. J..... | 467,699 |
| Street Car Replacer, J. Findlay, Toronto, Canada | 467,673 |

ISSUE OF FEBRUARY 2, 1892.

| | |
|---|---------|
| Trolley Wire Hanger, C. T. Lee, Boston, Mass..... | 467,940 |
| (Street) Railway Switch, S. T. Mock, Milwaukee, Wis | 467,948 |
| Electric Motor Regulator, F. O. Blackwell, New York, N. Y..... | 468,128 |
| Electric Railway, M. Wheelless, Nashville, Tenn..... | 468,163 |
| Electric Railway, M. Wheelless, Nashville, Tenn..... | 468,164 |
| Electric Railway, M. Wheelless, Nashville, Tenn..... | 468,165 |
| Conduit Electric Trolley, M. Wheelless, Nashville, Tenn..... | 468,166 |
| Electric Fare Register, W. H. Gillman, Boston, Mass | 468,172 |
| Street Railway Tunnel and Method, T. G. Gribble, Yonkers, N. Y., of Constructing the same | 468,282 |
| Conduit for Electric or Cable Roads, C. H. Bates, Minneapolis, Minn | 468,341 |

THE car barn of the Toledo Consolidated Company had a narrow escape from fire recently, which started from a torch being set too near the wood-work. It was promptly extinguished, but was a close call.

OBITUARY.

CHARLES P. SHAW.

By the death of Charles P. Shaw, which occurred in New York, February 2, 1892, one of the most prominent figures in cable railway circles, passed from the busy scenes of earth. Mr. Shaw was a lawyer by profession, but the promoter of many large enterprises. In 1884 he organized the New York Cable Railway Company, and began the struggle for franchise and right of way. His plan was familiarly known as the "gridiron" scheme, the idea being to run cable cars up and down, across and around the city, the system mapped out covering over seventy miles of track. Although opposed on every hand, Mr. Shaw pursued his scheme with a vigor that seemed to recognize no such element as defeat. It is said he was a regular and persistent attendant at the State Legislature, but was never able to bring about the ends desired. Mr. Shaw was born in Essex county, N. Y., June 2, 1836; married Miss Fisher, daughter of a surgeon in the English army, in 1881. He died at the County Hospital, of heart failure, after a long illness, which included a difficult and dangerous surgical operation.

HIS PAPA WHO WAS "DEAD."

In an elevated train the other morning sat a sweet-faced, gracious woman with her little son, a rollicking, bright, eager youngster of seven or thereabouts, says one of the New York dailies. At one of the stations a gentleman entered with a woman—an insolent-eyed, yellow-haired, berouged creature. They sat down in one of the cross seats, not seeing the little woman behind them. But she saw them, and her lip quivered as she turned her head away. The lad, however, did not notice anything and continued talking eagerly to her in his childish treble. After a bit his voice seemed to strike the gentleman's ear as familiar. He laid down his paper, listened, and then turned around.

As his gaze met the child's those who were watching saw that boy's face was the counterpart of the man's.

"Look, mamma!" said the child. She glanced up. The gentleman flushed, raised his hat gravely and resumed his paper.

"Why, that looks like my papa," said the boy. "My papa in the frame, who is dead, doesn't it, mamma?"

"Hush, hush, my son," she said, and then she arose and led him into the next car.

Electric Railways.

C. E. LOSS & CO.,

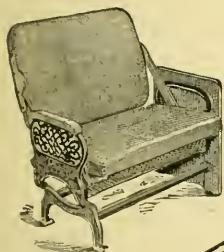
219 First National Bank Building,

CHICAGO.

Contract for the Building and Complete Equipment of Electric Railways.

Correspondence Solicited.

References Furnished.



A Regular Reversible Seat adapted for STREET CARS.

THE LATEST FOR ELECTRIC and CABLE CARS.

THE HALE & KILBURN MANUFACTURING CO.
PHILA DEL. PA. NEW YORK. CHICAGO.

Street Car Seats

Of Every Description, With or Without Springs, Covered in

CARPET, PLUSH AND RATTAN.

Hundreds of References. Thousands in Use.

Catalogues, Estimates and Samples on Application.

STREET RAILWAY SUPPLY MEN

ARE MAKING THEIR HEADQUARTERS IN

The Monadnock Building,

Dearborn St., Cor. Jackson, Chicago, Ill.



General Offices of A. T. & S. F. R. R. Co., C. & A. R. R. Co., Mich. Cent. R. R. Co., Chi. Elev. Term. Ry. Co.

TO BE FINISHED MARCH 1, 1892.

OFFICES TO RENT.

APPLY TO

ALDIS, ALDIS & NORTHCOTE,

707 Rookery, - - - - - CHICAGO.

ONE of the electric lines in St. Louis crosses a street which leads down from a long hill, and which during the past few weeks has been the favorite sliding place for the boys. Fearing that some of them would run into a moving car and be injured, the company sprinkled salt for a distance of half a block up the street, which melted the snow and very effectually prevented any possibility of accident.

A jib-boom from a schooner was run into a car crossing the Randolph street bridge in Chicago lately. The car stood it but the jib-boom came off.

Florida and the Sunny South via. the Big Four Route.

To all persons contemplating a southern trip, the Big Four Route offers special attractions and advantages possessed by no other line. Solid Vestibuled trains, heated with steam and equipped with palace sleeping cars, reclining chair cars and elegant parlor cafe dining cars run daily, making connection in Central Union Station, Cincinnati, with through express trains of the Queen and Crescent Route, Louisville & Nashville, Kentucky Central and Chesapeake & Ohio Railways, avoiding the tedious transfer necessary via other lines, and affording practically through train service to Old Point Comfort, Asheville, Chattanooga, New Orleans, Savannah, Jacksonville, St. Augustine, Tampa, Indian River and all winter resorts of the South. Tourist tickets via the popular Big Four Route at special low rates are on sale at all coupon ticket offices throughout the country. Ask the agent for tickets via the Big Four Route. D. B. MARTIN, General Passenger and Ticket Agent, Cincinnati, Ohio.

FOR SALE 125 Tons 38 lb. Second Hand Steel Tram Rails in excellent condition. 100 Tons 25 lb. Second Hand Steel T Rails, but little used.
D. E. GARRISON & CO.,
219 N. 4th St., St. Louis, Mo.

WANTED: The address of one Geo. W. Wells, formerly a contractor at Winchester, Mass.
Address.
STREET RAILWAY REVIEW.

Get Your 3 Joint Iron Poles from

JULIUS LEFMANN,

NO. 2200 N. 2ND ST., ST. LOUIS, MO.

THIS SPACE

Will be used to disseminate information which

BELONGS TO

All Street Railway men who are interested in good car wheels such as are made by the

Griffin Wheel and Foundry Co.

CHICAGO.

SEE NEXT ISSUE.

WE PURCHASE TOTAL ISSUES OF : : :

STREET RAILWAY BONDS.

: : : CORRESPONDENCE INVITED.

N. W. HARRIS & CO., BANKERS,

163 Dearborn Street, Chicago.
15 Wall Street, New York.
70 State Street, Boston.

H. R. PARROTT, President,

F. W. PARROTT, Treasurer.

The Parrott Varnish Co.

BRIDGEPORT CONN.

MANUFACTURERS OF

The Finest Grades of . . .

: : RAILWAY VARNISHES.

C. C. CHENEY, PRESIDENT.

C. A. CHAPMAN, TREASURER.

C. HEINEMAN, SECRETARY.

WESTERN BANK NOTE COMPANY,

New Fire Proof Building.

MICHIGAN AVENUE AND MADISON STREET, CHICAGO.

Steel Plate and Lithographic Engraving and Printing.

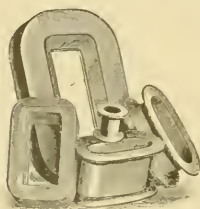
For Railways, Towns and Cities, Real Estate Bonds, Certificates of Stock, Drafts, Checks,

BONDS

For Street Railways, Water-works, Gas Companies, Letter and Bill Headings, Etc., Etc. for

Railways, Banks, Merchants and Corporations.

Bonds, and other Securities Engraved by this Company accepted on the New York Stock Exchange.



VULCABESTON (VULCANIZED ASBESTOS.)

MANUFACTURED BY

THE JOHNS-PRATT COMPANY, HARTFORD, CONN.

For Electrical Insulation. Furnished in sheets, tubes, and molded forms of any shape.

Field Magnet Spools

20,000 now in use. Vulcabeston Packing for steam, water, acid and gas; in sheet, wick, round and gasket forms of any shape.

H. W. JOHNS MFG. CO.,

Selling Agents, 87 Maiden Lane, NEW YORK



WINDSOR & KENFIELD,
PUBLISHERS AND PROPRIETORS,
334 DEARBORN ST., - - - CHICAGO.
Published on the 15th of each month.

SUBSCRIPTION, - - - ONE DOLLAR.
FOREIGN SUBSCRIPTION, - - - TEN SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW
Caxton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR, Editor. F. L. KENFIELD, Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW,
334 Dearborn Street, Chicago.

Entered at the Post Office at Chicago as Second Class Matter.

VOL. 2. MARCH 15, 1892. NO. 3.

THE attempt to secure passage of a bill for the construction of the street railway on Fifth Avenue, New York, has been defeated, and it believed the scheme is practically dead.

THE snow storms which prevailed throughout the early part of this month, were in many places the most severe of the season, and in some cities the hardest for several years. Drifts to the height of five or six feet was the fate of many lines.

A PERSON in Baltimore, who rejoices in the upright name of Walz, and who evidently belongs inside four of them, has an ordinance in his city council requiring street cars to make a minimum stop of one-half minute to receive and discharge a passenger, under penalty of \$100 fine for each offense. Mr. Walz evidently is either a foot passenger or a chronic kicker, neither of which were created for the comfort or good of a street railway.

IN speaking of the crowded condition of its streets, the Buffalo Express inquires, "what will be the result when the electric cars commence operating thereon?" In this matter the experience of other cities has been that mechanical traction give a current to the thoroughfare which did not exist when horse cars were being run. This has been the experience in Chicago, and a number of large cities which might be mentioned. Of course there are times, when on a narrow street, the rush of cars completely occupies the track, but it will be found that this crowded condition occurs at the time of day when trucks have not come on or have just gone off of the street.

WHEN a passenger imagines he has a grievance against a street car conductor or other employe, his usual course is to rush home, indite a letter of complaint, and send the same to some daily paper in the city. This may serve to satisfy the personal resentment which may be entertained by the passenger, but is hardly a fair method of treating the company. How much better it would be to notify the superintendent, who of all others, is most interested in knowing of any possible short-comings on the part of his employes, and thus give him an opportunity to rectify the same. If this course was pursued the papers lose an occasional item, but the end to be conserved would be better accomplished.

OUR readers will remember that for the past three years, John N. Stewart, the president of the Ohio State Tramway Association, and who was the principle owner of a horse line in Ashtabula, Ohio, has been seeking redress against the city of Ashtabula, for having declared his franchise forfeited, and having torn up his track by a large force of men in the dead of night. In the Circuit Court of Ashtabula county, Judges Woodbury, Laubie and Frazier on the bench, have just sustained his injunction against the city of Ashtabula and granted the relief asked for, and ordered that repossession of his franchise be given Mr. Stewart. This is a fight that has lasted a long time; has been bitterly waged by both sides, and is a great victory for Mr. Stewart. The action of the mayor and council, sustained by the county judge of Ashtabula county, amounted to nothing more than the confiscation of the Stewart line, and the outcome although long delayed, cannot but be satisfactory to Mr. Stewart and all his friends.

BY the very conspicuous failure of the mayor of Indianapolis to govern the movements of 250 striking street railway employes, that city has been in a turmoil for weeks, and the railway company deprived of the protection for which it is one of the heaviest taxed institutions in its State. That the seat of government of the State of Indiana should be placed at the mercy of a mob for ten consecutive days is a travesty upon law and order. Whatever of sympathy may have been extended the strikers at the first was very quickly forfeited in the lawless acts of violence resorted to by the men. Politics entered largely into the case in the hope of securing the labor vote of the city, and is another highly suggestive illustration of the power to be wielded by whatever party should be in control of the city, in the event of municipal ownership of railways. Employes have certain rights, but inciting riot, defying law and putting in jeopardy the life and business of 110,000 law abiding citizens is not one of them, and can only merit the strongest condemnation. Every man who aided to derail and demolish cars, and assault the men in charge, forfeits the rights of citizenship, and should have been tried and sentenced as the law provides. One would imagine there was no higher law in Indiana than mob law.

BLOCKING THE WHEELS OF COMMERCE.

TO every city comes periodically a sort of tidal wave of sentiment, created often, and nearly always promoted by the daily press, in which issue is made between the city and the railway companies as to the obligations of the latter to the former. Of late months this generous demand on the part of the aforesaid press has expanded and grown in a truly remarkable degree, until many managers have asked themselves in desperation how much they would owe the city after turning over entire gross receipts, while still bearing the operating expenses. The many years during which invested capital not only did not yield any return but was for long periods in actual jeopardy of total annihilation, counts for nothing with such people and the idea seems to be the closer the lines can be drawn, the more restrictions placed on operation and the heavier the burden laid on the company, the better for the city. This is a most egregious mistake. A liberal policy is the best policy, and nowhere is more clearly demonstrated than in the municipal treatment of street railways.

Detroit has been hovering on the verge of rapid transit for months past, but still rides in horse cars, while dozens of little cities and large towns in the state are enjoying the advantages of mechanically propelled cars. For a city the size of Detroit, horse cars are not first class. They are a back number. But the syndicate that purchased the larger lines in that city cannot see their way clear to raise and invest two million dollars under the conditions which the city fathers desire to impose. The Citizens' Railway recently addressed a letter to the council citing the reasons why it cannot accept the city's terms, and the following extract therefrom will clearly indicate the line of policy above mentioned.

In discussing the eight tickets for twenty-five cents question the report states:

"Our statement that such a fare throughout the day would bankrupt this or any other company is true. It costs more than three and one-eighth cents per passenger for labor, operation and repairs. You are in error in stating that we represented that it costs this company to carry passengers 4.18 cents per passenger. Throughout the country, on street car lines, the average cost of carrying passengers by horse cars is 4.18 cents, as appeared by the tables compiled by the Edison General Electric Company and given in our former communication. But it costs this company 3.54 cents per passenger for labor, operation and repairs, without interest, profits, betterments and depreciation of the plant. You are also in error in your assumption that the average fare received by us is 3 $\frac{3}{8}$ cents. We have no objection to stating exactly what it is. It is 4.22 cents.

You will see from these figures that only .68 of a cent, as stated in our former communication, are left for interest, betterments and depreciation of plant. After deducting from this, .68 of a cent, the cost of the betterments and depreciation, who will say that there is an unreasonable amount left for interest and profits on the investment."

Not satisfied with imposing three distinct taxations, the company is asked to pave extensively. Their reply to this is:

"Under rapid transit system no use whatever is made by the company of the paving, nor will its use create any dust or dirt. The entire paving of the street will be of the same material, and we understand very expensive paving is proposed. Simply the rails on the street are used by the railway company, and yet we call attention to the fact where there are double tracks more than one-third of the entire cost of paving and maintenance of the street is to be borne by this company, and where there is but a single track more than a quarter. A moment's calculation of the cost of the pavement on Woodward avenue, Grand River avenue and other streets, will make plain to your committee that we were right in saying that it is an enormous burden upon the company. Furthermore, the tax assessed against the company not only increases with the increase of its property and its receipts, but the rate of taxation also increases after 1897, so that it seems to us in fairness and justice no additional burden in this respect should be demanded."

In summing up, the question of securing necessary capital is most forcibly covered. It says: "You ask the question, 'Why should the company be much less able to provide rapid transit when, according to your own figures, it is the cheaper of the two?'" We would have commenced putting in a rapid transit plant before this time, had it not been for the question that has been raised as to our rights under the present ordinances, but we would not be able to provide such facilities under more onerous provisions. Two million dollars cannot be raised to put into a plant under the conditions proposed by you. This \$2,000,000 is new money. It is in addition to the large investment already made. If we acceded to your proposition, not only would the first investment be wiped out, but this \$2,000,000 would also be lost. We cannot raise the \$2,000,000 unless the investor is certain that the principal and interest will be paid within the next seventeen years, the time when our main franchises expire. Rapid transit probably will increase the profits and probably will decrease somewhat the cost. But this \$2,000,000 must be taken care of, and if you impose terms that destroy the profits from rapid transit you will prevent rapid transit. It is no easy task to raise \$2,000,000."

The difficulties which beset the Detroit company are being repeated in the same intensity though in somewhat less degree in many smaller cities throughout the country, to the great hardship and even in some cases to the actual prohibition of projected enterprises.

The Supreme court of New York state only recently decided that where property had increased in value through the operation of elevated roads no claim was tenable against the company for damages. If then, as all agree, the construction of rapid transit surface roads increases the value of abutting property from five to fifty dollars, or even more per front foot, thus adding millions to the taxable assets of a city, and so thousands

to its revenue, why should a greater burden be placed upon rapid transit systems than existed when the unsatisfactory, uncomfortable and tedious one-horse car made its daily pilgrimages along said streets?

REORGANIZATION OF THE RHOMBERG LINES IN DUBUQUE.

LAST month we gave a history of the storage battery in Dubuque, of which so many praises had been sung—before its operation—and the sorry failure of high hopes and low operating charges. This month we chronicle its banishment, for the storage has been cast out, to make room for the more reliable and economical trolley system.

The company—the Dubuque Street Railway—also undergoes a reorganization, Mrs. Lineman, who held a half interest, disposing of the same for \$142,000 to President Rhomberg, who in turn will place a part of the new stock among leading capitalists in that city. The new officers are: President and general manager, J. A. Rhomberg; superintendent and treasurer, J. H. Rhomberg, and secretary, C. H. Meyer.

The new installation will cost upwards of \$150,000. The present power-house will be utilized as will car house, and the nine Brill cars, minus the batteries and motors. The new company will also do a lighting business, using the old storage generator for the purpose. Capital stock is \$375,000. The reorganization effectually settles the consolidation, which it is understood, the Allen & Swiney Company so greatly hoped for, and is said to leave them in bad shape, as their lines represent an investment of \$360,000, of which \$250,000 is outstanding bonds.

With the latest improved mechanical appliances, and the operation of the main line on a four-minute headway will give a service never before enjoyed by the citizens.

There was quite a lively scramble for orders among the several suppliers and considerable current was short circuited before the choice of motors was assured. It was finally secured by Louis E. Myers, Chicago agent of the Detroit Electrical Works, for that company's motor, which in view of the fact that theirs was not the lowest bid was quite a victory. When the smoke cleared away, it was seen that the equipment was assigned as follows: nine 30 and six 40-horse-power Detroit motors; Brill, six 16-foot motor cars; St. Louis Car Company, 10 trailers, each seating forty passengers; Edison, 100,000 Watt generator; new rail, Johnson Company, through O. W. Meysenburg & Co., and the overhead work will be done by the Edison Company. The Cushion car wheel has also been selected. Bids are being made for two additional boilers and one 500-horse-power Corliss engine, but at this writing has not been decided. Soon the cheerful trolley will be sailing towards Rhomberg's resort, and Dubuque's delivery of the storage battery will be completed.

The cushion car wheels will be placed in service on sixteen of the cars on this line.

PASSENGERS WITH PARCELS.

THE street car with its homogeneous assortment of humanity presents at the same time an equally mixed collection of packages. On some lines the rule is sharply drawn and the packages are sent home otherwise, with others there is unrestricted license, and big ice cream tubs, baskets of meat, fish and dirty linen, vie with bundles the size of a small dry goods box, and bicycles or baby carriages dangle from the rear brake handle. As in so many other matters of dispute the local character and requirements go a long way toward the manager's decision as to how this question shall be regulated. We believe however that bulky articles as mentioned have no place except on the front platforms, and on most lines no business even there. If the public want an express service, either make a separate branch of the business or refer the applicant to an express wagon. The Times of Lowell, Mass., in commenting on the recent order of the West End road in Boston (since rescinded) says:

"Now, here is another matter to which we believe attention might be given, to the mutual advantage of both the public and the railway company. This is the ever increasing nuisance of bulky packages in street cars. This has finally compelled action in Boston, where the West End Company has established this new rule.

We commend this to the attention of the authorities of our own road, not because Boston has done it, but because we believe this evil has really reached such proportions here that some action is advisable for the protection of the rights of the company as well as those of the public. What right have people to turn a street car into an express or a freight car? Yet it is the custom of the modern gill to do it if permitted.

Women particularly are apt to be almost as devoid of manners on street as on steam cars, and that woman is not far below the average who would take a whole car if permitted, and leave all others to 'ride afoot,' as Pat left his mother-in-law to do. Let fare be collected for everything that takes up room that might otherwise be needed for passengers, and if this does not check the evil it will at least protect the company from imposition. It does not take a very large parcel to monopolize the room that would be taken by an average-sized person, either sitting or standing, because the passenger is usually not in the horse car in a horizontal position, but the woman's bundle usually is, if there be any horizontal line in the latter.

Unless some parcel rack or other device for the bestowal of trumpery can be attached to a street car, (in which case also some charge should be made), we cannot see why all street car companies will not ultimately be obliged to protect themselves and their passengers by charging fare for large packages. It would cause friction, but the bundles cause this and something worse."

WHARTON & Co., of Philadelphia, have lost \$300,000 on their Third avenue, New York, cable road contract, and have thrown up the job.

THE INDIANAPOLIS STRIKE.



Strikers families watching events at southern stables.

HERE unquestionably is no moral obligation resting upon a street railway company by reason of which it should transport its employes from their homes to their place of labor, or carry them when not on duty and traveling about the city in pursuit of personal matters of their own. Whether as a matter of policy the company should or should not do this, is an entirely different thing.

When J. C. Schaffer became president of the Indianapolis

line, some four years ago, he extended the badge privilege so that the employes of the company were free to ride upon its cars, at all times, upon the presentation of their badge. Mr. Schaffer was succeeded in his office by J. P. Frenzel, who had been the preceding mayor of Indianapolis, and who, while a man of large business experience, did not claim any experience in street railway work.

On December 31, 1891, a bulletin was posted in all the barns of the Indianapolis Street Railway, stating that the badge privilege was being grossly abused, and that commencing January 1st, 1892, badges would be withdrawn and that conductors and drivers would be furnished with



Louisiana Street Stables—Striker's pushing car back into barn.

trip tickets for transportation to and from their work. At the same time the free list throughout the city was largely withdrawn, including police and fire departments. On the night of January 4th, the association of conductors and drivers held a lengthy mass meeting, in which a committee was appointed to wait upon President Frenzel and request the return of the badges. On January 5th, that committee conferred with the president, and it was mutually agreed and put in writing between them that the badges be

returned and that drivers and conductors be allowed to use the same for transportation to and from their work and for one round trip ride in addition once each day, the extra ride privilege also to extend to a lay-off of the employe not exceeding one day, and that should he take



Mob attacks first car out.

a longer lay-off than that, the badge was to be returned at the expiration of twenty-four hours, subject to his again taking his run. This agreement was repudiated by the men, on the grounds that the committee had exceeded its authority, and on January 10 the committee again called



Corner Illinois and Georgia streets, mob run car from track and attack driver Madison.

on President Frenzel, who refused to treat with them or take the matter up. On receipt of this ultimatum, the conductors and drivers immediately struck, numbering in all some 250 men and though an attempt was made to take out a few cars with clerks and others from the office, the effort met with poor success, the strikers in a number of cases grounding the trolley wires. The events of the several succeeding days were highly exciting, vio-

lence being done, the company throughout being unable from force to operate its cars and owing to the fact that police protection was not afforded, although the company could have secured men to operate its cars. Matters went on thus for some time, until the pressure of public

They also demanded the reinstatement to former positions of several who had been chiefly instrumental in fomenting the strike. To this the company could make but one reply and that was a refusal. This action precipitated another strike, the second within two months, and on February 21st the lines were tied up again. As this was Sunday, little disturbance occurred, and the company made but one ineffectual effort to take out a car. At 4 o'clock p. m. Sunday, President Frenzel issued a bulletin, calling on the men to return to work and stating that any failing to report for duty by 8 o'clock a. m. Monday, would be considered as no longer in the employ of the company. The same afternoon the labor unions of the city held a mass meeting, behind closed doors, and adopted resolutions demanding the removal of President Frenzel. This the directors refused to entertain, and have stood by Frenzel to a man.



Arrival of patrol.

opinion became so strong that both sides agreed to arbitrate and pending the settlement of which the running of cars was resumed.

During the consideration of the question by the arbitrators, cars were run as before. The decision was that the company had the right to withdraw its badges. The men demurred at this, claiming they were expected to



Return to barn of the first team taken out by Receiver—Doors locked.



Police clear a space—Supt. of Police Culbert in overcoat—Capt. Dawson at his left in long coat and cap.

assist in cases of accident whenever they were near the scene, whether on duty or in company with their family; hence were really on duty twenty-four hours a day and should receive transportation during that time. The question of wages, which had until this time not been made an issue, was then raised, the men claiming an advance to offset what they expected to pay in car fares.

On each of the succeeding days of the week occasional efforts were made by the company to operate its cars but were unsuccessful. The city of Indianapolis contains 110,000 inhabitants, with one policeman to each 1,000 residents, and these from lack of decision on the part of the mayor were of little avail. Politics entered largely into the affair, Frenzel having served as mayor on the democratic ticket, and personal schemes and jealousies aided to paralyze justice and shame order. The mayor utterly failed, nor does it appear he made any determined effort to enforce order. He disgraced the office and left the citizens of his city without defense or protection.

As a mayor he is a failure. As an excuse for an executive officer, who promotes disturbances by not suppressing the same he is a success. The stormy scenes of the week are well portrayed in our illustrations, which are from photographs taken by Mr. Hetherington, of Indianapolis, manufacturer of the Hetherington Magazine Camera. The views were taken under conditions the most unfavorable possible, both as to weather and position, and the excellence of the photographs is a matter of no

small satisfaction to the inventor. To secure views of a mob of strikers is not the easiest matter in the world by any means, and the faithfulness of the reproductions is a source of satisfaction to all concerned.

To return to the strike, affairs remained as we left them the first of the week, until February 29th, when at midnight, Judge Taylor appointed a receiver of the company, in the person of Wm. T. Steel, a former superintendent. The company was not insolvent; it was ready and anxious to operate its cars under regular guarantee to it by state and city contracts; it had money to meet all its obligations, and the wresting from the legally appointed custodians of the property of the company, and its delegation to a receiver, was to say the

return of the Knights by a disposition of the spoils in the shape of returning the badges. The receiver then took out one car, but was unable to do more, the barnmen obeying Frenzel's orders to lock the doors. This then was made an action in contempt of court, about which a day was spent in wrangling, and which resulted in the court instructing the receiver to recall the badges. But this was exactly what the men had struck for and they naturally refused to yield them up. Whereupon every man who held a badge, in doing so, held the sacred person of justice, as personified in Judge Taylor, in contempt, and matters began to assume the likelihood of the whole city holding judge, company and employes in contempt.

However, the men at last gave up the badges, and



Triumphal procession of strikers on appointment of Receiver—Passing Delaware Street.

least one of the most surprising of any freak or straining of the law which has occurred in many years. If corporate property is to be made a shuttlecock for discontented employes and legal sharpers to toss back and forth the fact is one which had well be known. The action moreover was made without consent or even knowledge of the company, and is considered ill-advised, hasty and uncalled for, by the press of the country.

The news of the victory for the men was the occasion of a big parade the following day, and Steele celebrated

under the receiver operated the road. On March 3d, by order of the court, the road was returned to President Frenzel and its operation continued pending certain agreements to be made between him and the men, which were finally settled March 12th, and the strike has ended.

THE storm of March 9th was the most severe in four years in the Northwest, and the cable lines of St. Paul were delayed three hours, the electric cars six hours while the steam roads were laid up much longer.



W. T. STEEL.



JOHN P. FRENZEL.

PALACE VESTIBULE CAR.

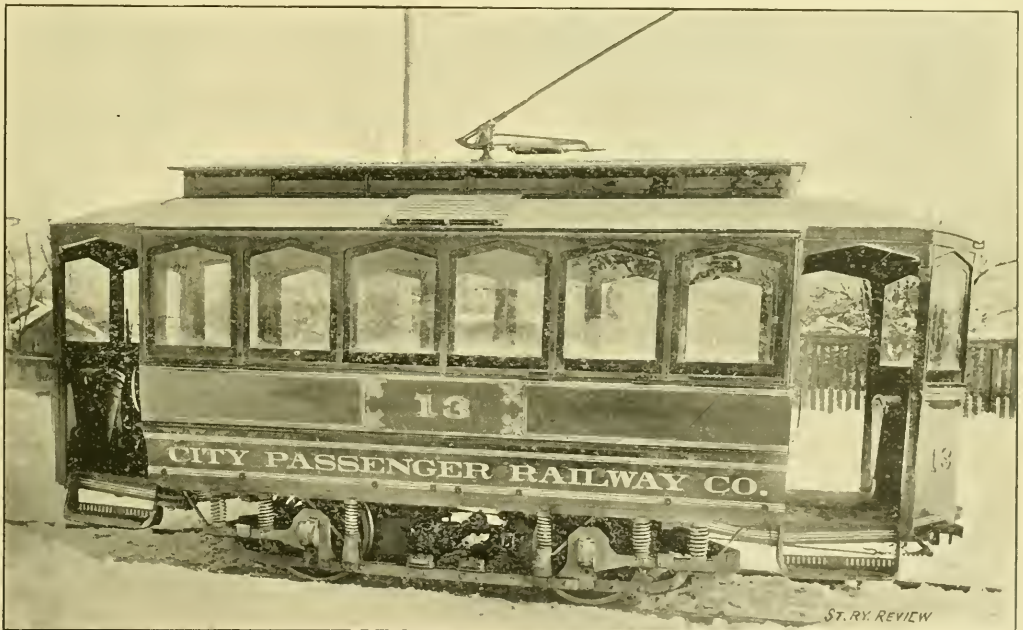
THE question of price is not the only one on which car builders are now competing, and more each day enters into the conditions of a sale, the question of workmanship and finish.

One of the neatest of cars sent out recently is the order built by the Lamokin Car Company for the City Passenger Railway, Altoona, Pa. The box is 16 feet, the car 25 feet over all. The interior finish is solid mahogany, seats and backs are covered with handsome Milton carpet. The trimmings solid bronze, the heater a Lewis & Fowler; two end lamps, and five ceiling lamps—all incandescent, furnish abundance of light. In the deck sash, a new style glass, "crushed ruby," presents a very fine appearance. The Cochrane trolley observation window, described elsewhere, is in each vestibule.

is the slope from center to each end, and the grooving of the floor for drainage instead of nailing on wooden slats. Altogether the car is a handsome, attractive piece of workmanship and is the object of much admiration from both the railway managers and their patrons.

SIMPLE SIGNAL SIGNS.

THE Street Railway Company of Minneapolis, Minn., is now arranging a system of colored lights for use on the electric cars at night. The new device consists of a brass box, 5 x 6 x 5 inches in size, one side to rest against the end panel of the car, the other sides provided with glass. The front window of the box is colored the same as the body of the sign board of the line on which the car runs. The electric globe encased in this box can send its rays through the colored glass for



LAMOKIN CAR COMPANY'S PALACE VESTIBULE CAR.

The trucks are the Robinson Machine Company's and as illustrated are so constructed as to afford a most uniform and delightful cushion to the car. It is claimed for them that a glass of water filled to the brim will not spill a drop when the car takes a curve.

The electrical equipment is the Wightman system, which has given such good satisfaction in Altoona, and the steps will be recognized as the well known and widely used Stanwood. The same style car was also delivered to the Williamsport Passenger Railway, with Westinghouse equipment, being the fourth order from that road.

As will be seen in the illustration, the trucks are so built as to permit ready access to the motors for inspection or repairs. A new feature in the floor construction

a long distance. In case it is desired to run a red car on a blue line the color of the signal is readily changed by simply changing the glass slide.

HENRY C. EDDY, formerly connected with the Street Railway Journal, has been made special agent for the Tradesman of Chattanooga, and will have his headquarters at 171 La Salle street, this city. Mr. Eddy ranks among the most successful of the young newspaper men and is meeting with fine success in his new work.

A CONDUCTOR was all torn up as to how many fares to collect from a two-headed boy. What would you do?

VESTIBULE ROOF OBSERVATION WINDOW.

THIS improvement in electric car building is so simple and useful the wonder is some one has not tried it before. It requires no argument as to its merits to convince a conductor who has had occasion to lean backwards out the window of the rear vestibule of a car and fish with the guide rope for the trolley wire. If rain or snow chanced to fall at the time his pleasure was not materially increased. If the window happened to be closed time was lost in getting it open.

The observation roof window is the invention of Mr. Cochran, of the Lamokin Car Company, and will be understood at one glance of the accompanying illustration.



VESTIBULE OBSERVATION WINDOW.

By looking up through the window in the roof, the trolley can be adjusted with least possible loss of time and labor. This window is placed in the cars built by the Lamokin Company for Altoona, Pa., and are found to be highly satisfactory; so much so that it is being specified in all orders now taken by these successful builders.

The illustration was taken from the inside of the car looking through the door into the vestibule, and the observation window, which is of heavy glass, is clearly shown in the roof. The improvement is one of the best in a long time.

The winter travel on all the lines has been heavier than at any previous period in the history of Chicago.

TESTING THE LOVE ELECTRIC.

ON Tuesday night, March 12, the Love Electric Traction Company, of North Chicago, made a test of their system with reasonable success. The cars are not yet in running order owing to mechanical difficulties in adapting the trolley to the underground conductor. The trouble seems to be in the fact that the lateral motion of the car moves the iron shanks which pass down through the slot, and the slot rail acting as a lever, the trolley will not maintain contact with the conductor. Trial trips are made each night.

President McGuire, of the McGuire Manufacturing Company, whose opinion is of value in view of his intimate acquaintance with street railway matters, was present with a number of other gentlemen when the test was made, and expressed himself as satisfied that the system can be made practical. As the car attained a speed of about twenty miles an hour during the test, he thinks the difficulties encountered are only mechanical and easily obviated.

The principal defects connected with the system, encountered so far, seem to lie with the projectors of the enterprise in adopting a means to an end. In other words they seem to lack mechanical ideas in working out the details. The trolley wires formed in short sections and suspended beneath slot rail are secured in position by clips or clamps. These clips form raised surfaces on the wire directly in the track of the trolley wheel. Every contact of the trolley wheels with these clips induce tremendous sparking and as these clips are placed at intervals of four feet the conduit is illuminated almost continuously. The trolley mechanism seems to be a general aggregation of a number of minds thrown together in a haphazard way. As a result when the car is under headway it sounds like a freight car loaded with scrap iron. In fact the system in practice seems to be a rattling success.

TORONTO LINES DOING WELL.

UNDER the able management of H. A. Everett, of Cleveland, the syndicate purchasers of the Toronto lines are well pleased with the progress made. Earnings for the past six months are as follows:

| | | |
|------------|-----------|--------------------|
| September, | \$89,225, | a gain of \$6,732. |
| October, | 68,487, | " 6,126 |
| November, | 60,519, | " 5,339 |
| December, | 68,604, | " 14,513 |
| January, | 55,421, | " 4,741 |
| February, | 53,572, | " 6,482 |

The large September receipts were due to the carnival festivities.

The company are operating sixty-six miles and are building sixty new cars.

CASSELL'S FAMILY MAGAZINE for March is an especially attractive number and as usual is full of good things.

THE CABLE ROAD OF PORTLAND, OREGON.

THE Portland cable railway runs from Portland Heights to the Union railway depot, its route being through one of the most desirable and picturesque residence portions of the city, and through the business center. From Portland Heights, which is reached by an incline with a grade of twenty feet and three inches to every one hundred feet, a magnificent view of the city and surrounding country is obtained. The eye, with a sweeping glance, takes in the consolidated city of Portland on both sides of the beautiful Williamette river, with its numerous steamboats and ocean steamships and vessels. In the distance, across the peninsula, is seen

shrewd investors who got in on the ground floor. A ride up the incline is indeed a great pleasure, and as a result the cable railway does an immense business. Every stranger, who desires to get a good view of the city, invariably takes a ride on the cable to Portland Heights. This is about the first place the visitor takes in. During the past summer the company maintained a pretty little park near the Portland Heights terminus, and every Sunday afternoon and evening it employed a fine band to give free concerts there. This feature, of course, made a very large Sunday travel over the line. Last May, President Harrison and party were conveyed to the



POWER HOUSE PORTLAND CABLE RAILWAY.

the grand Columbia river, into which the Williamette flows a few miles north of Portland. To the east, seventy-five miles distant, is seen the snow-capped Mt. Hood, which reaches a height of 11,934 feet above the level of the sea, and to the northeast, at about the same distance, Mt. St. Helens, 12,000 feet high, and Mt. Adams 9,570 feet, are plainly visible. Nature affords no more beautiful or varied picture than can be secured from a view from Portland Heights. It was a happy thought, indeed, of the projectors of the cable railway to climb this commanding eminence with their tracks, and thus make it easily accessible to all, and convert it into a most desirable residence section of the city. The Heights are now thickly dotted with handsome houses, and the property, which was previously considered of little value, has risen wonderfully in price, and has made fortunes for

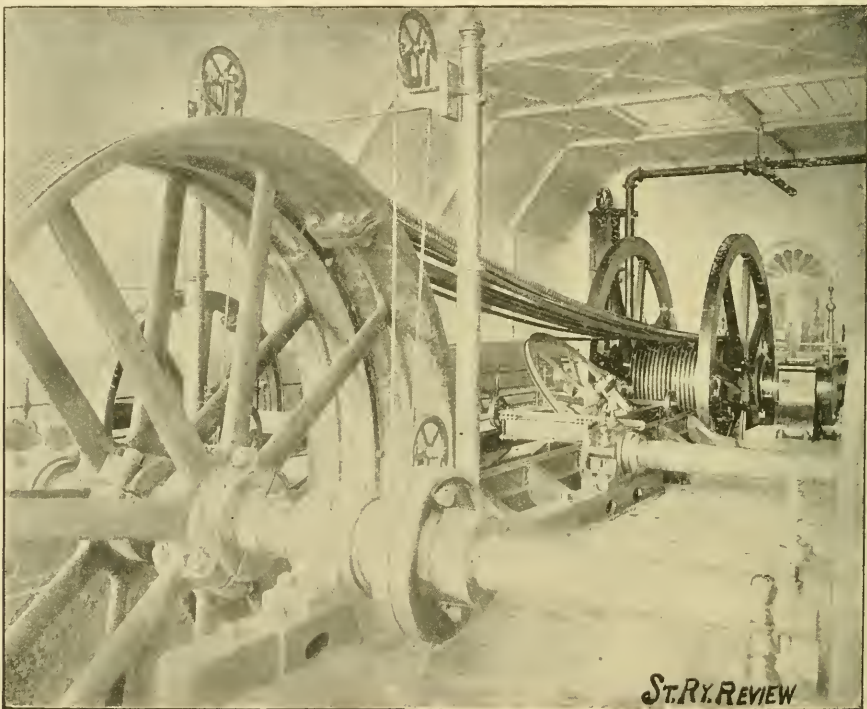
Heights in an open car, which was most beautifully and profusely decorated with flowers, flags and other ornaments, and which is illustrated herewith. The car was tendered to President Harrison by General Manager Lynch, who superintended the decorations. The ride to the Heights was one of the most enjoyable and unique incidents of the President's visit.

The incline is 3,000 feet long. It includes a trestle 1,100 feet long, and 50 feet high at its center, the maximum grade being 20 feet and 3 inches per 100 feet, for a distance 3,000 feet, thus elevating a car 600 feet from the base. The brake appliances on the cars are such that the liability to accident is reduced to a minimum. The company has never had an accident on the hill division since the first day it began operating.

The original length of the cable road is $2\frac{1}{2}$ miles of

double track, and another mile and a half was completed January 1, of the present year, making four miles in all. The new extension runs from Jefferson street to a point west of the City Park. The course is a winding one, and leads up to a considerable height. At the terminus of this extension or branch, the company has secured property for a park of its own, and also for base ball grounds. These terminal grounds are to be made very attractive and maintained as an amusement resort. The enterprise will be greatly appreciated by the public, and will undoubtedly prove very profitable to the cable company. This extension will also carry passengers to the City Park, a most picturesque spot.

other being an idler. The main shaft is 12 inches in diameter; the drum shaft is 10 inches in diameter, and the speed of the cables is 8 miles an hour; the grip used is a bottom grip, and is the invention of the company's engineer, R. A. McClelland. The gauge of track is 3 feet and 6 inches; the conduit is made of cement concrete; the yokes are wrought iron and steel, average weight 185 pounds; distance apart, 4 feet and six inches; the rails rest on the yokes, rail joints are made on yokes, and basalt block paving is used between the rails. The seating capacity in the summer cars is 32, and the same in closed cars. The company has on hand 22 cars. The average headway is 4 minutes in summer, and 6 minutes in winter.



DRIVING MACHINERY—PORTLAND CABLE RAILWAY.*

The rail used on this road is a 38-pound combination, and the slot is the same, both being made by the Pacific rolling mills of San Francisco. The conduit is 10x12 inches. Three cables are used, one 22,000 feet, one 8,000 feet, and 12,250 feet. Their diameter is $1\frac{1}{2}$ inch. The cables came from the Washburn & Moen Manufacturing Company, of Worcester, Mass. The boilers consist of two batteries of two boilers each, and 800 horsepower. There are two 24x48 Hamilton-Corliss engines, manufactured by the Hoven, Owen, Rentchler Company.

The drums are Walker's 10-foot differential drums, and were made by the Walker Manufacturing Company of Cleveland, Ohio. The number of wraps of the cable on the drum is three, and sometimes on short cable there are our wraps. The drive is made with one drum, the

On a 4-minute headway the company runs 12 cars. On pleasant Sundays in summer all the cars are operated. The cars can be run every ten minutes whenever demanded by the public.

The number of men employed is eighty, and they are skilled men in connection with cable railways. The gripmen are from San Francisco and Kansas City, and have all worked on hill divisions.

Before a man can obtain employment with this company as a gripman, he must bring letters showing that he has worked in that capacity, or a hill division on some cable railway, and he must prove by a test of two weeks work that he is competent. The gripmen and conductors work twelve hours a day, and are paid \$2.50. The cars are run eighteen hours a day.

The company's power house occupies a block on the corner of Fifteenth and Mill streets, and is pronounced one of the most complete on this coast, both as to the building and the machinery. The building is 110 x 152 feet and divided into power room, boiler room, car house and machine shop. The brick stack is 110 feet high. The machine shop is fitted up with the Putman tools, drill, shaper, lathe and hydraulic wheel press. A small engine furnishes motive power for this department, and also runs the arc and incandescent dynamos that light the building and offices.

The car house has capacity for thirty cars, and as the company has ordered more cars, provision will be

HELD UP THE INTER-URBAN.

THE steam roads with recent daring express robberies, are not entitled to all the romance of the unexpected. From all parts of the country have come the past winter, reports of conductors held up and assaulted and the knocking down at one stroke of the fares which the conductor had so faithfully and patiently been all day ringing up. One of the most recent and daring attempts occurred on the Inter-Urban Electric on its last trip at midnight, from St. Paul to Minneapolis. Five toughs boarded the car and took seats quietly until the car was well out. Then one of the party



THE PRESIDENTIAL CAR—PORTLAND CABLE RAILWAY.

made to put an addition to the building. The cars were built by the Stockton Car Works, and are commodious and of handsome design and finish.

The Portland Cable Railway Company was organized in February, 1890. The officers are C. H. Woodard, president; W. K. Smith, vice president; Eugene D. White, secretary; L. L. Hawkins, treasurer; and Geo. W. Lynch, general manager and superintendent. The capital invested in the enterprise is \$850,000. The cost of the track was \$40,000 per mile of single track.

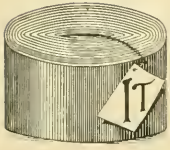
Portland may well be proud of an enterprise of this character, and still prouder of the men who put their shoulders to the wheel and alone and unaided called it into life. They are satisfied with the results which grow day by day and promise a realization of their most sanguine expectations as a financial venture, and they will in the future as in the past carry out all their promises.

stepped to the rear platform and seizing the trolley rope, pulled it from the wire. As the lights went out the others set upon the conductor, one drawing a knife and cutting a dangerous gash two inches long, near the base of the brain. The motor man came to the rescue with his brass lever and the way he cranked it was a caution to evil-doers, and caused a general stampede. The conductor succeeded in replacing the trolley and as the car started it was bombarded with stones, smashing in all the windows, some of the panels, and causing other damage. The conductor was found to be seriously injured, but did not lose any money.

HENRY VILLARD announces that he intends soon to operate the short line trains of the Northern Pacific, between St. Paul and Minneapolis, by electricity, and that there will be built for the purpose specially designed electric locomotives.

FROM THE TANNERY TO THE DYNAMO.

A Paper by Chas. A. Schieren, read before the National Electric Light Association.



MAY be of interest to engineers, and the electric light fraternity in general, to learn something of how leather is tanned, and the various processes through which a hide passes before it is tanned and carried ready to put into belting. Naturally, the first question will be. "Where do all the steer hides come from?" Principally from Chicago, because within its city limits there are four large slaughtering establishments where thousands of cattle are slaughtered daily, the hides of which are carefully taken off and assorted for whatever purpose they are best suited. The hides which are the heaviest and most perfect in point of freedom from cuts, brands and other blemishes are selected for belting leather. These hides are put up in bundles, packed into a freight car, and shipped to the tannery.

We propose to follow one of these freight cars loaded with belting hides to its destination. After a journey of about 600 miles, the car arrives at the little station of Adamsburg, Pa., right in the mountain region, a spur of the Alleghenies, where the tannery is situated.

Oak tanneries are generally placed near the bark region of the mountains, where the rock oak tree predominates the bark of which is universally conceded to be the best for making the finest grade of leather. It is interesting to watch the mountaineers fell the huge oak trees, and skin the bark from the same. This is generally done in the springtime, and tanners have to purchase their yearly supply during the bark peeling season, which is from the middle of May to about the middle of June, according to the condition of the weather; the season seldom lasts over six weeks. If the sap rises into the leaves the bark cannot be peeled off, and therefore, oak trees are only cut down in that period.

The peeling of bark is done wherever the trees are felled; the bark is gathered together in small stacks and covered to protect it from getting wet, because the strength of the tannic acid is lost by the bark getting wet; it must also be carefully guarded against mildew. Mountain fog is very damaging to peeled bark, therefore the mountaineers load the bark in wagons and deliver it as quickly as possible to the nearest tannery or railroad station.

However, our car of belting hides has arrived at the station, and we will watch the process of tanning. The hides are examined and weighed, and put into the shed. An equal number of hides are taken out daily (whatever the capacity of the tannery may be), and placed in a large vat of pure cold water, generally good spring water. After the hides are thoroughly soaked and the dirt washed out, they are laid across a beam, and, with a blunt fleshing knife, the surplus fat or meat still remaining is taken off; then they are placed in a vat of weak lime-water, and are hauled up daily and the lime strengthened until the hair gets loose, which action takes about

eight days. After this the hides are cleaned once more in pure water and placed over the beam and with a blunt knife, the hair is removed; this part of the work is done in what the tanners call the beam or lime house, and very much depends upon the successful liming process in making good leather.

After the hair is off, the hides are washed again and thoroughly cleansed and purified, to remove every particle of lime, after which process they are taken into the handlers. These are composed of large vats, about 7 by 9 feet, and 6 feet deep. The hides here are laid across sticks side by side, as close as possible, and hung about 3 inches below the top of the vat. These vats are generally connected so that when the first vat is fed, the tanning liquid will pass through every vat until they are all filled, and cover the hides completely. In the handlers the hides receive their first bath of tannin liquor, which is very weak at the start, and gradually strengthened. During this first stage of tanning, the hide plumps up, and is prepared for the lay aways; this process also opens the pores and swells the hide, which gives thickness and firmness to the leather. If the hides cannot be made thicker at this process of the tanning, they will never be made heavier afterward; this is the critical point and has to be watched closely. Much depends on the character of the tannic acid; if too strong, it tends to make the leather brittle and harsh; if the tannic acid should be too sour, it tends to make the leather soft and flabby.

Some tanners use a rocking process to keep the hides in motion, thereby opening the pores of the hide quicker to receive the tannic acid; however, opinions differ as to the utility of the rockers. Some claim (and justly) that the rocking motion loosens the fiber of the hide, and softens the leather too much. The best process is simply to hang them in the vat and cover them with the tannin liquor, and raise them a few times during the day, or draw the liquor through them, which some tanners are now doing with success.

The tannic acid in the handlers generally has a strength of from five to fifteen, very seldom over twenty degrees. The hides remain in that process from 10 to 12 days; they are then taken up, and, if they are to be used for belt leather, the flanks (bellies) and heads of the hides are cut off and tanned separately, the remaining butt part receiving an extra layer of bark to tan it more thoroughly and make it firmer.

From the handlers the hides are packed away in vats called lay-aways; these are large vats 7 by 9 feet, and 6 deep, having a capacity of from fifty and seventy-five hides each. The vats are not connected with each other, but only with the pump to change the liquor. The hides are laid nicely one on top of another, and loose ground bark spread between each hide, and when the vat is full it is filled with tannin liquor of from twenty-five to thirty degrees in strength. The hides intended for belting

receive at least six layers of bark, or in other words, are changed six times in the lay-aways; the first time they are changed after lying ten days; and then five days are added after each layer, so that the hides in the last or sixth layer takes forty days to absorb the tanning liquor and penetrate the leather. Each time fresh ground bark is spread between the hides and then covered with tanning liquor.

The leaching and grinding of the bark is an important factor in a tannery. The large pieces of bark taken from the oak tree are thrown into a hopper shaped mill or grinder, which resembles a coffee grinder on a large scale. The moss on the outside of the bark creates a great deal of dust; and contains little or no tannin, but it cannot be severed from the rind which really contains the acid. From the bark mill the ground bark is elevated into large tubs which have false bottoms or receivers underneath to take up the tannin liquor. After a tub is filled with ground bark, a rotary sprinkler is set in motion to saturate the bark with a spray of water or liquor, which percolates through the ground bark, and on its way to the bottom catches up the tannic acid contained in the bark; at times warm water is used to facilitate the operation, also weak tannin liquor is sometimes used with good effect; however, old school tanners prefer cold water, which they claim makes purer and sweeter tannin liquor. After the receivers at the bottom of these tanks are filled, the contents are pumped into large supply tanks, from which the liquor is distributed through the tannery as required.

The leaching process is the most interesting and valuable operation in the tannery, and upon its skillful management depends the financial success of the business; opinion differs very much as to the best methods. The large round leach tubs, such as described, are the most popular now in use; however, many tanners still adhere (and some with success) to the old square pressed leach tubs, in which the ground bark is simply soaked or steeped in water and left for a length of time, until the tannic acid is extracted from the bark. Opinions also differ as to using steam or hot water; however, all have their merits.

Very strange and erroneous ideas prevail among those who use leather, and have no knowledge of the art of tanning—certainly it is an art, and one of the oldest handed down to us. The general opinion prevails that leather made in "ye olden times," is superior to ours of the present time, but such is not the case: in fact, the fundamental process of tanning to-day is precisely the same as that of a thousand years ago, except that we enjoy improved machinery and appliances, which further the process and improve the material. What took our forefathers from fourteen months to about two years, we accomplish in from four to six months, and the quality of the leather is as good, if not superior, to the leather made a hundred years ago; with the aid of steam and power we can facilitate the process and shorten the length of time to produce the leather. "Olden time tanneries" had the lay-away vats in the yard exposed to the elements,

and in rainy and inclement weather, as well as during the winter, the tanners could not do any work, and left the leather lying in the vats, generally to the detriment of the stock. In our present improved and model tanneries everything is done under cover, even the bark is put under sheds to keep it dry, and good leather is tanned within four months; however, belt and prime harness leather generally take six months.

When the leather is taken from the last layer of bark, it is oiled on the grain and hung up in a darkened room to dry; to obtain a nice clear russet color the place must be kept at an even temperature, and very little heat used. After the leather is thoroughly dried it is put up in rolls containing five butts (hides) each, and whenever a car-load is ready it is shipped to New York; here it is again examined and weighed, and all butts not suited for belting are thrown out and finished into sole leather for shoe purposes.

The perfect hides for belting are soaked in warm water and the center part cut out and used for prime belting; the waste or offal is finished and rolled for shoe purposes. When the pieces are thoroughly soaked and cleansed they are oiled on the grain and hung up to dry, and when in a semi-dry condition, they receive a coat of stuffing made of equal parts of coal oil and beef tallow. This is done to preserve the leather and make it pliable for the transmission of power. After the stulling has entered the pores, which takes about 24 hours, the leather is subjected to great strain in large stretching machines. Great care and good judgment must be manifested in this part of the process, each piece of leather must receive an equalizing strain, because of the peculiar formation of the hide, the fibers being very fine and closely knit together on the back of the animal, and running coarser and thicker toward the flanks. It is of the highest importance for belts intended for electric light plants to have an equal tension over the entire surface of the belt; therefore, the stretching process of belt leather needs the utmost care, and should receive the closest attention. After the pieces of leather are thoroughly stretched, they are worked smooth on the grain side, and both by hand and machine labor are set down as solid and compact as possible; then they are put into a drying room and thoroughly dried. Afterward one edge of the piece is straightened, and then they are cut into whatever width of belt they are best suited for, the pieces of each width are matched accurately as to thickness, and then the laps (joints) are cut by a machine, the edge of the laps are feathered, and the joints cemented (glued) together, and pressed under a hydraulic press, which pressure is considered the best by all first-class belt-makers.

Rivets are now rarely put into belts; a double belt well cemented is good for all ordinary purposes, and rivets are superfluous; however, certain fastenings, such as endless copper wire screws, which do not obstruct the surface or unnecessarily stiffen the belt, are a benefit; especially when the belt comes in contact with water or too much oil; this fastening prevents the belt from coming apart, and holds the leather firmly together.

All main driving belts over forty inches in width have to be made in sections, consisting of two or more pieces of leather cemented together. The average hide for belting does not contain more than forty inches in width of solid leather suited for belting, very rarely over that; therefore, wide main belts are made in sections. Ordinarily the pieces are not lapped parallel, but simply butted. For example: A sixty inch, double belt receives two 30-inch pieces for the first layer, laid side by side, and a 30-inch piece over the center of the two lower pieces to break the joint, and two fifteen-inch pieces on top of each edge of the lower layer to complete the width; thus the belt is cemented together. However, for the electric light plants, where belts are run at high speed and with variable power, which produces sudden strain, the seams of these butted joint belts, in several instances, broke, doubled up and destroyed the belts completely. To guard against such a calamity it is considered advisable to make wide driving belts with parallel joints. For example: A 60-inch double belt will be made of two 33-inch pieces joined parallel with a 3-inch lap, making one solid piece 60 inches in width, and on the upper part put a 33-inch piece in the center, and two 18-inch pieces on the edges, all joined with parallel laps: this cemented together will make a 60-inch double belt with unbroken surface, and as one solid piece of leather having a uniform tension and able to withstand an equal strain over the belt transversely as well as parallel, and thus will prevent such large, heavy driving belts from collapsing at the parallel joints. Every one must admit that main belts made on this plan are superior and more reliable, and would come into general use if it were not for the additional cost of labor and material in making them.

Leather being by nature an absorber of moisture, belts must be guarded against exposure to oil. In electric light and power plants much mineral oil is used, and the great velocity at which the belts are run seems almost imperceptibly to suck or draw the oil from the journals of the engines and dynamos, and allow it to be absorbed by the belts, which gets completely saturated with oil, which in a short time, rots and destroys the fiber of the leather. Various methods have been used to overcome this difficulty. One of the most successful is a certain composition of belt dressing which is rubbed over the surface of the belt, and closes the pores of the leather. No foreign substance can penetrate a belt treated with this compound, and the belts last much longer and give better service. With perforated belts this compound does not seem to be so effectual, because the perforations naturally expose the inner part or the heart of the leather which is very porous; however, the surface of the belt being covered, it shields that part of the leather which comes in contact with the pulleys, and the current of air passing through the perforations protects the belt to a certain extent, and that class of belt runs smoother, with less friction, and is more reliable.

And now, gentlemen, we have reached the point where another curious and erroneous idea prevails among many engineers, namely, that belting should be made of

pieces only four feet in length, as if all hides were of the same length and texture. It will surprise these men to learn that there are no two hides alike; they vary in some particular point. Hides exist which will make almost six feet of sound solid leather below the shoulder and again some hides will not make four feet of solid length; the only safeguard is to specify belting made of leather cut below the shoulder of the hide irrespective of length.

In reply to the question whether there is any choice in the placing of the leather; whether it is better to place the heads all in one direction and the tails in the other; or whether there is any difference in putting the grain of the leather irrespective of the direction of the belt and the direction in which it is running, Mr. Schieren said: In order to make a straight line belt we have to use heads with heads, if the belt is made of anything else than centers; in using centers this is not necessary. The center is perfectly straight, and it is only by the greatest stupidity on the part of the workman that you can make it crooked by stretching one side more than the other. In making belts of other than centers there is a right and left, and the workman must be careful not to change the relation. Crooked belts often arise from the fact that the workman will put on a left, and then a right on a right, instead of making the joints shoulder on shoulder and butt on butt.

VALUE OF TRACK CLEANERS.

ATTENTION has often been called to the fact that track cleaners and scrapers attached to cars in regular service, while not sufficient to cope with heavy storms, are at the same time, when cars are running under frequent headway, sufficient to keep a reasonably clean rail, which otherwise could not be accomplished than by the use of a number of heavy plows. During the recent storms in Buffalo, the track cleaners attached to each car, and which are the invention of General Manager H. H. Littell, have proved especially serviceable. They are located at the front end of the car, in such a way that all the driver has to do is to use his foot when it is necessary to operate the cleaner, thus leaving his hands free for the performance of other duties.

The track cleaner can also be promptly lowered to remove any obstruction from the track, and is quickly raised to its normal position. An illustration of their value in this direction was recently furnished when a little boy fell in front of one of the electric cars, and was saved from instant death by the promptness of the driver, who pressed his foot upon the track cleaner bar and dropped it in the rail, just in time to push the boy from the track. The only injury sustained was a slight cut on the hand, and prevented an accident which in all probability would otherwise have proved fatal.

THE Boston News gives vent to the following: "Now it is said the Rapid Transit Commission has abandoned the tunnel system.—that part of the plan has gone under, as it were."

A GENUINE BICYCLE RAILWAY.

A SYSTEM of passenger travel is about to be put in operation between Mt. Holly and Smithville, N. J., by a company which has been organized to construct what is known as the Hotchkiss Bicycle Railway System, on a plan wholly unlike any which has ever been attempted. None of the motive power heretofore used is required in its operation; on the contrary, each passenger furnishes his own motive power. The illustration will give, without any further detail, a good idea of the construction. The track rests upon a foundation of cross-ties 3x6 inches by 3½ feet, which are placed at intervals of every 6 feet, and upon them rest wooden posts ordinarily 3½ feet high. These are secured to the ties by bolts and angle irons. Narrow wooden stringers connect the posts, and the top stringer has a T-shaped

disembark. The projected line between the two cities mentioned is several miles in length, and in its course crosses a small river no less than ten times. There is no reason why a high rate of speed can not be obtained, as steam and other roads will be crossed at an elevation so that there will absolutely be no restrictions or danger in operating the system. One man will be required at each station to collect fares and supply the machines, but aside from this, there are no other than ordinary repairs, which it is believed will be, however, of a very insignificant nature.

Machines of special construction will be made for the use of ladies, and the road can be operated both day and night at all seasons of the year. The machines to be used, are now being constructed in Smithville, by the H. B. Smith Machine Company, who are builders of the "Star" bicycle. Mr. Hotchkiss, the inventor, is already



HOTCHKISS BICYCLE RAILWAY.

rail fastened to it on which the bicycle runs. A special form of bicycle is required, although the ordinary saddle, handle bar and propelling mechanism are nothing new. The handle is not required for steering purposes, but is used simply as a means of convenience for the rider when in motion. The frame is double, extending down below the track rail on either side, a distance of 2½ feet, and has at the lower end a small guide wheel running horizontally, which serves to keep the machine in upright position, and absolutely prevents any possibility of jumping the track. The front wheel is the driving wheel, and is 20 inches in diameter, and like the other riding wheel, is grooved to fit the rail. Two tracks will be constructed so that the road may be operated in both directions at the same time. Side tracks will be placed at suitable intervals, at which the bicycles will be stored when not in use and at which point passengers can be supplied, leaving the machines at any station where they would wish to

known as the author of a number of useful inventions and was formerly a resident of New Haven, Conn. The officers of the company are president, Wm. F. Kelley, vice-president and manager, A. E. Hotchkiss, secretary, Joseph Powell, treasurer, George A. Lippincott, engineer, James Lippincott. Construction work will be commenced in a few weeks, and it is hoped to have the line in operation by early summer. Its completion and operation will be a matter of considerable interest, as being among the first of its kind ever put into actual operation in this, and most probably, any other country.

THE ability to make fast speed with electric cars is constantly advancing, and the new cars recently put in service between Forty Fort and Wyoming, Pa., are guaranteed to make 20 miles an hour, and it is believed will be able to make even 30 miles.

STREET RAILWAY LAW.

EDITED BY MR. FRANK H. CLARK, ATTORNEY AT LAW, CHICAGO.

Joint Use of Track in Hands of Receiver.

The amount to be paid for the joint use of a street railway track in the hands of a receiver may be determined by the Court appointing the receiver, where the statutes give the right to such use on payment of one-half the cost of construction.

THE Pacific Railroad Company is the owner of a street railroad, operated by means of a wire cable, for the carriage of persons in the city of Los Angeles. On January 20, 1891, Edward W. Russell commenced an action against said company, its stockholders, and a large number of creditors, praying for the appointment of a receiver for said road. On the day the complaint was filed, J. F. Crank was appointed receiver, with directions to take charge of the street railways under the control of the Pacific Railroad Company. Crank qualified and took possession, and has ever since continued to operate the road under the order of the Court. On January 26, 1891, the Los Angeles Consolidated Electric Railway Company presented to the Superior Court a petition in said cause, setting forth that the petitioner had entered upon the construction of its line of road, as authorized by certain ordinances, and in the further prosecution of its work it was necessary that it should intersect the tracks of the Pacific Railway Company, and run along the same for a distance of three blocks; and praying an order authorizing it to operate over and on said tracks for said distance, and directing the receiver to grant all necessary facilities therefor, and for a further order fixing the amount of compensation which petitioner should pay for the right to use the tracks as aforesaid.

Section 499 of the Civil Code provides that "two lines of street railway, operated under different managements, may be permitted to use the same street, each paying an equal portion for the construction of the track and appurtenance used by said railways jointly; but in no case must two lines of street railway, operated under different managements, occupy and use the same street or tracks for a distance of more than five blocks consecutively."

The question to be determined is simply whether the Court, which, through its receiver, has the custody and control of the insolvent corporation's property, has the power to determine the compensation, or whether the electric company must treat with the cable company, and, upon failure to agree as to the amount to be paid, bring an action therefor against the receiver, with the permission of the court. There are none of the elements of an ordinary condemnation proceeding involved in the litigation. There is no private property to be taken for public use,—no occasion to exercise the right of eminent domain.

In the case before us, the electric company has the right, under the statute and its franchise, to use the tracks of the cable company upon payment of one-half of the cost of the construction thereof. The only question to be determined is, What is the amount due the cable company? It is like any other claim for damages or compen-

sation in favor of a corporation whose property is in the hands of a receiver, and is to be determined in the same way. The cases all hold that, while it is, under certain circumstances, proper to direct the prosecution of an action at law against the receiver to determine the amount of compensation or damages to be paid, the better and more commonly recognized practice is to apply for relief by petition to the court in which the receiver is acting.

(Sup. Ct. Cal. Pacific R. Co., v. Wade. 13 L. R. A. 754.

Personal Injury at Street Crossing—Negligence—Evidence.

In an action against a street railway company for the death of plaintiff's husband, it was shown that he and plaintiff had stopped near defendant's south track at a street crossing to await the passing of a cable car on the north track, and that as soon as it had passed they attempted to cross, but were scarcely over the first rail of the south track when they were struck by a car thereon, which was almost upon them when they started, and the husband suffered injuries of which he died. The street was straight and well lighted, and the night was clear, and the car by which they were struck had a headlight with a reflector. The only evidence that the husband looked in the direction from which the car was approaching was given by plaintiff who, however, only inferred that he did so because "it was the natural thing to do." *Held*, that the accident was due solely to the negligence or misfortune of the deceased.

The fact that the gripman of the car that struck deceased was, at the moment of the accident, looking to one side, is not sufficient to show him guilty of negligence, when he had immediately before seen plaintiff and deceased by the side of the track apparently engaged in conversation, and so had no reason to anticipate that they would attempt to cross in front of his car.

(Supreme Ct. N. Y. Scott v. Third Ave. Ry. Co., 16 N. Y. Supp. 350.)

NOTE.—One walking on a railroad track, who, on seeing an engine approaching in front, stepped over on another track without looking behind him, and was struck by an engine coming from the rear, cannot recover for the injuries. Sup. Ct. Ill. Boden v. Chicago & C. R. Co. 24 N. E. Rep. 425—ED.

Street Railway—Injury to Horse on Track—Management of Motor Car.—Evidence of Negligence.

The evidence showed that plaintiff's driver was holding the team beside the track, that when they saw the motor coming, they grew uneasy, and when it was about 125 feet away, one of the horses "danced" onto the track and continued there until struck by the motor; that the motor was not going at the usual speed, but was going rapidly down grade. It did not appear whether the motor could have stopped after it was seen by the

engineer that the horses were on the track. *Held*, that there was no evidence of negligence on defendant's part to support a verdict for plaintiff.

(Sup. Ct. Ore. *Coughtry v. Willamette St. Ry.* 27 Pac. Rep. 1031.)

(NOTE.—A motor man on an electric street car may act upon the presumption that teams standing at the side of the street are hitched, or, if not hitched, are not liable to become frightened and run away. Tex. Ct. App. *North Side Street Ry. Co. v. Tippins.* 15 S. W. Rep. 1067. 1 STREET RAILWAY REVIEW 221.—Ed.)

Passenger Alighting from Moving Car—Unlawful speed—Failure of Conductor to give Warning.

It is gross negligence in a passenger on a street railway to jump from the car when it is going at a speed of 20 miles an hour, whether he knows or does not know that the car is going so fast. That the city ordinance restricted the speed of the car to 7 miles an hour would make no difference.

The presence of the conductor and his silence on hearing another passenger tell the plaintiff that the car was not going to stop and he had better get off, will not justify him in jumping from the car and causing his own injury.

(Sup. Ct. Ga. *Masterson v. Macon City & Suburban St. R. Co.* not yet reported.)

Injury to Trespasser—Driving Boy from Car with Whip.

The deceased, a boy four years and five months of age, while playing in the street, trespassed upon one of the defendant's cars, and was compelled to leave it by the driver, who struck him twice with the whip. To escape this, the boy ran upon the other track and fell under the wheel of another car moving thereupon. *Held*, that there could be no recovery.

(Ct. Com. Pleas Philla. *Mack v. Lombard & South Streets Passenger Ry. Co.* 47 Leg. Intel. 26.)

Street Railway—Persons entering moving Cars—Negligence.

Plaintiff, in an action against a horse railway company, testified that on the approach of one of the defendant's cars, he signalled it to stop; that the speed of the car was slackened; that as it passed, he seized the hand-rail on the rear platform and placed his foot on the step; that the brake was released and the car started with a sudden jerk, throwing his feet from under him and dragging him some distance, injuring him severely. *Held*, that the question as to negligence on the part of defendant and contributory negligence on the part of plaintiff was for the jury.

(N. Y. Ct. App. *Morrison v. Broadway & S. A. R. Co.* 29 N. E. Rep. 105.)

Corporations—Consolidation—Foreclosure of Mortgage—Intervention by Stockholders.

In a suit to foreclose a railroad mortgage, certain persons petitioned to be made parties defendant, alleging that the defendant company was made up by an illegal consolidation of three other companies, in one of which

they were stockholders; that they never consented to or recognized the validity of the consolidation, and were not bound by it or by the act of the new company creating the mortgage; that the new company "is perhaps concluded by its conduct in the premises from making defense" to the suit; that the original company, of which they were members, had no officer or representative upon whom they could call to make defense for them; and that the counsel for the consolidated company declined to set up the defense which they desired to make. *Held*, that these facts gave no right to intervene as defendants, especially as there was no charge of fraud or collusion, and the proper remedy is by an independent suit.

(U. S. Cir. Ct. N. D. Ga. *Central Trust Co. v. Marietta & C. R. Co.* 48 Fed. Rep. 14.)

Contract of Employment—Value of Services—Opinion Evidence—Limitations.

In an action for work and labor performed, it is proper for plaintiff to put to ordinary witnesses hypothetical questions in regard to the value of the services alleged to have been rendered.

Where services are performed under an agreement which does not fix any certain time for payment, nor when the services shall end, the contract of employment will be treated as continuous, and the statute of limitations will not begin to run until the services are ended.

(App. Ct. Ind. *Graves v. Pemberton*, 29 N. E. Rep. 176.)

Injury by Falling of Derrick—Negligence—Follows Servant.

In an action by a servant against a corporation for personal injuries occasioned by the falling of a derrick due to the pulling up of the post to which one of the guy ropes of the derrick had been fastened, which post was set by a workman under the direction of the superintendent, the question whether the superintendent is a fellow-servant is one of law and not of fact.

There was no defect in the derrick, guy ropes, post or piece of timber used to make the post more secure. The derrick was changed from place to place as occasion required and the moving and adjusting it was one of the duties of the workmen. *Held*, that if there was any negligence in the manner of place in which the post was sunk, it was the negligence of the workmen and not of the superintendent as representing the master.

(Sup. Jud. Ct. Mass. *McGinty v. Athol Reservoir Co.* 29 N. E. Rep. 510.)

THE introduction of the electric system in Salt Lake seems to have given rise to a spirit of insubordination and other disregard of the sanctity of old-time things on the part of the local papers there, one of which in speaking of a salt car which the City Railway Company has in use, says "the car is pulled by the might of two of the holy Zebras, left over as spared monuments, and the outfit has a look of hoary antiquity that is simply captivating."

THE KEOKUK ELECTRIC IN TROUBLE.

THE electric lines in Keokuk are having some harder hills to climb along the stony road of unsatisfied claims than even its cars experience in rising from the banks of the great river to the rolling prairies an hundred feet and more above.

On December 8th last the International Trust Company of Boston, holders of \$100,000 of first mortgage bonds, secured the appointment of H. C. Reiner, as receiver, and on February 22d last, an order from the Supreme Court to sell the entire properties on March 21st next. The Central Savings Bank of Keokuk, has a prior claim for a loan used in part purchase of site for power plant. The Trust Company comes next, and then the mechanics' liens. John L. Kenney is appointed commissioner to make the sale at public auction. Plant, buildings, equipment and franchises, poles in the street, everything will be sold. Bids must equal at least two-thirds an appraised value.

Sometime since an effort was made in City Council to declare the franchises forfeited on account of certain shortcomings by the company, but this is prevented by an injunction obtained by the Trust Company.

With a view to saving the property probably, the "Keokuk Electric Street Railway" was incorporated on February 23d, composed of John S. Wise, J. H. Herrick, James H. Anderson, James C. Davis and Joseph Buck, to "acquire, equip, construct, operate, etc." Capital stock \$200,000. Mr. Wise, the attorney, is connected with the Chicago office of the Edison Company. Altogether matters are in a decidedly chaotic condition which it is hoped the sale on March 21st will straighten out, and place the road in even better shape than when it started out so promisingly one year ago.

SIX SAY SLOAN SLANDERED.

ONE of the most unique cases of the many diverse and curious forms of street railway litigation, has been entered against the St. Paul City Railway, by a discharged conductor, or rather conductors, for there are six of him. The cause of action, slander, is a novel one as applied to a corporation, but the law of libel has been construed to apply with equal rigidity to corporations and individuals, hence their liability is the same as individuals, if the plaintiffs establish a case. All six cases are the same, brought by as many ex-conductors, all of whom charge Superintendent Sloan with having said to them at the time of discharge, "You have turned in a short register and have traded transfers." (Exchanged transfers with other conductors, both turning them in as cash collections instead of money.) Each man denies the charge, and the unusual character of the suits will excite no little interest in both railway and legal circles.

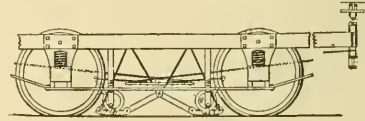
On a Camden, N. J. car a father and mother who had been separated for some time had a fight over the possession of a child, and police interference was necessary to restore order.

HOSE BRIDGE AT FIRES.

THE hose-bridge which was illustrated and described in a recent number of the STREET RAILWAY REVIEW, has been constantly in use by the West Chicago Street Railroad since that time, and has many times proved its value and efficiency. Only recently a fire occurred, on one of the main cable lines, lasting two hours, and which ordinarily would have caused a blockade of traffic, but the company's brigade with the hose racks were quickly upon the ground, and succeeded in raising all the lines of hose, and permitted of the free passage of cars without interruption of but a few minutes. A gong operated from the fire department headquarters is in the barn of the company, and sounds whenever a fire occurs on any of the leading lines.

TURNER'S TRACK BRAKE.

A BRAKE especially designed for use on grades has been invented by George W. Turner, of St. Paul, and which provides for two pair of track brake shoes 12 inches in length and the width of the rail.



The inventor claims that this brake is a quick stop, and avoids the wearing of wheels flat, as is often the case with wheel brakes. The brake is operated by an eccentric motion, actuated by a brake staff in hands of driver.

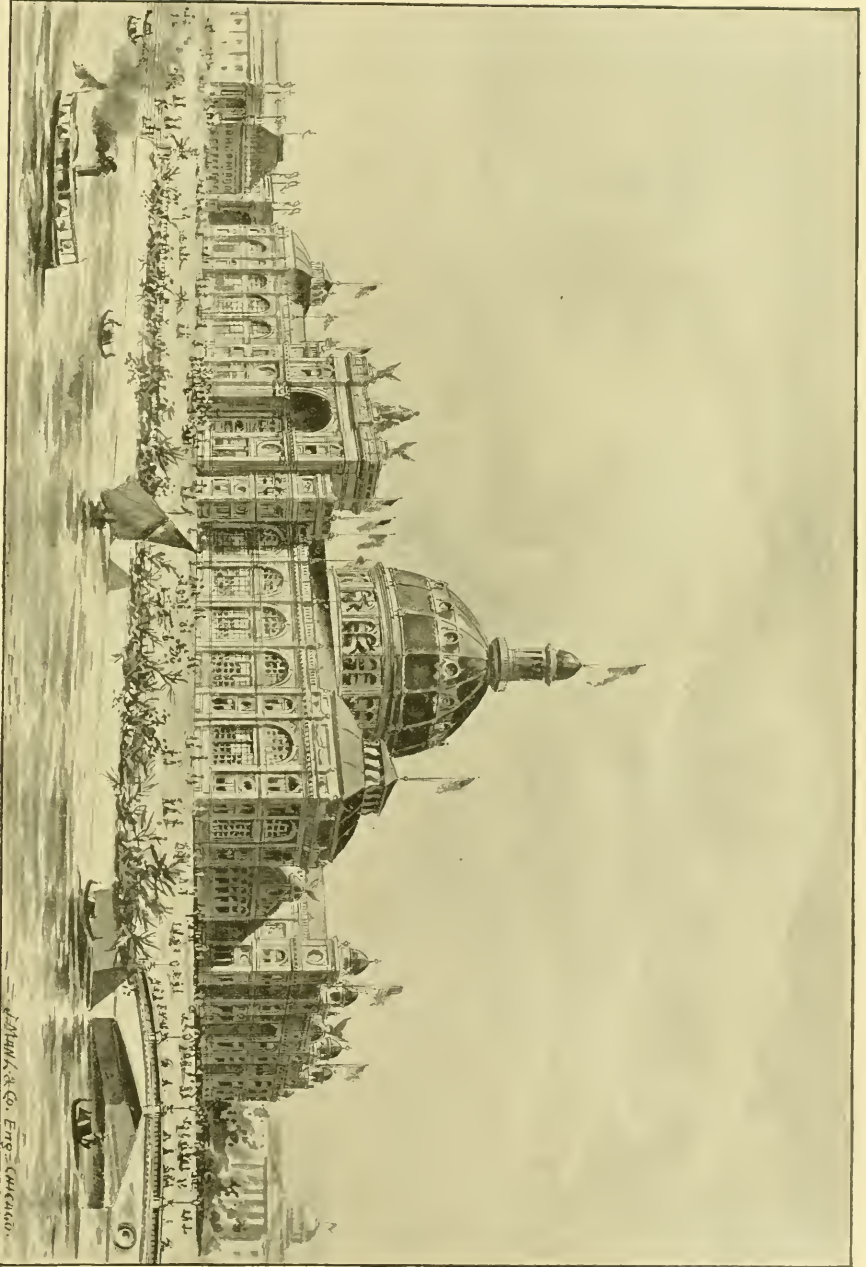
A BALTIMORE LINE SOLD.

THE Union Passenger Railway Company through President Perrin, has purchased a majority of the stock and bonds of the Highlandtown and Point Breeze Railway Company from Philadelphia parties, also agreeing to take the stock and bonds of the minority holders within thirty days at the rate agreed upon should they wish to sell.

The stock of the company is \$180,000, and the bonds amount to \$150,000. The road was built by local capital, but a controlling interest was sold to the Philadelphians some years ago, one-fifth of the stock and bonds being retained.

It is said that the Baltimore holders declined Mr. Perrin's terms and are negotiating for a higher price. The Philadelphia holders it is stated closed the deal at \$109,500 for their holdings, or upon a basis of \$140,000 for the entire issue of stock and bonds.

By an original deed the minority holders are said to be able to demand a sale of the road for the protection of their interests, and the road is advertised to be sold at public auction March 21. Mr. Perrin is in hopes to adjust matters before the sale, if not, he has an opportunity to buy at the sale, and to pay the Baltimoreans their pro rata share of the purchase price.



THE GOVERNMENT BUILDING.

The Government Exhibit Building is located near the lake shore, south of the main lagoon and the area reserved for the foreign nations and the several states, and east of the Woman's Building and of Midway Plaisance. To the northward are the buildings of England, Germany and Mexico. The building was designed by former Architect Windrim. Of classic style it bears a strong resemblance to the National Museum at Washington. Constructed of iron and glass, it is 350 by 420 feet in size, and cost \$400,000. Its imposing central dome is 120 feet in diameter and 150 high, of which, the rotunda will be kept free from exhibits. The building fronts westward and connects on the north, by a bridge over the lagoon, with the building of the Fisheries exhibit. The allotment of space for the several department exhibits is: War, 23,000 square feet; Treasury, 10,500 square feet; Agriculture, 23,000 square feet; Interior, 24,000 square feet; Postoffice, 9,000 square feet; Fishery, 20,000 square feet; and Smithsonian Institute balance of space.

UNDERGROUND FEED WIRES FOR ELECTRIC RAILWAYS.

A paper by J. B. Craven, read before the National Electric Light Association, at Buffalo.

UNDERGROUND construction for railway use is becoming every day a more prominent feature of railroad construction. Overhead mains and feeders will not much longer be tolerated, especially in larger cities, where already the common councils are making it part of a railroad franchise that feeders, at least shall be buried. The trolley wire, being bare, is of necessity left overhead, as safer and more economical, but it behooves us to meet this popular demand of placing all wires possible below the surface, otherwise, we may be compelled to put the trolley wire itself there. Such an order would put the electric railroad industry back for quite a number of years, for not only would it be expensive, but, to my knowledge, no commercial underground trolley system has yet been put on the market.

Underground construction for railroad use brings us many problems to solve. While not using a high tension current, we have one side of our system always grounded, so that between the many miles of cables in use and the earth, we have a difference of 500 volts; thus you see at once the necessity of having and keeping up the highest insulation possible. This question of ground return requires that the insulation resistance of a railway circuit be twice that of an arc or incandescent underground system, where you have a metallic circuit; then there are the constant and excessive strains that one does not meet either in arc or incandescent lighting, due to the throwing off and on the cars. It is almost impossible to figure your feeders to carry the maximum current, so that at any time you are liable to have your cables overloaded, bringing very heavy strains upon them.

Another question is the one of connecting overhead with underground wires. This brings lightning to the field to be guarded against, for the large surface of trolley wire offers an attractive path for lightning, and how to protect the underground feeders and mains has been quite a problem. Lightning has little regard for insulation, seeming to want a path only to earth; this path is offered by the underground cables, so that we have to introduce some arrester at the junction of the underground and overhead wires to give it some other path.

A lightning arrester is placed inside a water-tight iron box on top of a pole, wherever tap is made with overhead wires; this box also affords a good place where overhead and underground wires can be connected and keep moisture from the cables; this is accomplished by wiping a 3 inch lead cup onto the lead of the cable and filling it with insulating compound.

We have in Buffalo about 11½ miles of subways, divided into two trunk lines, which branch off and carry feeders to the outlying districts. Our conduits are laid in cement, 30 inches below the surface of the streets. They are crowned in the center so that the water will drain to

the manholes, which in turn drain to the city sewers, with a bell-trap to prevent sewer gas coming back.

Lately, on account of natural gas finding its way into subway and manholes, we have found it necessary to attach a blower at the station, which ventilates the whole system. Manholes we have placed every 400 feet, and have tried to make the distance standard, as pulling a greater distance brings an excessive strain on the cable when drawing it.

After careful consideration before this work was started, we decided to depend on our cable for insulation, not on conduits made of insulating material. To me it seems impossible to prevent moisture from penetrating the latter system, thereby lowering the insulation. We depend on our ducts for mechanical protection alone.

The cables in use here are lead covered, provided with an exterior fibrous jacket or covering saturated with pitch, the purpose of which is to protect the cables while being drawn into the duct. We have some 45 miles of cables, which have been in use since July last. These are of two classes. One depends for insulation on pure Para rubber, the other on a composition, our shortest feeder being two and a half miles in length, some of the longer ones reaching a distance of eight miles, yet the insulation on none at the present day is below 120 megohms, the short ones testing as high as 1,100 megohms. In laying this cable all tests were made in the testing room at the station; this was made feasibly by the use of a telephone circuit throughout the underground system, so that a workman making a joint in a manhole was in communication with the man making the test and could always find out if his work was satisfactory. The joints made were the standard joints used by the companies from whom the cable was bought.

I may mention also a joint as made in the cable, using composition for insulation. The method here employed differed from the foregoing, in that the lead sleeve is slipped over the completed copper joint, dressed down and wiped, the sleeve then being filled with compound through two small holes tapped through the top, which are afterward closed permanently with a soldering iron. Each feeder, for the purpose of tapping off branches to feed the trolley wire and to facilitate the breaking of cables in case of trouble, is run through a junction box every 1,000 feet. The box shown has eight stubs, which allows three cables to pass through and be broken, and two taps to be taken off for feeding purposes. A small telephone box is placed in each manhole, the terminals of which are all in multiple. A few words in regard to the testing of this system and the difficulties encountered on account of one side being grounded.

We are obliged to test at night, when the load can be thrown off one feeder and onto another; then the feeder is disconnected by means of a switch where it connects

to the overhead, and the test is then made. It is rather a slow process, but the only one left open to us.

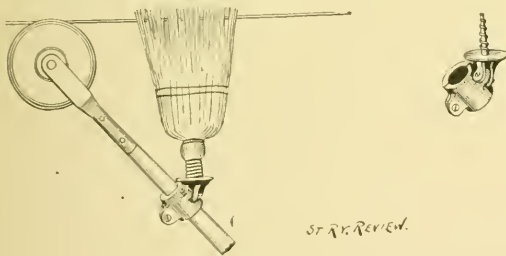
The testing-room is equipped with first-class instruments for practical use. The galvanometer, which is of the Thomson reflecting type, is enclosed within a magnetic shield made of wrought-iron pipe, and also suspended by three springs to absorb vibration. The rest of the instruments consist of a chloride of silver battery, standard resistance and shunt and reversing key. To the left is the telephone communicating with the manholes.

Thus far we have looked upon the difficulties and disadvantages of the underground system. No arguments have been advanced in its favor, but I think you will agree with me that it has some. First, it does away with the public objection of disfiguring the streets, obstructing firemen in their duties, and in the case of high tension currents, a menace to life itself; and then the liability of wires falling, causing a suspension of traffic, and, in case of a storm, causing a delay and loss of thousands of dollars to the company itself.

HOW TO REMOVE FROST FROM TROLLEY WIRES.

USUALLY once or twice during the winter season, managers of electric railways are occasioned more or less annoyance from the forming of sleet and ice upon the trolley wires, and which has to be removed before the cars can operate satisfactorily. It more often happens however, that a heavy frost will form on the wires, and which is far more of a hindrance than that offered by the sleet.

Harry E. Willoughby, electrician in charge of the overhead wires for the East End Electric Street Railway of Cincinnati, has devised an effectual but very simple



little device to remove this frost from the wires. It consists of a movable clamp which he fastens with a screw at any desired point upon the trolley pole; an ordinary clamp with a wood screw on one-half of the clamp, and a common whisk broom is used with the handle cut off close to the butt of the broom splints. A hole is then bored in the wood handle of the whisk broom and the screw screwed into it. It is then ready to be placed in position as desired upon the trolley pole. The whole length of the broom butt and clamp must be as short as possible, although the splints may be as long as occasion may require; the idea being to get it as near the trolley wheel as possible, thereby being suitable to a

great variety of heights of wire. The device has been put in operation in Cincinnati by Mr. Willoughby, and has proven very successful. The illustration given will clearly show the method of its construction. A patent has been applied for.

COMBINATION SMOKING CAR.

A SIX wheeled car with two compartments, one for the exclusive use of the smoking fraternity will be constructed for the Third Avenue, New York and Cable Road, and if it proves to be as satisfactory as



expected, the various car builders will be called on to figure on a large number. The side door shown, opens from both sides of the car into a passageway, extending across the car and opening into each compartment. The "smoking department" is one-third of the car length.

PLANS FOR THE NEW BALTIMORE CABLE PLANT.

DRAWINGS for the power-house of the City Passenger Railway Company to be situated at the northeast corner of East and Baltimore streets, have been completed. It will be one of the most prominent structures in that part of the city. It will be 170x92 feet with finished facades of red sandbrick, with Potomac red Seneca stone sills, lintels and trimmings, rock faced. The basement will contain the foundation for the engine, machinery and tension runs for cables, extending to the streets. The interior of the main floor will be faced with cream colored bricks laid in white mortar and with enameled wainscoting. The building is expected to be completed by September.

ROCHESTER RELEGATES HORSES.

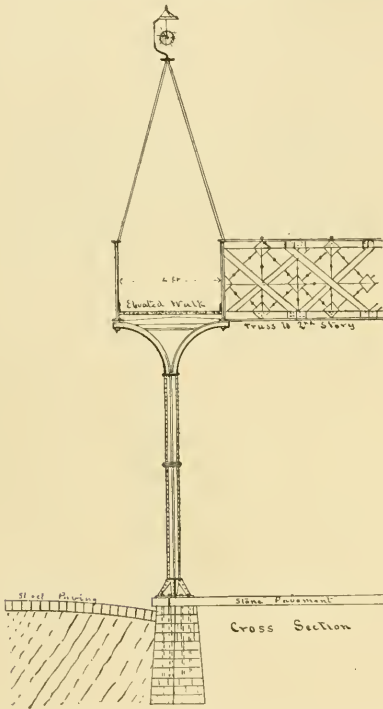
THE Rochester Railway Company. (N. Y.,) offers for sale \$200,000 worth of 6 per cent. gold debenture bonds, issued in 1891, and payable in 1911, with an option to the company of retiring the same on or after March 1, 1901. Coupons are payable in March and September. These bonds are the balance of an issue of \$600,000 debenture bonds, \$400,000 of which were purchased by the directors and their associates for investment.

The proceeds of the sale will be used in completing the electrical equipment of their sixty miles of car lines. Forty-seven are operated electrically, and thirteen miles by horse-power. It is proposed to dispense with horse-power altogether, and put the whole system under a more economical plan of operation.

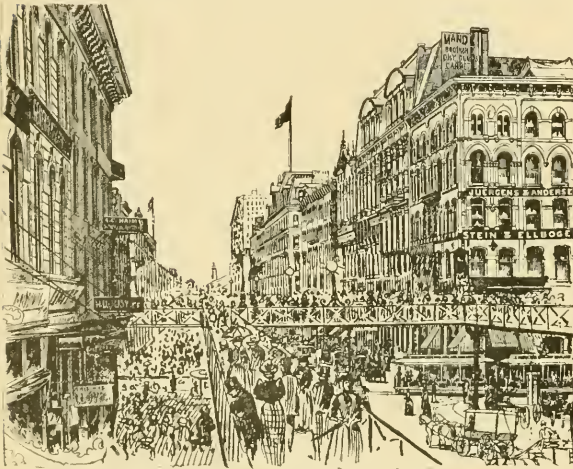
THE amount of new railway work planned for this season is already assuming large proportions.

NICHOLL'S ELEVATED WALK.

IN nearly all of the larger cities of the country, there is a greater or less district in the business centers of the city, where the vehicles in the street, and the throngs of pedestrians, create a congestion of traffic which renders the operation of the street cars one of extreme



difficulty. It is especially true in certain sections of Chicago, and with a view to relieve this congestion, T. J.



Nicholl, a civil engineer of this city, suggests the construction of elevated walks, which are to be carried upon

steel columns of suitable form and strength, placed at the outer edge of the sidewalk next to the curb, and resting upon suitable foundations of masonry and strongly anchored thereto. The upper end of the column to be spread in the form of a double "Y," the arms of which extend longitudinally and traversely to support the superstructure, the floor of which should be 16 feet above the sidewalk. The walk proper is suggested to be 6 feet wide and the railing light, strong and ornamental, and it is not believed that a structure of sufficient strength to support 400 pounds to the square foot would be sufficiently heavy to offer any objection in darkening the walk and stores below. Spans of a single arch should cross the street at corners, or if desired, midway in blocks, so as to afford easy communication between all parts of the street, it being intended to have the walk on both sides. If desired, property owners could construct an entrance to their second stories direct from this sidewalk, and thus secure the advantage of extra facilities on that floor. Mr. Nicholl estimates the cost of the undertaking at \$10 to \$15 per lineal foot. For ladies and children especially, who are timid about venturing across the crowded thoroughfare, the plan would have special attractions, and the scheme contains many excellent points which will readily suggest themselves to every reader.

THE SAMSON BRIDGE CHAIR.

IN our illustrated description last month of the Samson Bridge Chair, we inadvertently omitted the name of the manufacturer, which is the Tramway Rail Company. Lewis Block, Pittsburg. The large number of inquiries which have come to this office asking the address of the maker, indicates the interest which this new chair has awakened among street railway men throughout the country. We are informed that the demand for this chair has already reached surprisingly large proportions, and that the department of the works in which this chair is made is being crowded to its utmost capacity to keep up with the demand.

A LARGE INCREASE.

"ACTIONS speak louder than words," it is said, and sometimes figures tell even more forcibly than a long description, of what modern ideas will do. One of the lines at Paterson, N. J., which was changed to electricity last year, shows the following comparative business for three years as follows.

Comparison of January for three years past as follows:
 January, 1890, 5 horse cars, 41,113 passengers,
 " 1891, 6 horse cars, 51,566 passengers,
 " 1892, 7 electric cars, 96,388 passengers.

As the increase of population in that part of the city from which the line in question gets its business, has not been anything like the ration of increase shown, almost the entire credit for the gain must be given to the change from horses to electricity.

A STREET RAILWAY GAS WELL.



We have heard of a good many street railways being started on wind, but President George B. Kerper's road at Findlay, Ohio, enjoys the exclusive distinction of possessing its own gas well. Although many of the wells in the Ohio district have been failing for the last two years, it did not deter the company at Findlay from making a contract with experienced well drillers, and boring down into the bowels of the earth in search of their own fuel.

The well is 1,143 feet in depth, the last 37 feet having been drilled through the Trenton rock, beneath which are the gas pockets. A 2-inch line extends from the well to station, a distance of 200 feet, and a regulator in the power-house is so adjusted as to furnish a four-ounce pressure under the boilers. If that amount is at any time in excess of what is needed, it can be easily cut down by reducing valves in front of the boilers, and operated by the fireman. A gate at the well shows a pressure ordinarily of 135 pounds rock pressure when shut in, and will average from about 90 to 100 pounds when everything is in motion. Although the well is in a territory that has been drained very severely, and there are five gas wells within a circuit of less than a mile, the present one is a great success, and produces 300,000 cubic feet per day, of which only 50,000 are required to operate the power-house of Mr. Kerper's electric road.

In order to utilize the full capacity of the well, a company has been formed known as the Hancock Light & Power Company, which will install a lighting plant and furnish light and power. The directors are: G. B. Kerper, C. D. Kinney, D. H. Coons, J. A. Bope and Charles F. Smith. The officers are Charles F. Smith, president and general manager, C. D. Kinney, treasurer, and J. A. Bope, secretary. Although the well was quite expensive to secure, it insures a supply of fuel absolutely without further cost, and not only is sufficient to generate all the steam required, but to heat the offices and other departments of the company's buildings.

The gas flowing from the well is of unusually good quality, and the undertaking an unqualified success.

CAUSE AND EFFECT.

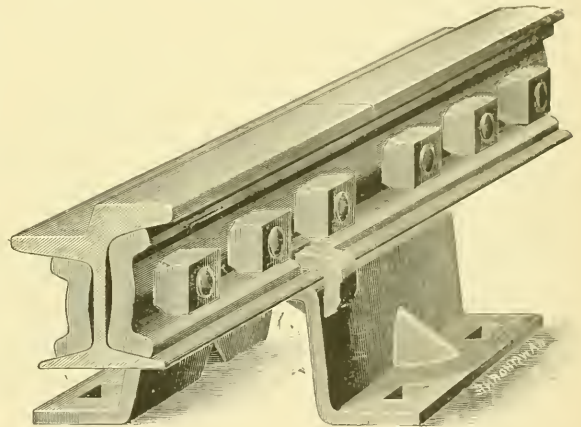
THE negotiation for the sale of the Fort Wayne and Elmwood Railway lines of Detroit to an eastern syndicate, which has been under way since January, has been declared off. It was the intention of the syndicate to turn the various lines into an electric system, but the hostile attitude and grasping spirit of the city council have alarmed capitalists who now withdraw, not daring to make the investment.

SMOKING cars are attached to the early morning electric trains in Adams, Mass., and are run between the city and North Adams, at extra high speed, and carry a large business.

A NEW SPLICE BAR.

THE making of a good street railway rail splice begins with and depends upon the design of the rail and should be formed at such angles that the fitting portions of the splice will be gradually pressed to a solid bearing by the impact of the bolts. Bad joints are generally the result of light, flimsy splice bars which do not fit the rails they are bolted to, and further in the use of light insufficient bolts of inferior manufacture. The Samson Bridge Joint is designed to obviate these difficulties, in that, the top and bottom portions of the splice bars have a bearing against the rail on both sides. The great importance of this will be apparent when it is remembered that at the instant when a wheel passes from one rail to another, these side fittings have to sustain the entire weight of the traveling load.

The splice shown here is 25 inches long and $\frac{5}{8}$ inch thick of rolled steel, and the bolts are the patent grip



thread with square nuts which lock themselves in place. With a 4-bolt splice, the failure of any one of the bolts necessarily destroys the entire usefulness of the splice; whereas having six bolts it is possible to have two of them fail and the joint still preserve its integrity. The bolts used in the joint in question, cost double the price of the ordinary track bolt, but the selling price of the complete joint is no higher than the poorer kinds. The splice bar is the invention and manufacture of the Tramway Rail Company of Pittsburg.

The joint is shown in the illustration as resting on their 7-inch clip chair, the whole affording a most simple, lasting and perfect joint, and a combination which is receiving the highest endorsement by leading managers throughout the country.

If a street car should operate at the rate of sixty miles an hour even, it would not facilitate the rapid transit of the woman who stands in the door and refuses to move up when a lot of people are waiting to enter the car.

BALTIMORE capitalists are buying heavily in street railway securities.

ELIHU THOMSON.

AMONG the names of electrical and scientific men most prominent at the present time before the world, doubtless few stand higher and are better known than that of Elihu Thomson, whose portrait appears on the opposite page. He was born in Manchester, England, in 1853, removing to this country with his parents in 1856, and settled in Philadelphia, where he received a fine education.

As a mere boy he was much given to study and was ever on the alert to discover and apply new schemes and models for mechanical application. At the age of twelve he became greatly interested in electricity and eagerly sought all possible information from the various text-books and works on natural philosophy which were at that time available. He also constructed for himself a complete Morse Telegraph circuit with instruments, batteries, etc., winding his own magnets, the wire of which he insulated by wrapping cord around the bare copper.

By the time his high school course was finished, young Thomson may be said to have thoroughly mastered electricity as far as it had advanced at that time, but he seems to have realized that little progress had then been made and that the future of electricity was at that time an unknown quantity. With a view to better prosecuting his electrical investigations he took a special course in chemistry in Philadelphia, and made a special study of testing iron, copper and other metals. Following this he was elected assistant in the chemical department of the institute where he had been a student and which position he filled until 1876. In the meantime, he had been appointed professor of chemistry in the Artisans' Night School of Philadelphia, and during this time delivered a course of lectures on scientific subjects, which attracted no little attention.

This position furnished unusual facilities for study, and experiment along the line in which he was so intensely interested, and also enabled him to become familiar with such kindred subjects as photography, microscopy, metallurgy and the like.

When at the age of 23, which was in 1876, he was elected to fill the chair of chemistry and physics at the Central High School at Philadelphia, which position he held until his resignation in 1880, when he became electrician to the American Electric Company, of New Britain, Conn. This finally developed into the well known Thomson-Houston Electric Company, of Lynn, Mass.

As long ago as while professor of the Philadelphia High School, Mr. Thomson built his first practical dynamo, doing all the work himself, and succeeded in securing sufficient power to run a small arc lamp. This so encouraged him that he decided to give his whole attention to electrical matters, and it was this which brought about his resignation of the professor's chair and his removal to New Britain.

In the winter of 1877-8 in conjunction with Professor Houston he served on the committee of the Brooklyn Institute on dynamos and electrical machines. In this con-

nection and for the first time much valuable information was made public, and the reports were read with the greatest interest by scientific men in all parts of the world. In 1878 Professor Thomson visited the Paris Exposition for the special purpose of studying the electrical exhibits, and returned to America to apply himself with greater industry than ever to his own work, and in 1878-9 he applied jointly with Professor Houston for a number of patents on electric lighting devices. This was the foundation of the present Thomson-Houston Electric Company, whose electrical products are to be found in almost every portion of the civilized world. It was largely through Professor Thomson that this company gained the prominence which it now occupies. In 1883 the company removed their works to Lynn, Mass., where the facilities which had hitherto been restricted were very largely increased.

Notwithstanding the fact that so many hours were daily occupied in study and inventive work, Professor Thomson found time to contribute quite freely to the scientific journals of the country and his papers have been most valuable contributions to electrical literature.

At the recent Paris Exhibition he was awarded the Grand Prix for electrical invention, and was also made Chevalier and Officer of the Legion of Honor at the same time.

During the past two years he has made a special study in the line of large dynamos, mining and railway motors, and electrical welding, which is now being so wonderfully demonstrated by the Thomson-Houston Electric Welding Company.

THOSE "GOOD OLD DAYS."

TO the end of time there will always be a large delegation of individuals who yearn for the superior advantages which existed a half century before. To such the conveniences of modern life are found wanting in the balance. But occasionally—only occasionally is there found a real scion of aristocracy who is honest enough to appreciate the good things of life.

Such an one, says the Boston Gazette, was sitting next a man who was grumbling. It was in one of the fine electric cars recently put on the Bartlett street line. The complaining passenger received an eye-opener, however, when the little old man opened up with "I remember when the coaches were the only conveyances to the Highlands. Some nights I would have to wait an hour on a street corner, while a dozen crowded omnibuses passed me, before I could get even an opportunity to ride home on the step of a packed vehicle; and for this miserable accommodation I had to pay a fare of 12 ½ cents." Those who remember the narrow little omnibuses, filled with steaming humanity, with ladies sitting on the gentlemen's knees, certainly have reason to be thankful that they have the roomy, brightly illuminated electric cars. The contrast between the old and the new method of conveyance is as sharp as that between darkness and light.



ELIHU THOMSON.

HYGIENE AND VETERINARY.

Edited by F. T. McMahon, Veterinary Surgeon, Chicago City Railway Co., World's Columbian Exposition, and Chicago Police and Fire Departments.

SINCE there are such a great number of horses working on the surface roads throughout the different cities, it becomes my duty as a veterinarian, to give encouragement to each company to employ the best talent they can produce to select and manage their live stock. It should be the work of the veterinary surgeon to select and overlook the handling of green horses during acclimation. He should note carefully the special ailments the street car horse is subject to from the nature of the work, and to see that they are relieved and treated by the most scientific methods, and such as will result in the quickest recovery, by using mild in preference to severe methods. To accomplish this purpose and keep the animal at work rather than laid up in the hospital undergoing some exhaustive experiment under the hands of the non-experienced person, who happens to have charge of such stock should be the aim.

SELECTION.

For this work the person should be quite familiar with the external form of the horse, as well as the anatomical parts, and normal from abnormal, as well as pathological conditions that may exist.

He should select an animal past 6 years old, that stands 15½ to 16 hands high, and weighing about 1,100 pounds when in good working condition.

The anatomical features to be noticed are a well shaped head and good eyes, the neck deeply set from the shoulders and arching from the withers, the back not too long, the hips wide, the ribs set well out and rounded, the fore legs set well apart with long bones well expanded at each extremity, good sized knees and fetlock joints, the metacarpal bones or cannon flat, the pasterns obliquely set and springy, to lessen the jar while traveling over the stone paved streets. The foot with circular toe and wide set heels, sole evenly concave, as they are not so liable to split, which is a very common disease to the street car horse, on account of the concussion they are subject to on the stone roads.

The hind limbs with long thigh and well developed muscles, the hock not too crooked, well developed but flat. It seems impossible to follow the standard I have given, but I think we should act as teachers to our stock-breeders and show them, that well formed stock can be raised at the same cost price, and bring them better prices in the market and give better satisfaction to the purchaser.

MANAGEMENT.

This would include the cleanliness of the animal and the surroundings of the stable, feeding, breaking to work and amount of labor daily to be performed. Cleanliness of the animal to be accomplished by good grooming, and of the stable by water tight floors with enough incline to drain off well, moisture taken up by the use of lime sprinkled on the floor daily, the walls, ceiling and stalls whitewashed

often. We have many good disinfectants and deodorizers. Sulphated iron is a very good one, using one pound to about eight gallons of water, it undergoes oxidization or decomposition and is converted into sulphurous acid solution. It is the cheapest, is odorless and easiest managed of our disinfectants. Lime is also valuable, as it is a caustic alkali, and destroys the acid odors that arise from fermentation of such prepared food as the animals have left in their feed box or scattered on the floor of the stall.

Over-crowding stables should be guarded against. A horse requires a great amount of pure air. Allow plenty of ventilation by having enough windows situated above the horse's head.

The stock should be divided into sections as follows: Those fitted for work. Those laid up for accidents, lameness, or internal diseases. A reception for green horses to remain till broken in and acclimated, and a separate place entirely for animals suspected with contagious diseases to be quarantined. This should not be connected in any way with the other stables.

FEEDING.

It would be impossible if not impracticable to feed a great number of horses at one stable on hay and oats without preparation.

Therefore a system has been devised to chop or cut the hay and grind the grain; generally using a mixture of corn and oats. It is prepared by wetting enough for the hay to take up the meal. Each animal is allowed from fifteen to twenty pounds of meal and ten pounds of hay daily, depending on size, appetite, condition, etc.

Salt should be used daily; in my experience I found where salt was least used the animals were more subject to colic, I would not however say that colic arises from the absence of salt, though we know salt has an important office to fulfill in the stomach, that of going to form the hydrochloric acid of the gastric juice. We also know that when a deficiency of the gastric juice exists in the stomach, digestion of the albuminoids of the food taken in will be diminished, and thus a portion of the food is passed off undigested, setting up more or less irritation as it passes through the digestive tract. We also know the gastric juice acts as an antiseptic and when deficient in quantity allows the food undigested to run on to fermentation, thus adding another factor for the production of colic.

We also know that nature has given the animal a most perfect set of molar teeth to masticate the food perfectly before swallowing it, when the animal draws his feed, as hay, from the rack at his leisure he seems to keep in better health. This is accounted for by all the organs operating in unison. We therefore conclude that artificial or prepared food is one if not the principal cause of so much dyspepsia and colic that is common to street car horses.

DISEASES.

The street car horse is subject to all known diseases. I will speak of those most common in this class of horses, as catarrhal fever, strangles, pneumonia, colic and acute indigestion.

Catarrhal fever is common among street car horses, and it is of great consequence to distinguish it from pneumonia. for if a course of treatment intended for most cases of pneumonia be carried too far it generally terminates in death.

To an attentive observer such a mistake is unlikely to happen. the early prostration of strength which generally accompanies catarrhal fever seldom follows pneumonia. The pulse is by no means to be depended upon; although it is often small and frequent, yet it often has the wiry, oppressed and indistinct feel usual in pneumonia. The disease generally commences with a chill or rigour which is frequently not observed. then increased heat with hurried respiration. At this period however a skillful veterinary surgeon should be called, as the animal requires a careful course of treatment, as the disease affects some of the most vital organs of the body.

STRANGLES

Is an eruptive fever peculiar to the horse, and shows itself by the formation of a tumor in the submaxillary space, (under the jaw) generally, but tumors may form in any part of the body, when it is called irregular strangles.

The treatment consists of plenty of pure air, keeping the animal warm, and giving stimulants and diuretics, as spirits nitre one ounce every three or four hours, and one-half ounce of nitrate of potash twice daily. Counter-irritation to the throat may be used in the form of mustard poultice. When pus forms, open the abscess, then inject with tepid water.

Colic is of two forms, spasmodic and flatulent.

Spasmodic colic is a spasmodic contraction of the muscular fibres of the intestines. It is treated by the use of opiates, as laudanum, sulphuric ether, morphine, etc.

Flatulent colic and acute indigestion are accumulation of gases in the stomach and intestines. The treatment consists of laudanum, carbonate of ammonia, turpentine, raw linseed oil, etc. Puncturing the intestines gives instant relief, and I can not recommend it too highly, but it must be done by a skillful hand and at the proper time.

Laminitis is inflammation of the sensitive parts of the feet, and is commonly called founder.

The treatment I have found most efficient for these cases is to remove the shoes and stand in hot water for one or two hours, after which envelope the feet in poultices of linseed meal. Give a good bed and encourage the animal to lie down. While the acute symptoms are on you may give tincture of aconite in ten drop doses every two hours for two days. The animal generally makes a speedy and perfect recovery.

BUNDLES, packages and surveyors' tripods, are again eligible to passage on the Boston street cars.

THIRD INTER-URBAN LINE BETWEEN ST. PAUL AND MINNEAPOLIS.

SOMETIME after the Selby Avenue Cable Line was changed into an electric line from Milton street west, the property owners, who had contributed the \$100,000 bonus for the extension of the cable to Merriam Park, became dissatisfied, and finally appointed a committee to lay their grievances before Mr. Lowry. The committee consisting of Col. R. M. Newport, J. L. Forepaugh and E. G. Handy, had an interview with Mr. Lowry and General Manager Scott, and as a result the railroad people made several propositions, one of them involving the extension of the electric line over to Minneapolis and there connect with the Minneapolis street car system.

The new line will be built as soon as possible, if satisfactory to the contributors of the bonus, of which there is little doubt, as a line commencing down town and running through the business part of the city and a thickly-settled resident section, to Minneapolis, will convey more passengers than one which merely runs to Merriam Park.

A NEW KIND OF SHOCK.

THE driver of an electric car between Fort Snelling and Minneapolis recently had a very interesting experience. As the car was proceeding on its way, a run-a-way team which had been attached to a farmer's wagon came tearing down the track and headed straight for the car. The driver at once applied the brake and reversed the motor, but too late to avoid a shock. One of the horses plunged over the front dash and through the door, falling dead on the floor, added to the consternation of the dozen or more passengers. The driver occupied an inclosed platform and barely escaped instant death, as all he could do was to squeeze up against one gate as the infuriated animal charged the car. It was one of the liveliest and most unusual accidents on record.

OREGON CITY'S ELECTRIC ROAD.

A NEW East Side electric line will soon be commenced, and completed within a year. It will run from Portland, Oregon, to Oregon City, passing through Milwaukie, Sellwood, and intervening towns.

The survey has been entirely completed. C. W. Brown is the promoter of the enterprise and will begin active operations on the receipt of proceeds from the sale of the Madison Street bridge, if it is accepted by the free bridge commission. His present line runs to the city limits on Hawthorne Avenue, no franchise will be necessary for the extension outside.

The plant will be located at Oregon City, where the falls will furnish the necessary power, and a large storage provided in Portland.

It is calculated to carry both passengers and freight, and no trouble about the right of way is anticipated, as it will greatly accommodate the farmers and fruit raisers, bringing their produce to the Portland markets direct.

A CHAPTER ON ROPES.



ROPE'S end may be either the paper mill where it undergoes a wonderful metamorphosis and emerges to enter an entirely different field of usefulness, or it may consist of a number of worn out untwisting strands, upon which the owner looks with mingled

impatience and disgust. The great variety of supplies which enter into the operation of a street railway is little dreamed of by those not engaged in its daily work, and such even would be surprised at what the list could be made to include. From earliest beginnings, however, ropes have played an important part, and at times have given service obtainable in no other way. From the old rope harness, or even the rope traces now so largely used on horse roads, to the ponderous power transmission rope, is a long distance, and the intermediate uses of rope, by a street railway are manifold. Not a barn, car house or power station but its employes might know more about this subject. The accompanying illustrations and information then, and the splice directions, which are kindly furnished us by the C. W. Hunt Company, of New York, one of the largest makers of ropes in the world, will find interested readers.

Ropes used in hoisting or for transmission of power are subjected to most severe tests. Ordinary rope chafes and grinds to powder in the center while the exterior may still look but little worn. The fibres of manilla rope are composed of very much elongated cells, and look under a microscope like a bundle of pipes. These are of great strength in the direction of their length, but are weak transversely, not being strongly cemented together.

To obtain fibres of suitable size for making rope, the stems are sub-divided by machinery, separating the cells one from another, and leaving the surface of the fibre rough and uneven: something like the surface shown when pine wood is split. When made into rope, these rough fibres are compelled in bending over the sheave, to slide on each other while under pressure from the load, causing internal chafing and wear, which may be seen when opening an old rope. Open an old rope by untwist-

ing the strands, and a fine powder will be found, showing where the rope underwent this internal friction. To overcome this difficulty the Hunt Company lubricate the fibres with lumbago mixed with tallow, which lubricates the yarns of the rope and also lodges in the uneven places of the fibres, making the rope partially waterproof. After running a short time, the exterior of the rope is compressed and coated with the lubricant, so that it looks when running like a rod of iron. In manufacturing rope, the fibres are first spun into a yarn, this yarn being twisted in the direction called "right hand." From twenty to eighty of these yarns, depending upon the size of the rope, are then put together and twisted in the opposite direction, or "left hand" into a strand. Three of these

strands for a three strand, or four for a four strand rope, are then twisted together, the twist again being in the right hand direction.

It is this opposite twist that keeps the rope in its proper form. When a weight is hung on the end of a rope, the tendency is for the rope to untwist and become longer. In untwisting the rope, it would twist the threads up, and the weight will revolve until the strain of the untwisting strand just equals the strain of the thread to be twisted

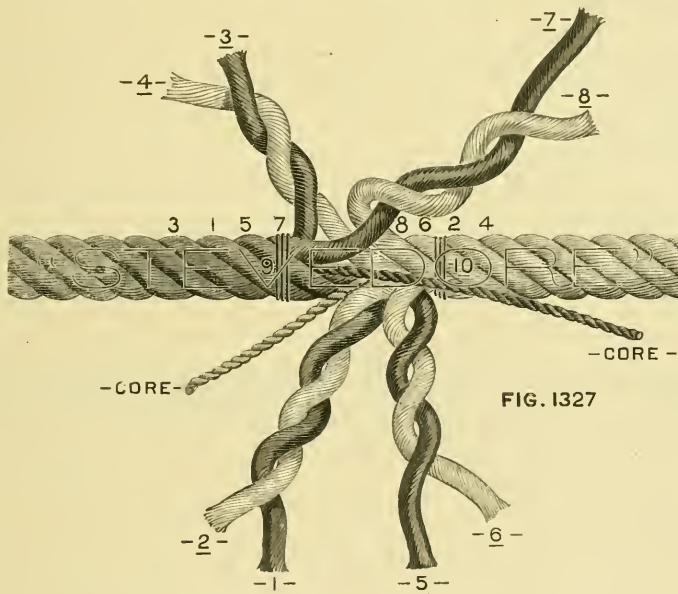


FIG. 1327

together. In making a rope, it is impossible to make these strands exactly balance each other. It is this fact that makes it necessary to take out the "turns" in a new rope, that is, untwist it, when it is put to work. The greater the twist, the harder and more rigid the rope is, and the better it will keep its form, but this is somewhat at the expense of the strength, because the fibres do not lie exactly in the direction of the center of the rope but at an angle with it, and the greater the twist, the greater is that angle; the difference, however, in practice is not great. To properly splice a rope or to tie a knot that will not slip, is a less difficult operation than many suppose. In a transmission rope, the splice is not only the weakest part, but is also the first to fail by breakage or pulling out of the splice. If the rope is larger at the splice than elsewhere, the projecting parts will wear on the pulleys, and the rope fails from the cutting off of its strands. A rope will frequently be injured from this cause before discovered or suspected.

SPLICING.

To splice a 13/4 manilla rope, first tie a piece of twine, 9 and 10 around the rope to be spliced, about 6 feet from each end; then unlay the strands of each end back to the twine, butt the rope together and twist each corresponding pair of strands loosely to keep them from being tangled, as shown in cut No. 1327.

The twine 10 is now cut, and the strand 8 unlaid and strand 7 carefully laid in its place for a distance of 4 1/2 feet from the junction.

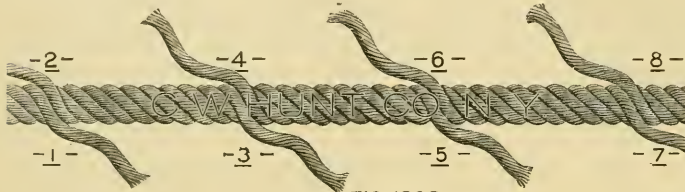


FIG. 1328

The strand 6 is next unlaid about 1 1/2 feet and strand 5 laid in its place.

The ends of the cores are now cut off so they just meet.

Unlay strand 1, 4 1/2 feet, laying strand 2 in its place.

Unlay strand 3, 1 1/2 feet, laying in strand 4.

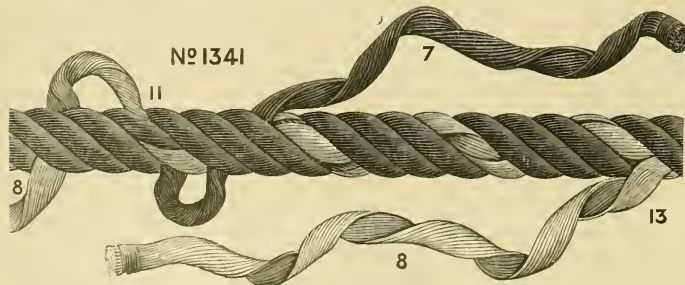
Cut all the strands off to a length of about 20 inches, for convenience in manipulation.

The rope now assumes the form shown in Fig. 1328, with the meeting points of the strands 3 feet apart.

Each pair of strands is successively subjected to the following operation:

From the point of meeting of the strands 8 and 7, unlay each one three turns; split both the strand 8 and the strand 7 in halves as far back as they are now unlaid and the end of each half strand "whipped" with a small piece of twine.

The half of the strand 7 is now laid in three turns and the half of the 8 also laid in three turns. The half strands now meet and are tied in a simple knot, 11 (engraving No. 1341) making the rope at this point its original size.



No 1341

The rope is now opened with a marlin spike and the half strand of 7 worked around the half strand of 8 by passing the end of the half strand 7 through the rope shown in the engraving, drawn taut, and again worked around the half strand until it reaches the half strand 13 that was not laid in. This half strand 13 is now split,

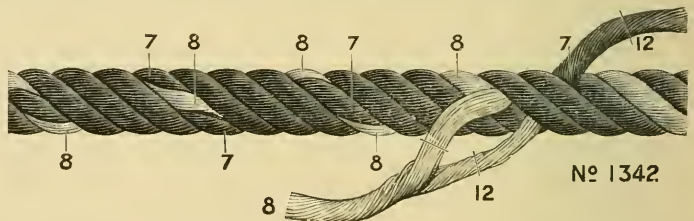
and the half strand 7 drawn through the opening thus made, and then tucked under the two adjacent strands, is shown in cut No. 1342. The other half of the strand 8 is now worked around the other half strand 7 in the same manner. After each pair of strands has been treated in this manner, the ends are cut off at 12, leaving them about 4 inches long. After a few days' wear they will draw into the body of the rope or wear off, so that the locality of the splice can scarcely be detected.

KNOTS.

A great number of knots have been devised, of which a few only are illustrated, but those selected are the most frequently used. In the engravings they are shown open, or before being drawn taut, in order to show the position of the parts.

The principle of the knot is that no two parts, which would move in the same direction if the rope were to slip, should lay along side of and touching each other.

The bowline is one of the most useful knots, it will not slip, and after being strained is easily untied. It should be tied with facility by every one who handles rope. Commence by making a bight in the rope, then put the end through the bight and under the standing part as shown in G, then pass the end again through the bight, and haul tight.



No 1342

The square or reef knot must not be mistaken for the "granny" knot that slips under a strain. Knots H K and M are easily untied after being under strain. The knot M is useful when the rope passes through an eye and is held by the knot, as it will not slip and is easily untied after being strained.

The timber hitch S, looks as though it would give way, but it will not; the greater the strain the tighter it will hold. The wall knot looks complicated, but is easily made by proceeding as follows: Form a bight with strand 1 and pass the strand 2 around the end of it, and the strand 3 round the end of 2 and then through the bight of 1, as shown in the engraving Z. Haul the ends taut when the appearance is as shown

in the engraving AA. The end of the strand 1 is now laid over the center of the knot, strand 2 laid over 1 and 3 over 2, when the end of 3 is passed through the bight of 1, as shown in the engraving BB. Haul all the strands taut as shown in the engraving CC.

By reference to the illustration of the power driving

machinery of the Portland Cable Railway on another page, it will be seen that the shaft of the driving drums is turned by an immense pulley, the power for which is transmitted from the engines by twelve large ropes. The large power station of the West Chicago Street Railroad, driving the down town loop, the work of which is the most severe of any section of cable road in the world, is a rope drive. So also are the generators of the Union Trunk Line Electric Railway, Seattle, rope driven, as illustrated in our issue of October, 1891. The advantages are freedom from noise and a positive, even drive, and it is claimed can in many instances be made a more economical installation: while, with usual care the life of the rope is of satisfactory duration, though requiring much more room than a gear drive.

As in cable railway practice, so in all uses of a rope where it is passed over a pulley or sheave, — the larger the diameter of the sheave the longer the life of the rope. For power transmission purposes the sheave should properly have a minimum diameter of forty times the diameter of the rope. As with all other appliances the greatest amount of usefulness can only be obtained by the exercise of intelligent care, and like the horse or engine—use them well and they will serve you faithfully. Ill treatment is expensive and soon comes to grief.

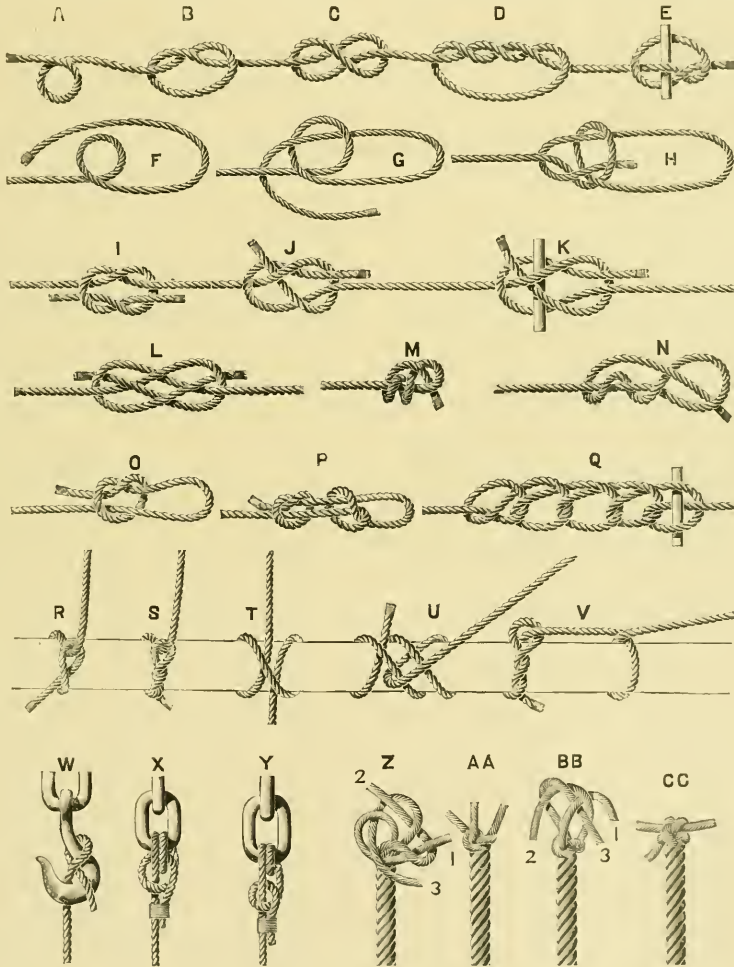
PLANS FOR THE WILMINGTON, N. C., ROAD.

THE Wilmington Street Railway Company has been reorganized and elected the following officers: E. L. Hawks, of New York, President; J. H. Barnard, Vice-President and General Manager; B. F. O'Connor, Secretary, and J. G. White, Treasurer. Authorized capital stock, \$300,000. Paid up, \$100,000.

The motive power is now being changed from horses to electricity. Contracts have been given to the Lewis and Fowler Manufacturing Company, of Brooklyn, N. Y., for cars and rails; also to the Ball Engine Company, of Erie, Pa., for the steam plant complete. The track laying and construction to J. G. White & Company, of New York, who will act also as consulting engineers.

The company have a number of cars and seven miles of track, including one and-a-half miles of steam track, connecting all railways that enter Wilmington. A Baldwin compound steam motor, of the latest pattern, has been purchased to be used in transferring cars and freight.

A NEW and novel "benefit" is announced by the management of the Electric Railway at Jacksonville, Ills., who will auction off tickets for the first ride in the first car when the road is opened, April 1st, 1892.



Copyright 1891, by C. W. Hunt Company, New York.

KNOTS, HITCHES, BENDS.

- | | | | |
|-----------------------------|---------------------------------|--------------------------------|--------------------------------|
| A. Bight of a rope. | I. Square or Reef Knot. | P. Flemish Loop. | X. Fisherman's Bend. |
| B. Simple or Overhand Knot. | J. Sheet Bend or Weaver's Knot. | Q. Chain Knot with toggle. | Y. Round Turn and Half-hitch |
| C. Figure S Knot. | K. Sheet Bend with a toggle. | R. Half-hitch. | Z. Wall Knot commenced. |
| D. Double Knot. | L. Carrick Bend. | S. Timber-hitch. | AA. Wall Knot completed. |
| E. Boat Knot. | M. Stevedore Knot completed. | T. Clove-hitch. | BB. Wall Knot Crown commenced. |
| F. Bowline, first step. | N. Stevedore Knot commenced. | U. Rolling-hitch. | CC. Wall Knot Crown completed. |
| G. Bowline, second step. | O. Slip Knot. | V. Timber-hitch and Half-hitch | |
| H. Bowline completed. | | W. Blackwall hitch. | |

OPERATIONS OF THE SIEMENS & HALSKE ELECTRIC SYSTEM, AND ITS FUTURE IN AMERICA.

BY AUGUSTINE W. WRIGHT.

IT affords me great pleasure to comply with your request to give you the result of my impressions regarding the Buda-Pesth Electric Railway. As you will remember, I was an enthusiast upon the subject of electricity and prepared the report for the St. Louis convention of the American Street Railway Association, on the "Progress of Electricity as a Motive Power."

Subsequent developments did not satisfy me, and I turned my attention to the cable. We have built twenty-three cables. I heard that the great firm of Siemens & Halske had perfected conduit construction in Europe. When our Mr. Meysenburg was in Europe last summer I requested him to visit Buda Pesth where the system was in use, which he did. Siemens & Halske are the pioneers in Europe on Electrical matters. They invented the dynamo, they invented the trolley, they built overhead electric railways four years before we had any in this country. As you know, numerous attempts have been made in the United States to perfect electrical conduit construction, and so far, each one has ended in absolute failure and all have been abandoned.

As soon as cold weather caused the cessation of cable construction in Chicago, I myself, proceeded to Buda Pesth, and was more than delighted with the working of the conduit road there. They are operating their lines at 45 per cent. of the gross receipts, and only receive 2½ cents American money per passenger. This is due to numerous reasons. Their machinery is perfect, the loss in transmission is held down. They are operating their road with from one-half to one-third the power of any overhead system to my knowledge. They claim also, to have the best overhead system in the world, but that I did not examine, as I was chiefly interested in the conduit construction. Having built one line in Buda Pesth and operated it successfully, financially and mechanically, they built three other lines, all four of which I found in successful every day operation.

They are so well pleased with the financial outlook that they are about to spend a large amount of money in additional lines. The question has been asked me since my return to the United States, whether "a slot three-fourths of an inch wide could be used," while the slot in Buda Pesth is one and three-eighths opening. The reason the slot is so wide in Buda Pesth is because almost universally in Europe the grooved rail is used for street railway purposes, and in Buda Pesth they have made the slot opening equal to the ordinary groove in work. No buggies are used in Europe, and no tires are so narrow as so drop in the groove an inch and three eighths wide. Of course in the United States the slot would be restricted to equal the width of the cable system, namely, three-fourths of an inch.

The cost of operation in Buda Pesth compared so favorably with that of the locomotive engines that the company there has already commenced the change of locomotive lines to conduit, and have already altered a portion of the track, and will this coming season complete the change.

Siemens & Halske also applied for a franchise to construct an elevated railway through Berlin, which will probably cost \$50,000,000 American money, which will be operated entirely by electricity.

I neglected to state that while wages are low in Buda Pesth, still the cost of coal is higher. Coal costs there about twice as much as it does in the large American cities, wages are about half. The results of my investigations were so entirely satisfactory that we hope before long to introduce this construction into the United States, and have already organized a Siemens & Halske Company in America, with headquarters in Chicago, and are proceeding now to purchase machinery and the preparations of our shops, wherein we will make generators of large size and other electric machinery. Regarding the cost of the conduit construction by the Siemens & Halske Company, we have not yet prepared our drawings and consequent estimates, but in a general way the price will be the same, if the slot is put in the center of the horse path as in the cable railway. In building any slot in the street, we are compelled to figure to sustain street transit trade, traffic strains, not the strain incident to the car traffic alone. This requires equally strong and heavy construction for an electric road, as required for maintaining the slot opening in the cable, but the electricity can be conveyed from anywhere, and on existing roads, where they have good track, we can build our conduit outside of the track and in that manner save the existing track. This of course would be much less expensive than to construct the entire track "de novo" and put the slot in the center, and it may be found advantageous ultimately, to construct the electric roads in this way. In Buda Pesth, the slot is directly under one rail, the outside rail of each double track. The objection to using the outside rail, is the large amount of street drainage that you catch in the conduit through the open slot.

All mechanical and electrical difficulties in the operation of this conduit construction have been overcome and solved during the operation of these four lines in Buda Pesth. I was particularly struck while in Buda Pesth by the difference in the German and American methods of introduction. For instance, as we all know in America, as soon as an electrician has evolved an electrical idea in his brain, he immediately commences the manufacture of the same, and sells it to the public as the "latest achievement" whereas a few months use will often demonstrate its disadvantage.

In Buda Pesth I found the gearless motor in operation on part of their cars, and I asked them "How does it work?" They replied, "Very well, Mr. Wright, but it has only had eight months' test, and we are not yet prepared to state that it is everything that we desire, and we are not yet offering it to the public." Of course, had this method of doing business been adopted in the United States the electrical system would have been years behind its present development, but this system has cost the consumer many millions of dollars.

In our Chicago works we propose to "crawl" before we "walk" and we feel thoroughly satisfied that the field is ample for all systems of electrical companies, but whatever the Siemens-Halsky Co. of America, may offer to the American public will be the result of the many years experience and great technical skill of the European firm, and drawings and all necessary information will be furnished the American office from the German office.

Regarding the conduit necessary for this electrical construction it will require the same depth as the cable railway, less the size of the carrying sheaves, because in the cable railway, when our conduit shall have filled to the bottom of the carrying sheave, it becomes useless. The electric railway possesses one advantage over the cable system in as much as this conduit can be cleaned by mechanical means, scrapers or brooms attached to the cars, for it is open and free from obstructions from end to end, while our cable conduit is obstructed by carrying sheaves, etc., etc.

The advantage in the operation of curves is too obvious indeed for comment. In the first place, on ordinary right angle curves on a cable road, about 6 horse-power is exerted to operate the cable only. This power will be entirely saved in the operation of the electric road, and no greater percentage of power will be required in rounding the curve on the electric road than on the cable. The first cost of construction of the curve for the electric road will be very much less, (probably two-thirds less), than the cost of curve construction as ordinarily practiced in cable railways. The angle iron used to conduct the electricity is many times larger in sectional area than the wires used in overhead construction, and their relative capacity to convey electricity is many fold greater than the copper wire used in the overhead system. Their surface is so large that the wear is infinitely small to a unit of length. The detailed elements of construction, insulation, etc., have caused a vast deal of thought, but they have been perfected as before stated, so that the road of to-day is no experiment, but one that has been thoroughly tested under climatic conditions similar to a great portion of the United States.

The motors, of course, can be as easily adapted to American car construction as the existing overhead system motor. In point of size, they are about the same as those in use in the well-known overhead systems of to-day, and the same size of motor will be required to be used on the conduit system, because the size of the motor itself is dependent entirely upon the power required to move the individual car and not upon the system. In a future

number of the STREET RAILWAY REVIEW I shall hope to have illustrated the general style of conduit construction.

While the electrical construction of the system will not be changed, the street construction will be materially altered for use in the United States, as our requirements are quite different. The use of the grooved rail, for instance, so general throughout Europe, would be an immeasurable hardship for the railroads of the United States. From actual test it requires from two to four times the power to propel the car over the grooved rail that it does upon the flat-step rail generally used in the United States, because the grooves can not be kept clean from grit, and the roads and streets of Europe are immeasurably cleaner than any that we have for use of our street railroads in the United States, except Washington.

A BIG NEWARK DEAL.

ONE of the largest railroad deals in the history of the State was consummated in New Jersey, recently, in the organization of the New Jersey Traction Company. The capital stock of \$500,000 has all been subscribed for by the incorporators. The specified objects as stated in the articles of incorporation are "to purchase, lease or acquire in any way the street railway franchises and property in the counties of Essex, Hudson and Union, and to equip, extend, improve and operate street railways in these counties and other parts of the State."

The names of the incorporators and stock subscribers are as follows: Benjamin F. Tracy, Secretary of the Navy; John J. Waterbury, President of the Manhattan Trust Company, of New York; Frederick Frelinghuysen, Geo. A. Halsey, John Kean, Jr., of Elizabeth; Jos. Smith, Jr., Bernard M. Shanley, Gottfried Krueger, John F. Dryden, Leslie D. Ward, Thomas F. Kinney, Chandler W. Riker, Peter Hauck, Franklin Murphy, Elisha B. Gaddis, Thomas C. Barr, A. Q. Kearbey, Andrew Le Massena, Jr., Henry Conger, S. S. Battin, John H. Ballantine, William Clark, Edward E. Denniston, Richard W. Clay and Edward J. Moore, of Philadelphia. The new organization has already secured the Newark Passenger Railway and the Rapid Transit Railway Company.

BETRAYED BY A BUTTON.

ON February 13th, the office of the Union Street Railway Company, of Chester, Pa., was robbed of \$78. The jollification that night of three trusted employes excited suspicion. Alexander Dick, one of the trio, was arrested. At the hearing he broke down and turned state's evidence and admitted that they had robbed the office. A button from Dick's vest found in the office led to his arrest.

An exchange sarcastically remarked that a street car line in Leavenworth is to run by compressed air, and that as Kansas has been living on wind for the past five years that this street car experiment is an eminently fitting one.

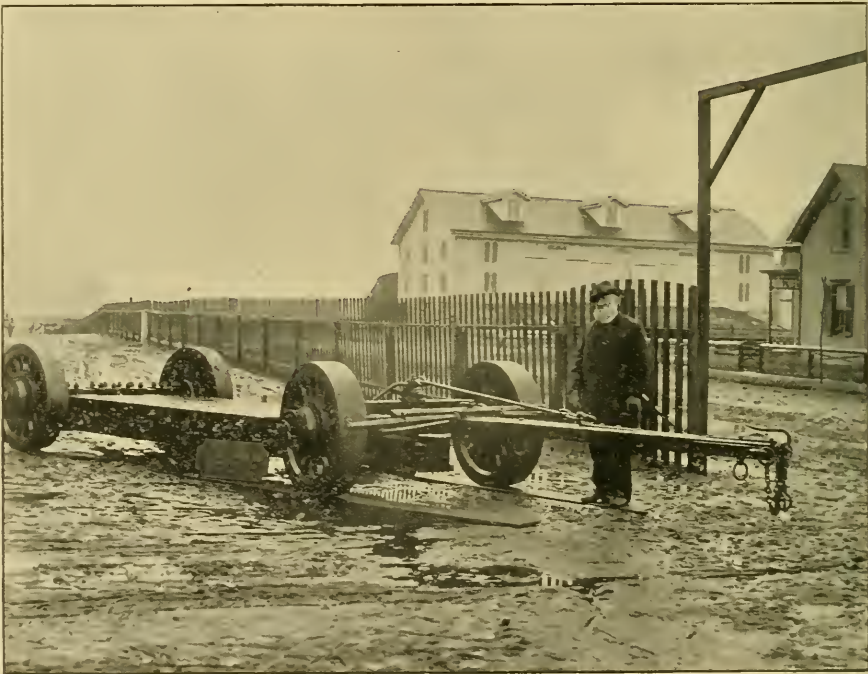
A MONSTER CABLE REEL WAGON.

LAST month we referred to the manner in which a number of the cable roads throughout the country transported their reels of cable from railroad tracks to power house, and below we give an illustration of the large wagon which has just been built for the Cleveland City Cable Railway, of Cleveland, Ohio, by the Miller-Knoblock Wagon Company, of South Bend, Ind.

This wagon is said to possess the largest carrying capacity of any wagon that has ever been constructed. It was designed and built especially for the purpose intended, and is of almost unlimited capacity. The weight of the wagon empty, is 9,000 pounds, and its guaranteed carrying capacity is 100,000 pounds, or 50 tons. The reels of cable as they come from the factory,

pavement. The wagon can be drawn by horses, traction engines or capstan, as may be desired. The company are expecting to do the work with eight teams. The platform is but a short distance above the ground, which enables the easy loading of the reels upon the wagon.

An attempt is about to be made to heat some of the railroad cars of France, by chemicals. The warmth is to be produced by means of boxes of acetate of soda. The chemical is put in a solid state into the boxes, and these are then plunged into hot water of about 100 degrees. The effect is, that the soda becomes liquid, and on being taken out of the water, the boxes are wiped dry and put into the carriage. By degrees the soda hardens, and while doing so, throws out the stored heat, which it is expected will last for upwards of four hours.



often weigh in the neighborhood of 40 tons, and this wagon is intended to carry these reels from the railroad through the streets to the power-house. The length of the bed of the wagon between axles is $13\frac{1}{2}$ feet, and is composed of 4 heavy "I" beams hung under the axles. The side beams are drawn in at the front so that the front wheels can have room to cut in when the axle is turned. The bed is 3 feet 2 inches wide, covered with a 4 inch oak plank, and the axles are 3x6 inches in diameter, of steel, and the two weigh 1,360 pounds. The wheels are 44 inches in diameter, with a 9 inch tread, the tire being $1\frac{1}{4}$ inches thick. The front axle is shorter than the hind one, so that the wheels do not run in the same track, the object of this being to distribute the weight more evenly over the surface of the street, to avoid cutting through

SOLD AGAIN.

PERIODICALLY, there has been for several months past, printed in the New York papers, and extensively copied throughout the country, the statement that all the lines in Cleveland have been purchased by a New York syndicate, with a view to consolidation. A few days ago the same statement was repeated, to the no small annoyance of the Cleveland managers. The report is false as regards the largest companies in Cleveland, which deny anything of the kind or any pending negotiations. The Cleveland roads are too well managed to be improved by changing the seat of power to New York or any other city.

CHICAGO ZEPHYRS.

THE Alley L is making good progress in its condemnation south of 39th street (old city limits) and will open up on time as advertised.

ARRANGEMENT has at last been made between the west and south side roads whereby both will secure their additional down town loops.

THE Connelly Gas Motor is again being tested on the Yerkes' lines. Gas is carried on the car instead of making it enroute as heretofore.

SUPERINTENDENT BOWEN of the south side road has painted in black figures on the headlight of each grip car the number of the street to which each car runs—39, 55, 71, etc.

THE West Chicago Street Railway Company has filed its acceptance of the West Lake street extension ordinance. The extension is from Crawford avenue to Forty-eighth street.

THE Northern and Western elevated road incorporates for only \$10,000,000 to build elevated roads. It is seeking a franchise and promises early construction.

THE L road on Lake street has been sold several times again since our last issue. We almost doubt if the promoters could give it away, let alone selling it. The structure is a disgrace to modern engineering.

A FIRE in the hay loft of the North Chicago Street railway car barns, on North Clark street caused a stampede of the 100 horses quartered there. They were taken out safely, but became frightened and rushed in all directions over the north side, being finally captured and stabled in the different liveries.

THE City Railway will convert this summer about 30 miles from horse to electric power. The lines are all in the districts annexed two years ago, but which are quite densely settled in places. The lines are nearly all "long hauls" and not profitable as operated by horses, and some have lost money since the advance in feed the past year. New track will also be as follows:

Thirty-fifth street, from California avenue to Stanton avenue.

Forty-seventh street, from Cottage Grove avenue to State street, and from Ashland avenue to a point 100 feet east of the railroad tracks at Leavitt street.

Sixty-first street, from Cottage Grove avenue to Stony Island avenue.

A loop for the line of this company at Sixty-third street to the Illinois Central tracks along Sixty-third street to Stony Island avenue, thence to Madison avenue, and thence to Sixty-third street, in connection also with a single track on Grace avenue from Sixty-third to Sixty-fourth street.

A line will also be laid on Seventy-fifth street.

PROGRESS OF THE R. D. NUTTALL COMPANY.

THE history of the expansion of street railway interests during the past five years, includes many inventions and the consequent development of manufacturing plants of mammoth size. The tremendous growth of electric railways has called for supplies of an entirely different character than those which for so many years formed the staple products of the street railway supplyman, and has resulted in increasing the railway managers acquaintance by several hundreds.

Of these no name is better known, or more forcibly illustrates push and inventive ability than does that of the R. D. Nuttall Company, of Allegheny, Pa., and as



R. D. NUTTALL.

the name of Nuttall and the character of his supplies is familiar to every manager, a few words historical, as to this firm and its head will not be devoid of interest.

The business was started by R. D. Nuttall and G. W. Moore, in 1887, in a very humble way, and with a combined capital of not over \$500. What may have been wanting in dollars was more than made up in energy and business ability. At the end of four months Moore parted with his interest to J. C. Summerville who, not having the faith in the future which Mr. Nuttall entertained, sold out in six months to him, and for the succeeding year the firm consisted of but one.

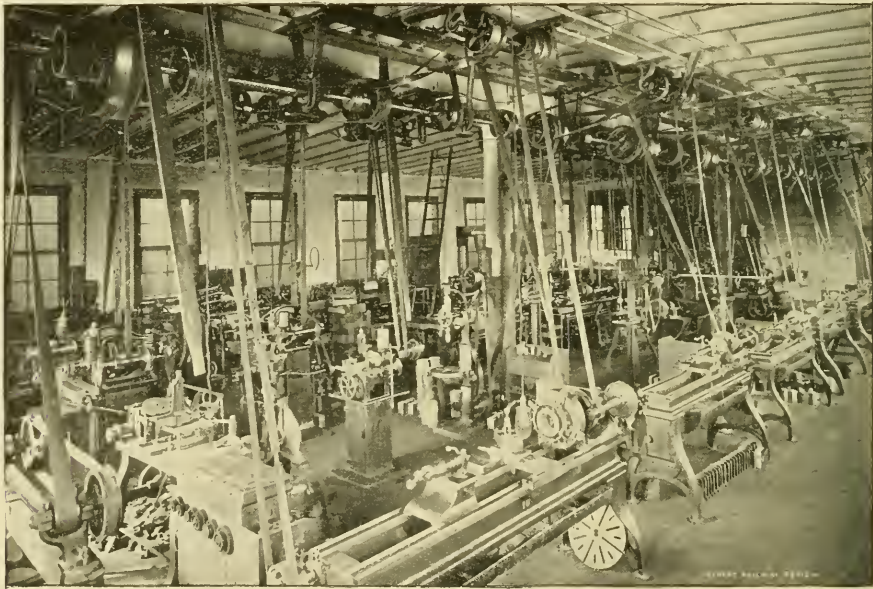
Meanwhile electric railways were coming to the front and orders poured in until the works were crowded to

full capacity and soon were inadequate. On January 1st, 1891, a stock company was formed, with Mr. Nuttall as president and principal stockholder, and the works again greatly enlarged, including the addition to the plant of the most complete line of gear cutting machinery in the country, at a cost of \$50,000.

In addition to gears and pinions the factory turns out large quantities of bearings, commutators, and the Nuttall Steel Trolley pole, all of which have met with phenomenal success, over 2,000 of the trolley poles having been sold since last October, when they were first placed on the market. A new department for the manufacture of armature cores ready for winding has just been added, and at the continued solicitation of many roads another branch of the business will be the winding of armatures. This part of the business will be in operation within the next thirty days.

From the age of 18 to 20 he was engaged in work that took him to all parts of the country, and he served his time as fireman and afterward as engineer on a steam road. Of unusually quick perception he possesses a natural love for mechanics, and it is no unusual sight for the visitor to the works, to find the president's office empty, while a search will discover in a remote corner working away on some improvement or new device, the chief executive of the company, whose greatest pleasure is to wrest from the wilderness of whirling machinery some practical idea and convert it into a useful and servicable appliance.

THE ELECTRIC MERCHANDISE COMPANY, Chicago, is wide awake. It has been so right along as evinced by the number of large contracts lately secured by it, and indications make us believe that it will continue in its present



R. D. NUTTALL COMPANY—COMMUTATOR AND ARMATURE DEPARTMENT.

The wonderful success of a business, which in so short a time has grown from nothing to one of the largest of its kind in the country, has been almost wholly due to the indomitable energy and executive ability of the founder, and who to-day, while one of the youngest manufacturers in the country has had an active and varied experience.

R. D. Nuttall was born in 1863, within twelve miles of the city of Pittsburg, and brought up on a farm, where he lived until 14 years of age. At that time he was apprenticed to the machine trade, and from the day when first he entered on the work has been entirely dependent on his own resources. His success, phenomenal for one of his years, has all been worked out by individual exertion and effort, and he can justly claim all the credit of a self made man.

wakefulness. The agreeable business methods, the high efficiency of all its supplies and its remarkably low prices make this company a popular house among contractors, builders and owners of electric railways. Superintendents throughout the country turn to it in emergencies; they know both by experience and reputation its reliability. The favor in which the supplies of this company are held is shown by the fact that in several recent contracts its overhead equipment has been specified as a necessity although the order has been given in toto to one of the parent companies.

PRESIDENT CHOATE, of the Old Colony Railroad, addressed the committee on railroads, urging the granting of necessary authority to allow the steam roads of the State to operate by electricity.

PERSONAL.

GEORGE W. MANSFIELD, of Lynn, has been elected chief engineer of the new Globe Street Railway Company.

E. B. LINSEY, Secretary of the Sheffield Velocipede Car Company, Three Rivers, Michigan, made THE REVIEW a very pleasant call recently.

GEORGE KOBUSCH, Secretary and Treasurer of the St. Louis Car Company spent several days in the city recently looking after the interests of his company.

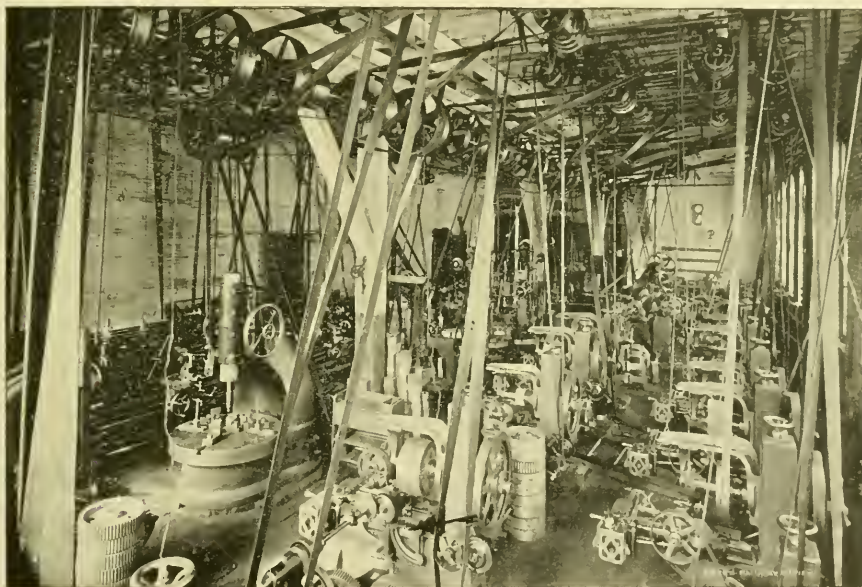
J. EDWARD FOSTER, General Manager of the Monmouth Motor Street Railway Company, favored THE REVIEW with a pleasant call a few days since.

E. A. ROWORTH, Superintendent Grand View Beach Railroad of Rochester, New York, favored THE REVIEW with a very pleasant call while on his recent western trip.

A. D. NEWTON, Secretary and Treasurer of the Eddy Electric Motor Company, Windsor, Connecticut, was in this city the first of the month in the interests of his company.

A HISTORY of the West End Street Railway of Boston, has been issued by Louis P. Hager, of 12 Pearl street, containing some 300 pages, including a large number of fine illustrations. The work contains not only a history of the road, but also prominent speeches delivered by President Whitney on the question of "Rapid Transit."

C. E. STUMP, Business Manager of the Street Railway Journal, New York, while making a western business trip the latter part of last month, was taken dangerously ill and obliged to return home as soon as he could endure the journey. His wife and daughter fortunately accompanied him and numberless friends were constant callers, each anxious to be of service.



R. D. NUTTALL COMPANY—GEAR CUTTING DEPARTMENT.

DANIEL F. LEWIS, President of the Brooklyn City Railway spent a day in Chicago while going and returning from Minneapolis, where he went to inspect the Electric System of the twin cities.

GEORGE P. STEARNS, the able Secretary of the Northern Car Company, of Minneapolis, spent a week in this city the early part of this month, and made our office his headquarters during that time.

C. E. WILSON, well known from his connection with the Knap Electrical Works, has just made arrangements to represent the Electrical Merchandise Company, Chicago. Mr. Wilson's long experience and large acquaintance will make him a valuable addition to the staff of the company.

T. P. BAILEY, Manager Railway Department, Thomson-Houston Electric Company, Chicago, Illinois, has gone to the Pacific coast on a trip of business and pleasure. Mrs. Bailey accompanies him.

I. H. BABCOCK, Treasurer of the American District Steam Company, Lockport, New York, accompanied by B. D. Hall, the Company's Secretary made us a pleasant call, during their visit in Chicago, recently.

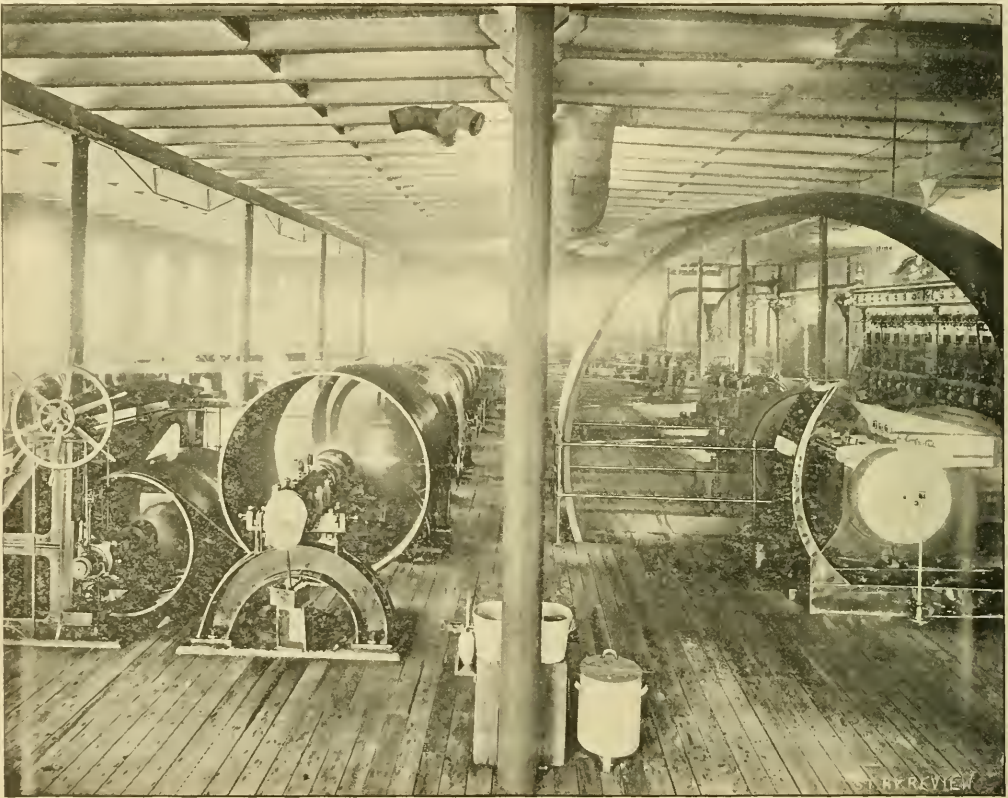
THE MCGUIRE MANUFACTURING COMPANY have supplied the steel trucks for the Love Electric Traction Company's system which is being tried on one of the lines of the North Chicago Railroad Company. The trucks give eminent satisfaction. The ease of riding and the absence of noise are particularly noticeable.

ST. LOUIS AND SUBURBAN RAILWAY.

THE St. Louis & Suburban Railway is one of the longest straight away lines that has ever been equipped with electric motors, being 18 miles in length, from its terminus at the business center of St. Louis to its western end in the town of Florissant, St. Louis County. This railway was originally operated by 3 miles of cable and 15 miles of narrow gauge steam road, under the name of the St. Louis Cable & Western Railway. The selected route was never adapted for cable

ments of electric traction. October 5th, the entire road was in operation. Since that time the management have further contracted with the Thomson-Houston Electric Company for a multipolar type generator of 360-horsepower, and fifteen additional motor car equipments, each consisting of two 15-horse-power single reduction motors.

The road has a large number of very sharp curves, some of them of only 30 feet radius. A special roll, 5-inch girder rail is used, fitted on steel chairs, spiked to white



INTERIOR OF POWER STATION.—ST. LOUIS AND SUBURBAN ELECTRIC RAILWAY.

construction, having some forty curves, and, moreover, was wretchedly constructed.

After investigating the various methods of propulsion and selecting the electric system, the management of the company contracted with the Thomson-Houston Electric Company, on May 14th, 1891, for the entire equipment of the road, consisting of 45 motor cars, each equipped with two 15-horse-power single reduction motors, 45 trail cars and ten 100-horse-power generators, besides the overhead construction (cross-suspension method) for the entire length of the road.

On July 18th, work was commenced on the overhead line, power-house, and in changing the cable and narrow gauge steam track to conform to the require-

oak ties, and through the business portion of the city the track is paved. On that portion of the road originally operated by steam locomotives, the track consists of 45 lb. "T" rails laid on white oak ties, and being well ballasted makes a very substantial road bed throughout the entire system, and permits high speed running.

The Thomson-Houston standard cross-suspension method of overhead construction is used, and the Company's own patented electrical devices for supporting and insulating the trolley wire are utilized. Iron poles are used throughout the business portion of the city, and the span wires attached to insulated tops placed upon them. Wherever the presence of foreign wires makes it necessary, the line is provided with guard wires which pre-

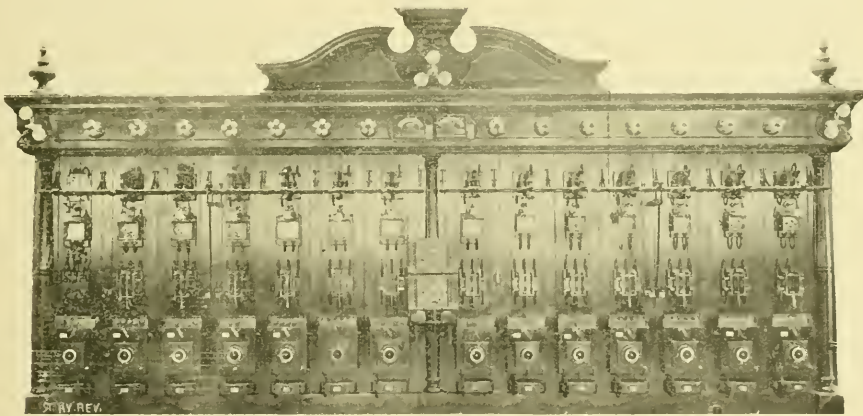
vents them from falling upon the trolley wires. The guard wires are divided into sections of 500 feet insulated from each other.

The return circuit is constructed with copper supplementary wire connected to each rail by tie wires fastened to the rail by channel pins. In addition to this an old car wheel is connected to the return wire at intervals of one mile, sunk deep enough into the earth to reach moist soil, thereby providing an earth return in addition to that of the rail. At the power station a number of old car wheels have been sunk into the ground and connected with the negative side of the generator to improve the earth return.

The overhead wire is protected by ten Thomson-Houston improved lightning arresters, each being grounded to an old car wheel sunk in moist earth, and further connected to the supplementary ground wires. The overhead wire is divided in 15 sections, and fed by separate feeder wires running from the generators at the power station to the various points on the line. Connected

ters of the main engine belts is 72 feet 7 inches. The counter shaft runs at a speed of 180 revolutions per minute. The generators are so located that the shortest belts are 13 feet between centers, and the longest 34 feet. All of the pulleys on the counter-shaft are provided with the Hill friction clutch, so that any one or all of them may be put in or out of service, as desired. The shafting is also arranged with clutch pulleys, so that a change from one engine to the other can be made so smoothly that no variation in speed, or voltage of generators, can be detected by measuring instruments.

An interesting feature of this plant is the handsome switch-board, which is 40 feet long by 12 feet high, made of selected beaded white oak strips and heavy moulding. It is provided with a shelf running the entire length, at about 3 feet from the floor. The oak is finished in the antique style. At the back of the board there is an opening 4 feet wide and 38 feet long, permitting easy access to the wiring at all times. The board is equipped with the following set of instruments for each generator. A



SWITCH BOARD.—ST. LOUIS AND SUBURBAN ELECTRIC RAILWAY.

to each feeder wire is an automatic circuit breaker which, in case of trouble or overload on any one of the feeder lines, automatically cuts out that portion of the system.

The power station is a substantial brick building with a steel, gravel covered roof. The dimensions of the engine and dynamo room are 153 feet in length by 131 feet in width. The roof is supported by 12 x 12 inch posts placed on substantial foundations. These posts also carry a crane of 42 feet 6 inch span. Above the crane is a monitor top, or lantern, which affords abundant light. The ten 100 horse power multipolar generators are set upon solid concrete foundations and belted by counter shafting to three Corliss engines, 30 x 72 inches, with fly wheels 24 feet in diameter, 74 inch face, each wheel weighing about 82,000 lbs. These engines were built by Hoover, Owens & Rentschler, and are illustrations of their best work.

The main driving belts are 72 inches wide and about 154 feet long, and were furnished by the Shultz Belting Company, of St. Louis. The distance between the cen-

lightning arrester, rheostat, three-pole switch, current indicator, circuit breaker and two-pole double-throw switch, all mounted upon highly polished slate backs.

The wires connecting the generators with the switch-board are passed through conduits under the floor of the dynamo room, 3 feet wide by 4 feet deep. Heavily insulated copper cables, well coated with insulating paint, are used, fastened along the sides of the conduits by wooden cleats. The generators are wired so that they may be run as self or separately excited machines. The change can be made without shutting down. On the face of the switch-board, and just under the circuit breaker, is a resetting device, by which any one, or all of the circuit breakers may be opened or thrown into circuit by one motion.

The station is lighted by 65 16 candle-power Thomson-Houston incandescent lamps, connected to the main line on the switch-board, and are not affected when the circuit breakers are opened. They can also be run from the exciter after the generators are shut down.

The station is equipped with an overhead traveler, or crane, having a lifting capacity of 15 tons. Any piece of machinery in the power house can be readily moved from one point to another in a very short space of time. This crane was built by the Walker Manufacturing Company, of Cleveland, Ohio.

The boiler room is 131 feet 6 inches long by 119 feet 3 inches wide. The granitoid floor, and the iron trusses which support a steel roof make it practically fire proof. There are three batteries of two boilers each, so arranged that any one can be run separately or in conjunction with either or both of the others. Their combined capacity is 1,100-horse-power. The following are the dimensions of each: 70 inches in diameter by 20 feet long, with 25 6-inch lapwelded tubes. Each battery is provided with steam drums 36 inches in diameter by 10 feet long, and mud drums 20 inches by 16 feet, rocking grate bars, long full fire fronts, anchors, mud check, safety-valve and combination steam and water gauges. A smoke stack of 50 inches diameter and 90 feet high is provided for each battery of boilers.

There are two duplex pumps, each of which is of sufficient capacity to run the entire plant for both boiler, feed and fire service.

Two 1200-horse-power closed feed water heaters are used to heat the water to 210 degrees Fahrenheit before entering the boilers. The work can be shifted from one to the other without interfering with the operation of the plant. Rohan Bros. furnished the heaters and boilers.

Two large cisterns in the boiler room hold sufficient water for 14 hours run of the station.

Cinders are removed by means of a large iron bucket with trap door bottom operated by an overhead traveler, which runs in front of the boilers and out through the door to the bearing off wagon or dumping ground.

All of the cars are equipped with single reduction gear motors, and these have performed service of a heavy character without giving any trouble and with the most perfect satisfaction. Not an armature or field spool has yet burned out, and it has only been necessary to replace two trolley wheels up to the present time. The cars, wheels and trucks were furnished by the St. Louis Car Company, and are models of the builders' art.

No expense has been spared to make it a model plant, which stands out as an illustration of the engineering ability and methods of electric railway construction pursued by the Thomson-Houston Electrical Company.

THE UNION DEPOT AND THE MOUND CITY RAILWAY

is another one of the large systems of electric railway in St. Louis, which has been constructed by the Thomson-Houston Electric Company. Both of the above roads are operated from one power station. The total mileage of both is a little over 31 miles, and 91 motor cars are in use, each car being equipped with two Thomson-Houston 15-horse-power railway motors.

These lines extend through the business portion of the city and run out to the suburbs, both roads having a large number of very difficult curves and continuous grades.

To each motor car is attached a trailer, and the traffic on both roads is exceedingly large. The power station is one of the largest in the country. It is equipped with four 500-horse-power Corliss engines, operating twenty-four 80-horse-power Thomson-Houston Bi-polar railway generators ("D-65"). The generators are connected to the line shafting by means of clutch pulleys, and any, or all, of the machines can be cut into or out of service at will. The station is provided with two large switchboards arranged with instruments similar to that of the St. Louis and Suburban. Both roads have been successfully operated since May, 1890.

The Thomson-Houston electric company have also equipped the Missouri Railway, sixteen (16) miles in length with thirty-six motor cars and seven 100-horse-power generators; the Southern Railway, with twenty-six motor cars and six 100-horse-power generators, and the St. Louis & East St. Louis railway, with six motor cars and one 60-horse-power generator, and have just closed a contract with the Benton & Bellefontaine Railway for thirty motor cars, each equipped with two 15-horse-power motors and three of its 360-horse-power multi-polar generators. When these are put in operation there will be in St. Louis a total of 249 motor cars, aggregating 7,730-horse-power and 5,000-horse-power in generators.

From the above figures one would believe that St. Louis' claim to the title of "The Electrical City" is well founded.

POWER HOUSE FOR THE ATLANTIC AVENUE ROAD.

PERMISSION having been secured to use the trolley upon the lines of the Atlantic Avenue railroad, William Richardson is commencing active operations, with a view of completion early in June.

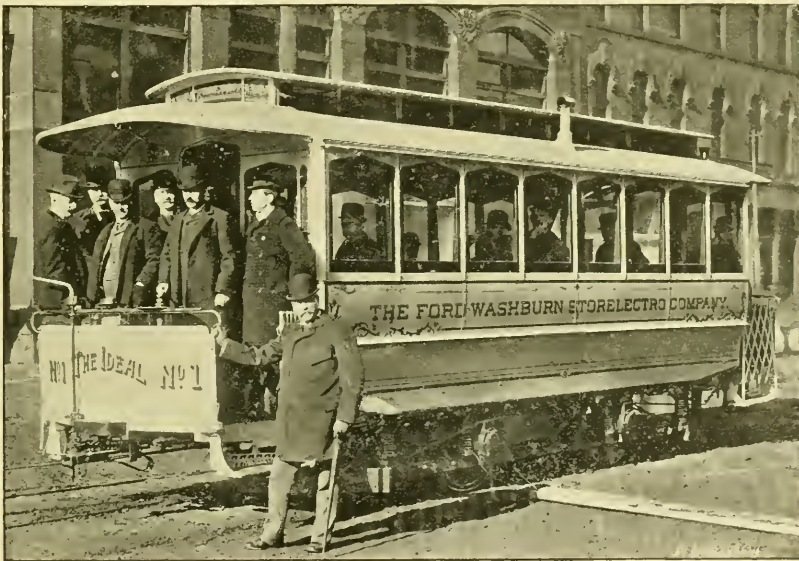
The Atlantic Avenue Company have recently purchased for \$90,000 a site for the new power house on Govanu's canal, which will be built at once, for the supplying of electricity to their lines. It will start with a capacity of 1,500 horse-power, which will be increased to 6,000 if necessary.

A conduit will be laid from the station up Third avenue to Bergen street and Atlantic avenue, where it will connect with the trolley wires. Another conduit running along First street, will connect with the Fifth, Seventh and Ninth avenue lines.

THE CROWN LUBRICATOR COMPANY have moved their office from 85 Dearborn street where they have been for a long time, to their factory at 7924 Wallace street this city, where they have built a commodious and comfortable office. The large increase in the output of the products of the Crown Lubricator Company has made it necessary that the managing officers should be near the factory which they will be pleased to have their friends call and inspect.

THE STORELECTRO CAR.

THE failure of the Accumulator system to meet the wants of the Dubuque Street Railway people, as fully set forth in our last issue, does not appear to have discouraged efforts in this direction elsewhere, and the Ford & Washburn Electric Company, of Cleveland, have brought out a system which they term the "Storelectro." Their car as illustrated below is 21 feet box, 26 feet over all, and is equipped with 180 cells placed under the seats; and operated by a 40-horse-power motor of their own make. The car was recently tried in Cleveland, and its promoters state it has drawn a loaded trailer up a grade of 1.5 per cent. at a speed of 15 miles an hour. They also claim a service of 50 miles on ordinary track, from one charging. President Geo. A. Ford, describes his battery as follows:



"In the first place, we have no plates to buckle. Ours is not a plate battery, and it does not rely on plates or anything like a plate to support the active material. The active material for one of the electrodes,—and it may be either electrode—is contained within a porous vessel or chamber having porous division walls, and the two electrodes are separated from one another by a porous wall which renders it impossible for the active material of one to come in contact with the other in any way. In the lead plate batteries with which everybody is familiar, the moment that any considerable quantity of active material was dislodged from any one of the plates it was liable to fall into such position as to short circuit the cell, either by lodging between the plates, or making connection at the bottom.

"Again, under severe strains the buckling of the lead plates was not only liable to dislodge the active material, but to make short circuits between adjacent plates by direct contact, and thus destroying the cell.

"By our construction it is physically impossible for the active material or the conductors of one electrode to contact with the active material or conductors of the other electrode. Hence, the electrodes of our cell are absolutely separate, and cannot come into electrical touch.

"Another important feature of our battery is that we do not rely upon anything like a lead plate for carrying the active material. We have chambers or spaces in which the active material is lodged, and which is subjected directly to the liquid, and is so situated that it cannot by any possibility escape from where it is placed. For example, if a porous pot be used for containing one electrode, we employ one or more perforated lead tubes, and the space between the pot and the tube or tubes is filled with active material. The tube or tubes are filled with liquid, and the active material is thus saturated from within the tubes through the perforations upon one side,

and through the porous pot on the other side, and by reason of compressible tubes in the pot to take up the expansion of the active material, and the active material is allowed to expand all that may be necessary.

"We are enabled by this principle of construction to make an exceedingly compact cell which is not only durable, but cheap and simple as compared with other cells hitherto or at present used. We find that we have no difficulty whatever in storing 400 amperes in a cell whose inside measurement does not exceed 4x8 inches in cross section, and 12 inches high.

"The battery is very much lighter for the quantity of current it carries than any other battery that has come under our observation, and hence is especially adapted to street car work, where excessive weight is objected to by many persons. In its construction everything is so simple and easy that an unskilled laborer may be successfully employed in setting the battery up, and we believe the battery is practically indestructible."

A MAGNIFICENT CABLE POWER HOUSE FOR CHICAGO.

A **SPLENDID** power house, from which will be driven the Blue Island Avenue Cable Line of the West Chicago Street Railroad, is to be erected at the corner of Blue Island avenue and Twelfth street, in this city.

To any who have been told that the days of cable building are ended, the plans illustrated in this article will prove something of a denial.

THE POWER HOUSE,

work on which has already been commenced, will be a handsome structure of pressed brick, with Bedford stone trimmings, occupying a frontage on Twelfth street of 120 and on Blue Island avenue of 183 feet. The power house proper, that portion of the building in which the machinery is located will be 116 by 100 feet and the balance of the building has been carried to a height of six stories and will be rented for office purposes. The building constituting a splendid improvement for that part of the city in which it is being erected.

Quarter sawed oak throughout will be used for doors and casings, the roof will be of double iron, and the peak, 60 feet above the floor. The stack is 150 feet high and ventilators and sky lights in the roof will afford abundant light for the boiler and machinery room below.

THE DRIVING MACHINERY,

will include two mammoth engines, 40 by 72 inch cylinders, and of 1,700-horse-power each. The fly-wheels will be 24 feet in diameter and weigh 100,000 pounds.

The line shaft is 18 inches in diameter. The steel plate couplings 54-inch diameter. The drum shafts are 16 inches in diameter, and 12 feet in length. Of the drums, three sets are 13 feet 4 inches diameter, and one set 16 feet diameter; they will weigh 17 tons each, and will all be equipped with the Walker Differential Rim. One hundred and fifteen tons of cut steel gears will be required to transmit the power from line shaft to the drums. The bed plates are of a hollow rectangular form, and four of the Weston Walker Friction Clutches of 1,000-horse-power each, operated by hydraulic machinery will be utilized to throw the drums in and out of gear. This application of hydraulics in cable railway practice has never been in use before, but is being installed in the Third avenue plant in New York. The foundations for carrying this machinery are 16 feet in depth, and have required in their construction 800,000 bricks. The driving machinery is all being built by the Pennsylvania Iron Works, Philadelphia, who have installed such a large amount of cable machinery in the country, and especially in Chicago.

The tension carriages will be of the well known Root pattern, the same as are used in San Francisco, St. Louis, this city and elsewhere.

In order to utilize the utmost amount of space, and to afford the long run for the tension carriages, the boilers, as will be seen in the illustration, have been placed on a

level with the driving machinery and rest on iron columns placed at sufficient frequent intervals to form a structure entirely secure and strong. Between the tension run is shown a small auxiliary engine with reels which will be utilized for drawing in the old cables when being replaced by new ropes and which will greatly facilitate this important branch of the service.

The boilers are eight in number, of 2,000-horse-power each, and will afford ample steaming abilities for the utmost necessities of the plant. Boilers are horizontal tubular, 56 flues, 4½ inches diameter, and 20 feet long. The plans for all the cable machinery, boilers, engines, etc., were prepared by S. Potis, the chief engineer of the West Chicago street Railroad Company, who called in H. B. Prudden as assistant in designing the office building.

The building when complete will cost upwards of \$300,000.

SPLENDID ENGINE RECORD.

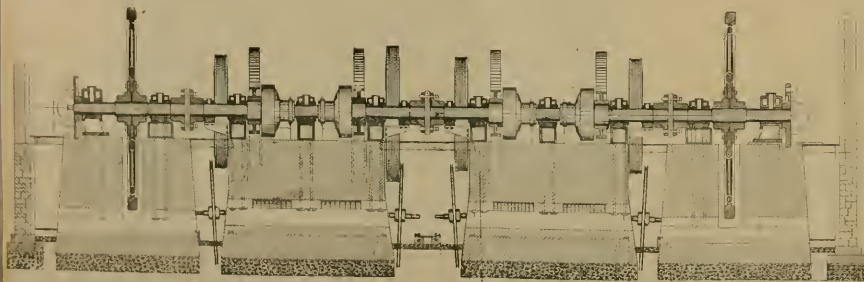
THE Eclipse Clutch Works of Beloit, Wis., are manufacturing the celebrated Williams engine at that point. During the past season they installed four 250 horse power Compound Condensing engines for the Louisville Street Railway Company, Louisville, Ky., and the economic duty and close regulation of those engines are reported by the officers of this company as something marvelous. The average mechanical horse power during a four months run, being about 400, quality coal used, Eastern Kentucky slack very lean: pounds of slack per horse power per hour, 3 8-10. This takes in the total amount of slack used during that period as weighed in at the station and is no fancy 10 hour test but practically every day duty. This horse power is arrived at by averaging the daily result of 40 electrical readings taken accurately every half hour. The average horse power (about 400.) will also indicate that the engines are running at less than one-half their full capacity, which as is well known, is not conducive to close economy. The regulation is also exceedingly close. A sudden variation in load between 100 and 1200 amperes, causing less than 5 volts variation. These engines are each connected to a No. 60 Edison generator and the volt meter shows very little variation from 530 at all times. The Eclipse Clutch Works have also recently closed a contract with the Chicago Illuminating Co., Chicago, for two 400 horse power tandem compound non-condensing engines, also an extensive friction clutch and shafting equipment, Excelsior feed water heater, pumps, etc. The Central Electric Light Co. of Chicago, have also ordered several of these engines and report wonderful working with their first engine, which has been in operation for the last two months. The new station of the Chicago Arc Light and Power Co. will contain three 500 horse power, one 600 horse power and one 250 horse power Williams engines, all compound condensing.

WM. ROSBOROUGH has been appointed superintendent of the Rochester (N. Y.) Street Railway, and Joseph Hicks, assistant superintendent.

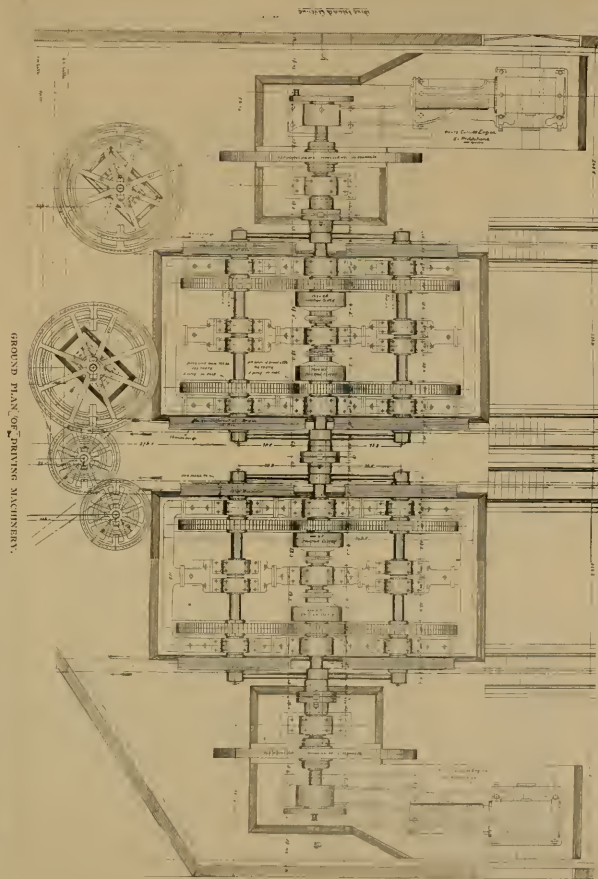


Blue Island Gas Company

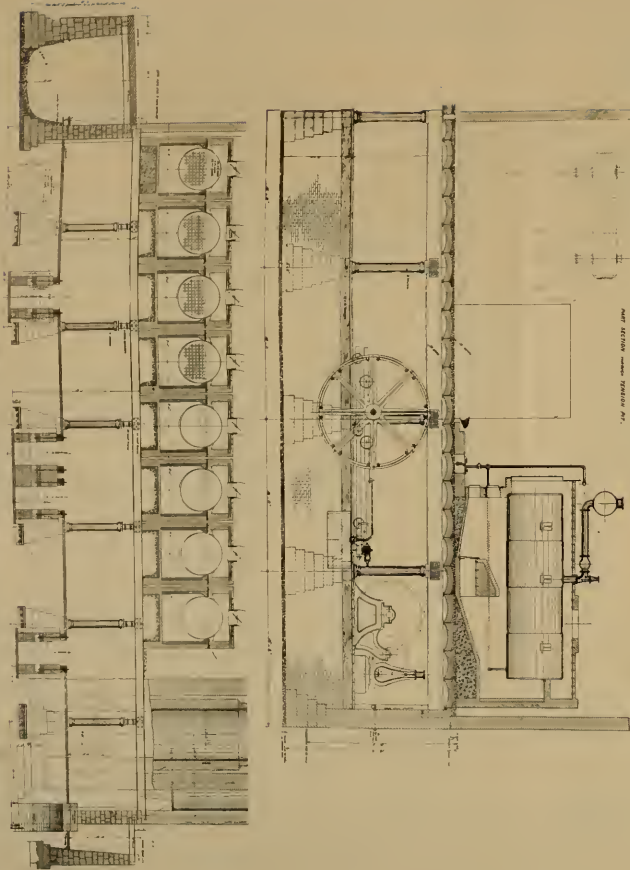
NEW POWER HOUSE OF WEST CHICAGO STREET RAILROAD AT BLUE ISLAND AVENUE AND TWELFTH STREET.



CROSS SECTION THROUGH MAIN LINE SHAFT.



GROUND PLAN OF DRIVING MACHINERY.



The Administration Building is pronounced the gem and crown of the exposition palaces. It is at the west end of the great court looking eastward, with the transportation facilities and depots at the west. The gilded dome of this lofty building is 120 feet in diameter and

portions, and crowned with sculpture; the second story is of the Ionic order, the whole forming a design in the style of the French renaissance.

The interior features of this great building are in keeping with the external. The underside of the dome is



THE ADMINISTRATION BUILDING.

220 feet in height, and will attract the attention of visitors. The building is 260 feet square with four pavilions 84 feet square at each angle, the central facade between each 82 feet wide, form the grand entrances to the building. The first great story is in the Doric order, of heroic proportions,

richly moulded and filled in with sculpture in low relief, and immense paintings representing the arts and sciences, and compares favorably with the most famous domes of a similar character in the world.

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

JOHN G. HOLMES, PRESIDENT, Pittsburg, Pa.
 THOMAS H. McLEAN, FIRST VICE-PRESIDENT, New York, N. Y.
 JAMES B. SPEED, SECOND VICE-PRESIDENT, Louisville, Ky.
 ALBION E. LANG, THIRD VICE-PRESIDENT, Toledo, O.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE THE PRESIDENT, VICE PRESIDENTS, and HENRY M. WATSON, Buffalo, N. Y.; LEWIS PERRINE, JR., Trenton, N. J.; W. WORTH BEAN, St. Joseph, Mich.; MURRY A. VERNER, Pittsburg, Pa., and THOMAS C. PENNINGTON, Chicago, Ill.
 Next meeting will be held in Cleveland, O.

Massachusetts Street Railway Association.

President, CHAS. B. PRATT, Salem; Vice-Presidents, H. M. WHITNEY, Boston, AMOS F. BREED, Lynd, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON Lawrence.
 Meets first Wednesday of each month.

Ohio State Tramway Association

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice President; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus, Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice President, THOS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee, OFFICERS and C. B. THURSTON, Jersey City; H. ROMAINE, Patterson; LEWIS PERRINE, JR., Trenton.

The Street Railway Association of the State of New York.

JOHN N. BECKLEY, PRESIDENT, Rochester, N. Y.
 THOS. H. McLEAN, VICE PRESIDENT, New York, N. Y.
 GEO. LAW, SECOND VICE PRESIDENT, New York, N. Y.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—D. F. LEWIS, Brooklyn, N. Y.; C. DENSMORE WYMAN, New York, N. Y.; CHAS. CLEMENSHAW, Troy, N. Y.
 The next meeting will be held at Saratoga, September 20, 1892.

Alabama.

MONTGOMERY.—The work of surveying the streets here for the construction of the LeBron electric system of street railway has commenced, under the supervision of Engineer Erwin.

OXFORD.—The Oxford Lake Electric Railroad Company has paid in full a judgment for \$30,000 recently taken against it by the Bank of Oxford.

SELMA.—Harvey L. McKee has resigned the presidency of the Selma Street Railway, and S. H. March, of New Orleans, has been elected president. R. H. McFadden has also been elected secretary, treasurer and general manager. The line will be extended on other streets and the work pushed with vigor under their enterprising management.

California.

BERKELEY.—The Rapid Transit Company is canvassing the eastern part of town for a bonus to induce them to build an electric road in that locality.

LOS ANGELES.—The Pacific Cable Railway Company, of this city, will forfeit part of its franchise and abandon a portion of the tracks on account of the expense of street paving.

LAKEPORT.—L. H. Buckingham proposes to construct an electric road from some point on the Donahue line to Lakeport. The cost of the road will be about \$160,000.

OAKLAND.—The directors of the Piedmont Cable Company held a meeting recently and discussed the matter of building the cable road on Fourteenth Street. It was decided to begin work at once and push things, so as to have the road in operation by the middle of May.

PIEDMONT.—The wires for the new electric road are in place, and the cars are now running regular.

STOCKTON.—All the lines now in operation are to be converted into electric lines by July 15th.

SAN FRANCISCO.—The Geary Street, Park and Ocean Railroad Company are making active preparations for extending the cable to Golden Gate park. Contracts have already been let for the construction of the road, and material to be used is being hauled along the line of the proposed extension.

THE Belt Railroad management have rented the privilege to carry passengers to C. A. Spreckels, who will operate a line of cars without interference with the freight traffic. Horses will be used first, and electricity later on.

THE Market Street Cable Company will build many new cars for the Geary street system in anticipation of increased business when the steam dummies give way to cable cars on Point Lobos avenue.

SACRAMENTO.—At the annual stockholders' meeting of the Central Electric Railway Company, the following directors were elected: J. H. Henry, L. L. Lewis, J. G. Martine, W. E. Henry, and J. P. Burke. The board organized by choosing J. H. Henry, president; L. L. Lewis, vice-president; A. Olsen, secretary; Christopher Spangler, superintendent.

SAN JOSE.—Messrs. J. H. Henry, J. P. Burke and C. M. Wooster will make application for an electric street railroad franchise and right of way, for a road connecting with the Tenth street branch of the Santa Clara street line. Also a branch to the Sanitarium and Campbell.

SANTA CRUZ.—The City Council has granted a franchise to the Santa Cruz, Garfield Park and Capitola Electric Railway to run a branch line from Walnut avenue down Center street to the site of the new Union depot.

STOCKTON.—The contract to build and equip eleven miles of electric street railway in this city has been let to the Thomson Houston Company. The road is to be completed by July 15th.

Canada.

MONTREAL.—The Montreal Street Railway Company have taken an appeal from the recent judgment of the Superior Court condemning them to pay the city for the cost of the pavement between the tracks on certain streets.

TORONTO.—The manager of the Street Railway Company and the City Engineer are discussing proposals for the introduction of electric street cars.

SELKIRK.—The people of this town are endeavoring to secure the construction of an electric railway between Selkirk and Winnipeg.

Colorado.

BOULDER.—The street railroad, with all its franchises, appurtenances, etc., was sold lately at sheriff's sale to satisfy certain liens. It was bid in for \$1,335, by N. H. McCall.

DENVER.—The west side cable will soon be in operation. Permits were lately issued by the city to the Denver City Cable Company to grade, preliminary to laying track on South Eleventh street, from Fourth avenue to Colfax and on Eleventh street from Colfax avenue to Curtis and on Curtis from Eleventh to Fourteenth streets.

A NEW Electric line to connect Westminster with the city is to be built and will be completed before July 1, to accommodate suburban travel.

Connecticut.

NEW HAVEN.—The New Haven and West Haven Horse Railway company will put in electric motors, and extend their tracks to Savin Hill, if permitted by the Common Council.

NORWICH.—The Norwich Street Railway Company has contracted for 750 poles and 6,000 ties for the building of an electric road. The managers hope to have the trolley system in operation by May.

Florida.

TAMPA.—There is talk of an electric railroad to the west coast, and the route is marked on the new county map.

Dakota.

GRAND FORKS.—A franchise for the Grand Forks Electric Railway Company is sought for by St. Paul, Minn., capitalists, of whom Mr. C. F. Eroll is chief promoter. The ordinance has passed its first reading by the council, and will probably be granted.

LEAD CITY.—A franchise has been granted to Walter Lenhart, for an electric railway through the city limits to the city of Spearfish, by the way of Central and Garden City, to be completed and in operation by September 1st, 1892.

District of Columbia.

WASHINGTON.—The Washington and Northeastern and the Suburban Railways will be consolidated, as soon as a definite plan can be agreed upon.

Georgia.

AMERICUS.—Mr. Charles M. Fouche is about to close a deal for the leasing and operating of the electric car lines of this city.

AUGUSTA.—The electric road now furnishes transfer tickets between Turpin Hill and the Exposition. The double 25 horse-power motors on the electric cars are being replaced by double 30-horse-power motors.

BRUNSWICK.—The Brunswick Foundry, Machine and Manufacturing Company, at a meeting of the directors, decided to build a marine railway to accommodate vessels up to 2,000 tons.

MARIETTA.—New York parties have signified their willingness to build an electric car line from Marietta to the Chattahoochee river, provided the citizens contribute about \$12,500, and the property owners along the line donate land to the amount of \$35,000. Moultrie Sessions is trying to secure the amount desired.

Illinois.

ANNA.—The Secretary of the State has licensed the Anna, Jonesboro and Asylum Electric Street Railroad Company to operate an electric railroad, between Anna, Jonesboro and the Asylum. Capital stock \$75,000.

CAIRO.—Mound City is desirous of having Cairo's electric light and street railway extended there.

CHAMPAIGN.—The Champaign Rapid Transit Company has incorporated, to operate a street railway. Capital stock \$50,000.

GALESBURG.—The Galesburg Street Car Company has decided to replace the mules in the near future, with an electric plant.

MONTICELLO.—It is proposed to build an electric railway through Piatt county, which will connect Monticello, Bement, Deland and Atwood, making a line thirty miles in length, with accommodation cars for passengers, and freight cars sufficient so that the farmers can bring their produce to market. The electric plants at Monticello and Bement will furnish the motor power.

PEORIA.—The Fort Clark Horse Railway Company has filed a notice of the increase of capital stock to \$500,000 to be divided in 5,000 shares of \$100 each.

The Lakeside Electric Railway Company, has filed a decrease of capital stock to \$8,000.

The Central Railway has in use a new style of gates for the electric cars. It is a folding gate and when not in use can be shut up and placed over against the side of the car.

SPRINGFIELD.—The Springfield City Railway Company will relay their track on Monroe street, between Fourth and Eighth streets, as soon as the city council decides on the paving question.

Indiana.

FT. WAYNE.—The Ft. Wayne Street Railway Company has filed an acceptance of the ordinance for electric street railway lines, as passed by the common council. Also a bond in the sum of \$25,000, signed by President J. H. Bass, S. B. Bond and F. De H. Robinson.

INDIANAPOLIS.—The Broad Ripple Rapid Transit Company's franchise has been signed by the board.

JEFFERSONVILLE.—The street railway plant is to be sold at Sheriff's sale March 19th.

TERRE HAUTE.—The Terra Haute Electric Street Railway contemplate an extension to Brazil.

Iowa.

CRESTON.—Work will be commenced on the Creston Street Car line as soon as the frost is out of the ground. Over 4 miles of street railway will be built and the line extended to the lake, 2 miles west of the city.

DAVENPORT.—The desire to use electric cars on the government bridge by the street railway company is causing considerable discussion of plans and projects. The majority seem to prefer horses.

MARSHALLTOWN.—A proposition is being entertained for the construction of the Marshalltown Electric Railroad. It looks favorable for an acceptance by the citizens.

SIoux CITY.—The Sioux City Street Railway Company are using fare boxes on the Crescent Park, Pearl and Jennings street lines.

WATERLOO.—The canvass for stock subscriptions to raise funds for building and equipping the Electric Street Railway is under way and making good progress.

Kansas.

HUTCHINSON.—A street car on Main street was recently struck by a Rock Island train and almost demolished at the crossing. Five passengers were more or less injured, but none of them seriously. Driver Garrison received injuries, which will prove fatal.

The Hutchinson Street Railway Company has amended its charter and increased its capital stock to \$150,000.

LEAVENWORTH.—Warren F. Putnam, of Boston, principal owner of the Leavenworth horse car street railroad, is seeking to obtain a franchise for the purpose of converting his line into an electric road.

Maryland.

BALTIMORE.—Mayor Latrobe has signed the ordinance authorizing the Central Street Railroad Company to equip its line with electricity. Work will begin at once.

The contract for yokes and general castings to be used in building the Blue line cable tracks of the City Passenger Railway was awarded to Davies & Thomas, of Catastoga, Pa. About 2,500 tons will be required.

The stockholders of the Baltimore Traction Company, at their annual meeting, re-elected the old directors, and organized by the re-election of T. Edward Hambleton, president; Frank S. Hambleton, treasurer, and Nathan H. Johnson, secretary.

Mr. T. WALLIS BLAKISTONE, counsel for the Central Street Railway Company, appeared before the Senate Committee on Corporations and asked that the committee report favorably on a bill which authorizes the railway company to issue bonds to equip the road with electricity, or other modern appliances for rapid transit, and to increase their capital stock to \$1,000,000 and to give them the power to extend the road into Baltimore county and to connect with any other street railways in the city.

CUMBERLAND.—The Electric Railway Company has leased land near the old Black Horse Tavern for a term of years, and will begin the erection of buildings for a Base Ball and Athletic Park at once.

ELLCOTT CITY.—Surveyors have located a line from this place to the terminus of the Edmonson avenue extension from Baltimore with a view of building an electric road.

Massachusetts.

BALLARDVALE.—The people of this village desire an extension of the Merrimack Valley Street Railway Company tracks to Ballardvale, the coming spring.

BOSTON.—The employes of the West End Street Railway Company recently gave their first annual ball at Mechanics' building. It was a grand success, fully 15,000 persons participating.

THE net earnings of the West End Street Railway Company for January, show an increase of about \$40,000 over that of the corresponding month of last year.

CHICOPEE.—The Aldermen have granted the petition of the Street Railway for permission to extend their tracks and also extended the time for completion from January 1 to July 1.

LAWRENCE.—The electric railway company are soon to enlarge their power house and add two new generators, also a large boiler.

LOWELL.—A new electric line from Lowell through Methuen, Lawrence and Haverhill to Salisbury Beach, is contemplated and surveyed to Haverhill.

LYNN.—Joseph Bailey, a lineman in the employ of the Lynn and Boston Street Railway, was instantly killed by the fall of a trolley pole in this city recently.

NATICK.—The electric railway company between here and South Natick, has secured the contract for carrying the mail between these two points.

SAUGUS.—The Lynn & Boston Railroad Company want to run electric cars in this town over existing lines of track.

SPRINGFIELD.—The directors of the street railway company recently voted to increase the capital stock to \$700,000. This is the limit allowed by the Railroad Commissioners last fall. A further increase of \$150,000 will be necessary for contemplated improvements, after permission is granted to make the extensions.

WORCESTER.—William B. Sprout, Esq, attorney for the West End Street Railway Company, Boston, was here recently on a visit.

Subscriptions for stock of the Worcester and Millbury Street Railway Company have been opened at the Citizens' National Bank. Capital stock \$150,000. An electric road to Millbury will be built as soon as the franchises are granted.

Michigan.

ANN ARBOR.—The motor line between Ann Arbor and Ypsilant which has been shut down for the past month by an injunction, has a new lease of life. The council has granted the Ann Arbor Street Railway a franchise to build in front of the Nichols estate and the motor line will run over the electric line track.

DETROIT.—The Township Board has granted to the Detroit and Dearborn Motor Company a franchise to run a road from Springwells to St. Josephs Retreat.

ESCANABA.—The Escanaba Street Railway Company has decided on an extension of their lines as soon as the weather will permit

ISPHeming.—The electric railway that connects Ispheing and Negaunee will be extended to Marquette this season This will make the road fifteen miles long, and the fare will be but twenty-five cents.

The electric cars between Ispheing and Negaunee are carrying 2,000 passengers per day at ten cents each.

KALAMAZOO.—W. R. Adams, receiver of the Kalamazoo City and County Street Railway Company is preparing the estimates of expense for extension of lines to the Asylum.

LANSING.—The council has granted the street railway company permission to relay its entire line with new T rails. Work will be commenced as soon as the weather will permit, and no expense will be spared to make this one of the best electric lines in the state.

Minnesota.

DULUTH.—The citizens of Lakeside have petitioned for an extension of the Duluth street railway line to Lester Park.

ST. CLOUD.—New electric cars of the latest pattern have arrived for the electric street car line, which is nearly completed.

STILLWATER.—William M. Hewitt has been appointed receiver of the Stillwater electric street railway and he will have things running in good shape.

ST. PAUL.—An electric line from St. Paul to White Bear Lake, via North St. Paul, is among the possibilities of the near future. Negotiations for the right of way are now in progress, and if successful, the line will be built this summer.

Missouri.

ST. LOUIS.—Mr. Guido Pantaleoni, the electrician, escorted an excursion party over the Lindell Railway Company's system for a trial trip of the new "Westinghouse Noiseless Motor." The results were highly satisfactory.

It is reported that the St. Louis & Kirkwood Company has secured connection with the Market street line of cars for their proposed electric line from St. Louis to Kirkwood, via. Sutton, Shrewsbury Park and Webster Groves, and that the construction of the tracks will be commenced this spring.

KANSAS CITY.—The new cable for the Ninth street line of the Kansas City Cable Company's system has arrived, direct from Hull, England.

Nebraska.

BEATRICE.—The Beatrice Rapid Transit and Power Company has absorbed the old Beatrice Street Railway Company by right of purchase.

OMAHA.—The directors of the Council Bluffs & Omaha Bridge and Railway line, decided to accept the proposition made by the Water Works Company, who own the ground necessary for a base ball park, and to erect a pavillion, fences and do other necessary work. The grounds to be used by the Omaha Base Ball Association and Club.

New Jersey.

ASBURY PARK.—The Electric Railway Franchise of this Borough has been extended to A. D. 1937.

CAMDEN.—The American Steel Railway Track Company, have filed articles of incorporation in the Camden county clerk's office. The capital stock is \$300,000, with \$1,000 paid in. The incorporators are: Charles E. Hellier, S. D. Nye and Reynold T. White, all of Boston, Mass; Edward Dudley, of Camden, and Edward Greeley, of New York. The objects of the company are to manufacture, or have manufactured and sell material for the construction of street railroads under letters patent.

NEWARK.—The New Jersey Traction Company has been formed here and under it all the street railroad companies in Essex and Union counties, except the South Orange Line of Newark, will be consolidated.

Montana.

GREAT FALLS.—The street railway has put on sale tickets over any portion of its line, at the price of eight tickets for fifty cents. Sold by the conductors on the cars.

HELENA.—A franchise is wanted for an electric line to Unionville.

New Hampshire.

CONCORD.—The board of Trade is unanimously in favor of an electric road from Lake Massabesic to the city.

NASHUA.—The Street Railway Company has recently received iron rails and fixtures for track laying, which will probably be used this season in extending the lines through Amherst street and Arlington to the Crown Hill district.

New York.

AMSTERDAM.—The Amsterdam Electric Street Railroad Company are running a new vestibule car heated by electricity, or Burton's car heater. The car is built by the Fowler Manufacturing Company of Brooklyn, and aside from all modern devices, is the first vehicle in public use in this state heated by electricity.

BROOKLYN.—The managers of the Kings County Elevated Railroad Company are preparing, if possible, to connect their structure on Fulton street with the Brighton Beach Railroad.

PRESIDENT RICHARDSON, of the Atlantic Avenue Railroad Company, has purchased land at Second street and the Gowanus canal, on which to erect his electric power house, for a trolley system.

BUFFALO.—The new Washington Sycamore Line is all ready, and will be put into operation soon. Work will be commenced on the Main street line as soon as the paving is decided upon. There is some talk of changing the large eight wheeled cars for four wheeled trolley cars of a new pattern.

The large car barns of the Buffalo Street Railway Company, were lately damaged by fire to the extent of \$5,000.

FREDONIA.—Gov. Flower has refused to sign the bill legalizing the action of the Dunkirk & Fredonia Street Railway Company in removing their tracks from the side to the center of the street.

GLOVERSVILLE.—The Cayadutta Electric Railroad Company has been incorporated with a capital of \$120,000, to build a street surface road from Gloversville to Fonda, a distance of 12 miles.

LANCASTER.—The Buffalo & Lancaster Electric Railway Company has filed a certificate of incorporation to build a street railway between Buffalo and Lancaster. The capital stock is \$200,000.

NEW YORK.—John F. Ferguson, a clerk, 23 years old, was recently sentenced to 3 years and 4 months imprisonment, for grand larceny of a diamond scarf-pin from a passenger on a Broadway street car.

The earnings of the Manhattan Elevated Railway Company are something like \$30,000 per day, and 720,000 people have been carried in a day.

The Metropolitan Traction Company has practically completed a lease of the Sixth avenue surface railroad for 999 years. The cable system will be used instead of horses. Work will be commenced in a few months.

NIAGARA FALLS.—An electric street railway for Niagara Falls and Suspension Bridge is under way, and well nigh assured.

ROCHESTER.—The Street Railway Company has appointed William Rosborough superintendent of the road, Joseph W. Hicks assistant superintendent and Thomas N. Christy, general inspector.

The Street Railway Company, in order to get the best possible service from their men, have announced a raise of 2 cents per hour in their wages, from March 1st.

SARATOGA.—All the property of the Saratoga Electric Railroad Company has been sold under foreclosure to C. E. Arnold, of the Union Electric Railroad, of Saratoga, for \$35,000.

North Carolina.

WILMINGTON.—Rapid progress is being made on the construction of the electric street railway in this city, upwards of 150 men are engaged in the work.

Ohio.

AKRON.—It is expected that by the 1st of June, Akron will be connected with Cuyahoga Falls and Silver Lake by an electric railway.

BELLAIRE.—The Bellaire Street Railway will be equipped with new rails and rolling stock this season.

CINCINNATI.—The Western Hills Improvement Association are pushing things, to establish an electric street car line for Price Hill.

JOHN WEAVER, superintendent of the Mt. Adams and Eden Park Electric line, states that the Company has ordered a number of 50-horse-power motor cars, to arrive early this spring, which will be used with trailers.

CLEVELAND.—The contemplated extension of the East Cleveland Railroad to Collingwood is promised this spring. The Collingwood Council has authorized the building of the Collingwood extension, which will branch off from a point in Collamer, nearly opposite the residence of J. D. Rockefeller, continue to St. Claire, one line going direct to the lake front and the other into Collingwood.

COLUMBUS.—The Stockholders of the Columbus & Westerville Electric Railway Company recently elected as directors: H. M. Neil, T. H. Simons, Adam Innis, G. W. Meeker, A. B. Kohr, F. H. Croughton and C. E. Bell. The directors organized by electing H. M. Neil president T. A. Simons vice-president, and Adam Innis treasurer, Merrick & Thompson were chosen attorneys, with instructions to make immediate application for a franchise.

The Columbus & Clintonville Electric Railroad is being rapidly pushed, and will be ready for operation by May 1st.

GALION.—The Suburban Electric Company was the only bidder for constructing and operating street railways in the city of Galion, which is a duplicate of that accepted in Bucyrus.

GALLIPOLIS.—Articles of incorporation have been filed by the Gallipolis Street Railway Company. Capital stock \$40,000.

LIMA.—The formal transfer of the property of the Lima Street Railway Company to the Lima Electric Railway Company has been made, and the work of reconstruction has been started.

MARBLE CLIFF.—A number of property owners met at Lane Avenue station, for the consideration of building an electric road. Pomeroy was also represented.

MASSILLON.—Captain Clutz, of the board of commissioners, states that the new electric road between Massillon and Canton is new a certainty.

MINERAL RIDGE.—The Mineral Ridge and Niles Electric Street Railway Company have incorporated, with a capital stock of \$50,000.

TOLEDO.—The Robinson Electric Road are running twenty-five new electric cars, of the latest make, from Brill & Co., Philadelphia.

The Canton avenue car barns have also been rebuilt.

Further improvements by the company will be made, by building a double track on the belt line on all streets, which are not now double tracked.

The Consolidated road will at once begin the construction of a belt line, which will take in Monroe street, Auburn, Central and Collingwood avenues, Adams and Summit streets, almost completing the electric railway service in Toledo.

YOUNGSTOWN.—The Citizens of Hubbard and the residents along the road from this city to that place are greatly in favor of an electric line connecting the two places. At a private meeting it was decided favorably and financial aid promised.

Oregon.

PORTLAND.—The East Side Power Company has been incorporated. Capital stock \$50,000.

Pennsylvania.

CONWAY.—A new electric car line to connect Conway and Beaver, running through Freedom, Rochester and Bridgewater, is to be constructed at once.

MCKEESPORT.—The White Traction line have adopted a fine blue uniform, sack coats, and caps, with gray buttons, and the name of the company, for their employees.

A CHARTER has been granted to the Union Passenger Railway Company, of this city; capital \$18,000. The incorporators are James Evans, S. O. Lowry, S. M. Bowman, W. A. Dunshee and John W. Stewart.

MURRAYSVILLE.—Surveys are being made for an extension of the recently opened Turtle Creek Valley road from Murraysville to Belmont, and grading will be commenced as soon as the weather permits.

PARKESBURG.—Money has been raised for the preliminary survey of an electric line between Parkesburg and Oxford, which will be made as far as Cochranville at once.

PHILADELPHIA.—The Pneumatic Fowler Company's ordinance, granting it permission for the laying of underground pipes to convey compressed air for the running of street cars and other purposes, has been approved by a sub-committee of the Councils Highway Committee.

MAYOR STUART recently signed the Quaker City Elevated railroad ordinance, for the construction of an elevated railroad on Market street, Ridge Avenue, Woodland and Lancaster Avenues.

The agreement includes a covenant that the Quaker City Company shall widen and strengthen the Market street bridge over the Schuylkill river on each side, at its own expense, to enable the company to carry the elevated railroad over the river, and keep the entire bridge in repair at all times.

PITTSBURG.—Eight new cars were received by the Central Traction Company lately for their electric branch. The road is almost equipped and will be running by April 1.

POTTSVILLE.—The Pottsville and Minersville Electric Railway Company, with a capital stock of \$100,000, has been granted a charter.

READING.—A charter has been granted to the Reading and Temple Electric Railway, with a capital of \$30,000.

SCOTSDALE.—The Scottdale and Bradford Electric Street Railway Company has employed Jno. L. Gans, of Connellsville to locate their route.

SOUTH BETHLEHEM.—The subscriptions for the South Bethlehem and Saucun electric railway, originated by Edwin Laufer, now amount to between \$38,000 and \$40,000. This is more than is required to secure a charter.

SUNBURY.—The property of the Sunbury and Northumberland Street Railway Company has recently been levied on by the sheriff.

YORK.—A bill granting power to the York Street Railway Company to use electricity or compressed air, or both, as a motive power on their lines was passed favorably by the council.

South Carolina.

CHARLESTON.—Work has begun on the extension of the street railroad through to Elk City to the Devereux Mills, and the Buckeye Company's establishment.

Tennessee.

CHATANOOGA.—General Manager Devine of the Electric Street Railway Company, has given Mr. Sullivan of base ball fame, the assurance that his company will fix up a ball park at some point on its line, all that now remains is a subscription of \$1,000 by admirers of the game.

CLARKSVILLE.—W. M. Daniel has resigned his position as president of the Clarksville Street Railway Company, and C. W. Tyler was elected to fill the vacancy.

KNOXVILLE.—New York and Knoxville capitalists have organized the Robertson Southern Electric Underground Railway Company in this city to build electric railways in East Tennessee.

A DIRECTORY meeting of the South Knoxville Street Railway Company was held recently. The soliciting committee reported that more than two-thirds of the stock had been sold. Bids for the cross ties, also on the grading and macadam, are in order and the work will be commenced inside of thirty days. The shares are \$100, payable in 10 per cent. instalments.

KNOXVILLE.—J. C. Duncan has been appointed receiver of the property owned by the Knoxville Street Railway Company.

NASHVILLE.—The Overland Railway Company has been reorganized, and the change to electricity will be made without delay with cars running to Waverly Place and Glendale Park.

Texas.

GALVESTON.—The first rail of the South Galveston & Gulf Shore Electric Railway was laid recently with appropriate ceremonies. The work will be pushed rapidly to completion.

HOUSTON.—The work of reconstructing the Louisiana Street Car line for electrical service has been commenced and will be rapidly completed.

Utah.

SALT LAKE CITY.—The City Railway Company are to extend their Third street line to the reservation, as well as the West Second South street tracks across the Rio Grande Western Railroad.

Virginia.

ALEXANDRIA.—The measurements for the King Street Railway are completed, and work will be commenced this spring.

PETERSBURG.—The House of Delegates has ordered to its engrossment the bill to incorporate the Richmond, Chesterfield and Petersburg Street Railway Company. This will be an extension of the street railway of Petersburg into Chesterfield county.

Washington.

EVERETT.—It is reported that the "3 S" road will be operated, for a while at least, as an electric line, and that an electrician is now figuring on a contract for equipping it.

OLYMPIA.—The West Side Street Railway Company has closed a contract with the Edison General Electric Company for the construction and equipment of two miles of road in 90 days.

THE contract for building and equipping four miles of street railway has been let by the Olympic Light and Power Company to the Thomson-Houston Electric Company. The line is to be in operation by July 1.

SEATTLE.—The Grant Street Railway Company are constructing a power house 120x120 feet, in South Seattle, of brick and iron. The machinery will have a capacity of 375 horse-power. The engine will be of the Westinghouse make, and the dynamos will be of the Thomson-Houston make.

SUMNER.—F. C. Ross is securing the right of way for an electric road at Sumner, and will begin construction at once.

Wisconsin.

FOND DU LAC.—The sale of the street railway has been adjourned to April 1st.

JANESVILLE.—John A. Barham, president of the Janesville Street Railway Company, Janesville, Wis., has contracted with the Chicago office of the Pond Engineering Company, for a complete steam plant, necessary to operate his road by electricity. The plant includes a 14x13 Armington & Sims engine, with foundation box; 66 x 16 steel boiler, with stack, and the usual fittings, a number three Blake Boiler Feed Pump, and a No 5 Hopps Exhaust Heater. The Pond Company's contract, also includes delivery and erection of this machinery in Janesville, with foundations, brick work, pipe connections, etc., all ready for service.

KENOSHA.—John W. Munson has been granted a franchise to build an electric street railway in this city.

MILWAUKEE.—Work on the bridge over the Menomonee Valley in the town of Wauwatosa, being built by the Milwaukee & Wauwatosa Motor Company, is progressing rapidly. The company has secured the right of way to the state fair grounds, and will build a line of road from the Wells street line to the grounds this spring.

NEENAH.—C. C. Garland of Minneapolis, has bought the plant, franchise and good will of the Neenah and Menasha Street Railroad, and will convert it into an electric line.

SUPERIOR.—The Superior Street Railway Company is about to be incorporated by L. F. Johnson, J. H. Agen and R. A. Haste, with capital stock at \$250,000. Application for a franchise will be made at once.

THE Providence Telegraph has a cartoon of two Boston men hailing an electric car, beneath which appears—"with death in view they hailed the electric car." The scene must have been laid out near Mt. Auburn.

THE block system will be put on the Brooklyn Bridge, the length of each block being from 300 to 600 feet.

ECHOES FROM PUGET SOUND.

SEATTLE, Wash., March 10, 1892.

The event of the month here has been the opening of the Grant Street Electric Railroad. It starts from a point at the edge of the main square of the city, Pioneer Place, and runs south for about 11,000 feet to a suburban settlement, known as South Seattle. Within another month the road will be completed for a mile or more further to the race track. Most of the road runs across the tide-flats and is built on piles. The result is that the track is nearly a dead level. Great speed can be obtained, for though the track is on the right of way for the country road, it is separated from it, and there are few places where a fast running car will be in danger of colliding with wagons. There are but few curves.

Five passenger cars and one freight car are now used, giving a fifteen minute service. The cars were made in this city by Rohlf's & Schoder, the material being Puget Sound ash. The trucks were built by the Washington Iron Works, according to plans of Andrew Jackson, the superintendent of the road. They have very few bolts, and the lubrication is so arranged that overheating of the journals is almost an impossibility. A lubricating compound is placed so that when the box becomes heated, the lubricant melts and floods it. The trucks are interchangeable, so that they can be transferred from one car to another by the loosening of a few nuts. The rails weigh fifty six pounds to the yard and the switches are automatic. Power is supplied at present by the Union Trunk Line; but the company intends to spend \$60,000 in a power-house of its own.

The Seattle Consolidated Street Railway Company has re-elected its old board of trustees, L. H. Griffith, D. J. Denny, George R. Kinnear, J. E. Porter, J. F. Hale, and Victor Hugo Smith. This company has devised a plan for a saving of \$500 a month in its expenses. The members of the corporation own a lumber mill at Fremont—the north suburb, which is reached by one of the company's branches. Hitherto it has cost \$150 a month to get rid of the waste material from this mill, but now all of it is loaded into an electric box car and hauled to the power-house where it supplies fuel for the engines.

The Green Lake Electric Road—one of the feeders for the Consolidated system—will issue \$50,000 in bonds in order to complete a circle around the lake, fit up boat houses and pleasure grounds, and buy additional equipment. Only a mile more of road will be necessary in order to make the circuit of the lake. D. J. Denny may build a spur from this line to his mineral springs, which are a mile north of the lake.

The Front Street Cable Road has put in new differential drums, which were made by the Walker Manufacturing Company, Cleveland.

J. K. Edmiston, president of the Rainier Avenue Railway Company, says he will soon begin the construction of the Baxter street branch which is to be about a mile long. According to the franchise, the road must be in operation by April 1 of this year.

The State Supreme Court has revised the judgment in the case of Marie Howkins against the Front Street Cable Company for damages for injuries. The Supreme Court holds that it was an error for the court below to instruct the jury that where a passenger is injured without fault of his own, there is legal presumption of negligence, casting upon the carrier the burden of disproving it.

Supplemental articles of incorporation of the Tacoma & Steilacoom Electric Road have been filed, increasing the capital stock \$500,000. E. B. Kittler, who represents the Thomson-Houston Company as president, and L. B. Livermore, secretary.

The Tacoma Railway & Motor Company will tear up its line on Twenty-sixth street and build on Twenty-fifth.

The Tacoma city council has refused to pass an ordinance forfeiting the company's franchise on South K street, owing to the failure of the company to operate cars there. The company claims that operation would not pay on South K.

The Lake Whatcomb Electric Road is now open. The company will apply for a franchise to carry coal, logs and general freight.

M. J. Dooley has brought suit against the company asking to have a receiver appointed. He claims to have originated the idea of building the road, and to have entered into an agreement with J. E. Baker, Hugh Elridge, W. E. Waity and J. A. Cook whereby he was to do the legal work and secure the purchase and they furnish the money for the construction. For his services he was to receive a one sixth interest, but he alleges that he has not received his full share.

Surveyors are locating a route for an electric line from Tacoma to Sumner, a distance of nine miles.

The Green Lake Electric Railway company has leased its line to the Seattle Consolidated Street Railway company for two years from February 15. The Consolidated also has an option of purchase. The Consolidated company binds itself to operate the line with a through car service at least once an hour.

The new arrangements will give the residents of the northern part of the city much improved service, for the running of through cars will obviate the necessity of the change at Fremont, and shorten the trip from the city terminus of the Consolidated line five or six minutes. As business warrants it the service will be increased, and in summer a feature will be made of pleasure and picnic business, for which cars run much more frequently.

The Green Lake line consists of five miles of track, extending from Fremont to and almost around Green lake, and has two passenger cars. At present electric power is furnished by the Consolidated company. The absorption of the line will result in considerable economy in operation.

The Green lake company will this summer lay out pleasure grounds on the north side of the lake and will plank the 120-foot boulevard extending around it.

The Consolidated Street Railway Company is building two new open cars, and will build ten more this season. They are of purely Seattle manufacture, and contain many new features of electrical equipment. The car bodies will stand nearer to the ground than those of the old pattern, and the motorman will stand in the middle like the gripman on a cable dummy. All the controlling apparatus will be above the floor, and will be worked by levers on the same principle as the cable grip.

The Consolidated has just added three cars to its service, and is making more frequent trips on most of its branches. The company has completed its lease of the Green Lake Electric Railway, over which it now runs a car every hour. The Green Lake Company has chosen the following trustees: E. C. Kilbourne, James Leddy, V. Hugo Smith, C. E. Chapin, William D. Wood. The officers elected are: President William D. Wood; vice-president and manager, E. C. Kilbourne; secretary and treasurer, C. A. Kilbourne.

V. Hugo Smith, secretary of the Seattle Consolidated Street Railway Company, has been nominated by the Republicans for city treasurer.

Woo Dan, a Chinaman, sued the company for \$25,000 damages for the loss of a leg, on February 7, 1891. The jury returned a verdict that the fault lay with the Chinaman.

The extension of street railways to all points on Lake Union has driven the small steamers formerly plying there out of the passenger business. The Lake Union Transportation Company has just sold the *Maud Foster* and has transferred two of the other boats to the Sound.

The Grant Street Electric Road has been completed to the race track, $4\frac{1}{2}$ miles south of the city terminus. The construction of the power house has already begun. The cost of the building and plant will be \$50,000. The power house will be 120x120 feet, will be constructed of brick and iron and will be fitted up with all the latest improvements. The machinery will have a capacity of 375-horse-power. The engine will be of the Westinghouse make and the dynamos will be of the Thomson Houston make. In addition to power for running the cars there will be an electric light plant to furnish light along the line and supply South Seattle with illumination. While the house is being made ready the Seattle Consolidated will supply power for six cars.

John S. Patterson, Angus Mackintosh and Hugh L. Thomas have incorporated the Suwanish Construction Company, with a capital of \$200,000. The object is the construction and operation of street railways but the incorporators refuse to say where they will build.

A new time schedule has taken effect on the West Street and North End Electric Railway under which cars run every twenty minutes, instead of every eighteen minutes as formerly. This change is due in part to the fact that under the old schedule the cars ran so fast that the motors were burned out very frequently and repairs ate up a large share of the earnings. They have been running at the rate of 14 to 16 miles an hour, each car's mileage being 190 per day.

On February 26, Otis Sprague was appointed receiver of the Tacoma & Puyallup Railroad Company, upon the application of R. F. Radebaugh, president of the company. Previous to applying for a receiver, Mr. Radebaugh filed a complaint with the superior court for \$495.08 as the balance due him in accordance with a settlement of the company's accounts. The company at once confessed judgment and filed a deed assigning all of the property, franchise and other rights to Receiver Sprague, for the benefit of the creditors. The road will be operated by the receiver. In reference to the receivership, Mr. Radebaugh made the following statement: "All of the company's property, real and personal,

is covered by mortgages, and cannot be sold on execution without injury and prejudice to the creditors and stockholders. The company is wholly insolvent and unable to pay its debts, the officers of the company admitting this to be so. He is the owner of 500 shares of the company's stock and is the indorser on \$30,000 worth of the company's paper, which is otherwise unsecured. The company's taxes are unpaid and there are no funds to pay them. It is believed that the creditors would commence suit by attachment, and that there was danger of plaintiff and other creditors losing their claims. The road is a narrow gauge, 12½ miles long; has four ten-ton and one thirty-ton motor and other rolling stock and real estate worth \$500,000.

For work alleged to have been performed, Owen Wood has filed suit to recover \$1,525 of the Tacoma & Puyallup and the Wapato Park Belt Line Railway. Mr. Wood was formerly foreman of the construction and repair forces.

H. A. Craigin has been appointed general manager of the Tacoma Railway & Motor Company. He is 28 years old, and while a student at Harvard college and the Boston Institute of Technology made electrical and mechanical engineering a specialty.

The work of securing the right-of-way from the Puyallup Indian reservation to Sumner for the Ross Electric Railroad has been begun. Mr. Ross has secured right-of-way through the Puyallup reservation.

The contract for building and equipping 4 miles of street railway has been let by the Olympia Light & Power Company to the Thomson-Houston Electric Company. The contractors agree to have the line in operation by July 1. The road will run from the East Side to Tumwater.

The West Side Street Railway Company of Olympia, has closed a contract with the Edison General Electric Company for the construction and equipment of 2 miles of road in ninety days.

The regular service on the Fairhaven & New Whatcom Electric Railway Line from Fairhaven to Lake Whatcom has begun.

Consolidation of the electric lines of Fairhaven and New Whatcom, the two adjoining cities in Bellingham Bay, is deemed probable.

TOPEKA'S ELECTRIC RAILWAY.

THE Topeka Rapid Transit Railway Company has reorganized and passed from the hands of its receiver to a new management, physically and financially sound, that will establish it among the solid and necessary institutions of the city.

Much credit is due to the manly efforts of H. C. Spear, C. C. Baker and their associates, in relieving the company of its financial embarrassments, in a manner highly satisfactory to all concerned.

The floating debt has been paid, and of the \$342,000 of bonded debt formerly outstanding, \$92,000 has been retired, leaving the total debt of the road only \$250,000, bearing interest at 6 per cent.

The coupons due in July, 1892, have been prepaid, leaving no interest charges due till January, 1893. It is designed to give the citizens of Topeka the best street car service possible, which will no doubt be appreciated by their hearty co-operation and support.

THEY came to blows, but nobody was injured. This was the situation on a Chicago street car when nine members of a brass band boarded the car. One be-thought him of a little music for the edification of the passengers. The conductor thought differently, but the attempt to eject one roused the balance of the horned men, and one verse of "Johnny get your gun" fixed the fare collector, who retreated in haste. Then the car and the musicians went on in concert.

REAL ESTATE is on the boom in Baltimore as the direct result of cable roads in operation and prospective.

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days; reported especially for the STREET RAILWAY REVIEW, by Munn & Co, Patent Attorneys, 361 Broadway, New York, N. Y.

ISSUE OF FEBRUARY 9, 1892.

| | |
|--|---------|
| Trolley Wire Support, J. P. B. Fiske, Lynn, Mass..... | 468,336 |
| Elevated Electric Conduit, C. O. Newton, Homer, N. Y..... | 468,388 |
| (Cable) Car Brake, H. H. Kenkel, St. Paul, Minn..... | 468,409 |
| Adjustable Guard Rails for Street Cars, D. Catarieus, Brunswick, N. Y., and A. S. Crable, Lansingburg, N. Y..... | 468,454 |
| Motor Gearing for Electric Cars, E. B. Phillips, Cleveland, O..... | 468,536 |
| Adjustable Device for Cable Grips, C. L. Anderson and G. H. Fairchild, San Francisco, Cal..... | 468,555 |
| Electric Railway System, W. J. Ogden, Baltimore, Md..... | 468,545 |
| (Street) Railway, A. G. E. Westmacott and J. P. Hutchinson, Newton, Pa..... | 468,608 |
| Elevated Railroad Car, W. T. Shaffer, Evanston, Wyo..... | 468,699 |
| Electric Railway, C. W. Thomas, Jersey City, N. J..... | 468,768 |

ISSUE OF FEBRUARY 16, 1892.

| | |
|---|---------|
| Trolley for Electric Cars, J. W. Beebe, Waterloo, N. Y..... | 468,779 |
| Signal for Electric Railway Systems, F. A. Cheney, Elmira, N. Y..... | 468,787 |
| Cable Railway, W. C. Metzner and G. E. Buschick, Chicago, Ill..... | 468,813 |
| Motor for Street Cars, A. J. Painter, Pasadena, Cal..... | 468,824 |
| Double Traction Motor for Elevated Railroads, G. A. Stephenson, Los Angeles, Cal..... | 468,842 |
| Automatic Passenger Register, D. L. Tower, Brooklyn, N. Y..... | 468,845 |
| Traction Device for Tram cars, W. B. Wright, Chicago, Ill..... | 468,860 |
| Turn Table Connection for Electric Railways, R. M. Hunter, Philadelphia, Pa..... | 468,912 |
| Electrically Propelled Car, H. E. Day, Brooklyn, N. Y..... | 468,948 |
| Converter System for Electric Railways, T. A. Edison, Llewellyn Park, N. J..... | 468,949 |
| Electric Railway, F. J. Sprague and P. F. O'Shaughnessy, New York, N. Y..... | 468,959 |

ISSUE OF FEBRUARY 23, 1892.

| | |
|--|---------|
| Conduit for Cable or Electric Railways, G. S. Morrison, Chicago, Ill., and C. Vogel, San Anselmo, Cal..... | 469,262 |
| Electric Railway, W. S. Smith, Berkeley, Cal..... | 469,280 |
| Plot for Street Cars, J. W. Abrahams, Allegheny, Pa..... | 469,291 |
| Cable Grip, T. Otto, Schkenditz, Germany..... | 469,318 |
| Method of Utilizing Stationary Cables on Cable Rys., J. P. Harper, Kansas City, Mo..... | 469,330 |
| Overhead Conductor for Electric Railways, E. M. Bently, New York, N. Y..... | 469,353 |
| Brake for Electric (Street) Cars, E. S. Amrock, Waltham, Mass..... | 469,383 |
| Street Railway or Tramway, J. M. Price, Philadelphia, Pa..... | 469,392 |
| Trolley for Overhead Railways, N. E. Austin, Danbury, Conn..... | 469,460 |
| Street Railway Rail Chair, W. H. Mattson, Philadelphia, Pa..... | 469,485 |

ISSUE OF MARCH 1.

| | |
|--|---------|
| Conduit System for Electric Railways, J. E. Waller and E. Manville, London, Eng..... | 469,828 |
| Trolley for Electric Railways, W. H. Morgan, Alliance, O..... | 469,899 |
| Power Transmitting Device for Electric Railways, E. H. Johnson, New York, N. Y..... | 469,944 |

A Tale of Two Cities.

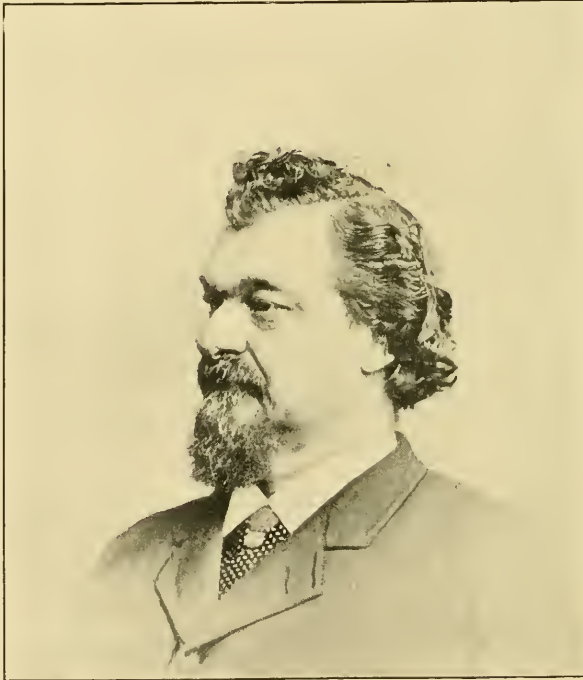
Three weeks ago the grippe attacked me,
Like the dickens, too, it racked me;
In the ice they would have packed me,

But for the trifling circumstance that I had sense enough to get on a Wabash train and go to Hot Springs, Arkansas, where I speedily regained my health. By the way, if you make this trip go via the Wabash. I bought my sleeping car ticket right through and had no worry about reservations.

OBITUARY.

At his home, in the city of Boston, on the 15th of February, occurred the death of one of the best known and most beloved members of the street railway fraternity. Although a sufferer for some years past from heart disease, which was the immediate cause of his death, the news of his demise was very unexpected to street railway men generally. Mr. Richards was born on the 4th of March, 1828, in Dorchester, Mass., but passed his boyhood in and around Boston, where he received his education, until the age of 13, when he entered business with his father, displaying that unusual executive ability which characterized his business career through his entire life. He was married in 1852, to Ann R. Babcock, of Boston. His active connection in street railway interests began in 1875, when he took control of the Metropolitan Railroad of that city, and rapidly brought it out of a chaotic state into one of the best managed and systematized roads in the world. He continued at the head of this company until its consolidation with other roads, into the present West End Street Railroad of Boston, when, after a few months, he resigned to devote his time to his many personal interests, which were of a large and important character.

On the occasion of the organization of the American Street Railway Association, which occurred December 12th and 13th, 1882, in the city of Boston, Mr. Richards was especially active; and presided at the closing banquet on that occasion with that great ability which always characterized his presence on such occasions, and in which office he was conceded to be the most accomplished member. He was also president of the association in 1885 and 1886, which convention was held in the city of St. Louis. As a speaker he was at once eloquent, pathetic and witty, and had the happy faculty of turning the laugh on another in such a way as to never wound, and he possessed in a rare degree that ability to call forth an expression of either laughter or tears from his auditors in almost the same breath. A man of large accomplishments himself, none was ever more ready to recognize merit even among the ranks of his humblest employees. The fact that such possessed experience and knowledge by which he could profit, and from which he did not consider his posi-



CALVIN A. RICHARDS.

tion so far removed as to prevent his listening to the experiences of others whenever he thought the interests of his company could be promoted by so doing, was illustrated in a remark, "I have not a man in my employ but can teach me something." Although not actively engaged in street railway work, his presence at the Buffalo Convention in 1890, was a signal for a hearty ovation which he acknowledged in his most happy vein. His death occasions feelings of the most sincere regret from all who have ever had the good fortune to know him. The city of Boston owes much to him for having promoted its street railway interests during a critical period, and the American Street Railway Association is no less indebted for the faithful services and kindly interest and counsel which he so freely gave.

A. D. WHITTON.

In the death of A. D. Whitton, of the Philadelphia Traction Company, the railway service loses one of the long time promoters of the cable system. He was born in Scotland, thirty-six years ago, and leaves a wife and two children. About eight years since he was employed by the Traction Company, and was engaged in the construction of the principal cable line of that city, and later, designed roads in Pittsburg, Chicago, Baltimore and New York, and acted as consulting engineer.

MELTIRE CAMPBELL.

Meltire Campbell, of New York, a superintendent of the Broadway and Seventh Avenue Railway, died Feb. 25th, of heart

failure at his home, No. 453 West Fiftieth street.

WILLIAM P. MULLEN.

Wm. P. Mullen, Vice-President of the Shultz Beltings Company, died recently at his home in Newtonville, Mas., after a long sickness.

THE removal of the old gas posts from the business streets of Columbus, Ohio, have thrown Uncle Sam's letter boxes out of a job, and the Consolidated Street Railway Company has offered the use of its poles for the purpose. The change will be made at once.

THE South Brooklyn Line of the Brooklyn City Railway expects to have the overhead trolley system in operation by the 4th of July.

CABLE AND ELECTRIC MOTOR POWER ON STREET RAILROADS.

MARCH 5th, 1892.

Editor Street Railway Review:

A letter writer in the Street Railway Journal for February says: it would be interesting to know what reasoning finally induced the "clear headed men" who control the principal street railroads in Brooklyn to decide in favor of electricity (instead of the cable) for their lines.

A general survey of the press makes one wonder that cable railways continue to be built at all.

The magazines give us popular accounts of the progress of electricity, the big dailies have their electric column, the street railway journals are under a heavy electric pressure, and electric pamphlets, papers and paragraphs fill all the gaps. The presses are generously fed by wealthy corporations, and numberless individuals, immediately interested in the electric boom. Bonfires are lighted everywhere and nothing escapes the rakes that can be made to blaze for the glory of electricity. There is more evidence offered for the efficacy of electric traction than sufficed to make a bonanza of Perkins' Tractors.

And who speaks for the cable?

Day after day we read: the cable road costs nine times as much as the electric; its operating expenses per car mile are as 14.12 to 11.02 cents, or, with interest added, as 20.91 to 14.05; the cable road burns three times as much coal as the electric; the cable has an "efficiency" of 50 per cent.; electricity has an efficiency of 85 per cent.; operating expenses per passenger .05488 for the cable, against .04736; and so on.

You will recognize the figures: I did not invent them.

Some of us know better, and some wonder why cable roads are built: but the Electric man has the next word, and it is, "As these figures have not been questioned by any authority upon the subject they may be accepted as substantially correct."

It seems natural that some of the "clear-headed men" who control street railroads should make the Brooklyn blunder. The mass of evidence is overwhelming.

Occasionally some one of these "clear headed men" suspects its one-sided nature. Perhaps he asks how it is that cable roads operating at such an enormous disadvantage pay in the "twenty-seven principal cities" 10.15 per cent. dividends against 5.59 per cent. for the electric; and why in the census table of "eighty-one per cent. of the operating roads" the cable shows a net surplus \$557,749. against \$30,820 for the electric: and why cable road stocks are high and electric low: and why this electric road with a business of \$1,500 per day cannot sell its bonds from San Francisco to London, while that cable road offering \$2,000,000 at 9 a. m. has \$2,500,000 called for by 2 p. m.; and why the papers are almost silent about some thirty-five miles of cable road to be built this year in a neighboring city while every mile of half-built electric road with its two cars is paraded in every possible way.

And having got this far he may chance to hear for the first time of cable roads operating for 9.5, 8.5, 7.4, 7.2

and 6.6 cents per car mile (exclusive of interest on bonds only); and of others for from 55 to 42 per cent. of gross receipts; and of others for 2.75 to 1.50 cents per passenger; and he may be shown that the cable road burns 1 pound of coal to the electric 3 (instead of 3 for 1), and that if 50 per cent. is a good figure for the "efficiency" of the cable road, no electric road can show 40 per cent. or 30 per cent., and a few, if any of them, 20 per cent., measured in the same way:—and other unsuspected things.

If he himself "cables" he may give thanks, but he does not roar with a loud voice, and there is no "authority" in the shape of organized boomers of "systems" and of patents by the thousand, to drag him into the chorus.

I merely wanted to suggest why some cable roads are *not* built, and to explain the seemingly greater anomaly that some *are*.

CABLE RAILWAYS.

GIVE THE PEOPLE A SHOW.

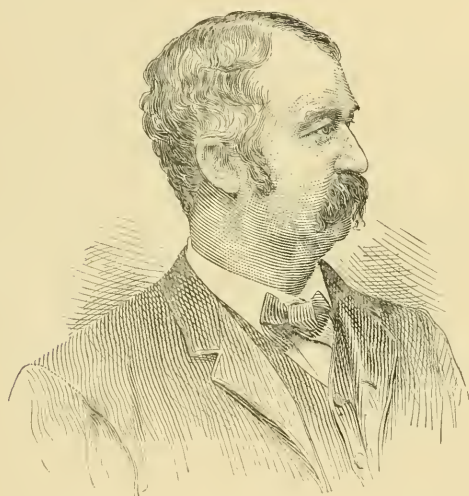
IT is now the time for thoughtful managers to plan and commence the arrangements for suitable public entertainments to be given at favorable points on their lines during the coming summer months. Steam road managers are visiting the summer resorts and places of natural attractions along their lines, and will soon flood the country with handsomely illustrated descriptive matter calling attention to these special claims, as offered by their respective roads. The investment is in every way a legitimate one. The street railway may not have natural attractions along its line; all the more need then to set at work and make some attractions. This they can do. Instead of spending money in advertising points of interest as their steam road brothers, they can do that which is equally as good by arranging special attractions which will draw enormous crowds if properly directed. Where city parks are wanting they can lease, and at small expense, fit up convenient picnic groups. If a lake or river lies at or near the end of a line, put a lot of pleasure boats there to be rented at nominal prices. Hire a band to give a free evening concert once, twice or four times a month. Vary the character of the entertainment. The manager in each city must adapt the time, place and character of the attraction to the local conditions, which are best known to him. What would answer in one place might not be at all successful in another, but in all cities will be found golden opportunities which if once discovered may be made to yield a handsome business to the road, and at a time of day, too, when otherwise the equipment would not be all in use.

The Union Street Railway of New Bedford, Mass., have made arrangements for summer amusements for its patrons and closed a contract with a competent theatrical manager to give entertainments on the line of its road during the summer months, and will erect at its own expense the necessary building in which the entertainments, mostly light opera, will be given.

THE SUBURBAN'S LOSS, CHICAGO'S GAIN.

IT is with deep regret that the many travelers and friends of the Suburban Elevated Railroad, learn of the resignation and removal from New York of E. B. Wetmore, who from the opening of the road was its superintendent and master mechanic, also officiating as train master since the Suburban Company merged into the Manhattan. It will be highly gratifying for them to know that he is to enter new and wider spheres of action, his new position being that of superintendent and master mechanic of the Chicago & South Side Rapid Transit Company, better known as the "Alley L."

He resigned February 29th, and is now superintending the construction of the engines being built at the Baldwin Locomotive Works, Philadelphia, also the cars by Jackson & Sharp, Wilmington, Del., for the Chicago company.



E. B. WETMORE.

Superintendent Wetmore was born at Middleton, Conn., in January, 1835, and apprenticed in the New Haven, Hartford, and Springfield railroad shops at the age of fifteen years; after serving five years he was appointed engineer on the Ohio & Mississippi Railroad, remaining till October, 1863. At this time his engine was precipitated down an embankment of 160 feet, and he was picked up in an unconscious condition, scoring one of the most marvelous escapes in the history of railroad accidents.

On his recovery he was appointed as passenger conductor, resigning in 1867, and came East on appointment as engineer on the New Haven & Hartford Railroad. Afterward taking the first engine over the N. H. M. & W. Air Line, and being promoted, served five years as conductor.

In 1878 he started in as an engineer on the Metropolitan L. Railway, and before a year was promoted to road foreman of engineers. The following year he was appointed engine dispatcher, and soon advanced

to the position of train master, in which capacity he acted until 1887, when he was tendered the position of superintendent on the Suburban Road.

Under his able management the Suburban Road progressed finely; trains were run regularly, the cars kept neat, and the employes courteous, increasing its popularity with the traveling public.

After the shipment of the engines and cars from the East, Superintendent Wetmore will remove with his family to Chicago, leaving with the best wishes of the officers and employes for his future prosperity and success, to accept a hearty welcome from his many friends and well wishers in the progressive West.

MASSACHUSETTS STREET RAILWAY ASSOCIATION.

AT the regular monthly meeting of the Massachusetts Street Railway Association, held at Young's Hotel, Boston, March 9, 1892, there were fourteen companies represented. Vice-president Amos F. Breed occupied the chair.

The records of the previous meeting were read and approved, after which the question of taxing street railway corporations came up for discussion, and the prevailing opinion among those present was that the franchise tax of to-day in its amount and method of assessment is just and equitable, and ought to continue without change except in the distribution of money thus collected.

It was thought that the money thus collected should be distributed among the towns and cities according to the number of miles of tracks in the towns and cities, through which the tracks extend.

PERSONALS.

W. H. BONE, manager of the Walker Manufacturing Company of Cleveland, was in the city a few days since.

J. C. CALNAN, manager of the State Electric Railway at Clinton, Iowa, visited Chicago the early part of this month.

W. J. CROZIER, superintendent of the Pleasant Valley Line at Pittsburgh, has decided to devote his time to personal interests.

W. R. MASON, general manager of the Electric Merchandise Company has returned from an extended Eastern trip, and reports a very successful business.

J. C. COTTON, has succeeded Mr. Greenwood as manager of the Pittsburgh Allegheny & Manchester Traction Company. Mr. Greenwood will have charge of the electrical department.

H. C. GESSMAN, the electrician in the employ of the Edison Company who was sent to St. Joseph, Mo., on January 20th, to make some tests on the street railway there has not been seen since that time, and fears are entertained that he has met with foul play.

ECHOES FROM THE TRADE.

THE STEWART HEATER COMPANY, of Buffalo, N. Y., is now represented by H. C. Fisher, 505 Rookery, this city.

THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY have just supplied the motors for the Love Electric Traction Company of North Chicago.

THE GOUBERT MANUFACTURING COMPANY, find a great demand for their heaters, which is keeping them very busy at their New York headquarters, 32 Cortland street.

THE GRIFFIN WHEEL AND FOUNDRY COMPANY have received an order for the wheels of the 180 new cars of the Chicago City Railway, to be built by the J. G. Brill Co.

THE THOMSON-HOUSTON ELECTRIC COMPANY, have equipped 214 roads, either under operation or being constructed under their system, requiring in all an equipment of 3,406 motor cars.

THE VOGLE CABLE CONSTRUCTION COMPANY of 13 Broad street, New York, have just issued an illustrated description of their cable system, and copies will be sent to any address on request.

THE MILWAUKEE CAR WHEEL AND FOUNDRY COMPANY has changed its corporate name to the North-west Wheel and Foundry Company, and has moved the entire plant to St. Paul, Minnesota.

F. R. DRAVO & Co., Pittsburgh agents of the Ball Engine Company, have installed their engines in the Central District Telephone & Telegraph Building, Vandergrift Building, and Schmidt Building of Pittsburg.

THE ELECTRICAL REVIEW, in its decennial issue dated February 20th, gave a comprehensive history of the progress of electrical matters up to date, and in point of illustration, typography, and editorial ability, the issue was one of rare beauty and excellence.

THE J. G. BRILL COMPANY have shipped a sample car on order of the Milwaukee Street Railway Company, which is 18 feet long inside, and is finished in cherry, and mounted on the Brill truck. It is a handsome car and is attracting no small amount of attention.

W. W. NUGENT, a consulting and contracting engineer of prominence, has been appointed sole agent for the celebrated Goubert Water-Tube Feed Water Heaters, vertical and horizontal, in Chicago, his office being located at 823 Home Insurance Building, this city.

THE UNIVERSAL ELECTRIC RAILWAY CONSTRUCTION COMPANY, of Philadelphia, have moved their offices from the Bullitt Building to their works at Holmesburg, Philadelphia, in order to facilitate construction work, orders for which have been coming in very rapidly.

THE NEWBURYPORT CAR MANUFACTURING COMPANY have recently taken orders for cars for Rochester, N. Y., Allentown, Pa., Brocton, Mass., all of them to be equipped with the Reliable Manufacturing Company's improved ratchet brake handle, for which J. F. Shaw is agent.

THE CASSIER MAGAZINE COMPANY, of the Potter Building, New York, have favored their newspaper and advertising friends with envelopes for the filling of advertising contracts, by means of which an advertiser can tell at a glance the amount and location of his ads. It is a most convenient device.

THE ELLIS CAR COMPANY has delivered two sample cars to the Milwaukee Railway Company, one closed and one open. The latter equipped with the Ellis' patent back swing, which is becoming very popular among the buyers of open cars. The company is also getting out a large order of cars for Johnstown, Tenn.

THE CUSHION CAR WHEEL COMPANY have sold wheels for 16 cars for Rhomberg's line, in Dubuque, also for 5 cars on the Kankakee line, being their second order, and are equipping the electric cars of the Citizen's line at Indianapolis. They have also received an order for several sets from the Joliet Electric Railway.

THE Accelerator car, manufactured by the Brownell Car Company, of St. Louis, will shortly make its appearance in Chicago, 30 of the cars having been ordered by President Yerkes, for the North Side Street R. R. Company. One car has also been ordered for Milwaukee with a view to testing its popularity in that city.

THE BROWNELL CAR COMPANY, of St. Louis, have taken an order for 50 closed cars for the Baltimore Traction Company, which are to be manufactured with special reference to strength and beauty, and which when completed will be the finest in operation in that city. Also 20 electric cars for the Consolidated Electric Railway at Grand Rapids, Mich.

THE STANWOOD MANUFACTURING COMPANY have just doubled the floor space of their establishment. They have discarded the use of malleable iron entirely in the construction of their steps. The frames are now made of rolled steel and the hangers of pressed steel, thereby reducing the cost of repairs to a minimum. They have orders ahead for three months.

THE ALLEN SAFETY CAR BRAKE, manufactured by W. W. Allen, Red Wing, Minn., has been ordered for electric lines in Sioux City, also Allentown, Pa. The brake is positive, quick in action and a car equipped with this brake can no more run away on a down grade than it could on an ascending grade. Managers of lines operating on hills should not fail to investigate the Allen brake.

SUIT has been brought by the Builders' Insulating Tube Company, of Lynn, Mass., and the Insulated Fibre Industries Company, against the Interior Conduit and Insulation Company, E.H. Johnston, president, for infringement of patents covering the making of pipes or paper tubing, to carry electric wires. The plaintiffs in this action announce they will also bring suit against users of the pipe in question.

THE GOULD AND WATSON COMPANY, of Boston, manufacturers of Mica Insulated Goods, has recently sold through its London agent a heavy shipment of its devices to the General Electric Power and Traction Company. These molded mica insulators are coming into general use at home as well as on the other side of the Atlantic, so that it keeps the company busy to supply the home and foreign demand.

THE BALL ENGINE COMPANY, of Erie, has just installed a 60-horse-power engine, being the third for the Hygia Hotel, Old Point Comfort, also a 150-horse-power for the Electric Light, Heat & Power Company, of Kitanning. One 100-horse-power for the Electric Department of the Lockport, New York, Gas Company. Three 150-horse-powers for the Westminster & Vancouver Railway Company, British Columbia.



"STEP LIVELY, PLEASE".—PUCK.

KOHLER BROTHERS, representing the Western Branch of the Eddy Electric Manufacturing Company have received the following orders: The Love Electric Traction Company, Chicago, one 110-horse power railway generator; The Atlanta Traction Company, two 110-horse power generators; the West End Railway Company, Rockford, Ill., one 110-horse power railway generator. In addition to this they have sold a large number of stationary motors.

THE NEW PROCESS RAW-HIDE COMPANY, of Syracuse, N. Y., are in receipt of a letter from Superintendent Barnes, of the Plymouth and Kingston, Mass., electric road, in which he states that for purposes of testing the raw-hide gear he placed it under one of his motors, where it worked against a gear of gun metal. Although in use for seven months, and having worn out two sets of gun metal gears the New Process raw-hide pinion is still in good working order.

THE TRAMWAY RAIL COMPANY, of Pittsburgh, Pa., are meeting with the most satisfactory success with their rail sections, joint chairs and Samson bridge chair, having recently taken among other orders, one from Captain Hall, of Peoria, who has placed a contract for all his material, and who has purchased more than five miles of

the bridge chair. Fifteen car loads of track material have already been shipped to Peoria alone by the Tramway Rail Company.

EDWARD C. JONES, of the banking house of Jones & Faile, of So Broadway, N. Y., having examined carefully the property of the Battle Creek Street Railway Company, was so well pleased with its condition and future prospects, that he has purchased the entire issue of first mortgage bonds issued by the railway company, amounting to \$110,000. The line to Goguc Lake will be in operation within thirty days. It is the intention of the company to make the lake trip a popular and desirable recreation.

DAYTON MANUFACTURING COMPANY, of Dayton, Ohio, has purchased the entire railway business, including supplies, material, patterns, good will, etc., of Post & Co., of Cincinnati, and which in addition to their already large facilities will place them in position to promptly supply customers with everything in their line. The consolidation of the business of these two firms, and the excellent management which has characterized the Dayton Manufacturing Company, places it in a position to greatly enlarge its field of trade.

THE JOHN STEPHENSON COMPANY among other large orders are at work on 100 of the new cable cars for the Broadway line, which it is expected will prove superior to any similar vehicles ever constructed. The new cars will be 31 feet in length, 7 feet in width inside. They will also be 2 feet higher than ordinary cars in use in New York City. The rear platform will be very large, with low hanging steps, and it is expected that the new cars will be able to seat comfortably upwards of 40 passengers.

T. C. WHITE, St. Louis, Mo., has moved from the Bank of Commerce Building, to 805 Locust Street, where he occupies the entire first floor as a supply room, and will carry in stock at all times a full line of Nuttal's specialties, such as trolley poles, gears, pinions, armatures, cores and other supplies, which railway companies so often need on short notice. Mr. White will be able to ship the same day, on receipt of order, and with his greatly increased facilities will be able to take care of his large and fast increasing business.

THE Great Western Electric Supply Company are general agents for the celebrated Chubbuck Malleable Iron Brackets, which are so well known and largely used throughout the United States. These brackets, as their name indicates, are made of malleable iron, by an improved patented process, and are much lighter, stronger and neater, than cast iron brackets of any description. They are invaluable for street railway work on account of their strength and a malleable iron pin is far superior to any wooden pin that could be used, and being so light are most easily handled. They stand the strain of heavy feeders, turning corners and on curves to the complete satisfaction of every one who has ever tried them.

THE INTERNATIONAL REGISTER COMPANY, with headquarters at 435 "The Rookery," this city, has been formed to handle the Pratt patent fare register. The names of the officers of the organization are so well known as to need no further words of endorsement, or guarantee the ability of the organization, which is composed of practical railway men. A. S. Littlefield is president, W. J. Cooke, vice-president, and A. S. Englund, secretary and treasurer. The new company starts out with every indication of a prosperous career.

THE ENGINEERING EQUIPMENT COMPANY, 143 Liberty street, New York, and 126 Pearl street, Boston, who are the selling agents for the Syracuse Tube Company, report large sales for their iron poles for railway purposes. Recently an order was sent to the factory for a sample pole, which necessitated the drawing of certain classes of pipe, in making of the joints, putting together, painting and placing on cars, all of which was accomplished by noon of the day on which the order was received. The factory has a capacity of 100 poles a day.

THE RELIABLE MANUFACTURING COMPANY, of which James F. Shaw, 53 State St., Boston, Mass., is agent, has recently equipped several of the West End Street Railway Company's cars, with their improved ratchet brake handle. They are also shipping several orders of their reliable sand boxes, having recently sent 36 to the Thomson-Houston Electric Company, of San Francisco. James F. Shaw, Boston, Mass., has recently taken an order from the Briggs Carriage Company, Amesbury, Mass., for 60 set of ratchet brake handles.

THE J. G. BRILL COMPANY have just received an order from the Chicago City Railway Company for 100 large open cars and 80 large closed cars. The fight for the order was an earnest one, nearly all the companies bidding, but it was carried off by the Brill Company. This is the first time in seventeen years that the Company have gone outside of their shops for cars. The J. G. Brill Company have also received contracts for six cars from the Dubuque Street Railway Company and also for six cars from the St. Joseph and Benton Harbor Electric Light and Power Company.

A. H. ENGLUND, formerly secretary and treasurer of the Electric Merchandise Company, Chicago, has opened an office at No. 436 "The Rookery," as secretary and manager of the International Register Company. This Company has purchased the Pratt patents on conductors' fare registers and have equipped a very complete factory for the manufacturing of these machines in both portable and stationary forms.

Mr. Englund's long and practical experience in the street railway supply trade has made him a host of friends and the success of his new enterprise is assured.

THE Randall Street and Electric Car Manufacturing Company has recently been organized for the purpose of manufacturing street and electric cars and other railway

THE STREET CAR NUISANCE.



Of all life's nuisances which lie
About our path through life,
I know of none, though far, though nigh,
With more annoyance rife
Than he of namby-pamby wits,
Of idiots the star,
Who in his journey always sits
Cross-legged in the car.

What though his boots with mud are thick,
They're crossed with other bilks',
And leave their slime—for none will kick—
Upon the ladies' silks.
The hero brave of Austerlitz,
Fresh from the cannon's jar,
Has not the nerve of him who sits
Cross-legged in the car.



If streets be dusty, and his boots
With dust are coated thick,
He gets no shine from street galoots—
He knows a cheaper trick:
He crosses one leg over its
Near neighbor mid the jar,
And ladies clean them as he sits
Cross-legged in the car.

Look up the line, and roar in glee,
At boots and shoes displayed:
From sixteens down to sevens you see
A varied line arrayed—
A gauntlet that one runs who flits
To the Park or down Spring Garden in the
throng where each sits
Cross-legged in the car.



—Philadelphia Press.

appliances in Boston. The general manager is I. H. Randall, who has been for 30 years with the Metropolitan and West End Railway Companies as master car builder. The present location is 1131 Tremont street, Boston, and the company is capitalized at \$150,000, under the laws of Massachusetts. The great demand for cars by the adoption of electric power throughout the country for the past few years, has been greatly increased and the manufacture of electric cars and railway appliances constitutes a most important part of the business. They expect to have their new catalogue ready for distribution in a short time, which will embrace cuts and general description of articles manufactured by this Company.

OWING to increase of business, the Pond Engineering Company have found it necessary to remove their Chicago office from 427-429 "The Rookery," where they have been located for three years past, to room No. 8 of the same building. This room is located on the ground floor, and extends from the rotunda to the Rookery court. The front part of the room will be used exclusively for office purposes and the rear for drafting, shipping, etc. Room No. 8 is one of the best offices in the well known Rookery office building, and the Pond Company is fitting

it up in an elegant manner, with a view to the best accommodation and convenience of themselves and patrons.

It has also been found necessary to make a change in the Dallas, Texas, offices of the Pond Engineering Company, which has just been moved to much more desirable quarters, in the Scollard building, room No. 211.

Those changes, will, no doubt, be of interest to many friends of the company, who will be welcomed with pleasure at the new locations.

THE LAMOKIN CAR WORKS, of Chester, Pa., have been the recipients during the past week of some very flattering testimonials from leading railway companies for whom they have built equipment. The workmanship, style and finish of some of their recently delivered cars, speaks volumes for their future success, and assures them a permanent place among the leaders in this branch of industry. Recent deliveries are as follows: For Rock Creek Railway Company, Washington, D. C., six 16 foot Palace car bodies mounted upon Robinson radial trucks; six 16 foot closed car bodies, mounted upon Peckham motor trucks; six 8 seat open cars for trailers, having Cochran's patent malleable iron panels. Electric Railway, Derby, Conn., one open vis-a-vis motor car body, also one 16 foot closed motor body, being the third order. Williamsport Passenger Railway Company, Williamsport, Pa., two 16 foot Palace motor vestibule, also two 8 seat reversible open motor car bodies, being the fourth order from them. City Passenger Railway Company of Altoona, Pa.: two 16 foot Palace motor vestibule cars complete, with the Lamokin adapted Robinson motor truck, and observation window in the roof for conductor's use. Also, 8 closed and 4 open cars for Manchester & Richmond Railway, Manchester, Va.

PORTLAND LETTER.

PORTLAND, Ore., March 10, 1892.

This has been an era of law suits against the street railway companies here, but so far all of them have come out best. The Multnomah county had two suits last week for \$15,060 each, the "mental anguish" in each case coming high. The plaintiffs, two women, were awarded \$150 each, just \$14,500 less than asked. The City and Suburban company compromised a \$20,000 suit a few days since, by a settlement, in which it is generally understood the amount was about what the cost of a suit would have been, provided the plaintiff had received enough damage to throw the costs onto the railway company. The Metropolitan Company has a couple yet on the docket, for which damages are asked in larger sums, from their recent accident on the Fulton Park line. A \$20,000 suit a few days ago gained the plaintiff \$100, and was tried by a jury.

The Portland & Vancouver Railway Company have been sued for \$20,000 by Michael Beck who was struck by a train last fall. He was intoxicated and got into a cut when the engine caught him, breaking his skull. He was taken to the hospital and his case attracted a great

deal of attention from the fact that his brain was plainly visible through the fracture, and it was not thought possible that he could recover, but he is out again and wants a fortune for being drunk that night.

Live stock comes high in the "far West" too; the Metropolitan lines ran over a dog a few days ago and have been sued for damages. The city and suburban railway company killed a cow and a bill for \$150 was sent in. The animal having been in bad condition, a veterinary surgeon made a post mortem and found a case of big jaw, with which the animal could not have lived but a short time.

The Portland Street Railway Association has decided upon right-of-way, and each road has printed instructions regarding them. All can come to a full stop when reaching each others track, and the one having right-of-way proceeds. The volition of gripmen is no longer depended upon as to who shall cross first but the right-of-way based upon rules and penalties made by the Association. A number of other matters will come up at their next regular meeting, occurring the second Wednesday in each month.

All the companies are complying with the ordinance in the matter of placing gates on their cars. Just how open cars will be fitted out remains to be seen. The weather has been so warm that open cars are being pressed into service.

The City & Suburban Railway Company is putting a new track down on Morrison street bridge and laid a new sub-marine cable for the steel bridge. A large force of men are also working on the G street extension, East Side.

The Cable Railway Company is pushing its extension rapidly to the City Park and Base Ball Grounds. They will give four-minute service this summer to the grounds.

The Parcel Express Delivery will go into service on the St. John's line the 15th of this month. The company has built a 24-foot car, equipped with Eames' vacuum brake and will make two trips each way daily. The run is seven miles and in addition to the express business will carry the St. John's and Peninsular mails. The freight business has been larger there and will keep a man busy handling it. The same company has a contract from the government for carrying the Sunny View and Mt. Taber mails. The mails now reach these points twice daily. Mr. Hood.

Florida and the Sunny South via. the Big Four Route.

To all persons contemplating a southern trip, the Big Four Route offers special attractions and advantages possessed by no other line. Solid Vestibuled trains, heated with steam and equipped with palace sleeping cars, reclining chair cars and elegant parlor cafe dining cars run daily, making connection in Central Union Station, Cincinnati, with through express trains of the Queen and Crescent Route, Louisville & Nashville, Kentucky Central and Chesapeake & Ohio Railways, avoiding the tedious transfer necessary via other lines, and affording practically through train service to Old Point Comfort, Asheville, Chattanooga, New Orleans, Savannah, Jacksonville, St. Augustine, Tampa, Indian River and all winter resorts of the South. Tourist tickets via the popular Big Four Route at special low rates are on sale at all coupon ticket offices throughout the country. Ask the agent for tickets via the Big Four Route. D. B. MARTIN, General Passenger and Ticket Agent, Cincinnati, Ohio.

ENTERING EXHIBITS AT THE WORLD'S FAIR.

INVENTORS and manufacturers who may desire to exhibit Street Railway Appliances at the World's Columbian Exposition, should take note of the following summary of the rules and regulations:

There are no charges for space, and a limited amount of power will be supplied gratuitously. All show cases, cabinets, shelving, counters, fittings, countershafts, pulleys, belting, decorations, signs, &c., must be at the expense of the exhibitor, and conform to the general plan adopted. No single piece or section of greater weight than 30,000 pounds will be accepted, if machinery is required for its installation. The expense of transportation, receiving and arranging exhibits and removal at the close of Exposition shall be paid by the exhibitor. Exhibitors may insure goods and employ watchmen, subject to certain regulations.

The installation of heavy articles, requiring foundations, should, by special arrangement, begin as soon as the progress of the work on the buildings will permit. The reception of articles will begin November 1st, 1892, and no article will be admitted after April 10th, 1893. Space not taken possession of April 1st, 1893, will revert to the Director-General for re-assignment. Exhibits intended for competition must be so specified or they will not be examined for award. Articles that are in any way dangerous or offensive, also patent medicines, nostrums and empirical preparations where ingredients are concealed, will not be admitted, and any article dangerous or detrimental will be removed. Exhibitors will be held responsible for the cleanliness of their exhibits and the space surrounding the same, and be in complete order at least thirty minutes before the hour of opening. The removal of exhibits will not be permitted prior to the close of the Exposition.

All packages containing exhibits intended for the several departments must be addressed to the "Director-General, World's Columbian Exposition, Chicago, Illinois, U. S. A." In addition, the following information must be written on the outside of each package:

- (a) Department in which exhibit is to be installed.
- (b) The State and Territory from which the package comes.
- (c) The name and address of the exhibitor.
- (d) The number of the permit for space.
- (e) Total number of packages sent by the same exhibitor, with serial number on each package, list of contents of each package, and freight prepaid.

By addressing the Director-General, World's Columbian Exposition, an application will be sent.

The entry of exhibits of street railway appliances in the department of Transportation of the World's Fair is in an exceedingly backward state. The Exposition Board state this is owing to a want of activity on the part of the committee appointed by the American Street Railway Association in organizing and getting down to business. The committee was to have had charge of appli-

cations and the general supervision and arrangements, but as it is applications have been made direct to the Transportation Department.

We append a list of the names of the applicants for space to date as follows:

Adams & Westlake Co., Chicago, J. G. Brill Co., Philadelphia, Consolidated Car Heating Co., Albany, A. French Spring Co., Pittsburgh, Griffin Wheel & Foundry Co., Chicago, Barre Sliding Ry., Chicago, Johnson Co., Johnstown, Pa., Moffett Journal Bearing Co., Chicago, National Car Spring Co., New York, Price Ry. Appliance Co., New York, Pullman Palace Car Co., Chicago, Safety Car Heating and Light Co., New York, Standard Fireless Engine Co., Chicago, John Stephenson Co., New York, A. Whitney & Son, Philadelphia.

No time should be lost in making application, as the Transportation Building will be crowded at best, and the exhibitors of steam road appliances are rapidly filing entries. The street railway supply men cannot afford to fail to make the largest and best display possible, but most seem to have labored under the impression there is lots of time to spare. It is highly important to act at once and secure good space.

THE GREAT WESTERN.

Not so much is heard these days of the big double decker with which Pullman was to revolutionize things. St. Paul and Minneapolis have decided against them. An attempt was made to run one on the cable line of the Chicago City Railway after midnight, but it had to be assisted by another grip car several times and could not get around the loop without the assistance of horses. The car is a beauty and undoubtedly cost as much as a good sized house, but in many respects it resembles the Great Eastern. Few managers care to rebuild their car houses to suit a car, preferring to buy cars that will go in a one story building without raising the roof. The joints also complain of a 14 ton car and fall in their tracks. Up to date its entry though conducted somewhat on the triumphal plan does not seem to have called out any very large orders from railway companies.

The double decker which while using the Sessions patent should not be confounded with the Sessions side-seat car which without increasing the weight or height of an ordinary car doubles its carrying capacity.

PORTLAND, OREGON. has decreed that open cars (other than motor or grip cars) must not be run between November 15th and April 15th, and that closed cars must be protected with safety gates.

Hot Springs, Arkansas.

Avoid the chilling, grippie-laden winds of March by taking a trip to Hot Springs, Ark. The season at this great health and pleasure resort is now at its height. The Wabash is your Hot Springs line. Two daily trains from Chicago make direct connection at St. Louis with a double daily line of sleepers to Hot Springs. No worry about berths; sleeping car tickets sold right through. Compartment sleepers, parlor cars and free chair cars.

ADVERTISEMENTS FOR HELP OR POSITIONS WANTED WILL BE PRINTED IN THIS COLUMN FREE.

FOR SALE. 2 No. 20500-volt Edison Railway Generators, 65 H. P. complete, with regulating devices, and in perfect working order, for \$1,625 each. 3 No. 10 220-volt Edison Dynamos, complete with regulating devices, and in perfect order, for \$700 each. 1 Hawkeye 220 volt Dynamo, 200 Amperes, for \$500. 1 Hawkeye 220-volt Dynamo, 150 Amperes, for \$350. 3 Baldwin Steam Dummy Locomotives, from 8 to 11 tons, 2 for \$500 each. One as good as new for \$2,500. All of them were in daily use last summer. Address
DAVENPORT & ROCK ISLAND RY. CO.,
Davenport, Ia.

FOR SALE. 1 Baldwin Saddle Tank Engine, weight, 9 tons, cylinders 9 x 12 in., built in 1881. Price, \$1,000. 1 Baldwin Steam Motor, weight, 20 tons; cylinders 9 x 12 in.; built in 1883. Price, \$1,500. 1 Baldwin Steam Motor, weight, 11 tons; cylinders, 10 x 14 in., built in 1887. Price, \$2,000. All the above standard gauge, have Eames brake, and are in excellent condition. Also 400 Tons 48 lb. Slot Rail, 2 Walker T Frames with 12 ft. Staggered Arm Sheaves, 1 Set Double Cable Driving machinery, with four King Walker Differential Drums. 1 Hazelton Tripod Boiler, 150 H. P. 1 Hazelton Tripod Boiler, 300 H. P. All the above but little used and in excellent condition. CONSOLIDATED STREET RAILWAY CO., Grand Rapids, Mich.

WANTED: Second-Hand 250 or 300 Horse Power Corliss Engine, for street railway use. Must be in good condition. Ready for delivery by May 1st. Address X R.
Care STREET RAILWAY REVIEW.

WANTED. A position as Superintendent or Assistant with an Electric Road, by a young man thoroughly competent in all branches. Address J. E. M. P. O. Box 792 Syracuse, N. Y.

FOR SALE 125 Tons 38 lb. Second Hand Steel Tram Rails in excellent condition. 100 Tons 25 lb. Second Hand Steel T Rails, but little used.
D. E. GARRISON & CO.,
219 N. 4th St., St. Louis, Mo.

Get Your 3 Joint Iron Poles from

JULIUS LEFMANN,

NO. 2200 N. 2ND ST., ST. LOUIS, MO.

KODAKS

are always sold loaded ready for immediate use. They can be used for roll films or glass plates. The new

 Daylight Kodak

Can be loaded in daylight. Registers exposures and locks automatically when a new film is turned into place.

\$8.50 to \$25.00.

SEND FOR CIRCULARS.

The Eastman Company,

ROCHESTER, N. Y.

Electric Railways.

C. E. LOSS & CO.,

219 First National Bank Building,

CHICAGO.

Contract for the Building and Complete Equipment of Electric Railways.

Correspondence Solicited.

References Furnished.

THIS SPACE

Will be used to disseminate information which

BELONGS TO

All Street Railway men who are interested in good car wheels such as are made by the

Griffin Wheel and Foundry Co.

CHICAGO.

SEE NEXT ISSUE.

SPECIAL BARGAINS

Are often found in our advertising columns, but some people say advertisements are not read, and you are reading one now.

EVERYBODY READS OUR ADVERTISEMENTS.

THE STREET RAILWAY REVIEW

IS THE LEADING STREET RAILWAY PAPER.

EXAMINE THIS ISSUE AND SATISFY YOURSELF.



WINDSOR & KENFIELD,
PUBLISHERS AND PROPRIETORS,
334 DEARBORN ST., - - - CHICAGO.
Published on the 15th of each month.

SUBSCRIPTION, - - - ONE DOLLAR.
FOREIGN SUBSCRIPTION, - - - TEN SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW
Caxton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR, Editor. F. L. KENFIELD, Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW.

334 Dearborn Street, Chicago.

Entered at the Post Office at Chicago as Second Class Matter.

VOL. 2. APRIL 15, 1892. NO. 4.

WHAT are you doing or going to do this summer to create evening and afternoon riding? It is the most profitable part of the service and can be made to assume surprising dimensions if properly studied and managed.

SUMMER business is already becoming very heavy and those roads which delayed orders for new summer equipment are regretting they did not act more promptly. Revenue lost for want of carrying capacity is a total loss, and the lesson seems plainly to point to taking up the problem of next winter's equipment in abundantly ample time.

CHAUNCEY DEPEW goes on record for a great many things, and the latest remark worthy of notice is his statement in regard to rapid transit. Mr. Depew says that his experience in traveling on the London underground road has given him a most unfavorable impression of the same. He strongly disfavours a similar arrangement in New York. Similar complaints have been heard from the lay-public of American travelers.

WHILE in Europe the street railways suffer the inconvenience of certain regulations not imposed in this country, they still are better protected in that the city and state live up to the letter of their contract with the companies, and such a thing as the passage of a retroactive law is unknown. Many cities in this country break their contracts with as little compunction as a Zulu would evince in eating the heart of his most bitter enemy.

WHAT would the dear public do if there were not street railways on which to vent their vengeance? One General King, of Brooklyn, avers that the whistles used

by conductors on open cars rudely grate upon the tender sensibilities of his auditory appliances, and addresses the Board of Health for aid. Probably the General would recommend the adoption of the sign language used by deaf mutes, or an arrangement of calls on a diatonic scale.

THE Baltimore American makes a suggestion for the use of retired car-horses as follows: "It is stated that about 22,000 horses, donkeys and mules were eaten by the Parisians during the year 1891—and without disturbing the European balance, writes a correspondent to the Philadelphia Press. The price of horse-meat varies from three cents to twenty cents per pound, and no questions asked. Now, here's another use for the American car-horse that has finally succumbed to "the pace that kills." Instead of gathering these noble animals to their forefathers in the usual way, let us send them to Paris, to be worked up in such dainties as bouchie a la reine!"

IN most cities an ordinance exists prohibiting the passing of a vehicle or street car through a funeral procession. While all due respect should be paid the dead, the law has worked great inconvenience in many cases to the living. Not infrequently persons take a street car to catch a train, to miss which may work an irreparable loss. The mayor of Baltimore has requested the reconsideration of the ordinance in that city, as not infrequently delays of 10 and even 15 minutes have occurred. A fair and proper solution would be to allow cars to pass through after a wait of, say, five minutes, the police having authority to stop the procession for that purpose.

THE volume of new work in all parts of the country is a surprise even to those who are nearest in touch with the trend of events. In the East especially, reorganization and extensions are the order of the day and surprising changes are coming over many a staid old town. The Brooklyn orders aggregating nearly \$5,000,000 are undoubtedly the largest to be expected during the year. Spring has opened early in all parts of the country, and in most places the weather is favorable for construction work. Glancing over the land, the railway companies present the appearance of a vast hive of industry and are pushing improvements with characteristic energy.

AT A recent dinner in Philadelphia, President Widener, of the Traction Company, spoke on the "New Philadelphia" as the result of additional rapid transit for that city. He aptly reflected the condition of affairs in numerous other cities, when he said: "Opposition is in itself peculiar and difficult to combat. It comes from old foggy people who own their own homes where factories should stand."

The work of revolutionizing old-time, but now unsuitable residence districts, which is going on in every large city, is one of the most radical and stupendous characteristics of the modern city, and is made so quietly and gradually as not to be fully realized by the residents of

the city. Others visiting the old places, after an absence of one or two years, are amazed at the transformation wrought by rapid transit. It is, however, a change for the better, and one which cities have been approaching for, in some cases, many years, yet it was impossible until the advent of modern means of transportation. Beyond question, no other element in modern city life so largely enters into the determining of residence and business districts as the location of rapid transit lines of intra-mural travel. The old landmarks are dear to those who have been associated with them through half a century of progress, but the conditions of fifty years ago and those of to-day are as widely separated, and present needs imperatively demand facilities in touch with advanced modern life and progress.

SOME storekeepers in Paterson, N. J., during the storm there the latter part of March, thought it funny to throw back on the tracks the snow plowed into the gutters by Manager Lawless' electric cars. The police did not prevent, even when the company protested, and a pitched battle occurred between the two snow shoveling brigades, in which the railway people were outnumbered though not outgeneraled. The company thereupon concluded that as street cars were so objectionable to these business men, they would take them at their word, and accordingly called in all the cars from that portion of the line, with the result that merchants whose stores were usually crowded with customers, had only about one an hour. This was a phase of operating cars they had entirely overlooked, and before night these same and now repenting gentlemen were led to see the error of their way, and of their own accord set to work and cleared the tracks. One man acknowledged the operation of the electric cars had increased his trade \$3,000 a month over what it was when horse cars passed the door, and came round to assure the management they might pile all the snow on the street in front of his store if only the cars be kept running.

The incident aptly illustrates a spirit not wanting in any number of other cities. When the company by the most prodigious efforts has raised money, built a good road and given rapid transit, and in so doing enhanced the value of property in the amount of hundreds of thousands of dollars, and increased the volume of business many-fold, these same ungrateful people in a few months forget it all and raise, or join in, the cry for the company's blood. They want reduced fares, and burdens and restrictions and more taxes imposed upon the road until one not versed in such matters might well suppose the street railway was the bitter enemy of progress and advance, and was the one great blot upon municipal existence.

It is such things as these which encourage and build up a company struggling under the burden of maintaining a service 5 or 10 years in advance of the town, and engender in the heart of the management those qualities and feelings which follow in the wake of appreciated effort!

VERY much of the prevailing sentiment existing in the minds of the general public in regard to the supposed enormous profits of street railway operation is highly erroneous, and yet it cannot be denied that to a greater extent than perhaps at first thought, one would imagine, that sentiment is entertained in good faith and accepted by the public as a fact. To convince another of this error, one can best do so by looking at the matter, whatever it be, from the standpoint of that person. And so in endeavoring to correct false public beliefs, we should answer not only from our own standpoint, but that of others as well. Because you understand the details and expenses of street railway management, it will not do to assume that your patrons see things in their correct light, even though they may be over confident that they know it all. For example: Ninety-nine out of every 100 people in Chicago would not hesitate to wager—if they ever backed any opinion in that way—that a stormy, rainy day was one especially profitable to the companies. True at certain hours, the cars are crowded perhaps more so than in less inclement weather, but the public does not know that it is necessary to have a rainy day schedule and that perhaps 20 per cent. or more cars are in the car house, which otherwise would be required upon the street. If the full equipment was on the street, a part of it would run practically empty, not earning enough to pay the wages of one man, to say nothing of two.

A greater proportion of the people on the street ride on stormy than on pleasant days, but the number of people out of doors on such days is in the aggregate so greatly less than usual as to more than offset the extra necessity to ride.

In other words, 80 per cent. of the available riding public on pleasant days will frequently show a much greater revenue than results from carrying the entire available riding public of stormy days. This is the case in Chicago. There are doubtless reversals of this rule in some cities, but it serves to illustrate how very incorrect may be a widespread belief—a belief maintained because the public have never been informed to the contrary.

A would-be promotor called at our office recently who expects to revolutionize affairs in a certain city, by making a 3-cent fare where a 5-cent fare now prevails, and with the firm expectation that he will clear 2 cents per passenger. If he succeeds in putting his scheme through, which is highly improbable, the "revolution" will very soon consist in a desire on the part of his misguided stockholders to mob him, and a receiver will do the rest. It is unnecessary to add, the gentleman never had a day's practical experience in street railway work in his life. If he would but drive a horse car a single day and keep his eyes open, he would convince himself of the utter futility of what he now believes a matter of easy accomplishment. It is such people, too often aided—in these matters—by an uneducated press, that sow seeds of discord and discontent among a ready and thoughtless public. It would seem then, a desirable matter of policy, for man-

agers and presidents to take advantage of the occasion when complaints are made in the daily papers to reply through the same medium and set the people right. While the daily press have whole columns at the disposal of some cranky "Kicker," who perhaps does not buy two papers a week, the railway company will usually have to secure a hearing of its side of the case at probably a dollar a line: but the experiment may be worth trying. At these rates, if your article is long enough to suit the editor, it will go in all right—if not, the chances are you will be published as failing in the attempt to bribe and muzzle the press, the rightful defender of the people and the essence of purity and fairness. For a man smarting under the injustice of ignorant abuse, the situation is not one highly flavored with the soft and rosy light of an approaching millennium.

REPORT OF THE BOSTON RAPID TRANSIT COMMISSION.

THE report of the commission was rendered April 5, after long months of study and personal investigation in this country and Europe. It recommends radical changes in the location of steam road terminals, the removal of a large amount of street railway tracks in the congested business district and the construction of an elevated road. The underground system, as existing in London, is condemned as unsuited to Boston, for many reasons, one of the chief of which is the danger to health resulting from the great difference in temperature between the open air and deep tunnel.

The route named is to build one elevated railway from Dudley street, Roxbury, through Washington and Tremont streets, and a proposed new street to Park square, from there in a tunnel under the Common, Tremont and Court streets, then above, by a new street to the North Union station on Causeway street, from thence over Craigie's bridge to Harvard square in Cambridge via Main street. The other line is to extend from South Boston point through Fourth street, Broadway, Dorchester avenue, Federal street, Congress street, Postoffice square, Water street, Commercial street, Cross street and Haverhill street to the North Union station and thence across Charles river through Charlestown to Sullivan square. These roads are to connect at two points, the first at Eliot and Kneeland streets by a cross line, and second at the North Union station, so that they may be used either as a loop line, a circuit line, or as two direct lines connected by trains. A branch line is also to be built to the East Boston ferries. It is recommended that the fare upon this line should be 5 cents for a continuous passage, and that arrangements should be made with the steam railroads for the sale of transfer tickets. Commissioner Richardson dissents, and recommends one direct route through the centre of the city.

Relief is further believed in the removal of surface tracks from many narrow streets and relaying on proposed new streets, and by the construction by the West End system of a double track tunnel under the Common from

Park square to Park street, thence under Tremont to Schollay square and under private property to Adams square. Passengers now landed at the door of every prominent retail store, hotel and theatre in the city would, by the change, have to make a short walk, in some cases, but it is believed with a net saving in time.

Street vehicle traffic also comes in for a share, and under the proposed scheme heavy traffic is debarred from certain streets within given hours, drivers must observe certain routes in moving, slow-moving vehicles must keep next the curb, and within limits on Washington and Tremont streets a wait at the curb must not exceed 2 minutes between 8 a. m. and 6 p. m.

The construction of the 13½ miles of elevated road is placed at \$11,000,000, in addition to \$7,000,000 to be charged the city in opening new streets, a total of \$18,000,000.

A permanent commission of three is recommended, consisting of the Mayor ex-officio, one Boston man and one from the Metropolitan district, the two last named appointees of the Governor.

The Metropolitan district embraces the territory within a radius of 10 miles of the City Hall.

The present commission was appointed by the Governor and Mayor of the city on June 10 and confirmed by City Council, June 18, 1891, under a legislative act of June 3, the same year. Commission began work June 20, and have pushed their labors with more than ordinary energy and ability. The Mayor is chairman; J. Q. Adams, vice-chairman; H. M. Jordan, clerk, George S. Rice, engineer-in-chief; Theodore Cooper, Alphonse Eteley and Fred. P. Stearns, advisory board of consulting engineers.

The Commission state in their opinion unless the recommended plans are accepted rapid transit will be delayed many years. The well-known and unfortunate topographical conditions of Boston have made the attempted work of the Commission probably the most arduous of any similar body ever appointed.

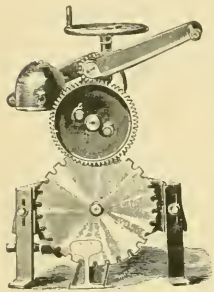
PROSPEROUS BENEFIT ASSOCIATION.

TREASURER'S REPORT OF THE THIRD AVENUE, NEW YORK, EMPLOYEES' MUTUAL RELIEF ASSOCIATION.

FOR year ending February 26, 1892, the association has a very creditable showing indeed, as will be seen by the following table of figures, and shows on its face a careful administration of affairs by everyone concerned. The cash collected from dues was \$4,149.50; assessments, etc., \$901.25; membership fees and other sources, \$1,176.65, making a grand total of \$9,086.80. Disbursements were: for sick benefits, \$2,731; death benefits, \$1,500; a memorial for Lewis Lyon, \$150, and several other necessary causes, amounting to \$5,888.85, showing a balance of cash on hand, February 26, 1892, of \$3,197.95, which is very encouraging, indeed. The treasurer is John Beaver, who is the treasurer of the company.

PORTABLE RAIL SAW.

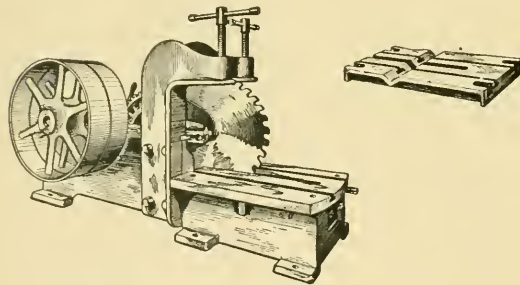
THE economy in time and the superior quality of finished work of machine over hand labor has no better illustration in all the range of street railway work than in metal and rail cutting. That such a machine should not be a part of the indispensable equipment of the track repair force of every road is a matter of wonder.



PORTABLE SAW.

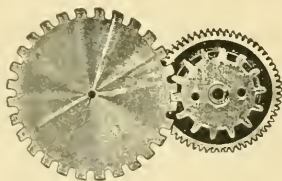
There is now however, no longer need to be without this tremendous labor saver, as the Q. & C. Co., Phoenix Building, Chicago, are placing on the market a simple, practical and inexpensive machine.

The portable saw is easily carried, can be worked anywhere by two men, and requires a space of only two by six feet. It will cut any rail in less than seven minutes and has made frequent records of cutting a 60-lb. rail in three minutes, a 90-lb. rail in three minutes twenty-five seconds, and a 72-lb., 35 degree angle cut, in seven minutes.



POWER RAIL SAW.

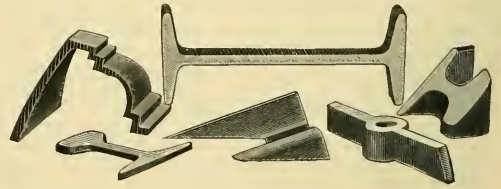
The power saw operates with an astonishing small output of power, requiring but one-horse-power, and has even worked with a half-horse-power electric motor. This is owing to the new feature of transmitting the power to the periphery of the saw blade. This machine occupies but little shop space and may also be worked by



METHOD OF DRIVING SAW.

hand. A special feature is the slow motion of the saw, the result of the periphery drive mentioned. Each tooth acts as a planing cutter, leaving the work perfectly smooth and true and without disturbing the temper of the metal. Accuracy to 1-100 of an inch is assured, and will adjust to cut on an angle from 90 to 45 degrees right or left, without removing the saw. The teeth are readily

sharpened and there is nothing about the device which is liable to get out of order easily. The illustrations show



A FEW CHOICE CUTS.

both hand and power cutting machines; the principle of transmitting power to the saw and some samples of rail sections cut.

THE GOLDEN AGAIN.

THE Denver, Lakewood & Golden road will not use the overhead system, but have contracted for a number of Patton gas-electric motors.

There is not much track-laying to do, however, as the roadbed is nearly all completed, with the exception of the district near the Platte River. Crossings will have to be put in, and this will entail considerable work. In those places where the Golden road uses the Tramway Company's tracks into the city, the third rail has long since been laid.

WASHINGTON CITY.

Frank A. Reed, general superintendent of the proposed Washington, Alexandria & Mt. Vernon Electric Railway, is sanguine of success.

Six or eight motors, and the same number of trailers, will be run at first. The trailer cars will have a seating capacity of sixty passengers each, while the motors themselves will seat forty, a total of 100 passengers to each train. In some instances two trailers will be run, making the total seating capacity of the train of three cars 160. During the summer open cars will be run, and closed ones, properly heated, in winter. The road will probably be in full operation by the latter part of July.

SUBURBAN LINES.

THE new suburb of Rochester, N. Y., is to be baptised Depew, after "our Chauncey." Here will be located the shops of the New York Central and here will be a terminal of the electric line. The new suburb promises to have a real western boom attached to it and the railway is to be cause thereof.

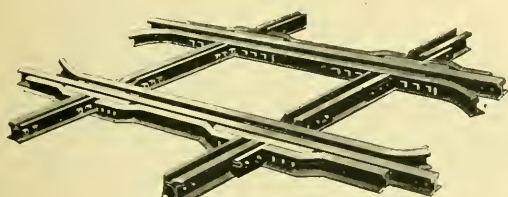
Terre Haute, Ind., is to have a new electric line through Highland Place, a distance of five miles. The Vigo Real Estate Company is the moving element.

The company is composed of representative citizens who hope to profit by the natural rise in real estate values that should have set in several years ago but who, at the same time, have at heart the welfare of the city and show their faith in its growth and prosperity by offering more liberal aid to its improvement and the fostering of industries here, than has ever before been given.

JUMP OVER CROSSING.

IN the operation of railways, as every manager knows many things are necessary which are not wholly desirable. Of such a not-infrequent case is where his tracks must cross those of some steam road, which with an utter disregard for the rights of others, refuses to allow their rails to be cut or drilled for crossing purposes. To make the best of such unfortunate conditions, the Tramway Rail Company of Pittsburg, have brought out their Jump Over Crossing, the name and cut of which are in themselves a description of the device.

It is not necessary to drill holes in the steam rail, or attach it in any way, the street crossing being made in three pieces, viz.: the two outside portions and the cen-



JUMP OVER CROSSING.

tral portion between tracks, each of which is complete within itself. On the outside portion the heavy steel T shaped castings serves to unite the girder rail with the side guard rail piece, and at the moment when the locomotive is passing serves to keep the tram rail well back out of the way. Should the steam wheel be double flanged, they will run along on the guard piece and the casting aforesaid, and do no harm, as that piece of the construction rests on the same tie that the steam rail does, and is just as strong. Chuck blocks serve to keep the central piece of the casting away from the steam rails and hold it firmly in position. The street car wheels travel on the flange over the casting across the head of the steam rail, and is therefore compelled to jump the width of the throat, which is quite narrow. Prominent managers declare this the best type of crossing yet devised, for use under conditions named.

A NEW SCHEME.

WHAT a Chicago rascal can't think of is usually not worth thinking of. Just at present West Side police officials, assisted by West Side railway company employes, are looking for an unlicensed conductor who has collected some hundreds of fares during the past week. He is supposed to be a discharged employe of the Madison street line, which he especially favors with his novel scheme for collecting nickels.

When the cars blocked up in front of the Haymarket Theater prepared to move the other evening the conductors discovered that almost every other passenger had paid his fare and none seemed to relish the request of the second conductor for an additional fare.



THE great question of the hour has been, of course, the trolley fight. Brooklyn's opposition was not a shadow to the fierce, senseless and unwearied efforts of the good people of the burg.

No stone was left unturned to defeat the symbol of progress. Petitions were turned in by the mile, mass-meetings massed and old fogies gased by the hour.

The right had been asked by the Traction company of putting in the trolley system on the following lines: The Union, the Eighteenth and Twentieth Streets, the Twelfth and Sixteenth Streets, the Spruce and Pine Streets, Catherine and Bainbridge Streets, Thirteenth and Fifteenth Streets, and Twenty-second Street and Allegheny Avenue.

The transit people, on their side, did the most painstaking work. The letters from President Whitney, of the West End; from the East Boston Trade Association; from the Department of Public Safety, of Pittsburg; From the Cleveland City Council, and from the hundreds of other admirers of the trolley and guardian angels of progress were cogent and warm.

The usual arguments were advanced by the "anti's," and, it seems, successfully rebutted, as far as it lies in the minds of the common and select councils, for the concessions were granted. The fight was to a finish, and thoroughly reviewed the trolley from all points.

In face of the opposition the mayor vetoed the ordinance. The council without delay passed the ordinances over the veto, and Philadelphia, good old Philadelphia, has caught up with the times.

From the records of the police department the following table of accidents in this city during 1891 is compiled:

| | Fatal. | Not fatal. | Total. |
|----------------------------------|--------|------------|--------|
| Accidents from street cars. - | 24 | 185 | 209 |
| Accidents from other vehicles. - | 35 | 453 | 488 |
| Accidents from steam cars. - | 98 | 338 | 436 |
| Miscellaneous accidents. - | 129 | 1837 | 1966 |
| Total. - | 286 | 2833 | 3099 |

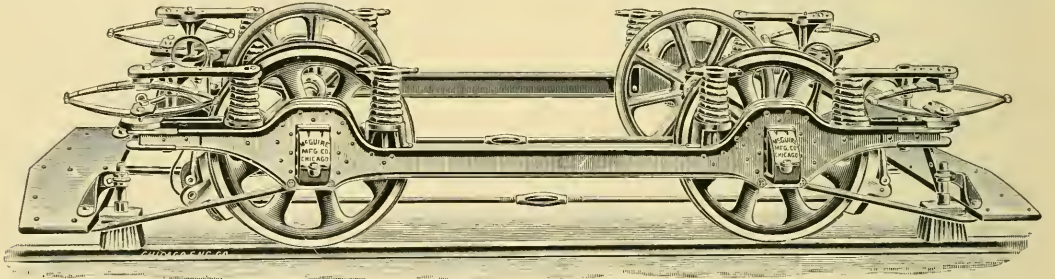
In 1890 there were 18 deaths resulting from street car accidents, and 175 from steam cars.

THE MCGUIRE ELLIPTICAL SPRING TRUCK.

THAT extremely successful manufacturer of trucks, the McGuire Manufacturing Company, announce as their very latest, an elliptical spring, in addition to the spiral springs hitherto employed by them. The arrangement is best described by the illustration presented below, and President McGuire is highly pleased with its reception.

The first truck of this style was put in service in Burlington, Iowa, six months since. Its record there resulted in an order, no repairs having been required during that time.

Duluth orders 26 sets—16 for 22-foot cars, and 10 for smaller bodies; 30 are building for Grand Rapids, to carry cars 28½ feet over all; Joliet tried one and will adopt; Indianapolis will specify in their next order; the Interstate Rapid Transit, of Kansas City, will use them on their 4-wheel cars; Sandusky, Ohio, will specify for their next; in fact 130 sets of these trucks have been ordered within the past ten days.



MCGUIRE ELLIPTICAL SPRING TRUCK.

SHORT'S SYSTEM IN SIAM.

IT is not a small compliment that the Short Electric Railway Company, of Cleveland, has the contract for the electrifying of the Bangkok, Siam, Tramways. The present road is six mile in length, 30-inch gauge and is laid with 45-lb. rails. The road is almost entirely level, the only unusual features in its construction being the fourteen canal bridges which it crosses. It is the intention of the company for the present to equip about one-half the entire length of the road for electric traction.

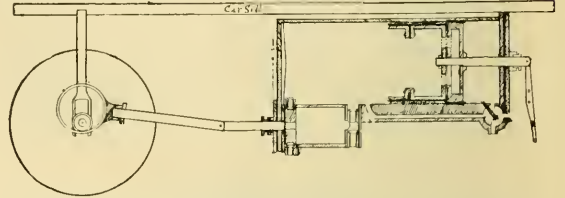
This will necessitate the immediate shipment of 17,200 feet of overhead construction, including side brackets. On account of insects, teak wood poles are required, which will be furnished by the Bangkok Company. They will also supply their own boilers,

An engine and two 65-horse-power generators will be sent, as well as all necessary station apparatus and six cars each with one 20-horse-power motor.

THE SHULTZ BELTING COMPANY, of St. Louis, provides the "woven leather" belt for the Citizens' Electric Railway Company, of Decatur, Ill. Recent sales include 15 in the State of Montana, one 48-inch flat belt for the Municipal Electric Light & Power Company, of St. Louis, and a 30-inch belt 175 feet long, for Clinton, Mass.

NEW AIR BRAKE FOR STREET CARS.

PROMINENT managers and mechanical engineers who have examined the air brake invented by J. H. O'Hara, of this city, pronounce it a most practical device. The brake is fastened under the car, driven by an eccentric on one axle, and operated by a lever in the driver's hands. The pump needs work only when setting brake, the air cylinder always holding sufficient



compressed air to set brakes. A ⅛ turn of valve allows pump to work without setting brake; a ¼ turn allows air to work piston and applies brake instantly, and effectively stopping car, if required, in a very few feet. The air

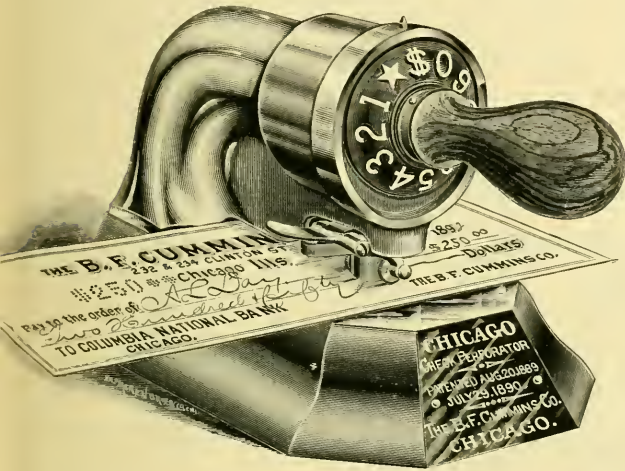
reservoir is virtually one end of the working cylinder, the action of the 4-way valve controlled by driver permitting the air to flow from one end under the piston and exert power in an opposite direction.

A public test will be made in a few days on the cable line of the North Chicago Railway. Any number of cars in a train may be controlled at the same instant. A gauge on the driver's platform shows the existing pressure. The brake is equally well adapted to steam roads and is believed by many to be the coming brake for that purpose.

THE R. D. NUTTALL COMPANY, through their traveling agent, Mr. Mayer, report a large and satisfactorily increasing demand for their steel trolley poles and commutators, and that orders for their shaft supplies still keep coming in at the usual pace. The merits of their new steel trolley poles is pronounced, from the fact that they are drawn from a solid steel tube, tapered by degrees, without any joints or lap-welding whatever, which produces a light, durable pole, capable of standing an unusual amount of bending and grief, such as trolley poles are subjected to. Their tempered copper commutator trade has increased beyond their expectations, and the new department lately started for making armature cores and shafts complete, and for winding armatures, is already crowded.

PROTECT YOUR CHECKS.

THE advance in every department of street railway operation, in the keeping of records and basing purchases for next week on the expenses of last, is very great, and the office is more systematically run now than was considered necessary a short time since. Accounts are more carefully kept, and paying bills in checks has become universal. With the use of the check system, however, a new danger has arisen, viz., that of having the value raised by the addition of a single letter and figure; as, from 6 to 60; and to remedy the evil the check perforator has become an absolute necessity. The law requires the maker of a check to use all due diligence in protecting it. The omission to employ the most



effectual protection against alterations is evidence of neglect, which renders the maker responsible for fraudulent alteration, the bank being responsible only for the genuineness of the signature and ordinary care in paying the check.

The Chicago Check Perforator, as shown in the illustration, combines the highest quality of workmanship and finish, with the greatest durability and facility of operation.

It is the only machine that will perforate the top, bottom and center of a check. It is fast, because it is operated with one hand. It has stood the test of time, and is now used by more than 7,500 of the largest concerns in the United States.

It is made by the B. F. Cummins Company, 232 and 234 Clinton street, Chicago. They also manufacture all kinds of perforating stamps for street railways and corporations.

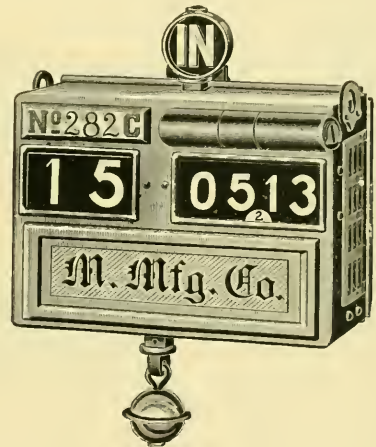
It is understood that electric railways require large conductors, but few people are aware of the fact that the tallest man in Wisconsin is in the employ of the Milwaukee Street Railway Company as a collector of fares, and is a person who stands six feet nine inches in height, and weighs 240 pounds.

THE NEW MEAKER REGISTER.

NOT satisfied with a record, the result of daily use by over 150 roads, of the Meaker Register, that enterprising concern has worked out improvements which are the result of long months of study and experiment, and at a cost of many thousand dollars.

The new register records on two separate accounts, one for settlement, the other for each half trip, the continuous account recording to 160,000 fares before returning to 0.

The cut shows the end of an "in" trip, with 15 fares registered for the trip account, and 20,513 for the continuous record. To change the "in," sign to "out" conductor must raise the sign before he can turn it over, and in so doing throws a red canceller over the 15. These cancellers can not be removed until the direction sign has been moved up and down until zero (00) is reached. They can not be removed by the recording pull, and



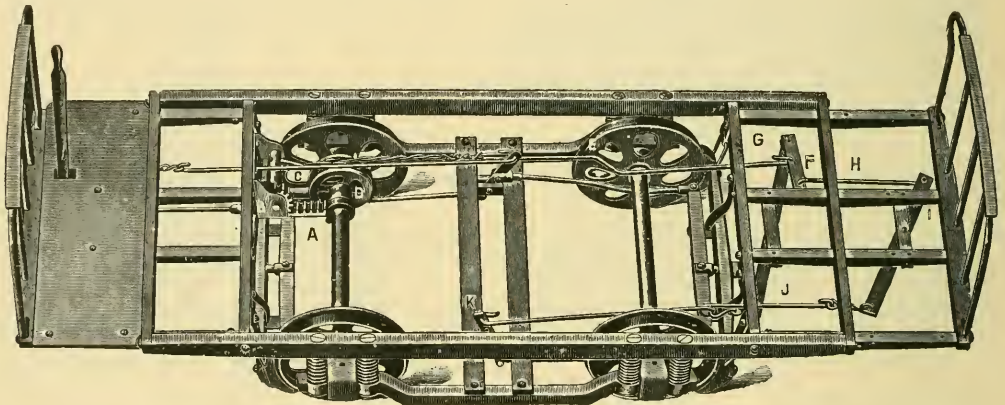
should never be seen except when setting back to zero at end of route. The only possible change which conductor can make in the continuous number is to enlarge it by pulling the recording button. A curtain which can only be moved by a key in the hands of the receiver, may be turned down to cover the continuous number. The lock used can not be picked, and is entirely new, having never been used for any other purpose. The location on the face of both series of numbers is a decided advantage. The pull has been made to operate with the least possible exertion, and the register is not as large as formerly. Altogether it is a very handsome machine, and defies the manipulations of the most expert. The makers guarantee it as absolutely sure, and that it in every respect is a register which "can not be beat."

A highly interesting, as well as highly instructive, paper was recently read before the Chicago Electric Club, by Elmer A. Sperry, on the subject of "One Motor for Car Equipment." Mr. Sperry defended one motor equipment most ably.

THE CROSSLEY FRICTION BRAKE.

OUR readers are familiar with a "rope drive;" now we have a "rope stop." Every one has watched the man who sits beside a windlass or capstan and by a gentle pull on the rope as it unreels, keeps it tight on the drum, although the load at the farther end of the line may be a 3-story house or a monster vessel. And yet that constant force is necessary or the rope slips and the house is not moved. It is identically this same principle which has been employed by the Crossley Car Brake Company, of Cleveland, in the construction of one of the most simple and effective devices we have ever seen.

A vertical lever on the platform operates a rack and pinion movement, and facilitates the tightening of the rope on the drum, the other end drawing on the brake beams through a system of levers. It releases imme-



THE CROSSLEY FRICTION BRAKE.

diately, without springs, is positive, noiseless, and works instantly, not requiring that length of time used in other momentum brakes, to take up lost motion.

A feature which will specially commend itself to the manager who is becoming weary of taking his car apart every time he wants to adopt something new, is that the winding drum is made in halves and can be applied easily at any time; it fits any axle. All the cars in a train can be connected and controlled by the one lever. The wear upon the rope is very much less than would be supposed, and amounts to but a few cents per car for a whole year. It will stop a car under full headway in its own length; it involves few wearing parts, and those are of insignificant cost, and a child can operate the lever.

On the Newburg line, and on Tom Johnson's road, in Cleveland, it is giving perfect satisfaction. It will pay our readers to investigate. Sample will be sent on trial.

A NEW application of power of unlimited quantity, is said to have been discovered by J. E. Foster, general manager of the Monmouth (Ill.) Street Railway Company. No burning fluid or material is employed. Tests not yet complete.

BROOKLYN ELECTRIC CONTRACTS.

SINCE the "change of heart" involved in the question of mule versus trolley in Brooklyn, several remarkable events have occurred.

The Thomson-Houston Company, of Boston, have the complete electrical equipment of 250 cars, on the Brooklyn City line, each car to have two 25-horse-power water-proof motors.

The Ansonia Brass & Copper Company, of Ansonia, Conn., and the Simplex people, of Boston, will furnish the trolley and feed wires.

W. H. Wallace & Co., of New York, will furnish poles, tubular in type, 27 feet high, in 4, 5 and 6-inch sections.

The Johnson Company will provide 66-pound girder rail, for a mile of track, the Johnson standard rail joint being used, and the chairs welded electrically to the rail.

Lewis & Fowler Girder Rail Company will put down 9 miles of their 65-pound girder.

The E. P. Allis Company, of Milwaukee, will build four Cross compound engines, Reynold's Corliss type, with a normal capacity of 800 horse-power, and a minimum of 1,400. These are built on special specifications of the Brooklyn Company.

Babcock-Wilcox boilers, in 8 batteries of 500-horse-power each, will be installed.

The Westinghouse Company has a \$2,000,000 order to equip the Atlantic and Third Avenue line. President Richardson is authority for the statement that this firm is to furnish 200 30-horse-power motors, 100 for June delivery, and 100 for September, and generators to the capacity of 2,000 horse-power. The entire car equipment is to be ready by December.

The Atlantic Avenue Company will put in three batteries of two boilers of 250 horse-power each—total horse-power, 1,500; Babcock-Wilcox make.

These orders have, no doubt, the effect of making the coming year one of greatest activity in electrical manufacture, and the firms who didn't get the contracts will be indirectly benefitted.

SHALL STREET RAILWAYS BUILD THEIR OWN CARS?



HALL street railways build their own cars? Is a question several of the largest roads in the country having at hand the requisite shops and machinery to do so, and indeed having been thus supplied for many years past, are now asking themselves.

The smaller companies have only in rare instances undertook to do this work, having but insufficient appliances at hand even for the heavier repairs to say nothing of entire construction. Such would have to be content with hand labor almost entirely, a method slow, expensive and much less uniform in every way. Uniformity of parts and exactness of assemblage are two cardinal features in car building, without which even the best materials will present a poor appearance and fail to yield their otherwise lasting results. The labor is delegated to some itinerant carpenter or cabinet maker, or perhaps to one or two "handy" men who tinker around the car barn and make themselves generally useful. Let such put forth their very best endeavor and try ever so hard, still it will readily be seen cannot in the nature of things expect to produce first class work. The materials are purchased in extremely small quantities, many of the supplies being in one-sixth dozen lots, and with the possession of no experience as to the relative wearing qualities of this wood and that, it becomes a matter of chance rather than a selection of articles from previously demonstrated tests. While the cost of the car may be spread over several months' pay rolls, and the materials paid for in many lots instead of one purchase, still such expenditure is any thing but economical.

In the case of large roads with several hundred cars, the number of which perhaps runs up above the thousands notch, the case assumes a very different aspect. Such must necessarily maintain extensive repair shops for the overhauling of the vast equipment, and repairs are of such regularity and volume as to warrant extensive outlays for machinery. It might be supposed that with these facilities at hand, an extra story for erecting and painting would be all that was necessary to secure a car factory as an adjunct of the repair plant.

But a very little thought will show how widely separated are the two, repair and construction work, in fact the more study is given the problem the wider grows the breach between them.

The majority of men can follow. To substitute a new part, while though not so good as the original, "will do," is possible with the ordinarily available labor. The man who follows is no originator, nor can a railway company afford to keep for repair work a man who is competent to lead out along new lines. Nor can it afford, for the number of cars it builds each year to keep an expensive man the year round and send him out over the country in search of new ideas.

The Car Builder on the other hand is not harrassed with the thousand and one distractions of railway management, which divert attention and postpone matters which

can possibly wait. Then, too, the Builder selects his men with special reference to their ability in certain directions, and in this way perfects their skill.

In Chicago, the three roads from time immemorial had built their own cars. But within the past three years a radical change has been made. The North Chicago was the first to abandon, then the West Chicago, and last of all the Chicago City, which had not purchased a car in over ten years, placed an order for over 150 cars. The managers of each road state their firm conviction that with the abundant facilities possessed by the several car manufacturing companies, and the sharp competition between them, that the construction of home made cars is not a matter either of policy or economy.

One of the leading car builders, while discussing this subject recently, said:

WHAT A PROMINENT CAR BUILDER SAYS.

"It is doubtful if anything a manufacturer of cars may say on this subject would have deserved influence upon a railway company contemplating building its own cars, and as almost every large company has now abandoned car building, the subject would seem to admit of little discussion.

"To our mind the mere idea of such a proposition is a reflection upon those engaged in the car business, for it suggests the thought that the building of street cars is so simple, that experience, study, brains, and energy are not required.

"The average street railroad president or manager, would doubtless laugh at the idea of buying a few yards of cloth and a paper pattern and then have his good wife make him a pair of pantaloons or a coat, that at the most could be bought from the leading tailor in any large city for \$75. If the wife was only an average seamstress she could probably make either garment well enough to cover one's nakedness and keep a person warm, but as for durability, style and attractiveness, the wearer would scarcely care to promenade down Broadway in them.

"To build a street car suitable for a first class horse line, is no small job, and when the necessities of a cable or electric road are considered, the problem becomes more difficult.

"If the only idea was to get something that would carry passengers, without regard to durability, style or attractiveness, then the railroad company and the housewife would stand on a level as it were—but we all know something else is required.

"We believe the car builders of this country as a class, are as intelligent and successful in their line as the street railroad presidents, and while the minds of the latter are ever concentrated on matters pertaining to the running of their roads, securing additional franchises, floating securities, those of the former are busy devising new and better methods of construction, etc.

"The question then presents itself—whether it is not better to concentrate thought on a few subjects than attempt to cover too many—and while the mind of a

railroad manager is engaged on car building, a subject he does not understand, he could earn more money for his stockholders by devoting the same time to other matters.

"Besides the proprietor or manager of a well equipped street car manufactory, there must be a large corps of high priced and highly trained mechanics that no railroad company building less than four hundred cars per year could afford to employ.

"The machinery of a car factory up to the present time is very costly and covers a great many special devices. A company building only four cars could not make such an investment profitable.

"The lumber stock must be large and varied and carried several years before fit to use.

"In conclusion and in proof that railroad companies cannot build their own cars to an advantage; we would only say: During all these years of trial and effort, none have succeeded in doing it—and those cars that have been home made are as incomparable with cars made by any one of the first class builders of the country, as would be a home made suit of clothes with one from the favorite tailor.

"The writer has been actively engaged in car building for twenty-five years, having first spent an apprenticeship in the shop—so what he knows of the business has been learned from the bottom up—he is free to admit that the longer he is in the business the less satisfied he is with the progress made, not that he has not been fairly successful, but his standard of excellence is vastly higher. What his success would have been had his mind during all those years been only partly on his business no one can tell, but it is safe to say the results would not have been as good or satisfactory to his customers."

SHARP COMPETITION OF MANUFACTURERS BENEFITS BUYERS.

The general manager of one of the largest and best managed roads in the country, and a man of many years' experience, says:—

"As to your inquiry concerning the propriety of a street railroad building its own cars—I have never felt that we could afford to compete with the regular shops. We do all our repairing in wood and iron and painting; but for building, the outlay for machinery, patterns, etc., would be very great, and a thoroughly competent, reliable and experienced superintendent would be necessary, and the question as to whether we could afford to employ this kind of man for the limited amount of work he would have to do, comes into the economy of management. Then there is the danger of falling behind in style and character of work in a private shop. It requires the sharp competition that always exists between manufacturing establishments to develop what may be new and desirable, and to inaugurate methods and mechanical appliances that cheapen and improve work. In a private shop these stimulants are all lacking, a few men usually get soft places at good wages, and they keep them, the foreman not caring to be troubled with untrained or cheaper men.

I think a railroad manager has his hands full if he runs his road well and keeps his track, cars, machinery, building and men in good order, and he can make more money for his company by running his cars than he can watching a building shop, and an unwatched shop would soon become a serious drain."

RAILROAD COMPANIES CANNOT COMPETE.

A gentleman well known in railroad circles and manager of one of the largest and best conducted roads in the country, very concisely covers the ground in the following letter received a few days since. He says:—

"I am of the opinion that but few, if any, of the street railroad companies in this country are in the position to profitably manufacture their own cars.

"The men who are competent to properly design and supervise the iron and wood work incident to modern street cars are rare and command high salaries. But few street railway companies can afford to employ such men. The street car manufacturer, on the other hand, should seek to find the best possible designer and builder, to the end that his cars may have immediate favor in the eyes of buyers. Again, the matter of carrying the immense and varied well seasoned stock necessary to all well conducted car building shops will be an important factor in this question. By watching the market carefully, a shrewd street car builder will keep his stock far ahead of present requirements, taking advantage of every bargain presented. The natural competition between car builders may be relied upon to keep prices for new cars within the limits of the views of those who wish to buy for cash, besides which a substantial guarantee may be obtained by buyers respecting the quality and durability of their purchases. I can see nothing in the present situation which leads me to believe that the street railway companies can in building cars profitably compete with the car builders of large means who employ the highest skilled labor and the most modern and approved methods of manufacture."

Thomas Lowry, the street railway King of the Northwest, tersely says: "I am decidedly of the opinion that it is better for a street railway company to buy its cars of outside builders. We invariably do this although we have the facilities for building our own if we are crowded."

CHEAPER TO BUY.

Another president says: "In my opinion the manufacture of any considerable number of cars at one time by a street railway company would be more expensive than to place the order with car builders. All large companies, of course, must have repair shops in which more or less of their cars are being built over, or enlarged. Such companies, I think, can with economy build a few cars from time to time when other work in their shops is not pressing. But for orders of any considerable amount, I am decidedly of the opinion that the regular car building companies can save money to companies by building the cars."

This is practically an acknowledgement that building is not desirable by companies as large as the one under the writers' control, or others of sufficient size to have

extensive shops, seldom ever require but a few cars at a time. When new lines are opened, or increased business on existing lines demand additional equipment, the number so needed is of considerable size, and on the basis stated would profitably be built outside, in other words a company large enough to have shop facilities, does not make small additions.

ON THE PACIFIC COAST.

Until within the past three years the bulk of the rolling stock on the coast has been built at home. Freighters had a good deal to do with this, which the patriotic sentiment so general there to do everything for themselves has supplemented. This has been carried to such an extent that several recent franchises in California have included provisional clauses that most materials used in the building and equipping of the line must be home products. This is an unfair and mistaken policy, as the local demand is insufficient to support the manufacture of products, the perfection of which depend on a large output, and the public are the losers thereby.

The editor of the Seattle, Washington, Times, evidences this spirit in a recent issue, when he says: "The Consolidated Street Railway company is having built in Seattle two new electric cars and will build ten more this season. Here is a practical application of the doctrine, patronize home industries. The way to build up Seattle is to buy at home and build at home. Money sent abroad may be bread cast upon the waters; but it is most likely to become soaked and sink." However, the road is not building its own cars, but has contracted with a local manufacturing company which is endeavoring to enter the car building field. Fully four-fifths of the cars on the Seattle lines were built, however, east of the Rocky Mountains, and a no small portion came from the Atlantic coast. Still another element enters into the question, and one which cannot be overlooked or denied. The car builder can afford to buy all his supplies in large quantities. The street railway company necessarily buys in small lots, and cannot expect the same prices made to large purchases.

The whole question, then, sums up about as follows: Large companies having facilities cannot afford to; small roads cannot afford to, because they lack facilities. Neither would possess, moreover, in the nature of things, facilities equal to those whose chief end is not the operating but the building of cars.

YONKERS' STREET RAILWAY.

THE change from horse to electricity goes on rapidly. The boilers are the Sterling Water Tube Type, and three in number.

The two dynamos develop 150-horse-power each. These stand on a solid bed of masonry six feet deep, of the best Portland cement and broken stone. Four iron rods with arched plates at the bottom run up through this bed, and to them the dynamos will be bolted.

The cars are made by Stephenson which fact is sufficient compliment to the parties concerned. The Eickemeyer motor is to be used.

CINCINNATI FIRE.

THE Mt. Auburn Cable Power House was totally destroyed by fire during the past month.

The origin of the fire is unknown, but the supposition is it started in the pit on the Highland avenue front, from the friction of the wheels.

The fire spread with lightning rapidity and several of the workmen had barely time to escape with their lives.

The destruction was swift and complete for the wood-work and machinery were saturated with oil and they burned like tinder. An hour after the fire started the west wall fell inwards with a crash upon the engines and boilers.

The power house fronted 100 feet on Highland avenue, by 125 feet on Sanders street. The walls were of stone and brick and two feet in thickness. It was built four years ago and was two stories in height with basement and sub-cellars. It was equipped with two Lane & Bodley Corliss engines of 250-horse power each and



RUINS MT. AUBURN CABLE POWER HOUSE.

carried four batteries of boilers. About 150 men were employed by the company.

The building was worth \$100,000 and the insurance \$50,000.

Our engraving shows the results of the fire and the remaining wall with the lonely looking stack.

An enthusiastic meeting of stockholders of the Cable voted to rebuild, and President Martin states the line will reopen June 27.

JERRY SIMPSONS' DREAM.

IN his earlier days, Jerry Simpson used to be an expert in sawing logs, and a story told in Washington of the sockless statesman, relates that while he was dozing in a chair at the Riggs House, the passing of an electric car, with its din and buzzing, recalled to his somnolent senses his old-time trade, whereupon he jumped up shouting: "Back her, she's struck a knot." The story is a little apocryphal, perhaps, but it goes as everything does about Jerry.

GRAND RAPIDS.

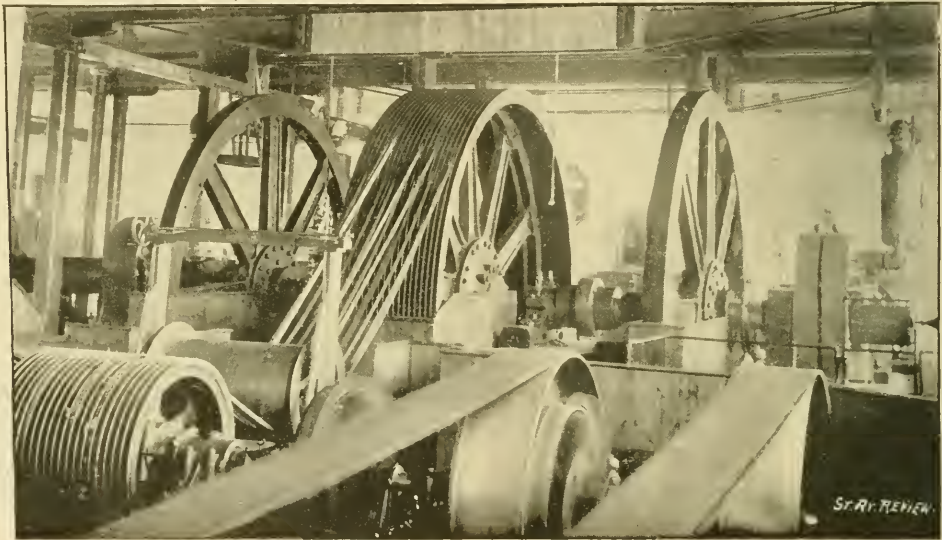
THIS brilliant city of Western Michigan, rejoicing as it does in the beauty of its location, the intelligence of its people, the magnitude of its manufactures and its political significance, looks out from between the protecting bluffs of the Grand River, the largest stream in the state. Here, 40 miles from the great lake, are gathered 80,000 people, who have raised on both sides the stream this progressive town and named it in honor of the water-power which is its life.

The stream at this point is 900 feet wide, running over a fall of 20 feet to the mile of rocky bed, and although furnishing, as above hinted, an immense water-power, is also navigable to this point by steamboats.

In rapid transit Grand Rapids' companies have placed little short of \$3,000,000 in horse lines, cable and electric traction.

The first horse road dates back to 1870, in the good old "hoss" days. For eighteen years the faithful mule made regular trips and furnished the material for the kicker's sarcasm. The reign of the mule was interrupted in the year 1888, by the beginning of the construction of the cable line of the

VALLEY CITY STREET & CABLE RAILWAY COMPANY, which organization laid several miles of single track, with turnouts at intervals, so arranged that the car would take the switch automatically, and without lessening speed. In 1890 the cable line was extended at a heavy outlay. The route, however, was full of curves, some of a very



INTERIOR POWER STATION, GRAND RAPIDS CONSOLIDATED RAILWAY COMPANY.

In point of population the city is second to Detroit, and, politically, the county seat of Kent county, organized in 1836 and in point of age incorporated in 1850.

As to its manufacturing interests, Grand Rapids possesses unlimited facilities, and utilizes them in the production of fine furniture, carriages, rough and finished lumber, tanned hides, plaster, barrels, hubs, farming implements, mill machinery and all the varied articles appertaining to the completion of these products. Although possessing a canal upon either side of the river, which furnishes some of the power required, and the rapids in addition, one-half the power used is steam.

Besides these natural advantages, the system of public instruction has necessitated public school buildings, a fine public library and the Kent Scientific Institute. The Court House and government buildings are an honor to the city, both as regards material and style of architecture.

The rapid transit facilities of such a city should be in proportion to the enterprise of the populace. And in truth they are.

small radius, and the result was the rope was short lived. Except at the double track at turnouts, the outgoing and returning rope were in the same channel but carried upon individual pulleys. The venture was a most unfortunate one and occasioned a heavy loss, which was sustained by the Valley City Street & Cable Railway Company—now merged in the consolidated system. This consolidation was effected by the union of the Street Railway Company of Grand Rapids and The Valley City Street & Cable Railway Company. The new company had its inception in a charter granted to the Valley City Company, April 18, '91, and accepted last May. On accepting the charter the Valley City Company absorbed the Grand Rapids Company. Despite its failure financially the cable road did good service in building up outlying districts, advanced the values of real estate and made many holders of property rich. It was another illustration, however, of the folly of trying to adapt cable construction to conditions for which it was never adapted. After the fact was demonstrated that a cable system was

not suited to this particular environment, the Consolidated Company without delay made preparation for the overhead electric system. The cable line was eleven miles in length and immediately wired, while additions were made with the utmost dispatch to give the other portions of the city street transportation. The other lines were rushed through until to-day the present mileage is 39.7 miles. During the coming year new lines will be put through to the extent of 12 miles of new track.

THE ROAD BED.

The greater number of Grand Rapid's streets are paved with stone and wood blocks, making with the carefully laid track a solid, serviceable roadbed, while the fact that the 66½-pound and 70-pound rail is made by The Johnson Co., is sufficient guarantee of its excellence. The steepest grades are, one 8 per cent. for 8,000 feet, and one 9.1 per cent. for 400 feet.

THE POWER PLANT.

As a legacy from the cable plant, the electric station inherits a Hamilton Corliss and a Wheelock engine,

The motors are divided among the Detroit, Edison and Short Companies as follows: Ten cars, with 1, 30-horse-power Detroit motor, 7 with 2, 25-horse-power Edison, single reduction, 24 with 2, 15-horse-power Edison, 1 with



IN THE BUSINESS DISTRICT.

2, 20-horse-power Short gearless. To assist as feeders to the main lines, 7 horse cars and 60 horses are retained.

THE SIGHTS ALONG THE LINE.

The old line to Reed's Lake carries a large number of people to this popular resort, and with the proposed improvements the line will do more business. John Ball Park is another resort, 2½ miles out, which will be served during the coming year. The North Park and Soldier's Home lines are also very popular.

The officers of the Consolidated: President, A. J. Bowne; treasurer, Jas. Blair; secretary, J. M. Hagar; vice-president and general manager, J. R. Chapman, and assistant secretary and treasurer B. S. Hanchett, Jr., have every reason to be proud of their system, and their 80,000 admirers in Grand Rapids and hundreds of friends



FOOT OF 8 PER CENT. GRADE.

aggregating 1,600-horse-power, and two boilers of the Babcock-Wilcox make, one a marine. This power is all sufficient, as 900-horse-power is the maximum, and about half that the usual exertion.

The power-house rope drives are of interest to every mechanic. The diameter of the large drum is 20 feet, making 60 revolutions per minute. The small pulley is 5 feet in diameter, and the rope used is manilla. These are driven by the Hamilton engines, 24 x 60 inches.

The Wheelock engines, 24 x 48 inches, drive a cotton rope, the drum over which it runs being 15 feet in diameter, going at a speed of 80 revolutions, and the small pulley is 5 feet. For proper appreciation the reader may look at the engraving of the same presented herewith.

The new power house is 88x212 feet and well fitted to discharge its necessary functions. The car barns are separate, five in number, with a total capacity of 176 cars. The largest barn is 50x250 feet.

A repair and paint shop is also in use by the Consolidated Company.

THE ELECTRICAL EQUIPMENT.

The generators, five in number, are of the Edison type and are of 235-horse-power each.



THE POWER HOUSE AND OFFICES.

all over the railway world may well congratulate them upon the success of Grand Rapids' rapid transit.

A ROCHESTER man killed himself by running to catch a street car. Sometimes it pays to wait for the next car.

THE Ontario Legislature has added a clause to the Toronto Street Railway Bill absolutely forbidding the running of street cars on Sunday.

STREET RAILWAY LAW.

EDITED BY MR. FRANK H. CLARK, ATTORNEY AT LAW, CHICAGO.

Street Railway Track wrongfully torn up by City.

A court of equity will enjoin a municipality from interfering with the relaying of a street railway wrongfully torn up by the defendant.

The petition alleges that John N. Stewart, the petitioner, had constructed at great expense a street railway along certain streets in the village of Ashtabula, in accordance with the provisions of an ordinance passed by said municipality, May 19th, 1883; that he maintained and operated said railway from the time of its construction until July 19th, 1890, and is still possessed of the right to maintain such railway. Plaintiff alleges that by the terms of said ordinance, the grant was to continue for the period of twenty-five years from its date.

The plaintiff then alleges that he complied fully with the terms and conditions of said ordinance. He further says that if it shall appear that he did fail in any respect to keep his railroad in the condition provided for in the ordinance, it was through the negligence and fault of the village of Ashtabula in not keeping in order the streets of the city.

The petition states that, notwithstanding the premises, in the night time of the 19th of July, 1890, and during the following Sunday, the said defendants unlawfully, riotously, maliciously and forcibly did enter upon the said railway, stop the passage of cars thereon, tore up its rails, removed its ties, greatly injured its roadbed, and purposely and maliciously destroyed the material of which such roadbed was constructed, and unlawfully converted the same to their own use, and did thereby forcibly prevent the said plaintiff from using and occupying the said railway, as he lawfully had the right to do.

The plaintiff says that he has at various times endeavored to restore said railway, but has been forcibly prevented from so doing by said defendants, who threaten to continue said force to the end of preventing the restoration of the same by the plaintiff, unless they are enjoined from so doing by an order of this court.

The plaintiff therefore prays that the defendants may be enjoined from interfering with or preventing him from relaying or restoring said street railway.

To this petition there is a demurrer, based upon the ground that the petition does not state facts sufficient to constitute a cause of action; secondly, that it does not state facts sufficient to entitle the plaintiff to the relief prayed for, on the ground that he has an ample remedy at law.

The questions that are raised in this case are somewhat novel. There are two cases cited to us, and they are both decided by the Supreme Court of Pennsylvania.

One is a case where, by the direction of the council, a portion of the track of a street railway was torn up, and subsequently relaid by the street railway company, and subsequently torn up by the city authorities. An injunction was allowed by the Supreme Court of the State of

Pennsylvania to enjoin the city authorities from interfering with a restoration of the road. In that case it would seem that the controversy between the company and the municipal corporation, was in regard to relaying or maintaining in the streets what is called and known as a Tee-rail.

The other case arose between the lessee and the lessor of a mine, in which case the lessor in the controversy had torn up the tramways of the lessee running to the mine, and by force prevented him, the lessee, from rebuilding and relaying his tramways. There was this further circumstance, as shown by the record: that the tearing up of the track "was evidently done in haste to avoid the service of an injunction." In that case the Court issued its order restraining the landlord from interfering with the defendant in the restoration of his tramways to the mine.

These are the only cases bearing directly upon the question, which we have before us, that we have been able to find.

It is not controverted by the counsel for the defense that if the allegations of this petition are true, the plaintiff has some remedy; but it is insisted that it is a remedy at law.

For ordinary trespasses, there is no doubt but that a party has ample remedy at law, and in that case ordinarily a court of equity will not exercise its high power for the purpose of preventing mere trespasses; yet it is true that courts often do exercise their power to prevent trespasses.

A case in which this question is somewhat reviewed will be found in the 33 Ohio State Reports, page 545, where the rule seems to be well established that courts of equity will take jurisdiction and act, although the party may have a remedy at law, if the remedy at law is not ample and complete as can be afforded in equity.

The case before us is one of that class where it is doubtful whether the remedy shall be at law or in equity. When a person has submitted his case to the tribunal without objection, or where he for the first time makes his objection on the trial that the parties have an ample remedy at law, in that case a court of equity will proceed to final disposition of the cause. But in the present case, that objection is taken in the first instance by demurrer. The parties defendant have raised this question at the very first step; there is no question of waiver. Citing a case in the 5th Wall, page 78, "It is not enough that there is a remedy at law; it must be plain, adequate, and complete; or, in other words, as practical and efficient to the ends of justice and its proper administration, as the remedy in equity." Citing the 3d Peters 210, 215.

"The case before us falls within a general class of which equity takes cognizance. It is brought against one, who under claim of right, is committing and

threatens to continue to commit permanent trespass upon plaintiff's land, and who is asserting a right calculated to produce strife and litigation. It may be conceded that the plaintiff had a remedy at law; yet it is quite doubtful whether that remedy is practical and efficient to the ends of justice as the remedy in equity."

* * * *

For certain portions of these injuries, there could be no question but that he might be fully compensated in damages; but under the terms of this lease, for it is in effect a lease, he had the right to use these streets in the maintaining and running of his street railway, for twenty-five years. After the expiration of the seven years, while he was fully carrying out, as he alleges in his petition, in every particular the conditions of his contract with the corporation and the provisions of the ordinance, they tore up his road. For eighteen years he had still the right under that contract, and under that ordinance, if the allegations in his petition are true, to keep, maintain, run and receive the profits of a street railway, and that it sought to be prevented by force of the party with whom the contract is made. Can that be compensated for?—This interest for eighteen years; this right of his to maintain and run his railway with the probable increasing business and profits which he would derive from the road, growing out of the growth of the City of Ashtabula.

This is a subject which we have given a great deal of consideration, and with any view which we take of it, we are unable to see how and in what manner he can be compensated. Can it be said, and ought it to be said, if what this man says in his petition is true, that the City of Ashtabula or any other city or corporation in the State of Ohio, can take into its own hands any street railway in it and tear it up by force and against the objection of the parties who have put it there, and who have the right to maintain it there, and then come in and say, "We have done this by force, but a court of equity has no power to give any relief. We have the right to gobble up your franchise, your right to the use of our streets, and the maintaining of your railway for whatever term that we may have given them to you, and the only remedy is for you to recover such damages, if any, as you may recover; but your right to the railway is subject to the control and discretion of the corporation."

That would not seem to be right; that would not seem to be justice, so long as the railway company was performing its duties, and performing its contract as is alleged in this plaintiff's petition.

There may be some difficulty, as is suggested by Counsel, if an order should be issued in this case finally restraining the city authorities of Ashtabula from interfering with the restoration of this road. It may be that a court of equity would not agree to all the relief which the party has prayed for, or it might be that a court of equity upon a final hearing might devise a way and manner in which the road should be rebuilt and should be carried on, respecting and carrying out the rights of both parties under the contract. But very likely this

only could be done, and only would be done by a court of equity, when it was shown that the plaintiff had fully performed, and was fully performing the contract on his part.

We think in this case that under the allegations of this petition, a court of equity has the power, and ought to have the power, to restrain the corporation from interfering with him in the restoration of the railway, and the demurrer is therefore overruled.

(Circuit Court, Ashtabula District, Ohio. Stewart v. Village of Ashtabula. Not yet reported.)

NOTE—The following is from High on Injunctions:

To warrant the interference of equity in restraint of trespass, two conditions must co-exist: first complainant's title must be established; and second, the injury complained of must be irreparable in its nature. And to come within the rule the injury must be of such a nature as not to be susceptible of adequate pecuniary compensation in damages. Nor will equity interfere to restrain a trespasser simply because he is a trespasser, but only because the injury threatened is ruinous to the property in the manner in which it has been enjoyed, and will permanently impair its future enjoyment. Sec. 701.

Courts of equity will not restrain the action of municipal officers when the persons aggrieved by such action have a full and complete remedy at law. Sec. 1242.—ED.)

Action Against Street Railway for False Imprisonment—Evidence—Absence of Driver as Witness.

Plaintiff, in action against a street car company for false imprisonment, following an arrest for alleged disorderly conduct in defendant's car, testified in chief that there were passengers in the car, and that he did not hear them complain of him. *Held*, that testimony by the officers who made the arrest that the passengers in the car at the time expressed their approval of the arrest was competent to disprove plaintiff's testimony.

In such action defendant, to excuse the absence of the driver of the car as a witness, may give evidence of its search and inquiry for the driver, and the inability to find him, he being no longer in its employ.

(Supreme Ct. N. Y. *McGuire v. Broadway & S. A. R. Co.* 16 N. Y. Supp. 922.)

Boy Stealing Ride—Injury by being thrown under Car—Negligence.

The evidence in an action for injuries alleged to have been sustained through defendant's negligence, showed that plaintiff, a boy ten years old, was carrying water for some third person when defendant's car passed: that, on hearing some one say that the driver wanted him, plaintiff went over to the car, where some man took his bucket, and put it and the boy on the platform of the car: that the driver repeatedly ordered him off, and at one time put him off; that he got on again and, after the car had started, jumped off, or was crowded off by the passengers, and was thrown under the car and injured. It further appeared that soon after the accident plaintiff said that it was his own fault and not the driver's. There was nothing to show that the driver knew that plaintiff was still on the car when the accident occurred. *Held*, that defendant was not guilty of negligence.

(Sup. Ct. Pa. *Wrasse v. Citizens' Traction Co.* 23 Atl. Rep. 345.)

*Electric Railways—Interference with Poles and Wires—
Moving Buildings along Streets—Injunction.*

The Act for the incorporation of cities giving the Common Council exclusive jurisdiction over the streets, does not take from the courts the authority to decide controversies concerning property rights, and, where such council fails to prevent persons from moving a building along a street and thereby interfering with the operation of an Electric Street Railway by cutting down its wires and poles, such interference may be restrained by injunction.

Where the Street Railway Company was organized under the statute relating to such corporations, and which authorized the employment of any kind of power in common use except steam, and the company, under authority from the City Council to use electricity, had constructed and commenced to operate such railway, this was an assumption of its corporate functions under color of law and claim of right, and the right to use electricity could not be attacked in such injunction proceeding.

(Sup. Ct. Ind. Williams v. Citizens' Ry. Co. 29 N. E. Rep. 408.)

Injury at Crossing of Horse Railway and Steam Railway—View of Track obstructed—Apprehension of Collision—Passenger jumping from Car.

At a crossing of a horse and a steam railway, the view of the latter's track was obstructed until within fifteen feet of it. A horse car was driven slowly upon the crossing, without warning from a gateman stationed at the crossing by the railroad company, until the horses were on the crossing, when, as an engine approached on a down grade, the gateman shouted to the driver of the horse car to stop, and commenced to lower the gates guarding the crossing, but when they were half way down, shouted to him to go on, and began raising the gates; others shouted contradictory directions to him. The driver stopped, or nearly so, but before he had stopped, plaintiff, a passenger in the horse car, in apprehension of a collision, jumped from the car and thereby was injured. There was no real danger of a collision, nor, from the driver's standpoint, any appearance of danger. He had his horses under control, and when directed by the gateman to go on, continued across the track. *Held*, that there was no negligence on the part of the driver which would render the street car company liable for plaintiff's injuries.

In such passenger's action for her injuries, evidence was received of the acts of the passengers and of the outcries by them and by by-standers. *Held*, that this was admissible as part of the *res gestae*, and as evidence that plaintiff was actuated by reasonable apprehension.

(Sup. Ct. Mo. Kleiber v. People's Ry. Co. 17 S. W. Rep. 956.)

Construction of Charter—Use of Street—Branches Connecting with other Railways—Pennsylvania Statute.

A city ordinance giving consent to the exercise of certain powers granted by the charter of a corporation

cannot enlarge those powers or confer a right outside of them.

In the construction of charters, it is a well settled rule that, so far as the rights granted thereby encroach upon public or common rights, they are to be construed most strongly against those setting them up and in favor of the public. They are not extended beyond the express words in which they are given, or their clear import, and whatever is not given in unequivocal terms is to be deemed as expressly withheld.

The Act of April 21, 1828, by which the Germantown Passenger Railway Company is incorporated, in authorizing it to construct such branches as may be necessary to connect it with any other railway within the City of Philadelphia, refers only to the railways then in existence.

Even if it were otherwise, the corporation would not be permitted to prevent the construction of a railway by another company over certain streets for the mere reason that the city had given it (the Germantown Passenger Railway Company) its consent to the building of such a connection, no work of any kind having been done upon it. If the Company does not promptly make use of its right to build the road, it cannot be allowed to prohibit others from obtaining and exercising such a right.

(Ct. Cm. Pls. Phila. People's Passenger R. Co. v. Marshall St. Ry. Co. 47 Leg. Intel. 26.)

PASS HIM AROUND.

WE are in receipt of a letter from E. O. Hill & Son, dealers in electric appliances, Honolulu, Sandwich Islands, as follows:

GENTLEMEN:—We write to put you on your guard against a man by the name of Wm. V. Lockwood. This man for the past year and a half has been in our employ, having charge of our Electrical Department; and had he attended to business would still have been doing well.

Those who know him best say that of late he has been addicted to gambling, which no doubt accounts for the fact that he has seen fit to quietly leave these Islands by sailing vessel, for San Francisco, leaving a large number of tradesmen and friends to mourn his departure to the tune of over one thousand dollars (\$1,000) to say nothing of gambling debts, which are said to amount to several hundred.

So far as we know he collected two bills for our account just before leaving, amounting to little over one hundred dollars, which amounts, with one hundred just drawn for traveling expenses on a projected business trip to another island, he has taken with him.

Fearing this man may attempt to defraud others in this line of business, and use our name to further his ends, we are taking pains to notify all whom we think he may possibly come in contact with.

Respectfully,

E. O. HILL & SON.

RENO RAPID TRANSIT FOR NEW YORK.

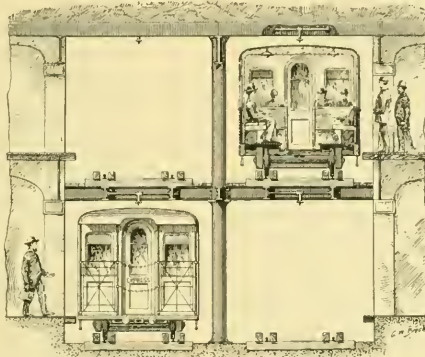
THE Rapid Transit Commission has recommended a four-tracked tunnel under Broadway, all tracks on a level. This is a both dangerous and difficult construction. Mr. J. W. Reno has a different plan that promises well. This postulates a square, double-decked excavation, say 23 x 23 feet and properly divided for local trains above and express trains below, as indicated in Fig. 1. This description of tunnel will accommodate cars 8 feet 6 inches high by 9 feet wide, and leave 8 feet surface above for sewers and pipes. It is planned that this tunnel shall have walls, floor and roof of cast iron panels, wherever the construction demands penetrating sand, clay or moist ground. To this difficulty of construction the hydraulic shield method addresses itself.

The proposed tunnel in longitudinal section is shown in Fig. 3. The narrow tunnel shows the following points of superiority over the broad tunnel recommended by the commissioners:

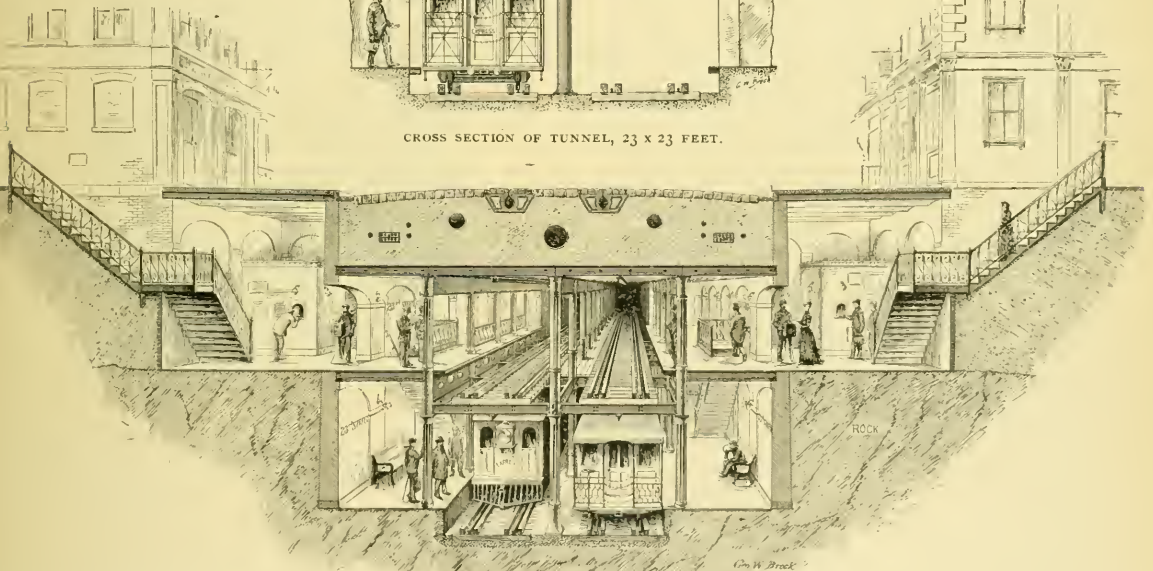
- (1) The narrow tunnel interferes less with buildings and sidewalks.
- (2) The narrow tunnel is more convenient to cross, having locals and express trains at different elevations.
- (3) The narrow tunnel will disturb the street less than the broad construction and will be more economic in roof area.
- (4) Convenience in the matter of ventilation, as the upper tracks are carried on open work ties and steel girders.

We are indebted to Engineering News for the illustrations in this article.

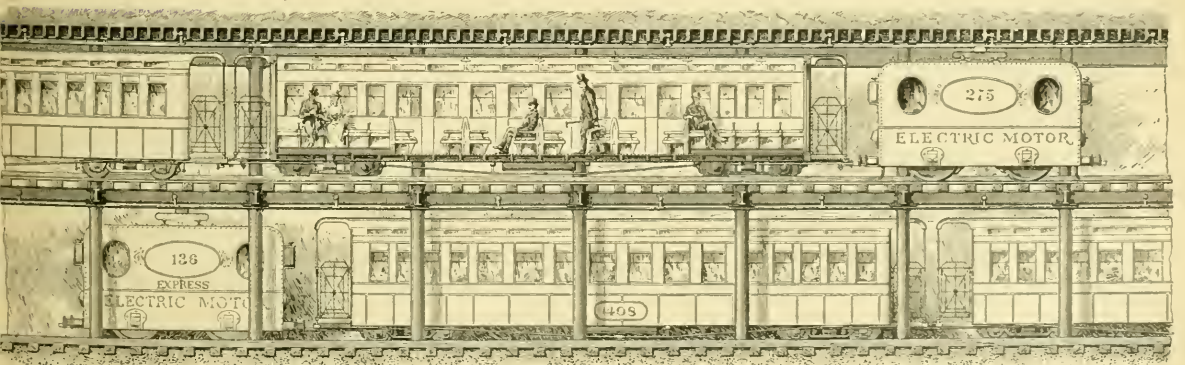
Estimated cost only \$1,500,000 per mile, and could be built without interfering with tracks and pipes above.



CROSS SECTION OF TUNNEL, 23 X 23 FEET.



CROSS SECTION SHOWING PROPOSED LOCAL AND EXPRESS STATION.



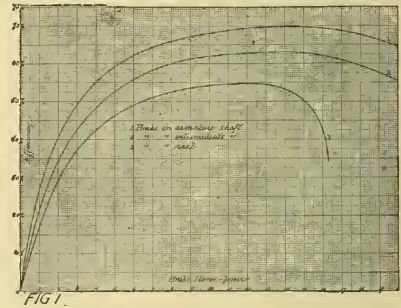
LONGITUDINAL SECTION OF TUNNEL.

THE GEARLESS MOTOR.

A Paper Read before the Chicago Electric Club. By S. H. Short.

At first thought it does not seem necessary to place on the market a motor of new design, which involves the abandonment of gear wheels for transmitting the power of the armature to the axle, but when we consider it carefully and examine all the advantages to be gained by so doing, we feel justified. If you recall the history of the steam locomotive you will remember that in the first machines the power was transmitted from engines through gear wheels to the axles. This was soon abandoned, because of the wear on the gears, the noise, the breakage and the many things which rendered it impracticable, especially where high speeds were required. If you will look back over the history of the electric street car motor, you will remember that among the first experiments which were made, the high speed armature was geared down through a long train of gears to the axle. Finally, within the last two years, the practical operation of electric motor cars with two sets of gears, of a double reduction, has become quite general. It has now been found, however, that those gears are a great source of expense in the operation of electric street cars, and it has been the object of the manufacturer to reduce the number of gears in street car practice as far as possible, until we now have all of the well known electrical manufacturers offering a motor for street car service with but a single reduction, and we have already found in practice that this is immensely superior to the old double reduction type of two years ago. While this single reduction type of motor is undoubtedly eminently successful, I believe we can go a step further with great advantage, that we can connect the armature directly to the axle of the car without the intervention of armature, intermediate or other kind of gears. The abandonment of gears, or a "Gearless" motor, is undoubtedly absolutely necessary where high speed is required for driving trains of cars upon suburban or interurban lines—a thing which we shall undoubtedly be called upon to do within the near future. It will be well for us to inquire into the disadvantages of the spur gear, which is the form that has finally been adopted as the only successful method of reducing the armature to the axle speed. These gear wheels vary in efficiency of transmission of power, with the load and with the speed. They wear rapidly, especially when placed under a street car in the grit and mud. This wear of the gear has been a very serious thing for the electric railways during the last three or four years. The repairs upon street car motors have been mostly because of the use of gears, and the cost of maintaining an electric motor car, has been due largely to this one thing. With the single reduction motor, of course much more than half of the difficulty has been removed, but we believe that with the gearless motor, which does not contain any of these wearing parts, and without the armature and intermediate bearings and

shafts, bolts and nuts, etc., we can get rid of all this source of cost in operating electric street cars. Those of you who have operated electric street car lines can appreciate what a serious thing it is for a tooth to break out of a gear in a car motor while it is in service. The car is loaded with passengers who have paid their fares. If one tooth breaks, the probability is that more will follow; finally the teeth of the gear do not mesh with the pinion and it either bends the armature shaft, or breaks the motor frame. Probably the wheels become locked and the car is unable to proceed on its journey. The passengers must be removed, and the car must be taken from the track, or dragged to the car house by another motor. This is calculated to make the patrons of the road dissatisfied with the electrical system, and it creates a feeling of distrust in the public mind about the certainty and regularity of the operation of the cars. Nothing could be more serious for a street railway management than a feeling of distrust among the patrons of the road.



While this is not now as common an occurrence as it was a year ago, because of the fewer gears in the single reduction motor, and the fact that we are making our gears of steel, which lasts longer and breaks less frequently, still the trouble is serious.

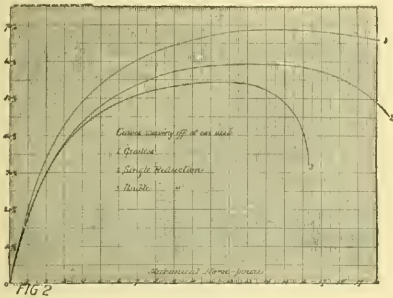
Again, it is a great source of loss to a street railway company when it is necessary to take a car out of service to replace worn out gear wheels. A car earns on an average, in a good street car city, about \$20 per day. If a car is taken off the road for half a day or a day, we not only lose the cost of the repairs, but we lose the profits on the day's run.

The causes which disable cars should be reduced to the minimum, and it is to this end that we are advocating the use of no gears in a street car motor. It is very seldom now that we have trouble with armature bobbins and field magnet spools burning out. While we had some trouble of this kind in the early days, we have learned how to insulate and protect the motors for street car service, so that electrically they are quite equal to the work they are required to do. We have, therefore, to look more carefully to the mechanical construction of

a street car motor, and perfect that part of the machine. We believe that we should make a street car motor with as few parts as possible, and especially should we endeavor to do away with the wearing parts.

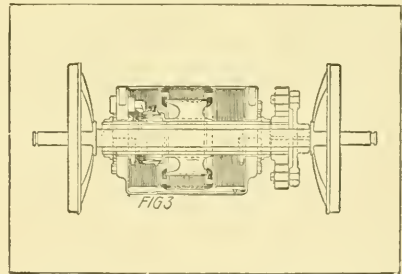
If we can abandon the gears, you can easily understand that we not only do away with them, but also with those wearing parts which accompany a train of gears, fast-running shafts and their bearings, box caps, nuts and bolts—all of which need looking after.

We will now take up the matter of the power lost in spur gearing, and see what we can gain in that direction by abandoning gears. When we first took up the sub-



ject of a gearless motor, we set about to see how much could be gained in the efficiency of transmission of power by doing away with the gears. I made a very careful and thorough investigation of the losses between the armature pinion and the intermediate gear, and between the intermediate pinion and the axle gear of a double reduction motor. I first put a double reduction motor in good order, eliminating the armature bearing losses, as much as possible, by running the motor for a long time, to wear the bearings down to a good surface. I put my power brake, for determining the horse-power, directly on the armature shaft and run by motor, delivering different horse-powers, all the way from no horse-power to its full output—20 horse-power. At the same time we measured the electrical horse-power which was being put into the motor, and from this we constructed a curve of efficiency of the motor at different loads, which curve is reproduced as the upper curve in figure 1. The greatest efficiency reached by this motor was about 70 per cent. at a load of from 14 to 16 horse-power. The efficiency of small loads, say at 2 horse-power, was something like fifty per cent.; at 4 or 5 horse-power an efficiency of 65 to 70 per cent. We then took the brake from the armature shaft, and replaced it with a well-made armature pinion, allowing it to mesh well with the intermediate gear, these gears being cut as nicely and as carefully as possible, so that there would be the least possible loss between the two in making this test. Putting the brake on the other end of the intermediate shaft, we again secured the readings of the horse-power delivered, after being passed through this one pair of gears; the electrical horse-power being carefully indicated at the same time. From the efficiency of the different horse-powers thus obtained we produced a second curve,

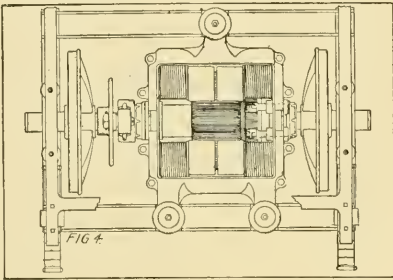
which is shown in figure (1) as the middle curve on the diagram, and we find that the efficiency of this arrangement has fallen considerably. We once more removed the brake and placed the intermediate pinion on the intermediate shaft, allowing it to mesh with the axle gear. The brake was now placed on the axle itself and another set of measurements—the same as those before made—were secured, and a curve of efficiency again plotted, which showed a large loss in these gears; the efficiency at the axle being less than at the armature by an amount indicated by the two outer curves. The axle results showed that at 14 horse-power delivered by the motor, we obtained an efficiency of 70 per cent. as a maximum when the brake was placed on the armature shaft. When the brake was placed on the intermediate shaft delivering 14 horse-power, the efficiency dropped to about 62 per cent. When placed on the axle, the efficiency dropped to a little less than 55 per cent. showing a loss in the gears of some 15 per cent. when delivering 14 horse-power. You will find, in going over these curves, that the loads vary considerably with the speed. Making an efficiency curve of the gears alone at different speeds, you will find the efficiency very low at heavy loads and slow speeds, and rises to its highest at medium speeds and medium loads. It again falls when running up to higher speeds. For this reason it is more economical to run a geared motor not too fast nor too slow, but at a medium speed. This fact has been established long since in the use of gears in other classes of machinery, and in designing machinery where power must be trans-



mitted through gears. The best possible speed at which gears are to be run, and the relation between pinion and gear, are carefully considered. In the single reduction motor we regain, we might say, more than half of this loss in efficiency, because the gears are run at a moderate speed. I think that this one feature of gear loss makes it desirable to abandon their use in street car motors if possible. If we can save in practice 15 or more nearly 20 per cent. of the power consumed in operating a street car motor, by using the gearless instead of the double reduction type, it is well worth while, as this means the consumption of less coal and the reduction of first cost in the power plant and accessories.

Figure 2 represents another set of curves developed in the same way as those shown in figure 1. Three motors were used in this test, the Double Reduction, Single Reduction and the "Gearless." In each case the

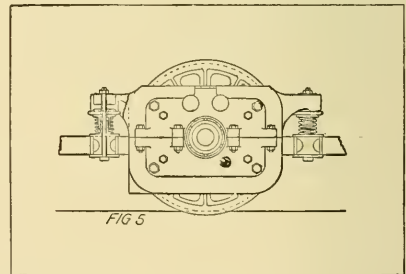
power brake was placed on the car axle. The Double Reduction motor showing the efficiency at different horse-powers is practically the same as the lowest curve in figure 1. The power brake placed on the axle of the Single Reduction motor shows the loss in but one pair of gears and its axle efficiency is greater than that of the Double Reduction. In the "Gearless" motor, however, there is no loss between the armature and the axle; therefore the curve shows the actual efficiency of the motor itself. In the Single Reduction motor the relation between the diameter of the pinion and the gear is greater than it is in the Double Reduction; therefore the loss is somewhat greater. If we had a still slower running motor armature on the Single Reduction, so that the pinion



could be larger and the gear smaller, this loss would not be so great, and the efficiency at the axle would be greater. From these curves it is seen that the efficiency of the Gearless motor at the axle, when delivering 14-horse-power, reached very nearly 70 per cent., or very nearly the same efficiency as the Double Reduction motor at the armature shaft. The Single Reduction motor when delivering the same power through one pair of gears, showed an efficiency of 60 per cent; while the Double Reduction shows a little over 50 per cent. These practical tests show that with the Gearless motor we actually save from 15 to 20 per cent. in the power necessary to put into the car in order to get the same result at the axle.

We will now give you a description of the construction of our Gearless motor. Gearless motors have heretofore, as you well know, been constructed and operated. The armature has been placed directly on the axle and fairly good results have been obtained. The City and South London Railway, in London, is operating its road with Gearless motors to-day. These motors are high-speed, making the problem somewhat easier. It is, however, difficult to construct a small motor, not too large to be placed under an ordinary street car, the speed of which shall not be above 100 to 150 revolutions per minute. Because of the light construction of the road-bed in street railways, it is also necessary to avoid the heavy hammer blow which occurs at the rail-joints from a motor partly or entirely carried on the axle. When the wheel of the car passes from one rail to another, it falls, striking a very heavy blow. If we have a very heavy weight, directly attached and carried on the axle, without any intervening cushion or spring, we will have a very severe sledge-

hammer blow on the rail at every joint. This will soon pound out and destroy the rails. You are all familiar with the difficulty which is experienced in keeping up the rail-joints on an electric line. The reason for this is apparent, if we think a moment, as it is a new element which has made its appearance since the introduction of the electric motor. All geared motors are supported at one end directly on the axle, by means of axle bearings. At the other end these motors are supported on springs; thus one-half the weight of a geared motor is carried directly to the car axle without the intervention of any flexible material. Imagine, if you please, that we could cushion both ends of a geared motor, and put a spring between the motor and the car axle at the axle end. We will relieve the heavy blow of the wheels at the joints, and the wheels would not do as much harm or as much damage to track. The actual weight carried by a set of wheels on the rails does not seem to affect the joints materially. Cable cars do not destroy their tracks, no matter how great their loads. Therefore it must be that this heavy weight of the motor carried solidly on the axle is the thing that is breaking down the rail-joints on electric lines. This heavy jarring also crystalizes the axles, and we have complaints from all over the country that axles on motor cars are breaking. When we come to examine these breaks, we find that the iron has crystalized, and the manufacturers are now endeavoring to overcome this by increasing the size of the axles. With the "Gearless" motor, as we now construct it, none of the weight is directly carried on the axle. By referring to figure 3, which shows a section through the axle of



the Gearless motor, it will be seen that the armature is mounted on a hollow shaft which surrounds the axle, leaving an air space of about an inch entirely around the axle. This hollow shaft is really the armature shaft of the motor, and is carried in its own independent bearings in the motor frame. The motor frame consists of a box made in two halves, which are fastened together, and contain the field magnets and enclose the whole, protecting it from mud and dust; the only opening in the box being on the upper side next to the car floor. This box, which makes the complete motor when assembled, is provided with three projections at right angles to the armature shaft. These projections are made to receive steel spiral springs, similar to car springs, and supported on the cross girders of an ordinary truck, such as is com-

monly used for motor cars and carry the entire weight of the motor. The axle is passed through this hollow armature shaft and can move freely in any direction within it. At one end of the hollow armature shaft is placed the flexible driving device which communicates the motion of the armature directly to the axle. This driving device can be seen in figures 3 and 4; and in figure 5 an end elevation of the motor is shown, together with the spring mounting of the motor and a section of the axle in the centre of the hollow shaft. Figure 1 shows a plan of the motor as you would look down through the trap doors of the floor of the car, the field magnets and armature, commutator and brushes all being revealed, and the ease with which you can get at the brushes and all the various parts of the motor is well shown. The axle also has a free end play of 2 inches through the motor and armature shaft. This is necessary in rounding curves and to ensure freedom for the movements of the truck.

When the wheels drop from one end of the rail to another the motor does not immediately follow, its inertia being so great. The wheels not being very heavy do not make a heavy blow, but by the time they have reached another portion of the rail, the motor falls down against its springs, distributing, as it were, the blow over a considerable length of the rail, thereby preventing serious damage to the rail joint.

The question is often asked, "How do you obtain the necessary power or tendency to turn the wheels around, without using an abnormal amount of current in so doing?" It is contended that in a geared motor we have an enormous leverage through the gears. If we had a small armature, the same as is used in the geared motors on the axle, we would not of course be able to start the car, or to do the work necessary in moving a loaded car, but we have a large armature placed in a strong magnetic field, and we have a great many more turns of the same current around the armature, thereby gaining in two ways, a greater leverage because of a larger diameter of armature and a greater pull at the end of that lever, because of the increased number of turns of wire on the armature and the stronger magnetic field. It is something analogous to the steam engine. If we replace an electric motor with a steam engine, we can use a small engine under the car, with a small cylinder, and run it at high speed, and gear down to the car axle, or, we can use a large engine connected directly to the axle, as is common now in locomotive practice, and run it slower and get the same power, with, as has been demonstrated in steam motors, greater economy. You can make a similar comparison between the high speed engines of small size and the larger Corliss engines running at slow speed. We have the advantage in the slow running motor, of practically doing away with the loss in Foucault currents set up in the armature ring. Air resistance we are liable to, the greater loss in the dead resistance of the motor, but by designing our motor with a very low resistance of the magnetic circuit, we are able to cut down the wires on the machine so that its resistance is quite low, being only about 2 1/2 ohms. There is

another advantage in this slow speed motor, which is not small; the wear on the commutator is very light and the heat produced by the friction of the brushes on the commutator is exceedingly small, making the motor run cool in all its parts. We are obliged, of course, to take advantage of everything that is possible in the construction of the gearless motor, in order to make it small and light enough for street car service. We use the best

*Brush material - Aug 7 1891 - In regular service pulling
Truck-car - Trip 76-3*

| Brush | Car | Rolls | Combs | Trucks | Car | Rolls | Combs | Trucks | Car | Rolls | Combs | Trucks | |
|-------|------|-------|-------|--------|------|-------|-------|--------|------|-------|-------|--------|-----|
| 2 20 | 53 | 448 | | 1 461 | 16 | 440 | | 3 113 | 30 | 444 | | | |
| | 3 | 424 | | 7 15 | 424 | | | | 6 | 420 | 79 | 424 | |
| | 1 | 424 | | 1 18 | 424 | | | | 4 | 370 | 424 | 70 | |
| | 0 | 424 | | 1 37 | 424 | | | | 0 | 424 | | | |
| | 2 | 424 | | 5 | 424 | | | | 3 15 | 424 | | | |
| | 53 | 444 | | 9 | 23 | 424 | | | 6 | 424 | | | |
| | 3 19 | 424 | | 4 58 | 20 | 424 | Start | | 4 | 21 | 424 | | |
| | 4 | 424 | | | 60 | 440 | | | 7 | 16 | 424 | | |
| 2 23 | 16 | 440 | | | 33 | 396 | | | 3 | 141 | 424 | | |
| | 6 | 444 | | 2 | 60 | 444 | Start | | 9 | 15 | 424 | | |
| | 7 | 444 | | 3 | 20 | 424 | | | 3 | 24 | 424 | | |
| | 1 | 444 | | 4 | 0 | 424 | | | 3 24 | 0 | 424 | | |
| | 17 | 444 | | 4 | 0 | 260 | | | | | | | |
| | 1 | 424 | | 1 | 12 | 416 | | | | 1 | 35 | 424 | |
| | 10 | 424 | | 1 | 27 | 336 | | | | 2 | 27 | 424 | |
| | 9 | 424 | | 1 | 27 | 424 | | | | 2 | 27 | 424 | |
| 2 30 | 11 | 424 | | 4 | 30 | 324 | | | | 3 | 22 | 424 | |
| | 1 | 424 | | 7 | 0 | 424 | | | | 4 | 18 | 424 | |
| | 1 | 424 | | 1 | 20 | 360 | | | | 1 | 41 | 424 | |
| | 1 | 424 | | 1 | 0 | 424 | | | | 1 | 18 | 424 | |
| | 2 | 44 | 424 | | 7 | 20 | 320 | | | 3 20 | 27 | 424 | |
| | 3 | 15 | 444 | | 9 | 17 | 400 | | | 4 | 27 | 424 | |
| | 4 | 11 | 424 | | | | | | | 6 | 27 | 424 | |
| | 17 | 444 | | | 1 | 27 | 348 | | | 7 | 21 | 424 | |
| | 1 | 424 | | | 1 | 27 | 320 | | | 1 | 28 | 424 | |
| 2 32 | 2 | 444 | | | 2 | 0 | 380 | | | 2 | 14 | 424 | |
| | 6 | 70 | 444 | | 2 | 0 | 424 | | | 3 | 14 | 424 | |
| | 13 | 424 | Start | | 3 | 40 | 324 | | | 9 | 16 | 424 | |
| | 7 | 24 | 424 | | 3 | 20 | 280 | | | 3 30 | 0 | 424 | |
| | 4 | 424 | | | 4 | 10 | 320 | | | | 1 | 18 | 424 |
| | 8 | 424 | | | 4 | 10 | 320 | | | | 1 | 18 | 424 |
| | 8 | 424 | | | 2 | 20 | 320 | | | | 1 | 18 | 424 |
| | 1 | 424 | | | 3 | 10 | 320 | | | | 1 | 18 | 424 |
| | 9 | 77 | 424 | Start | | 3 | 10 | 320 | | | 1 | 18 | 424 |
| | 1 | 424 | | | 3 | 10 | 320 | | | | 1 | 18 | 424 |
| 2 40 | 0 | 424 | | | 7 | 22 | 448 | | | 3 | 17 | 424 | |
| | 1 | 424 | | | 7 | 20 | 320 | | | 4 | 27 | 424 | |
| | 1 | 424 | | | 7 | 20 | 320 | | | 4 | 27 | 424 | |
| | 1 | 424 | | | 1 | 0 | 320 | 7000 | | 7 | 16 | 424 | |
| 2 42 | 2 | 424 | | | 1 | 0 | 320 | | | 3 30 | 0 | 424 | |
| | 3 | 11 | 424 | | 9 | 25 | 408 | | | | 4 | 20 | 424 |
| | 3 | 15 | 424 | | 2 | 40 | 320 | | | | 4 | 20 | 424 |
| | 5 | 424 | Start | | 3 16 | 39 | 440 | 7000 | | 4 | 35 | 424 | |
| | 4 | 20 | 424 | | | 41 | 392 | 4 424 | | 7 | 15 | 424 | |
| | 0 | 424 | | | 1 | 27 | 424 | | | 8 | 15 | 424 | |
| 2 45 | 0 | 424 | | | 2 | 27 | 424 | | | 8 | 15 | 424 | |
| | 6 | 32 | 424 | | | 7 | 20 | 320 | | 9 | 0 | 424 | |

wrought iron and steel in its construction, because of their superior magnetic qualities. We have to use the best copper, of highest conductivity, to reduce our resistance losses. This is, of course, in the end an advantage to the machine, because it makes it stronger and less liable to breakage.

It has been urged by some that the Gearless motor is more difficult to repair than a reduction motor; and that it is a serious thing to repair an armature bobbin which has been burned out, because the armature will have to be taken out of the machine, and the wheels pulled off in order to get at it. By referring to the drawings of the Gearless motor, it is easy to see that by dropping the lower half of the casing into the pit, it leaves the upper half of the motor carried on the truck frame, and by simply raising the car body, the armature can be rolled out from under the car without taking it off the axle, there being no need of ever removing the wheels from the axle, except when the wheels are worn out and have to be replaced with new ones. The Gearless motor armature can be removed from the car by one man in as short a space of time as the geared motor armature can be removed, and without so much danger to the armature, as it is well protected from abrasion and injury in handling.

To answer the question as to how much current is taken by the Gearless motor in operating a car, we have prepared a copy of readings taken from a car

in actual service, drawing a trail car. The current readings, also the pressure readings, were taken every half minute, and from Figure 6 a very good idea of the amount of current required can be gained. These readings were taken in August on the East Cleveland Railroad, Cleveland, Ohio. On this road the traffic is very heavy, although the grades are light, but by comparing these results with those obtained from single and double reduction, you will find that there is practically little or no difference between the current readings. The average readings however in the test run with the Gearless motor, will be considerably lower than those with the geared motor, owing to the fact that we have got rid of the gear friction. The Gearless motor will coast so easily that on a very slight down grade a car equipped with gearless motor will run up to speed, without any current being used, and in making stops the current is shut off from a Gearless car long before it is in a

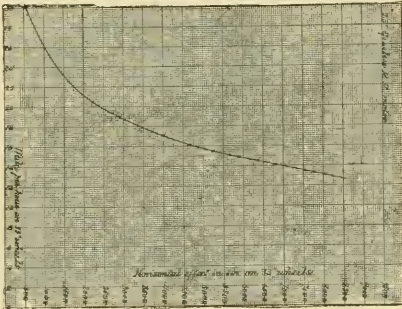


FIG 7

geared motor car. These intervals of the use of little or no current as compared with the intervals in which there is little or no current used in a geared motor are very considerable, and represent the extra loss in the gears.

We have carefully tested Double Reduction, Single Reduction and Gearless cars running on the same track, on roads in Cleveland, Ohio, taking at the same time readings of current and pressure, and we have found that in some cases the Single Reduction would require the least amount of current, sometimes the Double Reduction and sometimes the Gearless, depending upon the number of passengers hauled, stops made, and other things that might come in to consume more or less power; so it is difficult for us to say that there is any difference in actual power consumption between the three classes of machines. The Gearless motor is capable of starting loads as quickly as the geared motor, and is capable of starting as heavy load under similar conditions, and we have a curve shown in figure 7 which illustrates the actual horizontal pull of a 20 H. P. Gearless motor, mounted on 33-inch wheels. In examining this curve, it will be seen that the horizontal effort in pounds, when car is running twenty miles per hour, is about 250. In ordinary street car practice, we find that it requires about 20 pounds per ton to move a load on street car rails. This means that with a horizontal pull of 250 pounds this single motor could move a car weighing 12 tons at the rate of 20 miles per hour, or, as the curve will

show, that at 14 miles per hour, the motor has a horizontal pull of 700 pounds, or it will move a load of 35 tons at the rate of 14 miles per hour on a level track. This curve is not falling off rapidly, certainly not as rapidly as it would with a geared motor, because the loss in the gears begins to increase very rapidly with the heavy loads. You can easily figure from this curve what the motor will do under any conditions of load, grade and speed. The tendency in street car practice is to increase the speed of the cars, and the Gearless motor lends itself especially to this end, as we have found that with very rapid speed, geared motors wear out the running parts more rapidly and become very much more expensive to maintain, while the Gearless motor can operate with as great economy as the slow pace required in crowded streets, it is also capable of running at a very much higher speed in suburban traffic without the slightest fear of damage to the machine. In this respect it makes a very much more flexible motor than the geared machines. You can easily understand that this motor makes it possible for us to develop large electric locomotives to be used in elevated railway service and for pulling suburban trains in and out of large cities. From calculations and designs which we have made, we find that the size and weight of the motors required for 290 and 400 H. P. locomotives is not more than is necessary to produce the required adhesion to the rails needed for the required tractive pull to move these heavy trains. The motors are not large comparatively, and their economy will be very great. We believe that this branch of electric railroading will develop rapidly and that within a few years Gearless electric railway motors will be used in places, for purposes and in numbers unthought of at the present time.

RAPID TRANSIT DEFINED.

In a lengthy editorial an exchange anxiously inquires, "What is Rapid Transit?"

Rapid Transit is where you—

Invite young lady to go to opera at 7:30.

Get home at 7:35;

Dressed at 7:45;

Run two blocks to catch street car one block from corner, 7:46½;

Street car wins by length of two wheel bases, 7:47;

Cars on 12 minute headway, 7:59.

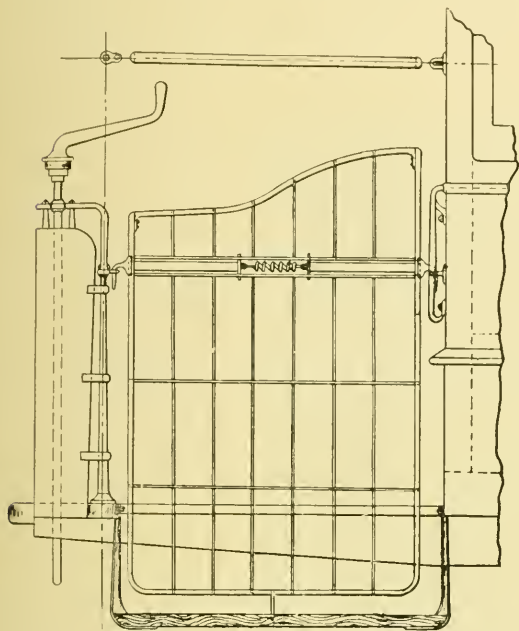
This is Rapid Transit.

THE Second avenue line in Pittsburg had a strike, but it was so long ago our readers have forgotten all about it. A few days since the boys concluded to declare it "off", and they sensibly boxed up the paraphernalia of the assembly and returned it to the district office. Hereafter they will confine their efforts to the running of cars instead of a branch of the K. of L.

How it is in New York: There are several hours in the day when an attempt to board an elevated train down town is worse than participating in rush in a foot ball game.—Press.

IMPROVED SAFETY GATE FASTENER.

A NEW fastener for platform safety gates has been patented by Henry Cochran, superintendent of the Lamokin Car Works. If a gate hangs loosely, it rattles or is liable to be insecure. If tight, there is a strain upon the car at the point where the gate sets into the eye, as every time the driver sets his brake it springs



the dash and draws upon the eye in the car body. By the device illustrated all this is overcome, and also permits of changing gates from one car to another without danger of delay in hanging.

A BIG CONSOLIDATION.

A N understanding has been effected by which seven New York City railways are consolidated, after the plan of the Philadelphia Traction Company. The deal was managed by P. A. B. Widener, Thomas Dolan and William L. Elkins, with the co-operation of Ex-Secretary of the Navy, William C. Whitney.

John D. Crimmins is president of the united lines, which union includes the Broadway & Seventh Avenue line, the Broadway cable, the Chambers Street, the Twenty-third Street Cross-town, the Ninth Avenue, the Sixth Avenue, and the Avenue C lines. The whole is controlled by the Metropolitan Traction Company.

A number of improvements and extensions are contemplated.

The system is really the acquisition of the three roads last named, as the four others were previously in union.

Henry Thompson is vice-president; Daniel T. Lamont, secretary, and Thomas F. Ryan and Daniel Hasbrouck, treasurers.

FOREIGN FACTS.

THE Gordon closed conduit railway is to be financially firmly established.

THE Wolverhampton Town Council has withdrawn consent to use steam on the Midland railways.

THE Leeds Electric Tramway has carried more than 200,000 passengers in the four months of its operation.

THE London Electrician says editorially, in remarks that tend to discourage English participation in the World's Fair. "*Timemus Americanos et dona ferentes!*"

THE Perth and District tramway company has been issued with a capital of \$75,000. It is intended to use a storage battery system with an estimated cost of \$67,500.

THE Bradford, England, corporation has set aside \$2,500 towards trying an electric system invented by Holroyd Smith, of Halifax. The system is an overhead one.

CORK will have tramway. The committee has approved plans for a line 7 furlongs in length, 36-inch gauge and one horse-car capacity. The company will apply for permit to use mechanical traction.

A JOINT committee of 5 Lords and 5 Commons has been appointed in the matter of London railway schemes with power to hear the promoters of such schemes and decide whether they should proceed or not.

THE Armstrong Glass Company of Birmingham, is prepared to furnish glass cells of largest size. There is now one on exhibition—4 feet 6 inches long. The tanks are exactly square and true and are of great advantage in chemical and storage battery work.

THE Madras Tramways Company has a capital of \$500,000. William Hutchinson & Co. have the rights, and will build 15½ miles of electric road, 6 miles to be completed in 2 years. It is expected that the total cost will be \$25,000 per mile including power-plant.

THE Leith corporation has had in consideration the co-operation with Edinborough tramways. A letter from the tramways companies was read during the discussion intimating the withdrawal of the clauses authorizing cables and electrics. It was finally decided that the tramways must be worked as one concern.

PIQUA PLANT.

THE plans for the new power-house of the railway are complete. C. C. Barnett is the architect. The structure will be brick, 40x60 feet and erected near the old barn.

A 175-horse-power Hamilton-Corliss engine will drive the No. 20 Edison dynamo.

The boiler is of the Sterling water tube type and the minor equipments are up to date as becomes an electric railway for Piqua.

OBITUARY.

COL. CALVIN GODDARD.

CHARLES J. VAN DEPOELE.

The great advances of science, the great strides in political welfare and the great processes of thought, sooner or later become matters of history, as we come to mourn the demise of the investigator, the statesman and the philosopher.

With the death of Charles J. Van Depoele the progress of electrical traction begins to assume historical interest and the present of our branch of industry stretches into a past.

Mr. Van Depoele was a native of Belgium, at the village of Lichtervelt, April 27, 1846.

While a mere boy he showed a great interest in matters electrical, and bought a couple of cells to begin experiments on his own account.

When 15 years old he was apprenticed to a wood carver in Paris, whither his family had removed, and here he finished the education begun at the College of Poperinghe, Belgium, in a course at the Imperial Lyceum, at Lille.

His evenings were devoted to electrical study and his days to wood carving, until 1871, when at the age of 25 he removed to America and settled at Detroit. Here he prosecuted his profession and with considerable success, and here he entered commercial lines. The always-present infatuation for electrical science, however, brought him back to his first love and he continued his experiments with more ardor than ever.

In 1880 he constructed a dynamo for electric lighting, and moving to Chicago, he formed the Van Depoele Electric Manufacturing Company.

As early as 1884 Mr. Van Depoele had experimented with electric traction and various exhibitions of the transmission of power by electricity were made in the Chicago shops.

During the next few years electric railways were developed at Toronto, Ont., South Bend, Ind., and Minneapolis, Minn., until in 1888 the Thomson-Houston Company bought out the Van Depoele system and patents. Since this event Mr. Van Depoele has been an expert at the Thomson-Houston shops, in Lynn, Mass., with electric mining and traction as his specialties.

Mr. Van Depoele, besides an eminent electrician, was a good friend, a fine gentleman and honored by all his acquaintance both business and personal.

S. T. POPE.

Mr. Pope was a native of Dorchester, Mass., and graduated at the Massachusetts Institute of Technology. He was connected for many years with the Chicago, Burlington & Quincy Railroad, occupying the position of superintendent Chicago Division during the great strike. He was made superintendent of the Chicago City Railway Company one year ago but was soon obliged to go West on account of failing health, and died in California.

The opening ceremonies next month of the first elevated railroad in Chicago, will be saddened by the death which occurred at San Francisco, on April 4th, of the president of the company, and one who has done more than all others to secure this form of rapid transit to our city.

Suffering from grip induced by overwork, and accompanied by his wife, he went to southern California two months ago in search of health, and was rapidly improving. Only a week before his death he wrote a long letter to this paper, describing his visit and expressing great pleasure at his ability to return sooner than he had expected. While in San Francisco on his return he took cold, suffered a relapse and died suddenly.

He was born in Norwich, Conn., in 1837, came to Chicago when quite young and was made assistant cashier in a bank. A little later, at the breaking out of the war, he volunteered and was placed on the staff of the governor of Ohio, as adjutant. His abilities soon won promotion and he was made Adjutant-General of the Army of the Cumberland, on the staff of General Rosecranz, being the youngest man to hold that position in the Federal forces. He fought in the siege of Vicksburg and the battle of Chattanooga and elsewhere.

After the war he accepted a position with Wells, Fargo & Co. After this his services as arbitrator were called into requisition in New York, where he was considered one of the most expert railroad accountants and was chosen by the Consolidated Elevated Railroad in 1880, at the time of the famous tri-partee agreement to settle the differences and values of the several roads interested, also the actual stock values of same, which arduous duty he performed to the satisfaction of all concerned. He was at all times perfectly willing to shoulder all responsibility with regard to his decisions.

His ability as an arbitrator was again brought in requisition in settling the affairs of the Hannibal and St. Joe bridge, and he planned the consolidation of the St. Louis gas companies. He, until two years ago, resided in New York and then moved to Chicago. Col. Goddard was a well-known member of the Century and of the Union League Clubs of New York for several years and the Union League of this city.

His administration of the affairs of the Chicago and South Side Rapid Transit Company, better known as the "Alley L," was such as to win the respect and admiration of everyone. There never was as stupendous an undertaking carried to completion in the city with as little friction as marked the progress of this road. He was a man of a most genial and kindly nature, and his death comes as a personal loss to all who knew him. It seems specially sad that he might not have been spared to enjoy the well earned honors of his work in this city. The road is a silent witness to his energy and superior executive ability.

He leaves a wife, a married daughter, Mrs. Reginald Woodward, of New York, and a son, Mr. H. A. Goddard, of this city.



THE LATE CHAS. J. VAN DEPOELE.

HIGH SPEED ON GRADES.



On a steam road a good engineer will avoid in every possible case the locating of his depots on a grade, even if he has to fill or cut for a considerable distance each way. Anyone who has rode on a locomotive will remember how the engineer lets her out long before reaching a heavy grade, and so makes a good part of the ascent by momentum. In some instances this is an absolute necessity, in order to climb the grade; in any event it saves time, coal, and places a less severe strain on the machine itself.

In the operation of street railways there unfortunately exists a necessity for making stops at such short intervals as often precludes the mounting of a grade with much of any speed. But in other cities the conditions are such as to permit of the hill run being made without interruption. Even where this is the case managers may well consider the placing in service of special cars bearing appropriate signs indicating the fact that the car does not stop between certain points and thus give an express service. If cars are operating on very close headway, of course this is impracticable, or if the grade leads through a section where many passengers take and leave the cars. But there are advantages in the application of the suggestion that will prove of benefit in very many cities. Each manager must be his own judge of its application to his road.

The Wightman Electric Manufacturing Company have always advocated high speeds, especially on grades. The following letter, therefore, addressed to that company by J. H. Vander Veer, the General Manager of the People's, at Scranton, Penn., is of interest, as bearing directly on the point in question. Mr. Vander Veer writes: "I have recently made an experiment in street railway practice in which I think you will be interested. I have fixed up a car, equipped with two of your 20-horse-power motors, in a very attractive manner, and for the last month or so I have been running this car as an extra, on one of my cars, and running only half way to Dunmore. This car has now become a very popular one with the residents whom it reaches, and I can account for it only by the fact that it makes very rapid time. The up trip, a distance of about a mile and a-quarter, averages a grade of 5 or 6 per cent., and I find that with this car we are enabled to go up the steepest points of the grade at a speed very nearly 20 miles an hour. I find, therefore, that the mileage that I can get out of this car is a long way in advance of the mileage made by the other cars; and as I do not have to pay any more for conductors and motormen for this car, it has proved very profitable.

As this car runs in between the regular cars, it has to make very rapid time, and frequently the trip has been made in less than five minutes, although there are several curves and switches on the line. I first thought that such a speed would be dangerous to maintain constantly, but

we have not had an accident so far, and I find that it pays much better to run the cars up hill fast than it does to make all the speed on the down grades.

The repairs on your motors, I would say, have been so slight as to be insignificant. This car has your automatic brake connection, and I fine that the motorman can run with a great deal more confidence than if the car did not have this arrangement, and he feels that in case of an accident to the brakes and a derailment of the trolley he would still have a means of stopping his car quickly.

It is a curious fact that when our schedule was so arranged that we could make three trips an hour, the receipts of this car were almost double what they are now when making only two trips. This seems to indicate that attractive cars operated at a high speed are requisite to the maximum success of any street railway, and the more there are the better."

KIDS AND CARS.

MANAGERS all over the country are seeking a solution of this question. If the cars are run slowly, the youngsters climb on and fall off to the extent of several thousand dollars per fall, and if the cars go on schedule time the rising generation runs across the track in front to the detriment of their personal appearance and the grief of their fond parents. If parents will not co-operate to stop this reckless, suicidal tendency, the "big policeman" should be given authority to healthily and heartily scare the youth of our land into other channels of amusement.

The question of the contributory negligence of the above mentioned fond parents needs considerable probing. For instance, the judgment for \$25,636 obtained by Frank W. Ehrman, an infant, in a suit against the Brooklyn City Railroad Company, has been affirmed by the Court of Appeals. At the time of the accident the boy was knocked down by a bobtail car on Throop avenue. Amputation of the leg above the knee was necessary.

Ordinarily street car drivers are abstractly supposed to possess no human attributes, and concretely are always found to be of, at least, not a blood-thirsty disposition.

No other line of business is so hampered by regulations and opinions, and during the warm weather when the infant is ubiquitous, the strain is three times as great upon the public mind, especially since every slyster lawyer will take up a case "on shares."

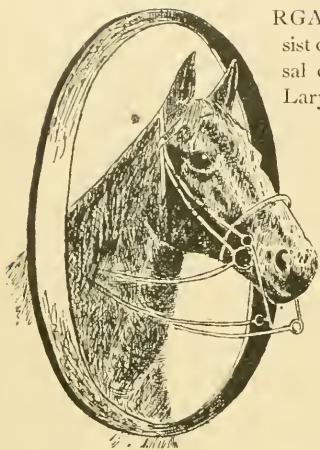
Will the public mind ever assume a just attitude toward the absolutely necessary demands of modern life?

A MAN who has been there truthfully says in the Buffalo Express: "If there is anything that tries a fellow's temper it is to give up his seat in a street car to a pretty girl and then have her squeeze along and make room for her male escort."

THERE isn't a day in the year but what the New York Elevated trains are held up. And yet there is no fuss made over it.—Recorder.

HYGIENE AND VETERINARY.

Edited by F. T. McMahon, Veterinary Surgeon, Chicago City Railway Co., World's Columbian Exposition, and Chicago Police and Fire Department.



ORGANS of respiration consist of Nasal openings, Nasal chambers. Pharynx, Larynx. Trachea. Bronchi, Bronchial tubes and the Lungs.

One of the most common diseases to which these organs are liable is

CATARRH.

It is a discharge of fluid from any mucous membrane, and in this case we refer to catarrh in the head, or common colds. As a

rule it attacks young animals that are not acclimated.

The most common causes of catarrh is exposure and sudden change in temperature, when it finds the constitution partially or generally incapable of resisting its effects, and after being kept in ill ventilated stables, going out in the cold air.

SYMPTOMS.

It first shows itself by a watery secretion from the nose and eyes, and a redness and dryness of the membrane lining the nostrils. The discharge soon becomes profuse, thicker, and of a yellowish white color. There is more or less fever, the appetite is impaired and a slight cough present.

THE TREATMENT

is very simple when taken in time. First remove the cause, by keeping the animal in a stable where the temperature is even, with the surroundings as well as the bed clean. Place extra blankets on the animal, give him plenty of cold water, and let the diet consist of warm bran mashes, linseed tea, etc. Steaming the nostrils gives relief also. Administer four drams of nitrate of potash in his drinking water twice daily. As a rule, the bowels are in good condition, and do not need any attention. Iron tonics may be given after the third or fourth day—about three or four drams three times per day. The disease usually yields readily to the course of treatment above mentioned, with general good care and nursing.

LARYNGITIS

is an inflammation of the mucous membrane of the larynx or throat, and is a disease to which you can not give too much attention, as it sometimes destroys an animal in a short time. The first thing noticed is his inability to swallow. You will see him masticate the food, then let it fall out of the mouth. He takes a mouthful of water and moves it about his mouth, and if he attempts to

swallow it, the water returns by way of the nostrils. The head is protruded and pressure on the throat evinces great pain and causes the animal to cough. There is a profuse discharge from the nostrils, a distressed expression of the face, and the animal wants water but fails to swallow it.

TREATMENT

must be prompt. Rather blister unnecessarily than run the risk of being too late. For this purpose mustard poultice may be applied at once, then remove in one hour and substitute a linseed poultice to retain heat and moisture at the affected parts. Inhalation of steam by means of hot bran or water, also give good results. The animal should have a supply of cold water to drink, and renew the poultices every hour, so as to keep the heat up to a high temperature. Chlorate of potash may be given in half-ounce doses every three or four hours, and one-half ounce of tincture of iron may be given night and morning. The fever accompanying the disease requires some attention, and tincture of aconite in fifteen-drop doses given every two or three hours, yields good results; also spirits nitrous ether and mendereri spirits given in ounce doses two or three times daily. In severe cases, where the animal shows signs of choking, the operation of tracheotomy must be performed at once, which will give instant relief. In three or four days the discharge becomes thicker and the dangerous symptoms pass off and a speedy recovery is the result.

BRONCHITIS.

Inflammation of the lining membrane of the bronchia tubes, when catarrhal affections extend down into the trachea it is called by the above name. It results from exposure to cold, ill-ventilated stables, foreign substances, such as medicine, getting into the bronchi, inhalation of irritant matter of any kind and similar causes.

SYMPTOMS.

There is a hoarse, loud cough, the respirations are increased, the abdominal muscles acting full, the animal looks dull, hangs his head, and if in a loose box stands with his head to the fresh air, which seems to give relief. The pulse fast but soft, the temperature is increased, the extremities are cold and by applying the ear to the sides of chest, will detect a rattling sound, quite different from the healthy murmur of respiration. There is also a copious discharge from nostrils.

So long as the discharge from the nostrils continues, the pulse distinct although rapid, and the febrile symptoms moderate, there is no great danger for the animal, and we may expect relief after five or six days. But if the pulse is faint and quick, increased difficulty in breathing, the absence of nasal discharge, the extremities cold, etc., the case is alarming, as complications of pneu-

monia may be expected, for it is seldom these organs do not participate to a certain extent.

TREATMENT.

We have here an extremely sensitive membrane to restore absolutely to its natural state; it is of such importance to the horse that no thickening or any other of the results of inflammation, save resolution, be tolerated. It also possesses such wide sympathies that in our treatment we must be especially careful not to excite them. There must be then a combination of soothing and active treatment. The medicine we prescribe must be with an object to allay irritability, and for this purpose sedatives are indicated, such as tincture of aconite, tincture of belladonna and tincture of gelseminum. We must not be prejudiced in favor of any particular drug. Spirits of nitre, solution acetate ammonia, nitrate of potash and any of the diuretics may be given. The pulse must be kept strong by the action of stimulants, and the animal kept warm by the use of blankets and bandaging the limbs. Allow plenty of pure air, as it is essential in all these diseases.

CONGESTION OF LUNGS.

Congestion is a state of the lungs which is usually followed by inflammation, but it is so distinct from pneumonia or inflammation of the lungs that we will consider them separately, for when a subject with congestion of the lungs is promptly treated, a return to health is secured in a few hours.

CAUSES.

As a rule it is the result of some severe exertion; or the animal being exposed when not in condition; standing in draughts when warm, and worked fast or hard when out of condition and not fit for the exercise.

SYMPTOMS.

Loss of appetite, dullness, the surface of the body and extremities cold, the respirations are hurried, the pulse weak and hardly perceptible; auscultation fails to detect the respiratory murmur; the head down; the animal dislikes to move or notice his surroundings; there is a tremor or chill over the body; the flanks heave rapidly and he does not care to move.

TREATMENT.

Heat the body as soon as possible by hand rubbing and the use of blankets; also friction to the limbs by hand rubbing and the use of warm bandages. Place in a comfortable box stall with plenty of pure air. The medical treatment must consist of such drugs as will tend to equalize the circulation, and for this stimulants are required, as brandy and ether. If the congestive stage does not pass off in two or three hours, we must resort to bleeding to relieve the pressure on the blood vessels of the lungs and heart, which are overtaxed. Take from six to eight quarts of blood, depending on the size and condition of the animal. Blankets wrung out of hot water may be applied to the chest and repeated as often as necessary. The animal must have gentle exercise for several days after the active symptoms have passed off and care taken that he will not suffer a relapse.

LANCASTER LINES.

LANCASTER, O., for a town of its size, shows befitting enterprise in its street railway.

The town itself has 8,000 population, natural gas, reached at 1,000 feet, and a situation at the head of the Hocking Valley iron and coal region. There are 3½ miles of street railway track in this enterprising town, at present under the horse regime, but the far-seeing manager, A. Bauman, says that electricity will be far more profitable and will undoubtedly be adopted soon.

THE CAYADUTTA ELECTRIC RAILWAY.

YORK State has a full record for interurban lines, and the latest stroke in this direction is the Cayadutta Electric Railroad Company, recently organized to build through Johnstown to Gloversville from Fonda.

The company is organized with a capital of \$250,000, and a strong array of the best business men fill their principal towns, as officers and directors.

The road will run passenger, freight and smoking cars, and will include on its route the cemeteries, fair grounds, and a pleasure park, to be constructed by the company.

The officers are: Everett Smith, Schenectady, president; J. L. Hees, Fonda, treasurer, and Thos. C. Frenyan, Buffalo, secretary.

THE BROAD RIPPLE RAILWAY.

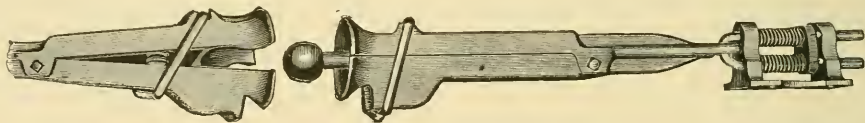
THE much-mooted, much-suffering, Broad Ripple Indianapolis line, at Indianapolis, Ind., is now assured. The Broad Ripple Rapid Transit Company has accepted the franchise, and filed its \$10,000 bond as evidence of good faith. The contract between President Belknap and contractor W. P. Stephenson, of Philadelphia, calls for an overhead electric line from the city limits to Broad Ripple, over Central avenue, with a spur road to the State Fair Grounds on Thirtieth street. The contract also stipulates that Mr. Stephenson is to build a power house and equip it with dynamos sufficient to drive twelve motor cars and twelve trailers, the contractor also to furnish the cars. For all this the contractor is to receive \$200,000. Mr. Stephenson is a street railroad builder of experience and responsibility.

The Broad Ripple road will probably operate under the "suburban" law, which provides that a company owning a suburban line of street railway may run its cars down town over the tracks of any company occupying streets, and that it can not be prevented from so doing, the law providing that if an injunction be begun, the outside company may continue to run its cars, pending final settlement; and further, that if the two companies interested can not agree upon a reasonable remuneration to be paid by the suburban to the city company for the use of the tracks, the matter shall be settled by the Circuit Court.

At least, the road means more transit and for this the people pine.

A PERFECT CAR COUPLER.

ONE change begets another. With the advent of cable and electric power, the operation of single cars was in most cases displaced, by running them instead, in trains of two, three and even four cars. This having its advantages, was found also to present the disadvantage of giving a surge or jerk as the train was put in motion, owing to the fact that the links were of unequal length, or not long enough, and which permitted one car to overtake its leader, and the result was a heavy pounding of the bumpers, and a most unpleasant sensation to all the passengers. To provide against such difficulties, Alfred G. Hathaway, of Cleveland, is manufacturing what is known as the Roche Car Coupler, the illustration of which, given herewith, will readily explain the same without any detailed information. The link is an iron dumb-bell weighing ten pounds, which, when used to connect two cars, gives a positive ball and socket joint. It will be noticed that the sockets are split horizontally, and that the two jaws maintain an open position by means of a tension spring within, except when closed and held shut by the binding link, which is fastened in place



ROCHE CAR COUPLER.

and cannot be lost. This draw-head permits of ample lateral motion in rounding curves, also of a vertical motion, so that if cars rock there will be no jar from the couplings; but positively prevents any headlong or surging motion. The two draw-heads and coupler complete weigh only 100 pounds and give complete satisfaction on the number of roads on which Mr. Hathaway has already introduced them. The Cleveland City Cable Railway Company are so well pleased with the few they have put in experimentally, that they are now equipping their entire line with these couplers. The dumb-bell which takes the place of the link is strong, will practically never wear out, and the coupling can be made much quicker than the ordinary link and pin coupling, which has heretofore been used on street railways. Every manager who is using trailers, or has any expectation of doing so, should not fail to investigate this matter thoroughly, and the result will probably be the adoption of the ball and socket coupler.

R. M. GIBSON, a negro preacher, sues the Atlanta Consolidated Street Railway for \$3,000 damages. He claims that he was on his way to Reynoldstown to deliver a sermon, and that he was forcibly ejected from one of the cars of the company, and arrived too late. If he can prove that amount of damages we would like to pass the hat in his church for a few months.

THE NEW PHILADELPHIA.

AT a recent dinner of the Clover Club, P. A. B. Widener, president of the Traction Company, spoke about the "New Philadelphia" to be the creation of rapid transit. He said:

"I wish to speak about a New Philadelphia from the standpoint of a business man, anxious for the prosperity of his people, and as a citizen, careful of his city's interests. Our people want a New Philadelphia, but whenever anything is proposed by private individuals or by public enterprise, having this object in view, our people rise in indignant protest. Progress cannot be made without sacrifice. The price to be paid for the city's advancement is the destruction of residences in that portion which business may enter and in which it may prosper.

"We need rapid transit. We need to bring into direct and speedy communication our whole city and to join into one business centre the vast outlying territory about us. Until we do that, people will live and work in one place and their stores and factories will be within walking distance of their residence. This crowds out all

other enterprise and blocks the commercial progress of our city, blessed to a wonderful extent with a hundred elements of natural advantage, only waiting to be called into action. And for all this there is only one remedy, and that remedy I can best point out by prophecy. In five years—and I make the statement without fear of contradiction—there will be no residence between Chestnut and Pine streets in the business portion of the city.

"This must come to pass and all opposition to it must and will be swept away. The opposition is in itself peculiar and difficult to combat. It comes from old foggy people, who own their own houses just where we should have factories and whose back yards cover territory which would treble in value if stores were built on it.

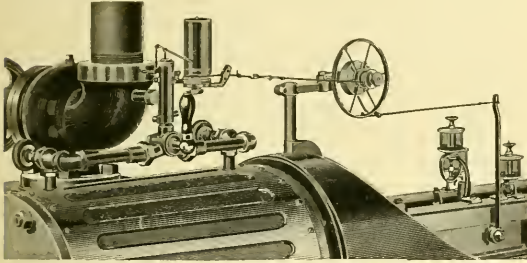
"Rapid transit is a remedy for this commercial stagnation. It will open up all the outlying districts, and people may sell their houses and move to others up town. Their old home site will change to a plate glass front store or a bustling factory, and the vacant improved land in the western part of the city will be built up. No man can disbelieve this if he believes truth, and no man can honestly oppose rapid transit if he knows the truth."

THE Consolidated Electric Railway of Seattle, has adopted the plan of changing its motormen and conductors, frequently, from one line to another so they may become familiar with all the streets in the city.

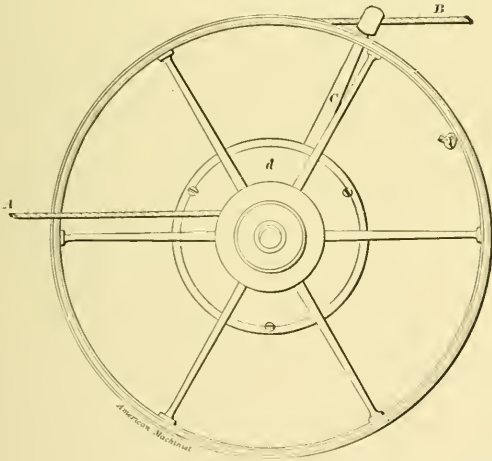
REDUCING WHEEL FOR ENGINE INDICATORS.

ENGINEER, how often do you take a card? We know of instances where this important matter is utterly neglected. The careful engineer will insist on knowing just what work his engine is doing, and the progressive manager will not be satisfied without this data frequently at hand.

To simplify the taking of cards, the Webster & Perks Tool Company, of Springfield, Ohio, have designed a



new reducing wheel, to reduce the motion of an engine cross-head to the required length on diagram drum of



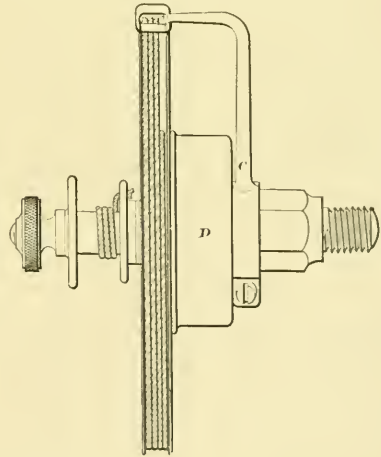
WEBSTER & PERK'S REDUCING WHEEL.

can readily be placed at a suitable distance to allow being attached and detached while running at full speed. All motions being on a straight line, the results obtained are most nearly perfect. The wheel and indicator can be placed in position and card taken in ten minutes.

A VETERAN DRIVER.

THE patient figure fiend has compiled some interesting statistics in the case of William H. Bellows, the veteran car driver, who has been in the service between Brookline and Boston for thirty-one years, and has averaged not more than two weeks off duty in each year. For twenty-eight years he made seven round trips daily of 7 1/2 miles each, the Tremont House and the local horse car station being the objective points, but for the past three years (except Sundays) his round trips have numbered six, of 9 miles each, the car going to Causeway street. According to these figures it will be seen that Mr. Bellows has traveled 570,175 miles, or more than twenty-two times the distance around the earth.

THE Bangor Commercial is constrained to remark that the street car furnishes the only platform upon which men of every shade of political belief will stand.



THE ST. LOUIS FIRE.

THE Missouri Railway Street Car Barn, on Crompton avenue, near the Manchester road, St. Louis, has had a serious blaze during the past month. The repair department was the second floor of the building. The fire started on this floor, and before the fire department responded the whole building was in flames. By hard and active work the fire was kept within the walls in which it originated. The cause of the fire is said to be spontaneous combustion. The twelve cars that were destroyed were valued at \$25,000. The value on tools, repairing material, etc., lost, is said to be \$5,000 and the building was damaged to the extent of about \$5,000 more, making a total loss of \$35,000.

indicator. It can be applied to any style or speed of engine.

The rim of the wheel being made of aluminum, weighing about 1/4 ounce, the spokes of Stub's steel and turned taper, the spring and case not revolving, the momentum is reduced to the minimum, so much so that in indicating, an engine of 12-inch stroke running at 300 revolutions, the spring can be entirely removed from the reducing wheel, using only the spring in indicator drum to reverse the wheel.

It will readily be seen since there are no joints to work loose and but the wheel proper revolving, the momentum is practicably reduced to nothing.

The wheel is entirely separate from the indicator and

A SINGLE REDUCTION MOTOR.

A Paper Read before the Chicago Electric Club by George K. Wheeler.

ALL practical electric street railway men appreciate the necessity of having a motor that shall have the greatest possible degree of self-protection from outside injury. This necessity was evident by the number and severity of the storms of the last few years, and it has been the aim of electric manufacturers to design a motor that would meet the requirements of ordinary street railway service, and so constructed as to be perfectly protected within itself, and to reduce the number of wearing parts, reduce the weight of the motor and construct a frame of such strength that breakage would be impossible, and to provide a more perfect magnetic circuit than that found in the double reduction motors. The important problems to be solved in making a successful single reduction motor, are as follows:

First:—Electrical and mechanical simplicity.

Second:—Slow speed and powerful torque.

Third:—Protection of field and armature from dust and water.

Fourth:—Accessibility of all parts of the motor so as to render it easy for repairs and adjustment.

Fifth:—High commercial efficiency at all speeds and loads.

Sixth:—Reduction of weight per horse-power developed with a view of lightening the load that must be carried at all times.

Seventh:—Small expense of maintenance.

There have been various types of single reduction motors placed upon the market during the past 15 months, and I must say that some of them have not fulfilled the above requirements. It is my opinion that much better results are obtained by a two-pole single reduction motor than by the four-pole, for the reason that it is much lighter, simpler in construction, has a smaller commutator, half the number of bobbins on armature, also half the number of brushes, and is much more economical to maintain. One of the leading electric manufactures has produced a motor that I think meets all the requirements for ordinary street railway service; this motor is 15-horse-power, weighs about 2000 pounds complete, including gear, pinion and gear case. The motor frame is constructed of two castings of steel, clamped together by bolts at the front and back, the axle brasses being held between the two parts. The armature bearings are cast in one piece with the lower half of the frame, and are provided with caps so that the linings may be inspected or renewed without disturbing the other parts of the machine. The frame is hinged together at the axle end so that the upper half may be raised if desired. The lower half of frame is so constructed that it is perfectly water proof up to the center line of armature and axle bearing. All the metal in the frame forms a part of the magnetic circuit, and dead weight is thereby avoided. The armature is a combination of the Gramme and Paccinotti type and so constructed that it is entirely iron clad. The iron

cone is a ring with projecting teeth solidly fastened to the shaft. The coils are wound between the teeth and firmly held in place by wooden wedges. It is not necessary with this form of armature to use the mica, insulating paper, canvas, and German silver bands. The winding is continuous and all joints are made by electric weldings, no solder being used in any part of the armature. The winding is such that there is no crossing of wires, and as it is below the surface of the iron core, it is protected from any mechanical injury. This form of armature permits of much less clearance between the armature and pole pieces and the smaller air gap materially decreases the magnetic resistance of the circuit. This certainly means less weight and less heating of the field spool, and that a smaller motor will perform more work on account of greater efficiency. The field coil (there being but one), is placed at the top of the motor and in this position exerts upon the armature a solenoidal pull, so proportioned that under normal load the armature is lifted from its bearings. I have had an opportunity of inspecting a set of armature bearings that had been in use upon a motor of this type for several months and the tool marks in the bearings had not been scored with the exception of a small spot on the bottom and top of bearing, thus demonstrating that the wear on brasses is reduced to a minimum. The armature pinion and axle gear are made of steel, of ample width of face and are run in an oil tight case in order to insure free and continuous lubrication and to exclude dust and grit. As to the exact life of gear and pinion thus enclosed, I am unable to state accurately, but I know of single reduction motors that have been in operation since May 1st, '91, so enclosed and running in a light weight of grease, which up to the present time do not show a wear of more than 5-1000 of an inch. It would certainly seem by this that the expense of maintaining the gear and pinion for two motors per car, could not exceed \$10 per year.

The tendency of modern improvement in railway motors is to diminish the gearing and I do not think that anything is to be gained over the double reduction motor by placing two sets of gears and pinions one on each side of a single reduction motor, as it not only increases the friction losses, but adds an additional weight to the motor, and if the motor frame and armature shaft are properly constructed there is no liability of straining or breaking either by reason of placing the gear and pinion on one side only. It is stated by a number of competent electrical engineers that the placing of one motor on a truck is ample for all ordinary street car service. By experience I have found that with a truck having but one motor attached to one axle, that the wheels on the axle to which the motor is attached do not brake as quickly as the free wheel, and flats are thus formed on the free wheels on this account; also that it is a difficult matter to ascend grades over 3 per cent., and that it is next to an impossi-

bility to operate a car so equipped during the winter months. It is also advocated that the proper method is to gear a single motor to both axles; this in my opinion is open to serious objections. In gearing a single motor to two axles of a truck, it is almost impossible to keep wheels perfectly true; that is, one set of wheels will perhaps wear more than the other on account of the variation in the quality of the iron, and as soon as one set of wheels is in the slightest way different from the others, a bad action takes place between the driving gear and wheel for the reason that one wheel is trying to run faster than the others, which of course naturally will cause one set of wheels to be dragged along until that distance has been overcome, and when the wheels start anew, the gears are in a short time thrown out of mesh with each other. It will be understood that in order to make a successful gear driven by a single motor, it is necessary that both sets of wheels travel exactly with the same speed over the rails, and that the truck on which the motor is mounted must be perfectly rigid, so that the gears will at all times mesh with each other. In practice this has been found almost impossible, especially where heavy work is required and a large number of curves are to be found, and also where the track is in bad condition; excepting, possibly, where the wheels on the truck are perfectly new and the track in good shape, and the curves very liberal, but it will be found if one set of gearing is disconnected, that it will require from 15 to 20 per cent. less power to operate. It is for these reasons that I believe the best results are obtainable by connecting a single motor to each axle of a truck. It may be argued that there is twice the liability for trouble where two motors are used, but experience proves that this is not exactly so, for by this method you obtain the proper traction and benefit of all wheels, and in case of extra load you have ample power to operate the car under all conditions of service, and in case of injury to any part of one motor, it can be disconnected and the car operated until an opportunity offers to make the necessary repairs.

A single reduction motor should be so constructed as to give the greatest possible distance between the bottom of motor and top of rail. With the best form of motors which have up to the present time been constructed, the greatest distance obtainable between a 15-horse-power motor and top of rail is $4\frac{1}{2}$ inches when placed on a wheel 30 inches in diameter. I strongly recommend the use of larger wheels, either 33 or 36 inches in diameter. With a motor mounted on 36-inch wheels, this will give a clearance of $7\frac{1}{2}$ inches, which is more than ample to clear ordinary track obstructions, and if the motor is thoroughly protected in its frame, it will not be necessary to use motor pans, which have been a necessary evil in connection with double reduction motors. It may be stated that a car equipped with 36-inch wheels requires an excessive amount of current to operate, but this is not a fact. On a test which I made more than a year ago on a car equipped with 36-inch wheels and a car equipped with 30-inch wheels, the same motor equipment and car

of same length and weight, operated over same length of road on same day and by same men total length of line being 16 miles, it was found that the car equipped with 36-inch wheels required about $\frac{3}{4}$ of horse-power more on an average than the car equipped with 30-inch wheels, although the 36-inch wheel car required more current in starting and climbing grades, but it would run longer on the level by momentum, and thus average up the current consumption.

With the present form of single reduction motors I think that the 33-inch wheel is of ample size.

On tests which have been made with the various types of single reduction motors they have been found to be 8 to 10 per cent. more efficient than the double reduction, and are capable of attaining a much higher speed under various conditions of service. On a recent test which I made on an over country road, being some $11\frac{1}{4}$ miles in length, the car being 34 feet in length and with 25 passengers, total weight of car being 23,700 pounds, car equipped with double trucks having two 25-horse-power single reduction motors to each car, the maximum speed attained was 32 miles per hour, this car climbing grades of 4 and 5 per cent. at the rate of 17 miles per hour; and on a car 16 feet in length, equipped with one 15-horse-power single reduction motor, over the same line of road, the maximum speed attained was 25 miles per hour on a level, and the car in climbing grades of 4 and 5 per cent. would not attain a speed of over five miles per hour.

By the use of single reduction motors the cost of maintenance and operation will be greatly reduced on any road so equipped for the reason that the number of parts has been greatly reduced from that of the double reduction, and its efficiency greatly increased. I am of the opinion that the single reduction has come to stay and will continue to force its way to the front and eventually supercede the double reduction motors with which our earliest roads were equipped.

PRESIDENT WHITNEY'S DOUBLE.

THE handsome head-official of the great West End road is more fortunate than most men, he has a double. The man in question is a motor-man on the road. Martin O'Brien is the name of Whitney's double, and in the nine long years he has been railroading he never has had the pleasure of gazing on his prototype. As he stands there on the platform of his car one is forcibly struck by the resemblance between the two men, and the query naturally arises as to how it escaped notice so long. There is the same strong athletic frame fully in the motorman's gray uniform as in evening dress, and the same upright carriage of the well-shaped head, the same brown locks surmounted by a West End cap instead of a derby. It is in the face of course that the greatest resemblance can be noticed. There are the keen eyes. Then there is the drooping brown moustache and the slightly sarcastic yet humorous mouth. O'Brien turns out at 5:00 and splitting wood and making chips to start a fire and then at 6:00 o'clock he has started on his long sweep from Jamaica Plain.

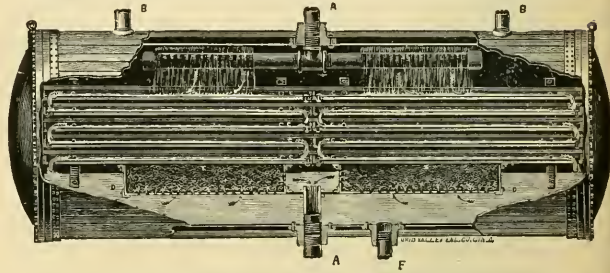
STILLWELL'S PATENT LIVE STEAM FEED WATER PURIFIER.

TO meet the demand for a practical and economical water purifier, where it is impracticable for various reasons to use an exhaust steam heater, and to meet emergencies, the horizontal live steam purifier, as shown in the accompanying illustration, was expressly designed. In mode of operation it is similar to the upright live steam purifier, but differs in mechanical construction.

As may be seen, it is a horizontal cylinder, made of best steel boiler plate, and may be placed in any convenient locality above the boilers to be supplied and with which it is directly connected. The cold water, or water from exhaust heater, is introduced at A, through a pipe connected by a tee with a horizontal pipe inside the shell. Both ends of this horizontal pipe are perforated with small openings, through which the water escapes in the form of a shower. Live steam is admitted at BB, filling the purifier with steam at boiler pressure. The water falls from the induction pipe through a body of steam into the top of two series of shallow iron pans, each pan

through the filtering chambers, EE, which are filled with coke or other suitable material, into the pure water chamber, and thence into the boiler through pipe A.

It is claimed that the feed water is then absolutely pure and at substantially the same temperature as the water in



STILLWELL & BIERCE HORIZONTAL PURIFIER.

the boiler, thus effectually preventing the deposit of sediment in the boiler, and the strain upon it incident to the introduction of water at a low temperature.

Each end of the purifier is provided with a heavy head fastened in place with cap screws. The depositing pans



LIME DEPOSITS REMOVED FROM WATER PURIFIER AT DAYTON (OHIO) CITY WATER WORKS.

being one-half the length of the purifier shell. These pans are provided with openings in the bottom at alternate ends, and the water is compelled to traverse their entire area in a thin sheet. The heat and pressure in the purifier being the same as in the boilers, the water, in its passage over these pans, is subjected to the same chemical change as in ordinary boilers, and is relieved of all scale-producing impurities, which are precipitated upon the surface of these pans, from which they can be quickly and easily removed. After making the circuit of the pans the water drops into the large settling chamber, DD, in the bottom of the purifier, where the non-crystallized impurities are deposited in the form of slush or mud, and are blown off at frequent intervals through the blow-off, F. To complete the work of purification the water passes

slide on ways which are fastened to the shell and can easily be removed through either end of the shell for cleaning, and any impurities which may attach to the bottom of the purifier shell can readily be raked out, as removing the head exposes the entire inner structure.

A strong reminder of what impurities are contained in ordinary feed water for boilers, is shown by the engraving from a photograph of the lime deposits retained and removed at one cleaning out of the Stilwell live steam purifier in use at the City Water Works, Dayton, O.

This Purifier is manufactured by Stillwell & Bierce Manufacturing Company, Dayton, Ohio.

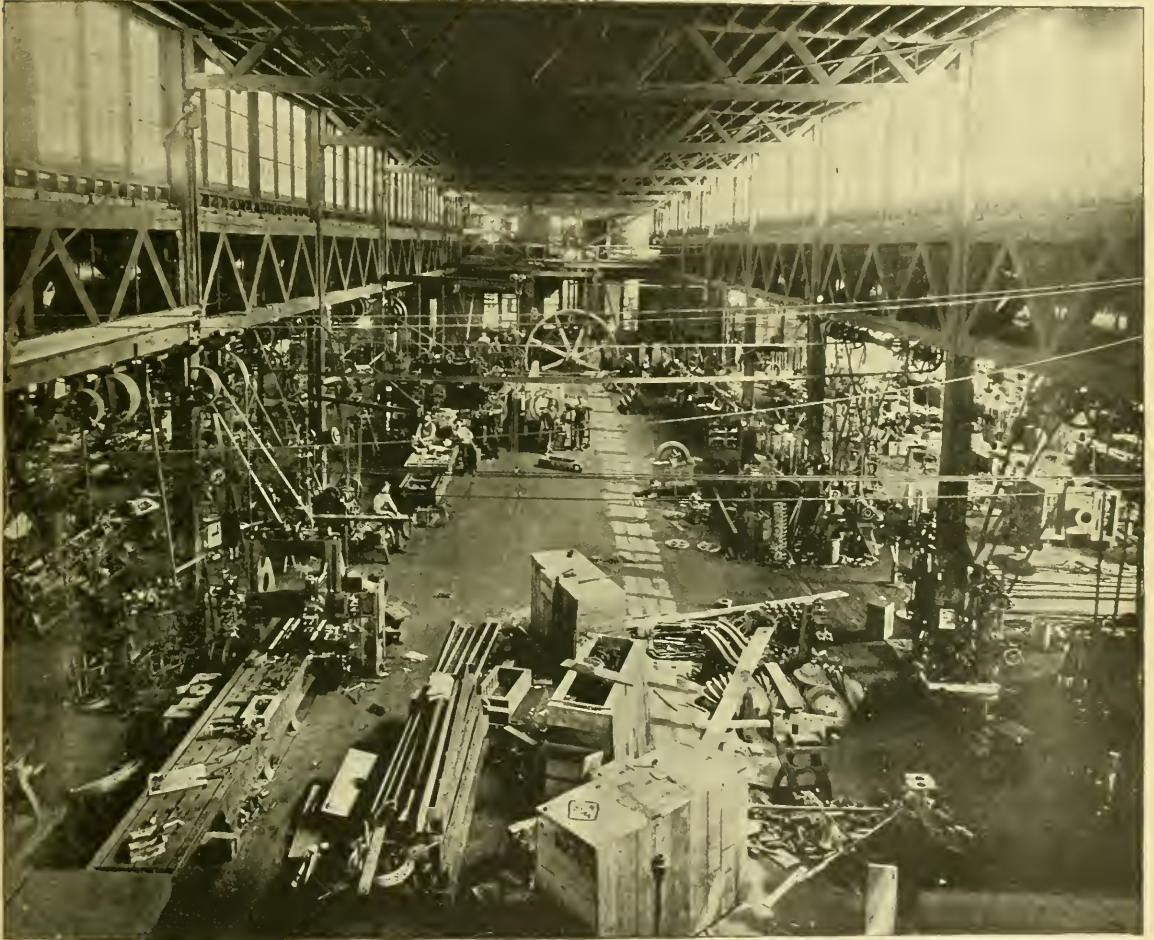
THE majesty of the law at Indianapolis has been placated by fining the strikers \$1 each.

THE BATES-CORLISS ENGINE.

NEXT to a locomotive, almost bursting with energy as it impatiently blows off steam before given its freedom, no other machine seems more endowed with life and brain than a working stationary engine. With action suggestive almost of reason, it bends its powers to the utmost under a sudden heavy load, and a moment later, relieved of the burden, it lightly does its work, as if some mighty giant, rejoicing

this month views of the Bates-Corliss engine, a sectional view of the cylinder and valve motion and a view of the shops of the Bates Machine Company, of Joliet, whose success forms a leading chapter in the history of engine building in the West.

The makers claim that without causing complication they have embodied certain desirable features not to be found in any other Corliss engine. Among them, and the most prominent and essential, is the valve gear; a full description of valve and valve motion is given below



INTERIOR VIEW BATES' MACHINE COMPANY WORKS, JOLIET, ILL.

in his strength, performed some trifling task as though he knew it not.

Street railway managers who once looked with merely pleasurable interest on an engine, must now, by the general adoption of mechanical power, give more than a passing glance, and are under the necessity of personally understanding the relative merits of the various makes. It is proper then to give each month necessary space to briefly describe the salient feature of such engines as are best adapted for street railway work. We present

Beside the ordinary rotary valve they make a special admission valve which is of the flat slide pattern. The power which moves them is applied parallel to, and in line with the seats, so that they cannot rock or twist themselves, obviating the tendency to wear unevenly. The life of these valves naturally is much greater than that of the rotary valve.

Tripping is done at the wrist plate, by means of which the mechanism of the valve gear is much simplified, the spring and small parts, in fact all mechanism at valve

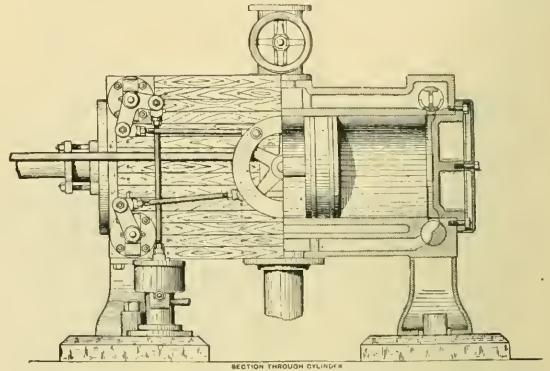
stems being eliminated, the only loose pieces being the hooks on wrist plate. No springs of any description are used in connection with the valve gear or governor, neither does the governor require any water or oil pot to steady it. The governor is of the fly-ball pattern and is provided with all necessary connections to automatically control the releasing gear; it is also provided with automatic stop motion.

The manufacturers claim to have the most sensitive governor and the closest regulating devices that have ever been applied to a Corliss engine. On special large engines is a separate eccentric which enables the cut-off to take place at any position of the stroke. This is especially essential for street railway engines, where at times, they are called upon to develop 25 per cent. more power than is usually required.

Particular attention is called to the girder frame, which is of the box form and of graceful outlines, being far more rigid than the usual web form and contains from 5 to 10 per cent. more metal than any other Corliss engine girder manufactured

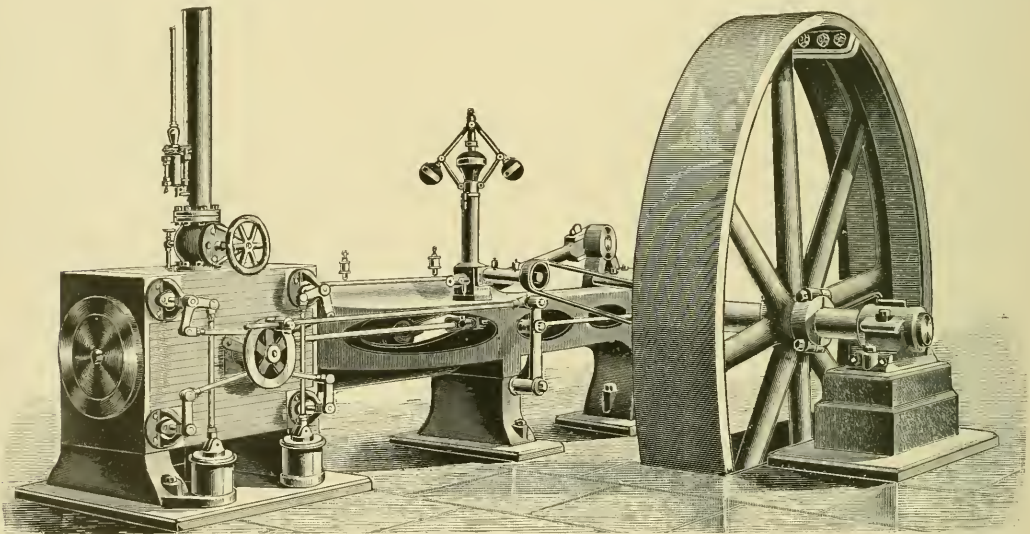
wearing surfaces and filled with best babbitt and scraped to fit guides.

The main shaft is of hammered wrought iron one-half



the diameter of cylinder except in heavy duty engines where this proportion is increased.

The crank pin is of forged steel one-half the diameter



BATES' CORLISS ENGINE.

The main pillow block, frame, and guides are all cast in one piece, thus avoiding the weakness due to the usual bolting together of these parts. The girder is also provided with a center leg, which supports the guides and extends to the outmost line of girder, thus giving the bed great rigidity and stiffness. The main pillow block is heavily proportioned and constructed with large wearing surfaces. It is also provided with quarter boxes which are adjusted with wedges and which can be removed without taking out the shaft. The out-board pillow block is provided with large cast-iron sole-plate and is adjustable.

The cross-head is of solid box form fitted with forged steel pin nearly one-half the diameter of shaft. The shoes are adjustable with wedges and are provided with large

of the shaft. All bearings and journals are of ample proportion to insure the greatest strength and longest wear with the least possible friction.

The works of the Bates Machine Company have been crowded with orders since the first engine was erected, several years ago, and during that time they have doubled the capacity of their plant and are now compelled to run day and night. At the present time they are turning out an average of one engine a week. We give on the preceding page a view of their machine shop, 200 feet long and 108 feet wide, which is equipped with special tools for engine work, principally of the Niles Tool Company's make.

In addition to the manufacture of engines, they have

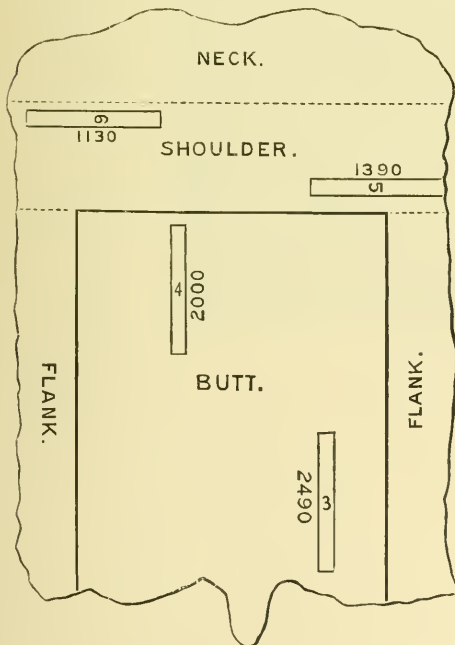
a large trade on heavy band and fly wheels, having facilities for casting and turning wheels 30 feet in diameter and any width of face.

Special attention is given to the equipping of electric light and electric railway stations with complete motive power plants. Owing to the perfect governing qualities of the Bates-Corliss they claim to be in position to give better results than can be had from any other engine of same type.

BREAKING STRAIN OF BELT HIDES.

At the meeting of the Polytechnic section of the American Institute, of New York, on March 17th, Mr. Charles A. Schieren read a paper on the "Art of Tanning Leather and Making Belting." He showed in the lecture the various processes through which a hide passes in the tannery, which were all beautifully illustrated by lantern slides. The various departments through which the hide passes in the tannery, the machinery used for manipulating the leather, as well as the grinding and leaching of the bark, were illustrated and thrown on a large canvass by lantern slides. This made the lecture doubly interesting, because the audience could get a clearer idea of the manipulation of leather in the tannery.

In the making of belting Mr. Schieren showed a hide



of leather from which were taken four pieces of equal length and width. They had been submitted to a test by a powerful testing machine of the Fairbanks Scale Co. of New York. These pieces were all eighteen inches long, and two inches wide, and were numbered. Number three, being cut from the lower part of the center, broke at 2,490 pounds strain, which would give the piece a

transverse strength of 14,910 pounds per square foot. Number four, cut from the upper part of the center of the hide, broke at 2,000 pounds. Number five, cut from the lower part of a shoulder piece, broke at 1,390 pounds. Number six, cut from the upper part of a shoulder, broke at 1,130 pounds.

The lecturer explained that very many belts were sold and offered in the market which were made from one piece of center on one side and a piece of shoulder on the other side. He clearly proved that such belts were defective, because of the shoulder being so much more liable to stretch, and not being able to stand the strain of a center piece, by at least forty-three per cent., it would be a serious mistake to put the two pieces together for transmission of power, on account of the unequal tension. A belt would be superior if two shoulders were used, or two center pieces, separately. He claimed that a belt made from two centers could withstand a transverse strain of nearly 26,940 pounds to the square foot, whereas a belt made from shoulders would hardly stand 15,120 pounds strain, and such belts would not be reliable, especially on dynamos, or swift running machinery, in fact for almost any drive where a belt is subjected to a severe strain.

THAWING FROZEN GROUND.

THE frost is pretty well out of the ground now, but the following method, recently tried with success, by the superintendent of the gas works at Waltham, Mass., may prove of service next winter: He spread stone lime to a depth of several inches over the spot where it was desired to excavate. Upon the lime, water was poured, and the whole covered with straw, upon which was stretched a tarpaulin or canvas. In the course of twelve hours frost was removed to a depth of two feet. Petroleum has been used with good effect in Chicago, though in case of great emergency there is little choice but to chop out the stony clods with axe and pick.

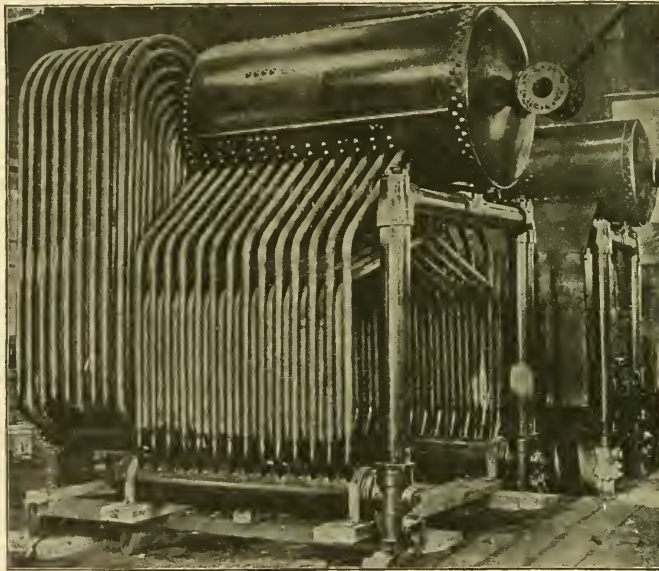
OHIO LEGISLATURE.

THE Ohio legislature has in hand a bill that is promulgated by some reformer of the sulky-plow style. The bill provides that whenever any street railways are operated by electricity, cable, compressed air, or any motive power other than horses or mules, the board of legislature or council of such municipality shall have the power by ordinance to require the owners or operators of any such street railways to place watchmen at any street crossings, intersections or corners which such board of legislature or council may deem dangerous; and to provide for the proper enforcements of such ordinances by penalties in the way of fine or imprisonment, or both, which may be imposed upon the owner or operator of such street railways or upon any employe of such railways. If they pass the bill they should do so with an amendment appointing a guardian for the framer of the measure.

THE COWLES' WATER-TUBE BOILER.

THE exigencies of railway work, both for cable and electric traction, are exciting the mechanical world to its highest degree of efficiency. In no line of power use, perhaps, is there so frequent demand for the best, and in no other line is there greater need of high power. The demands thus made have been met with the accustomed alacrity of our American inventive and constructive genius. In the matter of boilers we wish to call the attention of our readers to the successful attempt at meeting the trying requirements of street traction work, by the Cowles Water-Tube Boiler, designed by the Cowles Engineering Company, located at the foot of Forty-Third street, Brooklyn.

In this construction, as will be readily seen in the engraving, special attention is paid to accessibility for cleaning, inspection and repair. Special design is also noticeable for the perfect circulation of gases around the tubes, as well as that of the steam and water. The tubes are of best manufacture, bent cold at the strongest curve and expanded on. The shells are of mild steel and the heads and man-hole plates are of hydraulic pressed steel. The heavy pipe and the malleable fittings are not exposed to fire or heated gases. The manufacturers claim that it is impossible to injure the boiler by unequal expansion or overheating, and they invite correspondence and investigation.



COWLES' WATER TUBE BOILER.

CHATTANOOGA CHATTER.

THE last right-of-way has been signed and a road between Chattanooga and Chicamauga is assured. The road will be twelve miles long and is to traverse the historical sections of the intervening country. It will cost \$150,000 and connect at Chicamauga with the Chicamauga & Durham. It will open up a new and pleasant field for suburban residents and penetrate a scenic and historic vicinity. The line will be called the Chattanooga and National Park Railway.

The enterprise is due to the brain and perseverance of Samuel O. Russell.

The contract is let to Salter & Seymour, of 45 Broadway, New York, and work is to begin in 30 days.

CHANGES AT FT. SCOTT.

THE Ft. Scott (Kan.) Rapid Transit Railway Company has been newly reorganized, with a complete change in ownership of the property.

Messrs. Brady and Huges retire from the management and the following officers have been elected:—President, H. H. Andersen; secretary, F. H. Griggs; vice-president, A. W. Walburn; treasurer, J. Lorenzen; ass't secretary, Charles Nelson; C. H. Osburn, ass't treasurer.

These gentlemen, together with T. W. McLellan and P. F. Koch, of Davenport, Iowa, and H. E. Harris, of Ft. Scott, constitute the Board of Directors.

As soon as the weather permits work will be commenced on improvements and the road will be developed and run in first-class style by its liberal and energetic management.

THE city engineer of Toronto, after investigating electric systems with a view to recommending to the city authorities, closes his report with the remark: "The storage battery might be used on small level systems where only a few cars are run, at very considerable time intervals, and where no high speed is required; but it is unsuited to the large traffic of such a city as Toronto."

THE Olympia Tribune says:

"Rapid transit in street cars from one end of the city to the other, built up Seattle and Tacoma. It will build up Olympia and Tumwater, and enhance the value of property all along the line. Bob-tail cars and coal oil motors do not make rapid transit in this stage of electricity."

LOUISVILLE LIGHTNING.

A CONSULTATION between local and northern capitalists, conducted by Jas. B. Speed and St. John Boyle, of the Louisville Railway Company, has resulted in the decision to give six additional lines rapid transit.

The \$500,000 to be raised by converting common into preferred stock, will be sufficient to make these much needed improvements.

Mr. Boyle says that at no distant time all Louisville lines will be electrically moved.

TRAMWAY REGULATIONS IN EUROPE.

BY means of the Department of State we are indebted to United States foreign representatives for special and advance information, which will shortly be published, about the management of city transportation in Europe. In Prague, Austria, the street car system is owned by one man, and it has been in operation since 1875. Rates of fare are regulated by the distance traversed, 2, 4, and 6 cents being charged between regular stations. Taxes are paid on each metre of track, and at the end of 51 years the entire plant becomes the property of the city, if the city cares to purchase it at a fair valuation. A rule exists, but it is inoperative, that no more passengers shall be carried than the car will seat. Conductors and drivers receive only 36 cents a day of 12 hours each. Dividends not ascertainable, but supposed to be good.

In Antwerp, Belgium, there are a dozen horse car lines, they all pay a rent tax to the city, and have been established during the last 22 years. There is one line there, that combines cars with omnibuses; they have a fifth wheel by means of which the cars are removed from the track and put on again, but they are narrow gauge. Fare is from 2 to 3 cents.

In Brussels, Belgium, steam and animal traction are in operation. Electric storage traction is no longer employed having recently been replaced by animal traction. Rates of fare are according to distance, and range from 2 to 5 cents. In parts of the city the cars are divided in half, one part being first-class, and the other, second, with corresponding reduction of fare in case of the second. Strong efforts are being made to make the fares uniform on all lines. Franchises are now granted to bidders based on the time of concession, on the tariff, or on the rent to be paid. No share of the profits goes to the authorities. An annual rent, as well as ordinary license tax, land, property, and animal tax, is collected by the commune. Fares have recently been reduced, profits are considered moderate.

In Copenhagen, Denmark, omnibuses partly running on rails, horse and steam cars are in use, besides the usual quantity of cabs and omnibuses which more or less prevail in all European cities; $2\frac{3}{4}$ cents is the usual fare for the two mile routes, others charge 4 cents for a slightly greater distance, and numbers charge $1\frac{1}{2}$ cents for short distances. Mile rides on the tops of the cars are usually for the latter figure. Six mile rides on the steam cars are about 8 cents, but season tickets are greatly reduced. These short steam roads are not classed as successful financially. There, as in most European cities, the car lines are required to keep the pavement in order between the tracks, and a small distance on each side. The police enforce the law in this city and allow no passengers to stand in the aisles inside the cars, and only three or four on the platforms. Regarding cabs, if there is any dispute between passenger and driver about fare, when asked to do so the driver must drive to the

nearest police station and submit the dispute to the police officer in charge, who settles the matter in fairness.

In Bordeaux, France, passenger transportation is monopolized by an English company, which company also has charge of the transportation in Lyons, and many other large cities in France. The charter granted by the city provides, that in case of any dispute about fares between the company and working classes, the company must make a uniform rate of 2 cents per mile. Bordeaux cars and omnibuses carry first-class inside, and second-class passengers on top; when the cars are full an automatic sign-board states the fact, and no more passengers are taken on. Within the city limits the fare is 4 cents, inside, that is, first-class, and 3 cents second-class, or outside. Transfer tickets are given at the intersection of lines. Return or excursion tickets are given; 6 cents inside and 4 cents outside; officers, soldiers, and sailors are carried for half fare, and municipal officers and police free. The city receives \$48.25 tax for each car or bus in service; besides certain duties on grain fed to the horses. In France, the cities put a duty on products which come in to them from the surrounding country, as well as from abroad; in the same manner as the United States puts an import duty on the products received from abroad. These duties of the French cities are called octroi duties, and the transportation company's octroi duties in Bordeaux for 1889 were \$7,290. The net profits of the company for 1890 were about 16 per cent. The average receipts for 1890 were 25 cents per mile; for 1889 23 cents. Shoeing horses cost 18 cents per week per horse.

In Havre, France, the street cars are divided into first and second class compartments, and the fare is divided into road sections of various lengths, the price is 2 cents per section for the second-class, with one cent increase per section for first-class. The rate of fare is regulated by the city. One company has charge of all lines. The fare is considered excessive, and steps are being taken to reduce it 2 cents for second-class and 3 cents for first, for all distances, and abolish sections. It is an odd feature about European countries, as in France, the large steam roads charge $2\frac{1}{2}$ cents per mile for second-class, and 6 cents per mile for first-class passengers, and the people consider the price low; but a three-cent fare on horse cars they consider high. The Havre company make good profits, however.

At Lyons, France, although the outside of the cars is second-class, first-class passengers prefer to sit there in pleasant weather, both ladies and gentlemen. The fare is 2 cents within the city limits for second, and four cents for first; outside the city the price ascends one-half for both classes. Nobody is allowed to stand inside the car at any price. If anyone enters after a car is full, the car is stopped and the extra person is required to get off. At each office tickets are given out to applicants without cost and regularly numbered, and if the holder fails to note when his number is called out, he forfeits his chance for a seat, and must

apply for another ticket. These tickets only relate to seats, and not to fare. A special tax is paid by the different companies of so much quarterly, according to the cost of the franchise. In some French cities a percentage of the receipts is included in the tax. The general government has a veto power over the granting of trams—as horse lines are sometimes called there. The French law is strong on one point, a feature that might well be observed in this country; the Republic forbids that any tax or assessment of any kind shall be exacted from any company, except such as have been expressly agreed upon in the terms of the charter. Some of our Western legislatures are less scrupulous; they seem to reason that a contract between the State and the railway company may in expediency be broken any time, that is, on the legislative side of the contract; they would probably object, however, if the railway company took similar privileges.

EDISON CONTROLLING SWITCH.

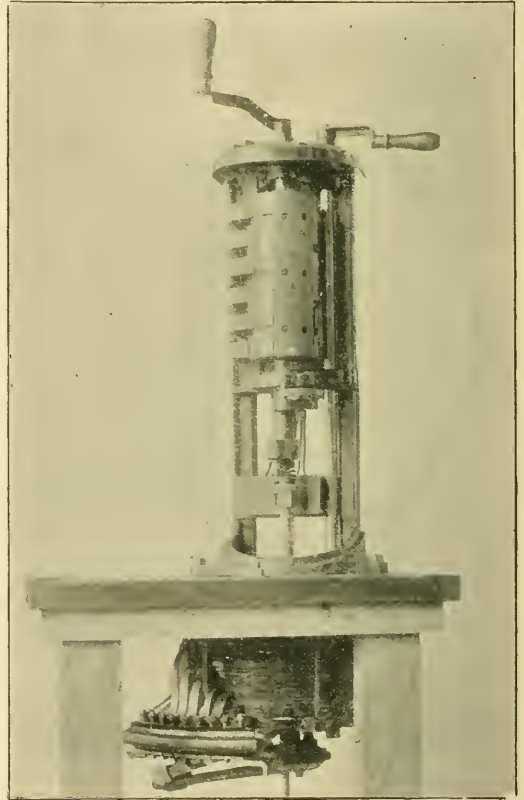
THE Edison General Electric Company have recently devised a new type of street car controlling switch, intended to take the place of the present platform switch for equipments of large motors of 25 horse power and upwards.

In starting the car the switch handle is turned from the position marked "off" with a "counter clockwise" movement; this has the effect of carrying the arm of the rheostat placed under the switch around on its contact segments and the resistance is gradually cut out of circuit. After this arm has been carried around and all the resistance cut out, it is released from the cylinder shaft and left locked in this position. Further movement of the handle then only effects the cylinder and commutates the field magnet coils of the motor from series to parallel in the usual way.

In stopping, the field coils are turned from parallel to series, the resistance coil is then again put in circuit, and finally the circuit is broken by the contact lever on the last segment of the resistance coil, and not, as formerly, upon the cylinder contacts. The only caution to be observed in stopping is to see that the switch handle is turned to the position marked "off." As the motors are reversed by means of a separate lever operating a reversing switch placed under the car, the reversing lever is connected to a shaft separated from the cylinder shaft, but interlocking with the cylinder shaft in such a manner that it is impossible to reverse the motors until the cylinder shaft is in an "off" position. The cylinder plates and contacts are made of thick iron stampings, as experience has shown that iron is a better material to use than brass, hitherto employed. Sparking does not burn the iron as much as the brass, and greater certainty of good contact is insured. The rheostat is of the regular circular pattern resistance coil, which has been in use for some months past as the standard slow starting device. This rheostat is protected by a gal-

vanized iron case, made to suit different car constructions. When fitting the switch, a sheet of iron and a layer of asbestos should be laid between the rheostat and the car floor. This will prevent any danger from fire either from heating or sparking in case of accident to the rheostat.

The current from the trolley wire first goes through the field coils and switch cylinder for commutation, then through the armature and reversing switch, and thence through the switch contact lever and resistance coil to ground.



EDISON CONTROLLING SWITCH.

Only six wires are run to the platform switch; these are the field magnet wires. The three wires running to the reversing switch are of the same size as the regular armature wires, as is the wire between the metal terminal of the reversing switch and the contact lever of the rheostat. When fitting switches to cars already wired, the cables can be utilized, but the terminals of the wires left idle should be well insulated.

A NEW definition of luxury has just appeared says a wicked New York paper. It is "an experience of being choked, hustled, trampled and half killed on one of Mr. Gould's Elevated Railroad cars at 5 cents a choke."

SAN FRANCISCO'S FIRST ELECTRIC RAILWAY.

THE Metropolitan Railway Company of this city expects to have its line completed by May 1, and in operation a few weeks later. This fact possesses peculiar interest to the people of San Francisco, inasmuch as the motive power of the Metropolitan is to be electricity, a power never yet used here for the purpose. San Francisco has an abiding faith in the cable, born of the ease with which it drags cars up the long, steep hills, and San Francisco is slow to adopt anything new. Hence those who have never seen an electric transit system in operation are inclined to scoff at the innovation, disregarding the circumstance that in many cities electricity has been adopted as the exclusive method.

The office of the Metropolitan Company is at 30 Montgomery street. Wendell Easton is president, E. L. G. Steele vice president, C. A. Fletcher secretary, and the Anglo-California Bank cares for the funds. In the beginning the company had the usual fight for the right to erect poles, but the Metropolitan won, and in this respect, at least, its troubles are over. It is intended to have the equipment thoroughly first-class. The Thomson-Houston system, with overhead wires, has been adopted. The rail used is 40-lb., and made by the Pacific Rolling Mills of San Francisco. The cars are to be a combination of closed car and dummy, no trailer being used. These cars are now partly constructed, and receiving the finishing touches. They are made by O'Brien & Sons, of this city, and show an excellent grade of workmanship. They are shorter than the average cable car in use there, and stand higher from the ground. They rest upon Robinson Radial Trucks.

The maximum grade encountered is 13.8, but to secure this, heavy work was necessary, and in consequence the cost of construction much greater than ordinary. There are many curves, this also being due to a desire to escape inclines deemed too steep for the electric car to climb. The course of the line will give an idea as to the number of these curves. Starting at Powell and Eddy, it runs on Eddy to Hyde, to O'Varrell, to Scott, to Fell, to Baker, to Page, to Clayton, to Waller, to Cole, to Carl, to J, to Seventh, to H, to Eighteenth, to M, and thence to the beach.

The length of the main line is 10 miles. There are in contemplation several feeders that will aggregate about 3 miles more. The power house is not so far advanced as the line itself, but will be ready shortly after the 1st of May.

When the company was first organized it was under the name of the San Francisco and San Mateo. The prime mover was C. E. Mayne, late of Omaha. It was Mayne who did all the initial work, got capital interested, fought for a franchise and right of way. Mayne is no longer connected with the concern, and the title he had selected went with him.

The Metropolitan is not designed to cover a heavy

business district. Although it passes through a territory somewhat devoted to retail trade, for the most part its field is built with residences, or is yet unoccupied because heretofore inaccessible. One great desire of the company is to open to settlement a section that has every advantage save the single one of rapid transit. Already there is a very apparent effect. Lots are being sold that a few months ago could hardly have been given away, and the demand for them is steadily increasing. For a part of the length the Metropolitan parallels a cable line, and it was here that the rivalry was engendered. Beyond this point, it turns aside, and of such traffic as exists, or as it can create, will naturally have a monopoly. Its route is picturesque. Leaving the level stretches of sandy street, it surmounts an eminence that affords a beautiful view in every direction, and then it gradually descends to terminate at the shore of the bay. There is no question but that it will do a large business. The Metropolitan bids fair to become one of several electric lines before next autumn.

TRIED TO SKATE.

THE illustration below is of a car on the Amesbury and Merrimac line of the Amesbury, Mass., street railway, which, while going at high speed, on striking a curve where the rail had become covered with ice.



departed from the appointed course of all well-disposed cars. Like people who turn aside from right doing, it soon came to grief and was precipitated down a 30 foot bank and struck on one end against the ice, which, 15 inches thick, covered the surface of the Merrimac river. The platform went through the ice, but no damage was sustained by the car other than breaking the timber of the platform and a single light of glass; not a joint even was started. The Ellis Car Company, of Amesbury, the builders of the car, never constructed it with any expectation of tobogganing down banks and diving under the ice, but naturally were highly pleased at the remarkable record made by their car under such unusual and severe conditions. The few occupants of the car escaped before it made the plunge and no one was injured.

DIED IN THE CAR.

A WOMAN named Welch, of good family, but addicted to drink, was found by the police in the streets of Wilkes Barre, Pa., recently, and arrested. She asked to sit down a moment but would not get up again. Finally the officer boarded a car with her and both sat down. The woman's face was ghastly pale and she gazed with open eyes only in one direction, and that was in front of her. A woman who sat directly opposite was annoyed at her staring, and after a while cried out: "My God! That woman is dead!" and nearly fainted. Then there was a panic in the car, which was hastily stopped. A physician was called and he found the woman in the arms of a policeman, a corpse.

NATURAL GAS AT SALT LAKE.

THE Salt Lake City Railway Company has sent us a photograph of the new natural gas wells recently opened, at a distance of 14 miles from the city. It



will be piped at once and in a short time the electric railways expect to be able to use it as fuel in their power plants.

TOPEKA TRANSIT.

THE ordinance authorizing the Topeka Railway Company to build, equip and operate railway lines in Topeka has been passed. The new line will absorb the present electric road and the city railway, making them of one system. Any or all systems of traction are allowable and the builders may go anywhere in the county and may even go anywhere in the state.

The Rapid Transit now has thirty-five motor cars and will get fifteen more, with fifty motor cars and all the trail cars, expect to be able to give the people a good service.

Twenty-five miles must be equipped within twelve months and \$400,000 will be spent this summer.

The capital is \$1,250,000 and the directors for the first year are: M. A. Low, Topeka; W. B. Strong, Boston, Mass.; George R. Peck, R. M. Gage, W. H. Rossington, Charles Blood Smith, C. C. Baker, Samuel T. Howe, J. G. Slonecker, and P. G. Noel, all of Topeka; H. C. Speer, Chicago, Ill.; C. S. Gleed and C. K. Holiday, both of Topeka.

JOTTINGS FROM JAPAN.

WHETHER it is because they don't know their right hand and from the left, or because their feet are pointed up when ours are down, or because the time honored system is the correct one, and our modern method a departure therefrom—deponent sayeth not. However, as is well known, the Japanese in writing, printing and reading, commence at the north-east corner of the page and read down and to the left, instead of from the north-west section and travel to the right, as editors and all others of the literati teach. For fear our readers may not have time to peruse the following in its entirety, we will simply state that the quotation is an extract from a very interesting illustrated catalogue issued by Y. Araki

ス馬差或ノテ其ヨ袋へ最エニ電
ル力ハハ發製功リ區キモル電
コノニ僅動造能通ニ程稱所
ト多歩カ機織セルシニシノハ
ナ少以カ一ヲル者ハ若シレニ
ケレ依テ過カヲ以テ者ハ其且
バテアラス出カヲ其全其フタ
依ラウシ又之シムカヲ精ハ
用上最モ輕位ヨリ出サシム
便ナル方ナリ要ルモ力
リ要ルモ力

& Co., of Osaka, Japan, and is descriptive of the good qualities of the Burton Heater, and the electric supplies of the Electric Merchandise Company, of this city.

W. C. Sakai, the general manager of the Japanese company, also writes W. R. Mason as follows:

"Dear Sir:—We are in receipt of your esteemed favors of the 8th. and the 1st of December, and in reply we shall be much pleased to say that the electric light in Japan has been in great consume since 1888, and still getting on very well.

We are connected with some leading firms of electric light and its supplies in Japan, and are sure that we can push forth the business should you inform us what kind of your merchandise would be most quickly sold and get profit.

We have forwarded to you under a separate cover, catalogue of electric supplies by this mail, and hope it will be found an interesting item of business.

Yours very truly,

Y. ARAKI & Co.

Just how long it will be before the electric railway will be "in great consume" is what Mr. Mason is trying to find out.

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

JOHN G. HOLMES, PRESIDENT, Pittsburg, Pa.
 THOMAS H. McLEAN, FIRST VICE-PRESIDENT, New York, N. Y.
 JAMES B. SPEED, SECOND VICE-PRESIDENT, Louisville, Ky.
 ALBION E. LANG, THIRD VICE-PRESIDENT, Toledo, O.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE PRESIDENTS, and HENRY M. WATSON, Buffalo, N. Y.; LEWIS PERRINE, JR., Trenton, N. J.; W. WORTH DEAN, St. Joseph, Mich.; MURRY A. VERNER, Pittsburg, Pa., and THOMAS C. PENNINGTON, Chicago, Ill.

Subjects for Discussion and Committees Appointed to Report Thereon.

"Power-House Engines."

T. W. WRENNE, President United Electric Railway, Nashville, Tenn.; L. H. McINTIRE, Engineer, Harlem Bridge, M. & F. Railway, New York; F. S. PEARSON Chief Engineer, Electrical Department West End Street Railway, Boston.

"Relative Cost of Operation of Horse, Cable and Electric Roads."

WM. MO C. RAMSEY, Electrical Superintendent Federal St. & P. V. Passenger Railway, Pittsburg, Pa.; F. R. GREENE, Secretary Chicago City Railway Company, Chicago; JOHN L. HEINS, Superintendent Brooklyn City & Newton Railroad, Brooklyn.

Next meeting will be held in Cleveland, O.

Massachusetts Street Railway Association.

PRESIDENT, CHAS. B. PRATT, Salem; VICE-PRESIDENTS, H. M. WHITNEY, Boston, AMOS F. BREED, Lynn, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON, Lawrence.

Meets first Wednesday of each month.

Ohio State Tramway Association

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice President; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus, Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

PRESIDENT, JOHN H. BONN, Hoboken; Vice President, THOS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee. OFFICERS and C. B. THURSTON, Jersey City; H. ROMAIN, Patterson; LEWIS PERRINE, JR., Trenton.

The Street Railway Association of the State of New York.

JOHN N. BECKLEY, PRESIDENT, Rochester, N. Y.
 THOS. H. McLEAN, VICE PRESIDENT, New York, N. Y.
 GEO. LAW, SECOND VICE PRESIDENT, New York, N. Y.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—D. F. LEWIS, Brooklyn, N. Y.; C. DENSMORE WYMAN, New York, N. Y.; CHAS. CLEMINSIAW, Troy, N. Y.
 The next meeting will be held at Saratoga, September 30, 1892.

Alabama.

HUNTINGDON.—An electric railway company has been organized. The new company consists of Samuel E. Henry, president; George B. Orlandy, secretary, and H. B. Brumbaugh, treasurer, with J. C. Blair, F. S. Johnston, J. G. Isenberg and D. Y. Swayne as the Board of Directors. The greater portion of the stock at \$50 per share, has been paid in and abundant capital is behind the enterprise. The authorities are favoring the movement.

MOBILE.—The ordinance which has been in the hands of a committee for an electric street railway has been reported on by them at last meeting unanimously favoring the building of said road. Construction must begin in three months from passing of ordinance giving franchise, and be in operation in one year.

MONTGOMERY.—The West End Suburban Electric Street Railway, whose valuable franchise from this city would have expired, took time by the forelock and engaged about 100 hands the night before expiring, laying the first track on the right of way granted.

BID for a 40x60 power-house for the Montgomery and Cloverdale line have been put in.

Arizona.

PHOENIX.—The City Council of Phoenix has given electric railway franchise for fifty years to a syndicate of Denver capitalists. Work is to be commenced at once.

Arkansas.

HOT SPRINGS.—The "Happy Hollow" street railroad at Hot Springs, will be in operation soon.

California.

ALAMEDA.—Rumor says that the Meetz road is to be sold to the Wayward line for \$50,000.

LAKEPORT.—Citizens who are advocating a road from Picta to Lakeport claim it can be built for \$6,000 per mile.

OAKLAND.—The Consolidated Piedmont Cable Company will run an electric to West Oakland.

SAN FRANCISCO.—It is reported that the new electric road running from Market and Stewart streets to the Holy Cross Cemetery will be in operation soon. The wires have been strung for the entire distance.

THE extension of the McAllister Fulton cable line to the D street entrance to the park is now in operation.

SANTA ROSA.—Four new cars have been ordered for the Central Street Railway Company, and W. H. Lee of the company, is now in San Francisco making arrangements to have them shipped here.

TEMESCAL.—The machinery for the Telegraph avenue electric road is being hauled up her.

Canada.

MONTREAL.—There are three applications before the City Council for rights of way to build electric roads, namely, Street Railway Company, Mr. Mainwaring, and The Park Railway. No decision has as yet been reached.

THE Chief of Police has stopped several employes of the Electric Street Railway from working on Sunday evening.

Colorado.

COPEEL.—The Hallam Land Company has leased the street car line in this city and is having the cars repaired and the track cleared off. They expect to start the cars in a few days. It is rumored that if the enterprise is liberally patronized the cars will soon be fitted up and run by steam instead of horse power.

BARNUM.—The board of trustees of Barnum has granted a franchise to the Denver, Lakewood & Golden electric to run within the boundaries of the town. The conditions of the franchise are that the line must be in operation within ninety days from date and that the motive power be electricity.

DENVER.—The rumor of a strike among the employes of the Denver City Cable Railway Company is pronounced by all conductors and gripmen as being false from beginning to end.

HARMAN.—The people of Harman are rejoicing over the commencement of the grading for the Metropolitan Electric line. The Tramway Company put large gangs of graders on Third avenue, Harman, and on Fourth avenue, Denver, and the line will now be pushed to completion as rapidly as possible. The new line will connect with the Metropolitan system at Fourth avenue and Hallett street.

Connecticut.

MIDDLETOWN.—The Schuyler Electric Company have made overtures tending toward the purchase of the franchise and property of the Middletown Horse Railway. Substituting therefor electricity, and extend the tracks outside city limits.

Delaware.

CAPE MAY.—Now that the City Council has granted the necessary permission for the construction for an electric railroad, work will soon be commenced so as to have the line in working order for the coming season. It will stretch along the beach for a distance of nine miles, extending to Cape May Point. The overhead trolley system will be used, with the power-house at the western limits of the city. Camden capitalists will build the road.

WILMINGTON.—Two engines of 150-horse-power each, have arrived for the electric street railway and have been placed in position in their power-house on Water and Orange streets. The main portion of the building has been completed and the roof is now being put on.

THE Wilmington City Passenger Railway Company proposes to run open cars on all of its electric lines during the summer months. The first of these is now being built by the company itself, and nine more have been ordered for delivery this spring. They are very large cars and will accommodate 48 people. These cars will be put on about June 1.

District of Columbia.

WASHINGTON.—Senator Edwards has offered a general act for the relief of the street-surface railroad companies organized under the laws of 1884, legalizing the action of certain railroads organized since that time, supposing the law of 1884 applied to them, whereas it applied only to roads organized before then. The bill applies to cities of less than 50,000 population.

THE driver of car 21 of the belt line was sandbagged and robbed recently. The robbers escaped.

Georgia.

ATLANTA.—The electric line to the river will be finished in a few days and cars will be running on regular schedule.

BRUNSWICK.—Judge S. R. Atkinson has appointed Sheriff W. H. Berry permanent receiver for the Brunswick Street Railway Company and placed the bond at \$10,000. The street cars and St. Simon's boat line will continue to be operated.

MACON.—At Macon, Judge Miller decided that he would pass an order for the sale of the street railroad, but the date of the sale and other particulars have not been decided upon. It is probable that the Thomson-Houston claim will be settled or the balance of the money will be divided among the bondholders. The road is a very valuable piece of property, and will in all probability bring somewhere in the neighborhood of \$300,000, as \$250,000 was offered for it by a party of Macon gentlemen last summer.

SAVANNAH.—The Electric railway line has run cars around its new belt. The new line was very largely patronized.

Illinois.

AURORA.—The owners of the Aurora street railway claim to have refused \$400,000 for their plant and business.

CHILlicothe.—The contract for carrying the mails between this city and North Chillicothe has been awarded to the People's Street Railway Company.

GALESBURG.—Efforts are being made by outside parties to obtain franchise for building a line. Aldermen, however, prefer the old company, but will vote for a new one if necessary. The question is being thoroughly discussed.

JONESBORO.—The electric railway between Anna and Jonesboro is a settled fact. Everybody is in harmony and she is bound to go.

MARSEILLES.—An electric street railway company has been incorporated at Marseilles with a \$12,000 capital stock. The incorporators are Frank Montgomery, Richard Hughes and A. J. Gunn.

PEKIN.—The following road is incorporated: Pekin Street Railway Company; capital stock, \$10,000; incorporators, Adolph Fehrman, Otto Koch and Friederich Schnellbacher.

Indiana.

EVANSVILLE.—The new street railway company of Evansville has contracted with the Westinghouse people for thirty electric motors.

FT. WAYNE.—The Citizens' Street Railway Company has filed a \$25,000 bond as security that it will hold to the conditions of the electric motive power ordinance recently passed by the City Council.

HAMMOND.—Two companies have applied for franchises to build electric street railways. One is the Hammond Electric Street Railway Company and the other the Hammond, East Chicago and Whiting Company. No decision was given either.

INDIANAPOLIS.—The Citizens' Street Railway Company have a force of men at work at Fairview Park fitting it up for summer. The company have fitted out a flat car and provided it with seats and carry the men out and bring them in from work, hauling the car behind a motor.

THE Citizens' company have petitioned for right of way on several new streets.

JEFFERSONVILLE.—The Ohio Falls Street Railway Company's plant in Jeffersonville, which about three months ago was ordered to be sold under the foreclosure of a mortgage on the Ohio Falls Car Company, was offered for sale, and the entire plant was bought in by the old company for \$10,000, and will be continued to run as usual. The indebtedness on the property was about \$11,000, and under the name of the Jeffersonville City Railway Company was reorganized. The incorporators have obtained a charter under the statutes of Indiana and are Louisville and Jeffersonville men. The officers are E. J. Howard, president; Geo. J. Long, vice-president; J. C. Zulauf, secretary and treasurer, and E. J. Howard, J. C. Zulauf, W. E. Tafel, George J. Long and Joseph Huffaker are the directors.

ANDERSON.—The Anderson Electric Railway has already 2½ miles of their line in operation electrically, and will proceed to change all the balance as rapidly as possible.

MADISON.—A party from Cincinnati will put in an electric line if sufficient inducement is made.

MICHIGAN CITY.—An electric line is in prospect.

Iowa.

CENTERVILLE.—Centerville is to have an electric railway from town to Forbush and Mystic. An eastern syndicate will push the deal.

DES MOINES.—The Legislature has sanctioned the building of county electric roads. This permits the construction of the Indianola-Des Moines line.

DUBUQUE.—Nelson Bishop, formerly treasurer of the Dubuque Electric Railway Light and Power Company, died at Augusta, Florida, March 22, aged 26 years. He had been in ill health for several months past, and left here for the south. Mr. Bishop was a model young man, and highly respected by all who knew him.

SIoux CITY.—The Hankinson storage battery car made a successful trial trip. The Bradbury-Stone battery is used.

SIoux CITY.—The new street car ordinance, providing right-of-way for a line to Leeds by the Floyd valley, will be favorably reported to the council at its next meeting, and passed under a suspension of the rules.

G. B. HEALY says that the iron on the street car line from the end of the elevated track to Greenwood will be laid early this season.

JUDGE WAKEFIELD has decided a very important case. The jury brought in a verdict of \$1,200 damages for Frederick Friday against the Sioux City Rapid Transit Company, but the Judge nevertheless ordered a verdict for the defendant. It is the first case of the kind in this state. Suits involving over \$100,000 hinged upon this case.

Idaho.

BOISE CITY.—The electric street car company is contemplating a number of extensive improvements, including the extension of its tracks up Thirteenth street.

Kansas.

FT. SCOTT.—The Fort Scott Rapid Transit Company has reorganized. President, H. H. Andresen, Secretary, F. H. Griggs, Vice President A. W. Walburn, Treasurer J. Lorenzen, Assistant Secretary Charles Nelson, Assistant Treasurer C. H. Asbun. Numerous improvements and extensions will be made.

LEAVENWORTH.—A Leavenworth company has been chartered for the purpose of building and operating an electric street railway between the city and Ft. Leavenworth.

The estimated length of the line is fifteen miles, and the capital stock of \$300,000 will be divided into 6,000 shares. The directors are Geo. A. Baker, Leavenworth; J. C. Lysle, Leavenworth; Geo. Burrows, Leavenworth; Laurens Hawn, Leavenworth; William Dill, Leavenworth; W. F. Putnam, Exeter, N. H.; W. A. Patten, Kingston, N. H.

GEORGE A. Baker, superintendent of the Leavenworth & Suburban Street Railway company, in a card published in a morning paper, says the company is sincere in its proposition to make the line an electric road if the city will permit it.

Kentucky.

COVINGTON.—The street car company have begun operations at Tenth and Madison, tearing up the old rails for the replacing of new ones.

Maine.

AUGUSTA.—There is a plan on foot to build an electric railroad from Lewiston to Augusta. Gen. C. W. Tilden and other men interested in the scheme, have been in Lewiston lately to look over the prospect.

BIDDEFORD.—The managers of the street railway have completed the foundation of their building for a power house, and will commence on the superstructure right away.

LEWISTON.—A. F. Gerald of Fairfield, president of the Waterville and Fairfield Railway and Light Co., has placed a sufficient amount of the bonds of the company to fulfill all consolidation contracts, and to provide for changing the railroad from horses to electricity.

ROCKLAND.—The contract for building the Rockland Electric railway has been made with the firm of Shaw & Ferguson, of Boston. The contract calls for a road built in the most substantial manner, with steel rails, and ties 24 inches apart. The Thompson-Houston system will be used. A contract has also been made with the Briggs Car company of Amesbury, Mass., for the immediate construction of ten cars, five of which are closed ones of a seating capacity of 28 passengers, and five open ones of a capacity of 50 passengers. The contract for the boiler to be used in generating the power, has been made with E. Hodge & Co., of East Boston. The location of the works has not yet been decided on. The portions of the road now under contract, are to be in running order by June 1, and it is probable that other portions may be built the coming summer.

Maryland.

ANNAPOLIS.—The Senate took an entirely unexpected departure in unanimously passing over the Governor's veto the bill "to incorporate the Annapolis, Eastport and Bay Ridge Electric Railway and Power Company, of Anne Arundel County." The incorporators of the bill are James H. Vansant, Edward Powers, Jas. I. Johnson, Charles A. Dubois, W. Hallam Claude, Richard H. Green, Jr., Joseph H. Bellis, Nevitt Steele, W. Clement Claude, F. Eugene Wathen, George H. Carpenter, Geo. W. Silsby and George W. Wilcox.

BALTIMORE.—Messrs David Stewart, George Blakistone and Seymour Mandelbaum, directors, Norman James, secretary, and J. L. Blackwell, engineer of the Central Railway Company, visited Boston to examine the West End Electric Railway of that city for the purpose of adopting the best appliances in the construction of the Central Company's electric railway. The trip will probably include a visit to Pittsburg.

THE Central Railway Company is going to push the worth of making electricity the motive-power of its line of six and one-half miles of double track, and will soon be able to let contracts under specifications which will be prepared by J. L. Blackwell, the electrical engineer and general manager of construction. The system has not yet been settled upon, but it is known that it will be operated by trolleys, and that only the best materials and appliances will be used in its construction.

DIRECTORS of the Central Railway Company have elected Mr. J. L. Blackwell engineer and manager of equipment for the construction of the electric road to be built by the company. Mr. Blackwell is consulting engineer of the Curtis Bay Electric Railway Company.

THE power house for the Blue line of the City Passenger Railway Company will be on North Charles street, near Lanvale street.

Massachusetts.

BOSTON.—Hyde Park's selectmen and the representatives of the Norfolk & Suffolk Street Railway Company talked over the proposed electric railway through Hyde Park. The selectmen voted to grant the franchise, and the company will take 30 days to consider the conditions, and at the end of that time will either put up a forfeit of \$5000 to complete the road before May, 1893, or relinquish the project.

THERE is a rumor that a syndicate of capitalists of large means have under consideration a scheme for establishing an independent electric railroad from Concord to Boston. It is understood that the project includes the taking of the local railway plants in this city, Manchester, Nashua and Lowell and the building of such links as will make the contemplated through line.

BROCKTON.—Since the granting of the recent franchise to the Brockton Electric Railway Company, giving them the right to lay tracks from Brockton through this town. Great interest has been taken in the scheme by some of the foremost men of this town, and articles of association for the formation of the Brockton & Holbrook Street Railway Company have been drawn up.

FITCHBURG.—The street railway committee has reported a bill to authorize the Fitchburg Street Railway Company to extend its tracks and to purchase the Leominster Street Railway Company and to change the name of the former corporation.

FALL RIVER.—Contracts have been closed by the syndicate which has purchased the Globe Street R. R. in this city for equipping the road with appliances necessary to operate it by electricity. The trolley system will be introduced. The work is to be done under the supervision of George M. Mansfield, of Boston. The overhead work will be done by Reed & McKibbin of New York.

HAVERHILL.—The committee on street railways reported a bill to incorporate the Haverhill & Amesbury Street Railway Company, with \$250,000. For the purpose of purchasing the Black Rocks & Salisbury Beach Street Railway Company. It may issue \$300,000 six per cent. bonds secured by mortgage on all its property, including its acquisition.

LEICESTER.—The electric road connecting Leicester and Worcester is reported to carry 20,000 passengers a week. Its stock has risen steadily, and is now quoted at \$125 a share.

LYNN.—The Lynn & Boston Railroad Company purpose to run electric street cars in Sangus as soon as it obtains the franchise; and the road will then establish an electric line connecting Lynn and Boston.

LOWELL.—The street railroad company has taken possession of its new quarters in the Howe Block, at the corner of Merrimac and Prescott Streets, and although not thoroughly located yet their quarters will be pleasant and convenient when they get settled.

MARLBOROUGH.—The Committee on Street Railways reported a bill to authorize the Marlborough Street Railway Company to extend its road into the towns of Hudson and Westborough.

NEW BEDFORD.—A new York syndicate offers to buy the Union road at \$160 per share.

CLINTON.—The Directors of the Clinton Street Railway have accepted the franchise granted them.

WORCESTER.—Two petitions were presented for building an electric line from Worcester to Millbury, one by the Consolidated Street Railroad of Worcester, and the other by the Worcester and Millbury Electric Railway Co. There is much interest manifested in the scheme and there is no doubt it will be a go.

ALL but \$34,000 stock of \$150,000 has been subscribed and the road will be running by the middle of August.

WEST NEWBURY.—Citizens have voted \$3,000 to grade a line of electric to Newburyport. Hon. E. M. Boynton is at the head of the movement.

Michigan.

ALPENA.—Alpena expects to have two miles of electric railway completed during the coming summer.

ANN ARBOR.—The Ann Arbor and Ypsilanti Street Railway began running regular trains between the two cities for the first time since an injunction of the courts was issued about two months ago.

BELDING.—The township board has granted a franchise for an electric railway between Belding and Otisico, to the Belden electric railway company. Work will begin at once.

DETROIT.—The proposed electric to Norris is now assured. Thirty citizens forming a company have taken up the Livingstone franchise, and will put the business through.

AN amusing spectacle was witnessed on Jefferson avenue recently. A storage battery car was crossing the belt line, the truck journals became too hot and the passengers got out and pushed the rapid transit car over the bridge, while the patient mule jogged along behind.

GRAND RAPIDS.—General Manager Chapman, of the street railway company, has ordered a Short electric motor and will give it a trial.

LANSING.—The Continental Trust Company of New York, having acquired the stock of the Lansing Street Railway Company, has applied for a receiver. J. A. Webb, of New York, who owns the stock, will appear against the motion.

MENOMINEE.—The street railway company will lay over two miles of track in their extension on Quimby street and Stephenson avenue. They will commence operations as soon as possible.

PORT HURON.—Detroit capitalists are negotiating for the Port Huron street railway. They have offered \$55,000.

GRAND RAPIDS.—Ten additional motors have been ordered from the Edison Company for use on the line to Reed's lake. The new route to the lake will be 2,000 feet shorter than the old one, and will be in operation by May 15. Arrangements have been made for entertainments to continue throughout the entire summer.

SAULT STE. MARIE.—The electric line, the Soo, may be bought by Chicago parties, represented by J. C. Woodward.

SAGINAW.—The employes of the Saginaw Union Street Railway Company presented Jacob Seligman with an elegant gold-headed cane.

ST. JOSEPH.—Material for the trolley line between St. Joseph and Benton Harbor has been ordered, and the contractor says the cars will be running before Independence Day.

Minnesota.

DULUTH.—The Electric Club, an organization composed of the employes of the street railway company, holds its meetings monthly.

MINNEAPOLIS.—The street railway company has made no plans for further extension of its lines this season, except perhaps interurban No. 2. The proposed line to St. Louis Park, and the one connecting the Twentieth avenue north may not be built at present. The only definite plan is the extending of the Hawthorne line to Bryn Mawr and a few blocks on the Western avenue and Second street northeast line.

THE outlook for obtaining the proposed interurban electric line by way of St. Anthony Park is good. By the terms of Thomas Lowry's offer to the property owners along the line, he agreed to have the road in running order by July 1, if a bonus of \$25,000 is subscribed. Of this sum \$18,000 have now been secured and the hustlers are out after the remainder.

THE Street Railway Company has commenced work on an addition 50 x 100 to the power house. The foundation permit calls for a \$11,000 building.

ROBBINSDALE.—Robbinsdale is to be connected with the city before summer by electricity. A motor and car combined will be put on as an experiment to be added to as soon as necessary.

STILLWATER.—W. M. Hewitt, receiver of the Stillwater Electric Street Railway Company, has filed an inventory of the company's property received by him Feb. 29. The real estate is valued at \$48,192.50; personal property, \$14,091.95, and cash, \$98.50, making a total of \$62,383.25. The company owned and operated five and a quarter miles of track, valued at \$5,000 per mile.

ST. CLOUD.—The Thomson-Houston Electric Company will put an electric street car line into operation between Sauk Rapids and this place. The contract has been closed for the material to be used in its construction.

ST. PAUL.—The tracks of the street railway on the Fourth avenue line from the postoffice to Thirty-eighth street south will be relaid as soon as the weather will permit. When the metals were put down some two years ago the work was done in a hurry and did not prove a satisfactory job. Other routes will also receive similar attention during the summer.

AN electric line is to be constructed from St. Paul to White Bear Lake at once. The contract calls for completion by June 1. Cars will be run every fifteen minutes.

WINONA.—The Winona Street Railway Company is seriously considering an extension of its present lines.

Missouri.

CARROLLTON.—Carrollton Street Railway Company of Carrollton has been incorporated; capital, \$10,000. Incorporators—Alfred Hassick, D. D. Thomas, H. S. Jewell and C. E. Ely.

JOPLIN.—The street car company has secured the contract for carrying the mails here and will commence the first of April. It will also carry an exchange between Webb and Carterville.

JEFFERSON.—J. H. Bobring says the electric road will be pushed to Jefferson Barracks as soon as the improvements at that place commence. The Scullin line will be extended.

KANSAS CITY.—The managers of the L Road are much elated over the improved prospects they now have. The road will be sold under foreclosure and be bid in by the reorganized company. Instead of thirteen it will run twenty cars.

THE Interstate Elevated Railway Company is changing its line from steam to electricity. Construction work has been under way about two weeks, and the change will be completed some time during the present summer.

ST. LOUIS.—The National Unicycle Elevated Railway Construction Company filed articles of incorporation recently. The capital stock is \$5,000,000. The incorporators are R. E. Maddox, J. P. Taylor, E. M. Turner, Charles H. Wengler and L. H. Brown.

THE Denverside Street Railway Company has just been incorporated with a capital stock of \$60,000, proposes to run an electric railway from the bridge entrance to Denverside.

SPRINGFIELD.—The Electric has been sold at trustees' sale for \$25,000. It was bid in by the Exchange National Bank of Atchison, Kas.

Nebraska.

BEATRICE.—The Beatrice Rapid Transit and Power Company have received nearly three carloads of material for their electric light extension. The company is putting in the Brush system.

LINCOLN.—Manager F. W. Little, of the Lincoln street railway, while in the east, ordered from the Westinghouse people about twenty new motors for the Lincoln lines. A lot of new summer cars has been ordered in anticipation of heavy business during the season.

OMAHA.—The Metropolitan Street Railway Company, having overcome all obstacles, will build and equip at once an electric line connecting the city with Sundee Place. This addition will also be lighted by electricity from a local power-house.

THE Street Railway Company proposes to convert the horse railway known as the "Lowry Line," extending from Tenth and Farnam streets by way of Ninth and Seventh streets to Sixth and Pierce, to an electric road, and has asked a permit to set poles. The road now has a small patronage, but it is believed if motors are put on it will carry much travel to and from the southern part of the city.

SOUTH OMAHA.—The injunction suit against the Metropolitan Street Railroad Company of South Omaha has been removed and work will be commenced on the new road at once.

New Jersey.

ORANGE.—Articles of incorporation of East Orange & Mont Clair Street Railway Company were filed. It is practically a branch of Orange Cross Town & Bloomfield Railway, and will be two miles long. Capital stock is \$25,000, \$1,250 of which is paid in. Officers are: President, Frances M. Eppley; treasurer, Mr. Thomas Nevins, and Mr. G. DeLisle Zimmerman, secretary.

PLAINFIELD.—The trolley ordinance asked by the street railway company has been partially granted. The line of the electric is over West Front street and out Grant and Spooner avenues. The company binds itself to adopt any better electric system than the trolley as soon as one is perfected.

New York.

ALBANY.—Superintendent Emmett, of the Watervliet Turnpike and Railway Company, tendered his resignation to the board of Directors, and has removed to Albany.

THE stockholders of the Albany City Railway, Tuesday, approved the contract with the Watervliet electric road. Possession will be taken immediately, and extensive repairs made.

BINGHAMPTON.—The Chenango line will be run by electricity.

BUFFALO.—The Buffalo, Hamburg & East Aurora Electric Railroad Company has been launched with a capital of \$300,000. It proposes to cover every important village within a radius of 15 miles of Buffalo on the south.

BUFFALO.—Another company has been formed to connect Buffalo and Tonawanda by a street railway to be known as the Buffalo North Main & Tonawanda Railway, and its charter is for 99 years. Capital stock \$60,000. The incorporators are L. F. W. Arend, A. T. Francher, Frank D. Smith.

A CERTIFICATE, showing that the capital stock of \$500,000, of the Buffalo Cross Town Surface Railway is all paid in, was filed in the County Clerk's office by attorney Clarence M. Bushnell. The subscribing stockholders are H. H. Littell, H. Sellers McKee, E. E. Denison, C. C. C. Cuyler and J. M. Brinker.

TROLLEY poles are being distributed along Main street, from Virginia to Cold Spring, and all the people out that way are expectantly awaiting the introduction of rapid transit.

LONG ISLAND.—The Steinway Railroad Company, of Long Island City, has reorganized, with an increased capital stock of \$2,500,000. The Company propose adopting the trolley system and will, in the near future, extend the road to Flushing.

POINT JUDITH.—Jeremiah P. Robinson, Isaac R. Robinson, William G. Roelker, Frank G. Sturgess, and Mark W. Maclay, of this city, are incorporators of the Point Judith Railroad Company, which proposes to build an electric railroad from South Kingston, R. I., to Point Judith. Capital, \$300,000.

SARATOGA.—An electric road will run to the race track and Saratoga Lake, and the cheap vehicles, with their noisy and importunate drivers, will find their occupation gone.

SYRACUSE.—Superintendent Hamilton, of Oswego, will enter the employ of the Consolidated, of Syracuse.

KINGSTON.—The company which proposes to purchase the street railroad and transform it into an electric railway, has been incorporated under the name of the Kingston City Electric Railway Company. The directors are E. T. Stelle, E. H. Loughran, C. W. Deyo, W. S. Gillespie, E. G. Lawrence, A. E. Winne, Robert Wilson, C. J. Smith and Jansen Hasbrouck. The capital stock is placed at \$175,000.

TROY.—The City Railway Company elected the following officers: James O'Neil, president; Charles Clemminshaw, vice-president and Joseph J. Hagen, secretary and treasurer. The following executive committee was chosen: James O'Neil, Charles Clemminshaw, Anthony N. Brady Edward Murphy, Jr., and William Kemp.

UTICA.—The Fulton and Montgomery County Electric Railroad Company has been incorporated, with a capital stock of \$75,000, to build and operate an electric surface railroad of standard gauge. The road will

be about nine miles long. The company's office will be in Johnstown. The following are the directors: Robert Wemple, Fultonville; M. B. Northrup, Johnstown; Jere S. Sitterly, Fonda.

ROCHESTER.—New and elegant rolling stock has been ordered from Stephenson Company for the Park avenue line. A number of conductors have recently been discharged and replaced by new officials.

THE heaviest patron of the street railway in this city is the postoffice department, which annually pays \$1,300 for street car fares, each of the employes being allowed three tickets a day.

NIAGARA FALLS.—It is now fully decided that the Niagara Falls and Suspension Bridge Street Railway Company are to put in the trolley system. When the tunnel is completed, electric power will be obtained. Previous to that steam will be used. The total cost will be \$14,600.

North Dakota.

GRAND FORKS.—Mr. Carroll, of St. Paul, is the chief promoter of the electric railway recently adopted for Grand Forks, N. D., for which the city council has passed to its first reading an ordinance granting franchise privileges. The conditions of the ordinance require the acceptance of the conditions within 90 days, construction to commence 90 days thereafter, and one mile must be completed six months later.

Ohio.

AKRON.—The Akron Street Railway Company is preparing to make numerous improvements on its line during the coming spring and summer.

CINCINNATI.—The residents of Terrace avenue, between Spring Grove avenue and Hoppie street, have enjoined the Cincinnati Street Railway Company against laying tracks for an electric line along the avenue.

COLUMBUS.—The Leonard Avenue Street Railway Company was incorporated, with a capital stock of \$10,000, by Theodore Leonard and George E. Roberts. It is to be an electric line, and outside capitalists are interested.

CUYAHOGA.—Cuyahoga Falls Council has granted the Akron street railroad the right of way through the streets of that village.

CANTON.—The Canton-Massillon Electric is under good headway. The company is making its own car bodies; buying the trucks.

DAYTON.—The iron rails to allow for the extension of the electric road Brighton Beach have been ordered and the prospects are fair that the cars will be running down there before long.

DENNISON.—An electric road between Dennison and Ulrichsville is to be built.

TOLEDO.—The Consolidated and the Robinson lines have subscribed liberally to the base ball league.

WELLSVILLE.—A petition is being circulated in New Lisbon and East Liverpool asking the legislature to permit commissioners to appropriate \$50,000 to the company, to build a road between Salem and Wellsville. The agent of an eastern Electric Railway Co. is now on the ground.

YOUNGSTOWN.—Members of the city council are urging the giving of a franchise to the Trumbull Electric Railway Company at once.

Oregon.

FAIRVIEW.—The last spike of the Fairview electric line was driven with much ceremony. The officials of the road took quite a party out in a private car.

NORTH MOUNT TABOR.—The work on the North Mount Tabor electric line is being pushed right along with great energy.

PORTLAND.—The Multnomah Street Railroad Company has not yet complied with the ordinance requiring gates on all their cars, but will do so in the near future. All the mammoth new cars are provided with them, and those for the old cars are being made at the company's shops as fast as possible.

SALEM.—The Center street branch of the street railroad has been abandoned.

E. F. PARKHURST et al, has secured an exclusive franchise over certain streets, work to be commenced before the expiration of one year or forfeit franchise.

Pennsylvania.

ASHLAND.—J. F. Curley, of the New York Leather Belting Company, spent a day in the electric railway power-house at Rappahannock, and put two 32-inch belts on the immense fly-wheels and countershafting, and two 12-inch belts on the dynamos. The machinery and dynamos work without a hitch, and the managers are confident of success.

MILLVILLE.—A charter was issued recently to the Millville, Etna and Sharpsburg Street Railway Company with a single track 12 miles long. Capital stock, \$300,000. The officers elected are: president, J. N. Davidson, and directors, John H. Dalzell, Joshua Rhodes, George B. Hill. Of the 6,000 shares G. B. Hill owns 5,960. The road will be operated as a branch of the Manchester.

CHESTER.—The council has granted the Union Railway Company a franchise and they have given the contract to the Short Electric Company, of Cleveland, Ohio, for 10 cars and station equipment. The Union Railway will also build a road connecting Media with Chester.

CITIZENS resolve to build a 10-mile electric from Parkesburg to Oxford. Another road is to be from Lenape to Unionville. The survey has been made and a company will soon be formed.

MEDIA, Chester, South Chester and Eddystone are all to be connected with an electric railway in the near future. The Union Street Railway Company will give out the contract for the erection of the electric plant, which will run the trolley system. Media will be taken in at once, and it is expected to have cars running on this branch by the middle of May.

EAST READING.—A number of the largest stockholders of the East Reading electric road are agitating the extension of their line to Klappenthal. The route proposed is to run around the mountain and strike a point near the pavilion.

HARRISBURG.—The work of putting down the tracks of the Steelton Highspire and Middletown Electric Passenger railway is being pushed along at a very brisk pace.

HUNTINGDON.—Work is to begin at once on a new electric street railway in this place. The company just organized consists of Samuel E. Henry, president; H. B. Brumbaugh, treasurer and George B. Orlady, secretary, who, with J. C. Blair, T. S. Johnston, J. G. Isenberg and D. Y. Swayne, constitute the board of directors.

MYERSTOWN.—The managers of the turnpike company have decided to apply for a charter to build an electric railway on their turnpike road from Reading to Lebanon, a distance of twenty-eight miles.

PITTSBURG.—With the building of the bridge across the Monongahela a new line of cross-town cars will probably be run by the Birmingham Company.

THE Supreme Court decides that the Central Traction Company has right-of-way over High street.

WORK is soon to be started on the West End road.

WEST NEWTON.—An electric street railway is to be built parallel with the B. & O. railroad from Boston to Elrods, thence to Christy Park and McKeesport, a distance of about three miles.

Rhode Island.

PAWTUCKET.—The advent of electric cars in this city was hailed with joy by a large number who congregated on Main street square to see the arrival of the first. The new system worked to perfection, and the power is furnished by the Pawtucket Electric Light company.

Tennessee.

KNOXVILLE.—M. R. McAdoo, late general manager of the Knoxville Street Railroad company, has been appointed superintendent of the Atlanta Street Railroad company.

MEMPHIS.—This summer there will be a new park near Memphis, with two electric lines extended to it. It is to be known as Billings Park, named in honor of the Chicago capitalist who has done so much for Memphis.

Texas.

CORSICANA.—An electric car line is being considered by the owners of the horse car line at Corsicana.

HOUSTON.—The Houston Street Railway company is making rapid progress in the construction of their new belt line.

Virginia.

NORFOLK.—At the postponed annual meeting of the directors of the Norfolk City Street railroad, the old officers were re-elected.

PEARSBURG.—John N. Adams, C. E., has been retained by a Northern syndicate to construct an electric railway between Floyd Courthouse and a point on the Norfolk and Western railroad, about twenty-two miles distant.

ROANOKE.—The street railroad at Roanoke, Va., has changed hands and will at once be equipped with electricity. The estimated outlay will be \$150,000.

Washington.

NEW WHATCOM.—The Fairhew & New Whatcom electric street railway has inaugurated a freight service to accommodate patrons at Lake Whatcom. A freight car is hauled once a day behind the passenger car out to the lake.

OLYMPIA.—Two electric street railways are being built at Olympia, and the State capital is booming.

SNOHOMISH.—The power house for the electric street railway line between Everett and Snohomish has been located on the east side of the river at the foot of Pacific avenue. Work upon it begins at once.

SPOKANE.—The Northwest Thomson-Houston Electric Company have contracted to equip ten cars with W. P. motors for the Spokane street railway.

TACOMA.—The city council revoked the franchises of the four street car railways, viz: Peninsular Electric, G. W. Thompson's West End, the Commercial Union and Terminal, and the Tacoma & Southern roads. All were revoked because the work was not begun within six months as agreed upon. There is no probability of these roads being built.

THE Tacoma & Puyallup railroad will be run hereafter as a street railway. No freight will be carried and no tickets sold, as the agents at both ends are withdrawn.

A company is being formed to build a bicycle railway between Tacoma and Seattle.

SUPERINTENDENT TIBBITS, of the Tacoma Railway & Motor Company, has taken off all trailers on the cable cars, and runs the grip cars every four minutes.

Wisconsin.

FOND DU LAC.—A new board of directors and officers were elected at the last meeting of Fond Du Lac Light, Heat & Power Company. The officers are: Jno. A. Barnham, president; F. B. Hoskins, vice-president, and H. C. Hilkins, secretary and treasurer.

JOHN A. BARNHAM and H. G. Williams, of Philadelphia, have purchased the Fond du Lac street railway franchise and property and have organized a company with \$100,000 capital to operate an electric street car line and furnish power for machinery and incandescent light for residences. Cars will be running by July 1.

JANESVILLE.—An addition to the lines of the electric road will be commenced at once, also a car house will be built costing \$1500. 40x80 18-foot posts to hold six cars. An office and waiting room will be amongst the conveniences of the new building.

KENOSHA.—The Kenosha City Council has postponed the granting of a franchise for an electric street railway to M. Munson, pending the opinion of the city attorney regarding the proposed right of way.

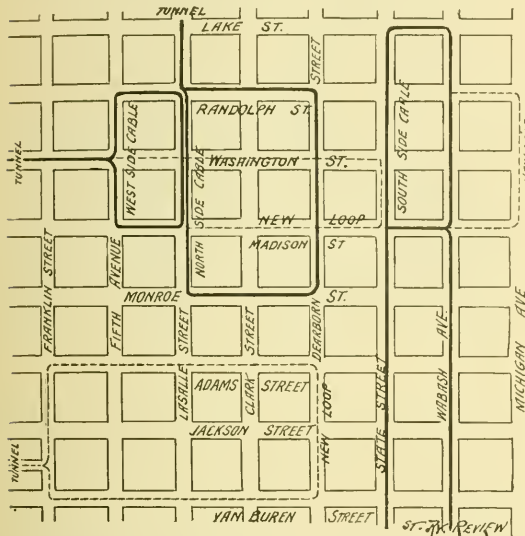
WAUKESHA.—It is proposed to build an electric railway this summer between Waukesha and Oconomowoc.

MILWAUKEE.—J. F. Donges et al. have organized the Lake View Street Railway Company, to connect Donges' Grove with the Whitefish Bay dummy line.

Chicago.

THE Lake street L has been sold about once a day for the last three weeks, but Mr Lauterback, the New York capitalist, denies the allegation that he has bought it.

THE new loop ordinances that go into effect the coming year are best explained by the following map. The dotted lines show the newly granted loop facilities, the dark lines existing cable loop tracks. This brings a majority of west side cable cars to State street and will enable the south side lines to double the present number of cars moved.



THE great West Division strike that has agitated the daily press for the past two weeks has been mainly in the heated think-tank of the enterprising reporter.

THREE thousand West Division drivers, conductors and friends, danced for the benefit of their Benevolent Union.

THE Calumet Electric Street Railway company has secured the material and taken out a permit for the extension of its line from the terminus of the Cottage Grove line to Burnside, at Ninety-third street. This will be a distance of about three miles.

WEST-SIDERS are promised another elevated road. The Metropolitan Elevated railway company has been formed, with a capital stock of \$15,000,000. The incorporators are W. W. Gurley, John Worthy, E. J. Harkness, Herman Benze and J. H. Glade, of this city. Mr. Gurley is the general counsel of the alley "L" road, Mr. Harkness is a member of the legal firm of Jenkins & Harkness, Mr. Worthy is vice-president and general manager of the Commercial Loan and Trust company in the Chamber of Commerce building and the others are connected with the South Side Rapid-Transit company. The ordinance has been granted and the road will be built on purchased property. Work will begin in 60 days. The route is between Congress and Harrison to the city limits. The road will be a great convenience and among the roll of new schemes it is refreshing to find one so well backed.

THE Union Elevated railway is incorporated with \$17,000,000 capital. The first board of directors are John Tyler, Thomas F. O'Malley, William W. Bell, George E. Scott and George M. Eckles, all of Chicago.

TRANSIT schemes for World's Fair grounds are now plenty. Bids are in from the following companies: The Holyoke & Adams company, which claimed to be backed by Henry Villard, offered to build and operate the road, dividing the gross receipts with the exposition company on a sliding scale beginning at 10 per cent if the total receipts are \$500,000

or less and ending with 32½ per cent, if the receipts are \$1,000,000 or more. The fare to be charged to be 5 cents. The Western Dummy Railroad company of Chicago offered to build and operate the road and to give the exposition company 20 per cent of the gross receipts. Fare, 10 cents. Louis Emory, Jr., Chicago, wanted to build and operate the road and pay the exposition company from 10 to 15 per cent of the gross receipts. He would charge 5 cents fare. The Chicago Elevated Electric Railway company offered, if furnished free power by the exposition company, to build the road, and charging a 5-cent fare, give the exposition company four-fifths of it. Or, if the bidder supplied the power, it would give the exposition company 50 per cent of the net receipts. The Decanville system, used at Paris, an elevated steam road, will charge five cents fare. The movable side walk and the Unicycle railway complete the list. A decision will be given in a week.

ABOUT 40 miles of new track will be laid by the West Division railway company during the coming 15 months, in order to hold the agreement of the "omnibus" ordinance.

CYRUS W. FIELD denies that he is interested in the Metropolitan Elevated railway, and the promoters claim the New Yorker is not "in it."

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days; reported especially for the STREET RAILWAY REVIEW, by Munn & Co, Patent Attorneys, 361 Broadway, New York, N. Y.

ISSUE OF MARCH 5, 1892.

| | |
|---|---------|
| Electric Railway, E. Thomson, Lynn, Mass..... | 470,221 |
| Cable Railway and Grip Therefor, C. Bollinger, Harrisburg, Pa..... | 470,280 |
| Cable Railway Switch, K. Rasmussen, Denver, Colo..... | 470,306 |
| Insulator for Overhead Electric Railways, H. D. Winton, Wellesley, Mass..... | 470,356 |
| Fare Register, L. C. Sloovere, Salem, Mass..... | 470,373 |
| Insulator for Trolley Wires, W. S. Andrews, New York, and H. P. Ball, Brooklyn, N. Y..... | 470,417 |

ISSUE OF MARCH 15, 1892.

| | |
|--|---------|
| Electric Railway, E. M. Bently, Boston, Mass..... | 470,654 |
| Motor, for Electric Cars, F. O. Blackwell, Boston, Mass..... | 470,656 |
| Contact Device for Electric Railways, F. O. Blackwell, Boston, Mass..... | 470,657 |
| Electric Railway Motor, F. O. Blackwell, New York, N. Y..... | 470,817 |
| Fare Box, J. W. Haigh and G. Exley, Worcester, Mass..... | 470,933 |
| Elevated Railway Plant, St. John V. Day, Terre Haute, Ind. and Chas. D. Moody, Webster Groves, Mo..... | 470,992 |
| Device for Heating Cars, H. Newman, New York, N. Y..... | 471,016 |

ISSUE OF MARCH 22, 1892.

| | |
|---|---------|
| Axle Box for Street Cars, N. C. Bassett, Lynn, Mass..... | 471,089 |
| Trolley Wire Support, E. A. Sperry, Chicago, Ill..... | 471,151 |
| Trolley Pole Catcher, M. M. Wood, Chicago, Ill..... | 471,206 |
| Street Car Heating Apparatus, J. F. McElroy, Albany, N. Y..... | 471,316 |
| Conduit for Electric Railways, F. O. Blackwell, Boston, Mass..... | 471,375 |
| Cable Take-Up, W. B. Upton, Kansas City, Mo..... | 471,447 |
| Charging Table for Electric Railways, E. P. Usher, Grafton, Mass..... | 471,447 |

ISSUE OF MARCH 29, 1892.

| | |
|--|---------|
| Fare Registering Device, M. Fortuno, Mexico City, Mexico..... | 471,540 |
| Electric Railway, W. C. Goss, Lynn, Mass..... | 471,543 |
| Switching Attachment for Street Cars, O. W. Brenizer, Duluth, Minn..... | 471,714 |
| Safety Attachment for Cable or Electric Cars, A. Raynal, New York, N. Y..... | 471,750 |
| (Street) Passenger Car, C. L. Pullman, Chicago, Ill..... | 471,761 |
| Running Gear for Street Cars, S. Robertson, Cleveland, Ohio..... | 472,001 |

ISSUE OF APRIL 5, 1892.

| | |
|--|---------|
| Fare Register, C. B. Cushman and H. G. Canfield, Akron, Ohio..... | 472,035 |
| Street Railway Track, J. A. Duggan, Quincy, Mass..... | 472,164 |
| Fastening and Seating of Guard Rails etc. for Street Railways, J. A. Duggan, Quincy, Mass..... | 472,165 |
| Safety Attachment for Street Cars, P. T. Townsend, Rochester, N. Y..... | 472,184 |
| Fare Register, W. L. Silvey, Lima, O..... | 472,232 |
| Inclosed Supply System for Electric Railways, J. C. Pyfe, Denver, Colo..... | 472,447 |

PUGET SOUND NOTES.

From Our Own Correspondent.

SEATTLE, WASH., April 9, 1892.

The first of ten new open cars built for the summer travel of the Consolidated Street Railway Company is finished. These cars are built like cable dummies, with seats facing outward at the sides and a platform in the middle for the motorman. He controls by a lever the motors, which are of the new gearless pattern. The park on the Woodland Park branch of this line is being much improved.

The largest award in a damage suit for personal injuries ever given by a jury in this country has been rendered against the Consolidated Street Railway in favor of Mrs. Annie Sears. On September 16, 1891 the car on which she was riding ran into a wagon and she was thrown out on the ground. She received injuries to her head and spine, which have made her an invalid for life. Her suit was for \$25,000, but the jury gave her \$15,000. The same company has won in a suit for \$5,000 damages brought by Mrs. Alice C. Fisher. She claimed to have received a severe shock in June, 1890, when a car ran into an obstruction at a switch; but the jury did not agree with her.

Andrew Jackson, who built all of the cable railways of the city—that is as contractor, has been appointed chief of police by the new Democratic administration.

E. F. Wittler, owner of a large part of the Union Trunk Line and manager of the company has been appointed Police Commissioner.

The new passenger station at the power house of the Union Trunk Line is now completed. The cars from all the branches run in under cover there, and transfers are made.

The Grant Street Electric Railway has extended two and a half miles further, and is now seven miles long. Cars make the run in thirty-five minutes. The power-house, a one-story brick structure, covering a space of 120 feet square, is nearly completed, and the engines will be running next month. There will be three engines of 100 horse power each, and three Thomson-Houston generators of 100 horse-power each; also a dynamo to run 1,000 incandescent electric lights. A machine-shop will be attached to the house. Three new open cars have been ordered; when they are done the company will have six closed cars and four open. The freight car is making daily trips.

The case of Edward Blewett against the Front Street Cable Railway Company, of Seattle, has been carried to the United States Circuit Court of Appeals, at San Francisco. Blewett sold some land to the company, and the latter bound itself by a bond of \$15,000 to build a cable road through the property within ten months. The company failed to keep the contract, and Blewett got judgment for \$18,000. He now appeals on the ground that he should have got costs, and the company appeals against the whole judgment.

The Tacoma Railway and Motor Company has increased its capital stock from \$500,000 to \$750,000. Superintendent Gabriel, of the company, has been succeeded by L. J. Tibbits, formerly of the West Street Company, of Seattle. He is greatly improving the service of the cable part of the system. An order has gone into effect that all employees are to be paid by the hour. The extra men who get only a small portion of the day are objecting, and the regular men are siding in with them.

George A. Jennings, a cable car conductor, recently squeezed between the Tacoma power-house door and a car, has filed suit for \$15,000 damages.

The Point Defiance, Tacoma and Edison Electric Railway will be equipped with electricity over its whole length of ten miles. The Thomson-Houston Company has the contract.

The Tacoma and Steilacoom Electric Railway Company will build a \$10,000 club-house at the end of its line to encourage travel.

The Olympia Light and Power Company has purchased the Olympia Railway Company's line. The transfer does away with a conflict for the possession of certain streets.

An electric line will be built, running eight miles from Snohomish to Everett. The road, which will go through a rich agricultural country, will carry much farm produce to market.

THE South Covington and Cincinnati Railway is now in the hands of Cleveland, Ohio, capital. The syndicate comprises John P. Shipherd, Thomas Jopling, G. H. Kindall and Howard P. Eells. The capital will be increased to \$1,000,000, and the route will be extended considerably to numerous small towns.

DETROIT AND RAPID TRANSIT.

THE denizens of Detroit are divided on the vital question of rapid transit. Meetings have been called at various times with the result that the people were divided as usual into two factions. The Free Press vigorously persecuted the trolley, while the News and Tribune lent their aid to progress. Opinion, rancorous ignorance, half-knowledge, and politics has run rife. Philadelphia was not more torn up.

The matter involves the entire history of Detroit street railways, and hinges on the question of the life of the franchise. A bill of complaint has been filed by the city, and the matter will go before the courts.

The franchise was for 30 years. The city claims from 1869, the company averring that it runs from 1879, when the last amendments and ratifications were made. The company has enough faith in its position to go to the expense of putting in electric traction under the ordinance of 1889, although the Board of Public Works will not sanction the deed. Both storage and trolley systems will be installed on Jefferson avenue within sixty days. Mayor Pingree is favorable to the trolley.

A gigantic scheme of elevated belt railway is on foot. The line to be 30 miles long, and C. H. Ellis is the projector. The cost is to be \$15,000,000.

THE new loop cable power station of the West Chicago road illustrated in our February issue, was put in operation several weeks ago and started out without any hitch, and has been running perfectly ever since. That machinery of such ponderous dimension, and occupying so restricted a space as this does, should prove all that was expected of it from the start, is a more than usual compliment to the Pennsylvania Iron Works Company, the builders, and to Chief Engineer Potis.

Two Daily Trains to Montana and Pacific Coast.

On and after April 3d, trains on the Northern Pacific Railroad will run as follows: Train Number Three will leave St. Paul 9:00 a. m. daily, running through to Spokane, Seattle, Tacoma, and Portland, via Butte, Montana. Train Number One will leave St. Paul 4:15 p. m. daily, running through to Spokane, Seattle, Tacoma and Portland, via Helena, Montana. Both trains carry complete equipment of Pullman first-class sleepers, tourist sleeping cars, free colonist sleepers, day coaches and dining cars.

Through Pullman and tourist sleeping cars will leave Chicago 10:45 p. m. daily, via Wisconsin Central Line, for Montana and the Pacific Northwest. First-class vestibule sleeper will leave Chicago 6 p. m. daily, via C. M. & St. P. Ry., for Butte, Spokane, Tacoma, and Portland. These through sleeping cars afford the best of accommodations, and enable travelers to avoid all trouble or delays from change of cars en route.

The dining cars on the Northern Pacific Line continue to meet with favor from the traveling public. No efforts are spared by the company to make this an attractive part of the service. With the superior accommodations now offered, tourists, business men or settlers will find the Northern Pacific Line the best route to Minnesota, North Dakota, Manitoba, Montana, Idaho, Oregon, Washington, British Columbia, Alaska and California.

Montana, Eastern and Western Washington folders "Wonderland" book, Sportsmen's Guide, Yellowstone Park, Broadwater, Hot Springs and Alaska folders for the season of 1892 are now out of press. Any of these publications will be mailed free on application to General or District Passenger Agents, Northern Pacific Railroad, or to Chas. S. Fee, C. P. & T. A., N. P. R. R., St. Paul, Minn.

STREET RAILWAY SPRINKLING.

THE great summer bugbear of street sprinkling, that comes to every municipality, big or little, is receiving attention from a new standpoint, by the United Tramways Sprinkler Co., of Louisville, Ky.

The particular advantages claimed for this method are: economy, safety, improving ease of traction, increasing travel by increasing comfort.



The first illustration in this article shows the sprinkler car ready for operation and needs but little description to make its use clear.

The body of the car is 12 feet long, 8 feet wide and 7 feet high, with an 18-inch crown. This car contains a wooden tank, 11 feet 6 inches by 7 feet 4 inches by 3 feet 6 inches, with a capacity of 2,000 gallons. The car body weighs, when empty, 4,500 to 5,000 pounds, and the weight of the full load of water is 10,000 pounds.



The car is equipped with a short pipe beneath the floor of the car, which is used to sprinkle the track, and with a longer swinging pipe attached by a slip joint to the standpipe and perforated its entire length. Both these pipes are controlled by a lever operated from the front platform. This sprinkler arm is from 6 to 15 feet long, according to the width of the street, and has a diameter

of 4 inches. The arms and all valves are made of brass. The perforation of the sprinkling holes is 3-32 of an inch, with a sliding interior cut-off which can reduce or cut off the stream at will.

The tank can be filled from a flush hydrant with a 5-inch main, in one and a half minutes, at a 30-pound pressure, and one tankful will sprinkle one-half of a 50-foot street for three-quarters of a mile, going at the same speed as a passenger car on the same track. The car usually in practice covers all its ground three or four times per day, and requires two men, driver or motor-man and pipeman.

The work performed is variable as the needs and power used. One horse car will cover six miles of street per day. An electric car will take care of ten miles of street per day.

This system has been in use for three seasons past in Louisville, with the greatest satisfaction to the street railway people, the public and the sprinkler company. The streets have not been blocked by the car, the time of filling being only two minutes, the rate of progress was reasonable as it makes no stop for passengers.

Numerous letters of recommendation have been received by the company, and all indications point towards a successful introduction in other cities.

A NEW PLANT.

THE new plant of the Minneapolis street railway company at Thirty-first street, is nearly completed

Exteriorly the most noticeable thing is the 175-foot stack, but on the interior of the structure are found ten engines, aggregating 2,500-horse-power. The company will employ 100 men at the completed plant and the most of them will have to reside in the near vicinity. Part of the plant will be a relay for some time yet, but the total power that can be exerted by both the plants is 5,600 horse-power.

INDIANAPOLIS INDICATIONS.

VERY good authority and all indications give body to the rumor that the Indianapolis Citizens' Street Railway has been sold by the Chicago owners to a New York syndicate headed by Belnap Shaffer, for \$2,500,000.

Half Rates to Hot Springs.

VIA THE WABASH RAILROAD.

The Wabash Line will sell excursion tickets from Chicago to Hot Springs and return at one fare (\$18.75), on the following dates:

May 6 and 7, good to return until June 10.

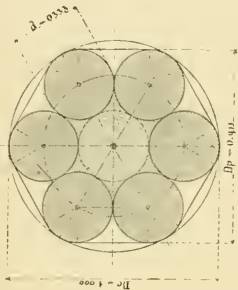
May 16 and 17, good to return until June 15.

Two daily trains from Chicago with coaches, reclining chair cars, parlor cars and compartment sleepers. Railroad and sleeping car tickets through to Hot Springs at ticket office, 201 Clark Street.

-MEASUREMENT OF ROPES.

CIRCUMFERENCE VS. DIAMETER.

FOR the following measurement of ropes we are indebted to Mr. A. S. Hallidie, President of the California Wire Works, of San Francisco. A custom has obtained of measuring ropes by their diameters, and the consequence has been that many disputes have arisen between the seller and buyer, regarding the actual size of such ropes. The custom that has generally prevailed heretofore has been to measure ropes by their circumference, and this custom is still in use where ordinary technical business accuracy is required, and no other way of measuring a rope can be relied on for accuracy and fairness. This applies equally to all kinds of ropes, whether three, four or six stranded.



Take for example a rope made of six strands, its section is as shown in the annexed diagram, and there being no accepted rule as to where the diameter shall be measured, it may be taken at any part of the circumference of the hexagon formed by the six strands.

Now what constitutes a one-inch rope when measured by diameter? Is it one inch measured on a line cutting the axis of two opposite strands, or is it measured on a line cutting midway on the faces of the hexagon, or is it any point between? There can be no dispute as to this method of measurement applied to a round bar of iron; but modify the circle to suit the conditions of a six-strand rope (nearly all wire ropes are thus made), and the trouble begins. The measurement on line "Dc" is one inch, but on line "Dp" it is only 0.911 inches; hence there is a cause for dispute that would not exist if the circumference were taken as the measure, instead of the diameter.

But even in measuring the circumference of a rope there is a possibility of unfairness, in the absence of a defined method of measurement, although this possibility is much reduced. Such ship chandlers and hardware men as are required to sell rope by circumference are very apt to take a piece of rope yarn and wrap it around the rope, and cut across the overlapping parts; but a mining or cable railway superintendent requires a more accurate way of measuring, and will take a piece of twine.

Better than either is a piece of ordinary writing paper about one-quarter inch wide, which is wrapped around the rope and cut off at the overlap with a sharp knife. This will give the circumference measured on the faces of the hexagon, and determine exactly the size of the rope.

A careful consideration of the question will show this advantage in measuring rope this way; each division of space of the circumference is three times that of the

diameter, hence the circumference is three times as accurate, and in every way, both as to fairness, accuracy and simplicity, is to be preferred. The formula shown herewith describes the method:

$$\begin{aligned} d &= \text{diameter of strand} \\ Dc &= \text{ " " circle} \\ Dp &= \text{ " between hexagon sides} \\ C &= \text{circular circumference} \\ Cp &= \text{hexagonal circumference} \\ Dc &= 3 d = 1.000 \\ Dp &= 2.732 d = 0.911 \\ d &= \frac{Dc}{3} = 0.333 \\ Cp &= 9.14 d = 3.046 \\ C &= 3.14 = 3.1416 \\ C &= 1.031 Cp \\ Cp &= 0.97 C \end{aligned}$$

PERSONALS.

COL. J. M. PARKER, of the Marshalltown, Ia., road, was in the city during the month.

JOHN PUGH, of the Baltimore Car Wheel Company illuminated our office with his genial presence a few days since.

J. B. WICKERSHAM, who died March 25th, at Philadelphia, published in 1854, illustrated descriptions of an elevated system for large cities.

W. L. B. ALLEN, representing the Short Electric Railway Company in St. Louis district, has been very low with pneumonia, but is now considered out of danger.

CHAS. J. MAYER spent several days in Chicago this month on his return to Pittsburg from an extended and successful trip in the interests of the R. D. Nuttall company.

T. AHEARN, of Ahearn & Soper, Ottawa, Canada, Canadian representative of the Westinghouse Electric & Manufacturing Company, spent several days in Chicago recently.

W. R. MASON was re-elected president of the Burton Electric Heater Company at the recent annual meeting in Richmond. The company are well satisfied with the results of last year's progress.

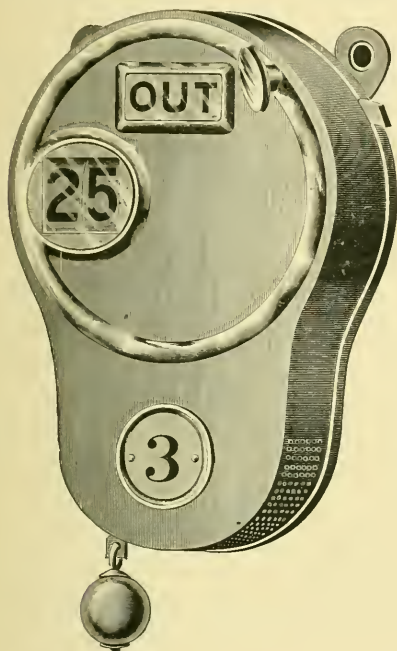
FRED S. WARDWELL, the general manager of the Duluth Street Railway Company, and one of the brightest and hardest working men in the street railway fraternity, called at our office a few days since.

C. G. GOODRICH, general manager of the Minneapolis lines, has returned from an extremely pleasant European trip, and is once more plunged in work. He was not favorably impressed with underground systems.

WM. RICHARDSON, president of the Atlantic and Third Avenue Road, Brooklyn, has been making a western trip, inspecting the lines at Indianapolis, St. Louis and Chicago. He was accompanied by Chas. A. Rich.

A NEW PORTABLE FARE REGISTER.

A NEW Portable Fare Register is being placed on the market by the International Register Company, 302 Dearborn street, Chicago. One of the many claims made for this register is its lightness and compactness, the whole machine weighing less than sixteen ounces. The illustration is three-fourths of full size. A heavy and clumsy register is a great burden to the conductor, particularly in hot weather, and this light reg-



ister is constructed in a thorough workmanlike manner, on well defined mechanical principles, and will not easily get out of order. The whole mechanism is made of a high grade of steel, such parts being tempered as are subject to the most wear. The outside case is made of German silver, highly polished, and can be kept bright and neat with a little care. The register is thoroughly accurate and reliable in its operation, and can not be tampered with.

The face or trip register counts up to 100 fares and can be shifted or reset to "0" from any point. The permanent register, which is seen on the back, has a total capacity of 10,000 fares; if necessary this can be made 100,000, or even 1,000,000. One valuable feature of this permanent register is the concealing slide, which can be set to cover the totals by means of a key, thereby concealing the permanent record from the conductor. This is considered an advantage by many street railway companies, and quite essential by some, for the reason that if on a busy day the conductor should forget to ring some fares (intentionally or otherwise) he is obliged to turn over all the money he has when settling, in order to save himself, as he does not know what the totals are.

Although on the market but a comparatively short time, the demand for these registers has been very large, the manufacturers reporting the equipment of some 15 roads throughout, together with a number of orders from roads putting on additional cars.

WELL DESERVED PROMOTION.

TO the numerous friends all over the country of M. K. Bowen, no news will be more appreciated than that of his appointment on the first of the present month to the superintendency of the Chicago City Railway Company, vice S. T. Pope, deceased.

He is a man peculiarly adapted to a position having the control of a large number of men, from the fact that he has gone through all the rough as well as smooth places in attaining to the position he now fills.

M. K. Bowen was born September 10, 1856, in the military barracks, at Jefferson, Mo., his father being the well-known officer, General John S. Bowen, a graduate of West Point.

He was sent to college early and graduated from St. Louis and Washington University, St. Louis. Going to work in earnest when young, he soon became a proficient machinist and was appointed foreman of Vulcan Iron Works and Rail Mill soon after, and stayed 1½ years, going to the same position with Missouri Iron Furnace Company, at expiration of that time.

He was, however, not made of the stuff that does not advance, for we next find him Assistant City Engineer of St. Louis, which position he held with credit to himself and benefit to the people, for 3 years. His next venture was Assistant Engineer of Survey and Construction of the Atlantic and Pacific Railway, and was offered the position of Engineer in Charge of Triangulation Surveys, etc., of the Lower Mississippi River, for Mississippi River Commissioners, and accepted, which position he held for 2 years. Going west soon after, his ability was called into requisition by the Metropolitan Street Railway Company of Kansas City, Mo., as Assistant Engineer of Construction, which position was so filled as to call forth the high commendation of the Company. His ability was so thoroughly appreciated that his promotion to Chief Engineer and then to Superintendent was only a matter of a very short time, which latter important office he filled to the satisfaction of all for 4 years. He was then called to New York to represent the Short Electric Railway Company, but was soon offered by the Chicago City Railway Company the position of Assistant Superintendent of their lines; and now, through the decease of Superintendent S. T. Pope we see him at the head of a railway system second to none. With such a man looking after the workings of the 2,500 employes everything will tend to the advancement of the interests of not only the men but of the stockholders of the Company.

He is a very pleasant gentleman to meet, and we feel sure of his gaining a warm place in the hearts of the people of Chicago, and among the men, by a fair administration of all difficulties which may arise between them.

ECHOES FROM THE TRADE.

THE ST. LOUIS CAR CO. has a new electric car truck of the extended spring base type.

W. E. BAIRD, of the Eddy Electric Company, reports a successful trip in the South and West.

THE BUSHNELL SPRING COMPANY have just sold a large order to the Consolidated Electric Railway Company, of Atlanta, Ga.

THE EDDY ELECTRIC COMPANY, of Windsor, Conn., contemplates the immediate erection of a two-story and basement addition to their plant.

CASSELL'S FAMILY MAGAZINE for April has an illustrated article on "Trains," giving a brief description of the progress of roads in England.

THE SIOUX CITY ENGINE WORKS doubled their sales in 1891. The business has outgrown its charter and will be reorganized in greater proportions than before.

THE HAMILTON CORLISS ENGINE COMPANY, of Hamilton, Ohio, have received the contract for the steam plant for the Naumkeag Street Railway, of Salem, Mass.

THE J. M. JONES' SONS, Troy, New York, have started on the construction of 20 new cars for the Brooklyn City Railway, which will be mounted on Robinson's Radial Truck.

THE J. G. BRILL COMPANY, Philadelphia, have received an order from the Brooklyn City Railway for 15 new open cars, which will be equipped with the Brill Truck.

THE Price Railway Appliance Company, of Philadelphia is receiving fine recommendations for its type of rail construction, notably from the People's Passenger Railway Company.

THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY have taken an order from a Western syndicate to furnish 200 motors for use on several roads controlled by the purchasers.

THE LEWIS & FOWLER MANUFACTURING COMPANY, of Brooklyn, are building 20 open cars for the Brooklyn City Railway, the same to be equipped with the Robinson Radial Truck.

L. E. MYERS, manager Chicago office of the Detroit Electric Works, has moved his headquarters to rooms 917 and 918 Monadnock Building, a visit to which will well repay all his friends.

D. B. DEAN, formerly connected with the Electric Merchandise Company, has taken the general Eastern agency for the McGuire Truck, and will make his headquarters in New York.

CAMPBELL & ZELL, of Baltimore, Md., have secured the Ramsey Engineering Works, of Locust Point, Baltimore, and will now be the more able to supply the demand for Zell water tube boilers.

THE BABCOCK-WILCOX boiler in a recent test showed to great advantage its superiority over its competitors. The record was one to be proud of, and the test was the most thorough, perhaps, ever given any boiler.

C. P. CHASE, City Engineer of Clinton, Iowa, has published a very comprehensive treatise on Brick Pavement, containing compilation of data on the subject and results of personal tests by himself. Price \$1.00.

THE ELECTRICAL SUPPLY COMPANY, of Chicago, have taken the agency for the well-known Boston trolley, manufactured by Albert & J. M. Anderson, of that city. They will constantly carry a large stock on hand.

CHAS. A. SCHIEREN & Co., will make for the Trenton Passenger Railway four electric belts, each 24 inches wide, and 112 feet in length; and for the Powelton Electric Company, of Philadelphia, a 36-inch double belt, 132 feet long.

HEALY STEAM MOTORS, Detroit, have been purchased and put in operation by the Owasso and Corunna Street Railway. The shops are well filled with orders, and the progress being made in introducing the motor is very gratifying.

JOHN STEPHENSON COMPANY, of New York, are as usual, crowded with work, including some very large orders. Among smaller contracts are new cars for Rochester, N. Y., and the Prohibition Park electric road in Sioux City.

ALBERT & J. M. ANDERSON, 21 Hamilton street, Boston, Mass., have issued a very handsome 20-page catalogue, illustrating and describing the Aetna insulating material, and the other popular products manufactured and sold by this firm.

THE CUSHION CAR WHEEL COMPANY recently placed a set of their wheels on trial with the Calumet Electric Railway Company, of this city, and have now received an order for 36 wheels—12 of 33-inch, and 24 of 30-inch, to be delivered May 1st.

THE TRAMWAY RAIL COMPANY, of Pittsburg are now ready to mail a beautiful 56-page catalogue, illustrating all the rails and joints and special track work manufactured by that company. This will be sent to all interested, upon application.

THE INDEX AND ANNUAL SUMMARY of the transactions and proceedings of the Association of Engineering Societies, compiled and edited by John W. Weston, 78 La Salle street, Chicago, secretary of the association, is a most valuable reference work. It will be mailed on receipt of 50 cents.

THE FALLS RIVET & MACHINE COMPANY, Cuyahoga Falls, Ohio, have under way a large order of line shafting and friction clutches for the Clinton Gas Light & Coke Company, of Clinton. The plant will be used for street lighting and railway service.

THE DETROIT ELECTRICAL WORKS are the recipients of flattering testimonials from the Athens, Ga., Railway Company. Dubuque will soon have Detroit motors, and the Omaha, Nebraska, Land Co. has an order in for four 30-horse-power machines.

BROWNELL CAR CO., of St. Louis, has a flattering recommendation of their accelerator, from C. T. Yerkes, of Chicago. They are building 50 cars for the Baltimore Traction Company and 30 accelerators will be put on the North division cable line in Chicago.

THE STEARNES MANUFACTURING COMPANY, of Erie, Pa., will soon establish a western agency, under the charge of A. F. Griswold, who has been connected with the firm for many years, and whose headquarters will be in room 120 of the Rookery building, this city.

THE ROBINSON RADIAL TRUCK, which has made such a splendid record on the West End Road in Boston, and elsewhere, has just been specified for 40 open cars which are being built for the Brooklyn City Railway. The trucks have given satisfaction wherever tried, and experience shows that a trial order is followed by a supplementary order.

THE LACLEDE CAR CO., of St. Louis, is full of work. Besides the big contract for the Third Avenue, New York, line, Colerain Avenue, the East End and the Browne street lines of Cincinnati want Laclede cars. Duluth, Minn.; Waxahatchie, Tex.; Watertown, Wis., and Covington, Ky., have orders in. The works are running both night and day.

THE NEW YORK OFFICES of the Short Electric Railway Company are removed to the Mills' building, 35 Wall street, to gain more room. Here E. E. Wessels and C. C. Curtis hold out the advantages of the Short system to all who will and to all who will not listen. The company is to be congratulated on its new quarters and its competent New York representatives.

THE RAILWAY REGISTER COMPANY, New York city, report business very satisfactory. The new register recently put upon the market, is giving excellent satisfaction. At a recent test made by the West End line of Boston, one of these registers was worked 400,000 times by mechanical power, and the wear was scarcely perceptible. The only part being weakened was a spring of the value of 5 cents.

THE WIGHTMAN ELECTRIC & MANUFACTURING COMPANY, Scranton, Pa., are much pleased with the results of the new motor which they are now trying on the East Cleveland line at Cleveland. The management express themselves as well satisfied, and that a car with this

equipment recently ran one mile in two minutes and six seconds. They are also delivering 25 motors to the Sea Shore Railway, of Asbury Park, N. Y. Among roads equipped are Scranton, Easton, Altoona, Du Bois, Pa., Attleboro, Mass., Auburn, N. Y., Cleveland, Ohio, (2 roads) Wheeling, W. Va., St. Joseph, Mo.



THE MCGUIRE MANUFACTURING COMPANY, Chicago, are full of work. Mr. Cook has just returned from a western trip, in which he secured orders for 8 additional trucks for Colorado Springs, being the fifth order from that road: 6 for the North St. Paul Street Railway, 70 for the Independence and Park Railway, of Kansas City.

THE THOMSON-HOUSTON ELECTRIC COMPANY, in their recent annual meeting in Middletown, Conn., stated through the vice-president, that the outlook for the year was most encouraging. B. F. Peach, Jr., first assistant treasurer, submitted his report that the total surplus, February 1, 1893, was \$7,564,593.46 and that the total cash dividends were \$1,731,131.88 with a profit for the year of \$2,760,080.25.

DORNER & DUTTON, Cleveland, are very busy these days. They have just sold 30 trucks in Ft. Wayne, and 36 in Rochester. Their new truck is meeting with a most flattering reception, and orders which have come in recently have filled their factory up to its fullest capacity. These trucks are very substantially built, and reflect due credit on the quality of work for which Dorner & Dutton are so well known.

THE Colles Patent Self-Jacketed Pressure Heater, Purifier and Oil Extractor, Chicago, is fast gaining ground, and the company are having a very satisfactory share of the trade. Although not the lowest priced heater on the market they are considered so in the end by many users, because it boils the feed water by exhaust steam. One of the principal points in its favor is that it has removable heads for examination and is in every way accessible.

THE PENNSYLVANIA IRON WORKS COMPANY, Philadelphia, have under way the construction of a larger amount of cable-driving machinery than has ever been built at one time by any firm in the world. Their contracts include three power houses for the Broadway road, two for the Third Avenue, New York; the Blue Island Avenue plant, and Van Buren station for the West Chicago Cable road, and are also rebuilding two power stations in Philadelphia.

THE BASS FOUNDRY AND MACHINE WORKS, of Ft. Wayne, Ind., has secured the order for the entire steam plant equipment for the Ft. Wayne Street Railroad, including engine and boiler capacity amounting to 150 horse-power each, and all the heaters and pumps. Although the Bass Works have not heretofore been prominent in street railway work, they are builders of an exceptionally good product and managers may expect to hear more of them from this time on.

THE SHORT ELECTRIC COMPANY in its late election installed the following officers for the ensuing year: J. Potter, president; S. H. Short, vice-president and chief electrician; Charles B. Lothrop, secretary and treasurer; E. E. Higgins, general manager; William B. Bolton, general counsel. The Short people have also captured

the contract for the Chambersburg, Pa., equipment. This contract covers the fitting of the cars with motors, etc., and station equipment. The order will be given at once, and the Electric Company guarantee to complete their contract within 90 days.

THE INTERNATIONAL REGISTER COMPANY, of Chicago, have removed their office from 435 "Rookery" to 302 Dearborn street, where their factory is located. Larger shop space has been secured and new machinery added to accommodate their increasing business. Street railway companies are showing a great deal of interest in the registers manufactured by this company, numerous inquiries and orders being received daily. The company are now perfecting their stationary register and will announce its completion in a short time. Something entirely novel and very simple is promised for this machine.

GEORGE H. HOLLINGSWORTH of Beaver Brook, Waltham, Mass., has secured the contract for the entire car equipment of the Newton & Boston Street Railway Company, which will build at once about five miles of track, connecting Newton Center, Newton Highlands and Newton Upper Falls with Newtonville. This equipment will consist of five open and five closed cars, which will be fitted with all the latest improvements, and be models of elegance and luxury. Mr. Hollingsworth is the builder of the combination car, which is attracting so much attention on the part of the Street Railway men at the present time in Boston and vicinity.

THE American Street Railway Track Company has been organized under the laws of New Jersey, with a capital of \$300,000, as successor to R. T. White, who has sold to them all his cable and electric railroad and track patents. Gen. E. S. Greeley, of E. S. Greeley & Co., 5 and 7 Dey street, railway and steamship supplies, is president; S. R. Bertrom, of the Equitable Mortgage Co., is treasurer, and Samuel D. Nye, formerly general manager of the Worcester Steel Works, is general manager. The company will have offices in the Mills' building, N. Y., and possibly will also have offices in Chicago and Boston. Mr. White will devote his time to the development of his other patents and will retain his present office in the Mills' building.

AN important consolidation of manufacturers of Electrical insulations has been recently effected between the Johns-Pratt Co., of Hartford, Conn., and the Gould & Watson Co., of Boston, Mass. The Johns-Pratt Co. are the manufacturers of the well-known insulating material, Vulcabeston, now used by all the large electrical manufacturers. The Gould & Watson Co. are identified with the manufacture of moulded mica, well known in the field of electric railway insulation. These two interests are now combined and the business will be conducted by the Johns-Pratt Co. The product of the consolidated companies will cover every requirement for electrical insula-

tion. C. Tennant Lee, the inventor of moulded mica, will be the consulting chemist of the company, and the H. W. Johns Manufacturing Co., 87 Maiden Lane, New York, with branches at Chicago, Philadelphia, Boston, Atlanta and London, will continue to be the selling agents as formerly.

THE WALKER MANUFACTURING COMPANY report the following orders on their books for differential drums: Washington and Georgetown Railroad, 6 14-foot drums; Baltimore Traction Company, 4 13-foot drums; West Chicago is a heavy patron to this extent: for the Blue Island station, 2 16-foot and 6 13-foot drums; the Van Buren street station, 4 13-foot, 4-inch drums; Washington street station, 4 12-foot drums; total, 16 drums. The Baltimore City Passenger will need 2 10-foot, 2 12-foot, and 6 14-foot drums; the Catskill Cable, (Otis Brothers, N. Y.) 2 12-foot drums; the Central Traction of Pittsburg wants 1 12-foot and 1 16-foot, while the new Mt. Auburn power-house at Cincinnati, will require 4 12-foot drums. The new winding machinery for the Elm street incline, has been shipped, while activity in hydraulic machinery is undiminished.

THE LAMOKIN CAR WORKS, Lamokin, Pa., report business for April rushing, to the following effect: 8 16-foot closed cars, Robinson trucks, and 2 8-seat opens to the Richmond and Manchester Railway Company: For Zanesville, Ohio, 4 9-seat closed end car bodies for May delivery. To the Cape May and Sewells Point Company 8 8-seat opens, Robinson trucks, May delivery. For the Milwaukee street railway 1 18-foot closed, Robinson truck, and 1 open. The Rock Creek Railway Company, of Washington City, has ordered 6 8-seat opens, Cochran's panels, palace finish. 6 26-foot closed palace cars, quartered oak finish, Wilton carpet, bronze trimmings, Cochran's patent, tied at corners by steel guard rail stays. To the Derby Street Railway (Conn.) 1 open car, Robinson motor trucks. This is a magnificent showing, out not more magnificent than the cars themselves.

THE SHORT ELECTRIC RAILWAY COMPANY announce recent sales, the Braddock Electric Railway Co., Braddock, Pa.; the Union Passenger Railway Co., Chester, Pa.; the Ft. Wayne Electric Railway Co., Ft. Wayne, Ind.; the Schuylkill Electric Railway Co., Pottsville, Pa.; Beatrice Rapid Transit & Power Co., Beatrice, Neb.; Janesville Street Railway Company, Janesville, Wis.; the Spokane and Montrose Motor Railroad Company, Spokane Falls, Wash.; the Bloomington City Electric Railway Company, Bloomington, Ills.; the East Liverpool and Wellsville Street Railroad Company, East Liverpool, Ohio; the Georgetown & Tenallytown Railway Company, Washington, D. C.; the West End Street Railway Company, Rockford, Ills.; the Jamestown Street Railway Company, Jamestown, N. Y.; the South Covington and Cincinnati Street Railway Co., Cincinnati, O., and the Lincoln Street Railway Co., Lincoln, Neb.

THE ELECTRIC CAR CONDUCTOR.

ADAPTED TO SUIT PROVIDENCE (R. L.)



RESSED in a natty suit of blue, brass-buttoned up and down,
With patent leathers on his feet, the finest in the town,
Gold rings upon his fingers and diamonds in his tie,
A roguish smile upon his lips and cunning in his eye.

"I'm a jolly car conductor, and I love the ladies all;
I'm a masher, quite a slasher—I'm so handsome, trim and tall—
Oh, you'd say I'm just a beauty, if your eyes could only see
How the girls' hearts quickly flutter, when they take a ride with me."

He helps the ladies gently on, each young one with a squeeze,
His heart is palpitating and he's bending at the knees,
When, down upon his open palm, the nickel it is pressed,
Love's wild, ecstatic raptures go thrilling through his breast.



And when the pretty high school girls in French begin to speak,
And tired of quoting from Voltaire they jump to ancient Greek,
"Begorra," the conductor says, "it's lookin' blue for me,
I should have studied French and Greek before I crossed the sea."

But then, in meek disappointment, this thought he flings away,
Averring such acquirements would not increase his pay,
He vows he could give wrinkles to the smartest man in town
On the science of flirtation and the art of "knocking down."



At last the high-toned demoiselles all turn their backs on Pat,
He weds some basement Biddy and installs her in a flat.
In course of time, when baby comes, he throws aside the rings,
And, to cheer the infant in his lap, the old refrain he sings:

"I'm a jolly car conductor and I love the ladies all;
I'm a masher, quite a slasher, I'm so handsome, trim and tall;
Oh, you'd say I'm just a beauty, if your eyes could only see
How the girls' hearts quickly flutter when they take a ride with me."



"WE must speak by the card or equivocation will undo us." "Why?" asked a classical street car rider "do the signs in street cars all read, "no spitting on the floor. Does it mean that this disgusting familiarity with the car seats will be tolerated or that the ceiling of the car has been put in for use as a spittoon?"

ADVERTISEMENTS FOR HELP OR POSITIONS WANTED WILL BE PRINTED IN THIS COLUMN FREE.

FOR SALE. 2 No. 20 500-volt Edison Railway Generators, 65 H. P. complete, with regulating devices, and in perfect working order, for \$1,625 each. 3 No. 10 220-volt Edison Dynamos, complete with regulating devices, and in perfect order, for \$700 each. 1 Hawkeye 220-volt Dynamo, 200 Amperes, for \$500. 1 Hawkeye 220-volt Dynamo, 150 Amperes, for \$350. 3 Baldwin Steam Dummy Locomotives, from 8 to 11 tons, 2 for \$500 each. One as good as new for \$2,500. All of them were in daily use last summer. Address

DAVENPORT & ROCK ISLAND RY. CO.,
Davenport, Ia.

FOR SALE. 1 Baldwin Saddle Tank Engine, weight, 9 tons, cylinders 9 x 12 in., built in 1881. Price, \$1,000. 1 Baldwin Steam Motor, weight, 20 tons; cylinders 9 x 12 in.; built in 1884. Price, \$1,500. 1 Baldwin Steam Motor, weight, 11 tons; cylinders, 10 x 14 in., built in 1887. Price, \$2,000. All the above standard gauge, have Fames brake, and are in excellent condition. Also 300 Tons 48 lb. Slot Rail, 2 Walker C Frames with 12 ft. Staggered Arm Sheaves, 1 Set Double Cable Driving machinery, with four Ring Walker Differential Drums. 1 Hazelton Tripod Boiler, 150 H. P. 1 Hazelton Tripod Boiler, 300 H. P. All the above but little used and in excellent condition. CONSOLIDATED STREET RAILWAY CO., Grand Rapids, Mich.

WANTED. Second-Hand 250 or 300 Horse Power Corliss Engine, for street railway use. Must be in good condition. Ready for delivery by May 1st. Address X R.
Care STREET RAILWAY REVIEW.

WANTED. A position as Superintendent or Assistant with an Electric Road, by a young man thoroughly competent in all branches. Address J. E. M. P. O. Box 792 Syracuse, N. Y.

FOR SALE. 125 Tons 38 lb. Second Hand Steel Tram Rails in excellent condition. 100 Tons 25 lb. Second Hand Steel T Rails, but little used.
D. E. GARRISON & CO.,
219 N. 4th St., St. Louis, Mo.

NOTICE Public notice is hereby given, that the interests of Garson Myers and the Calorific Ventilating Heating Company has ceased under the license heretofore permitted them to manufacture Street Car Heaters, and to sell the same, under patents Nos. 336,392 and 358,432; and all persons are hereby warned not to purchase or deal with the said Garson Myers, or the said Calorific Ventilating Heater Company, in reference to the purchase or use of said stoves or heaters or any infringement of same, after date hereof.

LYMAN P. CONVERSE, Inventor,
707 Wells St., Chicago.

Lyman P. Converse, Peter Fish, Proprietors.
Chicago, Ill., April 6, 1892.

WANTED Draughtsman. To a good man, with experience in car-building, an excellent position with a large manufacturing company is open. Address J, care STREET RAILWAY REVIEW.

C. E. LOSS & CO.,
General Railway Contractors.

Estimates made on all classes of Engineering Work.

MUSKIEGAN, ILL.

WE PURCHASE TOTAL ISSUES OF

STREET RAILWAY BONDS.

. . . . CORRESPONDENCE INVITED.

N. W. HARRIS & CO., BANKERS,
163 Dearborn Street, Chicago.
15 Wall Street, New York.
70 State Street, Boston.

A PITTSBURG man who knows it all, is advocating that old bald-headed delusion of a five-cent fare for passengers who are seated, and a three-cent fare for standing passengers. When the scheme was published in Chicago the roads here offered to remove all the seats and let everybody in on the car floor three cent deal; and if the dual rate was attempted that would be the only thing to do, as the crowds who wanted to ride standing wouldn't give the five centers a chance to enter once in a mile.

In describing the electric lines at Nashville, Tenn., in our February number, we omitted to state that the cars illustrated in that article were equipped with Detroit motors.

THIS SPACE

Will be used to disseminate
information which

BELONGS TO

All Street Railway men who are interested in good car wheels
such as are made by the

Griffin Wheel and Foundry Co.

CHICAGO.

SEE NEXT ISSUE.

THE LATEST

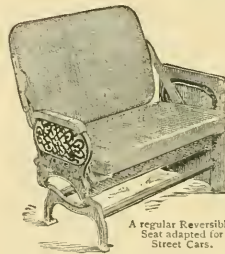
— FOR —

Electric and Cable Cars.

STREET CAR

SEATS

Of Every Description.



A regular Reversible Seat adapted for Street Cars.

With or without springs, covered with Carpet, Plush and Rattan.

Hundreds of References. Thousands in Use.

Catalogues, Estimates and Samples on Application.

THE HALE & KILBURN MANFG. CO.,
Philadelphia New York Chicago.

J. R. PARROTT, President. F. W. PARROTT, Treasurer.

The Parrott Varnish Co.

BRIDGEPORT CONN.

MANUFACTURERS OF

The Finest Grades of

. . . . **RAILWAY VARNISHES.**



WINDSOR & KENFIELD,
PUBLISHERS AND PROPRIETORS,
334 DEARBORN ST., - - - CHICAGO.
Published on the 15th of each month.

SUBSCRIPTION, - - - ONE DOLLAR.
FOREIGN SUBSCRIPTION, - - - TEN SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW
Coxton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR, Editor. F. L. KENFIELD, Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW,
334 Dearborn Street, Chicago.

Entered at the Post Office at Chicago as Second Class Matter.

This paper member Chicago Publishers' Association.

VOL. 2. MAY 15, 1892 NO. 5

ALREADY preparations are well in hand for the next annual convention of the American Street Railway Association. As repeatedly advocated in these columns, the exhibits will be confined to one place, and that has already been selected. It is the entire first floor of one of the largest business houses in Cleveland, and within two blocks of headquarters' hotel.

A LEGAL case of special interest will be found mentioned in our Law department this month. It is that of the "slander" case, in which a discharged conductor sues the St. Paul City Railway for damages, claiming slander in words used by Superintendent Sloan, who gave as a reason for the conductor's discharge that the latter "turned in a short register, and traded transfers." The court holds that such language by the company's official does not constitute slander on the part of the company; and that while it delegates to him authority to hire and discharge employes, it is under no obligation to give a reason to the person so discharged for its action in so doing, and that the company never delegated to its officers authority to give any reason for dismissal.

THE value of created travel which has been so persistently advocated by this paper, receives a strong commendation in a recent statement of Col. Elkins, of the Pittsburg and Duquesne Traction Company. He says: "Our experience last summer taught us the advantage of giving the people attractions to induce them to ride. It not only benefits the people, warms up their

hearts and makes them happy, but it increases our travel and consequently our dividends. You can say that we will provide music at both the Highland and Schenley Parks during the season, and will make ample arrangements on all our lines to accommodate them comfortably. It is to our interest to popularize not only our lines, but the parks as well, and we will not be sparing of expense to do it."

APROPOS the Sioux City Sunday scrape, an exchange remarks facetiously that by hiring Jews and Seventh Day Adventists to operate the cars all difficulty may be overcome. The law is specific in permitting them to work on Sunday. It says: "Nothing herein contained shall be construed to extend to those who conscientiously observe the seventh day of the week as the Sabbath." This clearly would permit them to operate cars just as it would to husk corn. Now let the Sunday street car men keep Saturday as a day of worship until the Legislature meets again, so that it can amend the law. Sioux City would be a great field for a Seventh Day revival.

OUR readers will learn with regret of the disaster which came upon the plant of the Northern Car Company, and by which its entire works were burned. Fortunately the office and draughting room burned last, enabling the saving of all plans and models. With characteristic enterprise and while the smoke was still rising from the ruins, the directors met, reorganized, and had materials purchased for new work, construction of which will be pushed with all energy. The new plant will be better equipped than the old, and facilities increased, and while the time which must necessarily elapse will prove a loss, we voice the best wishes of the fraternity that the loss may prove as small as possible under the circumstances and that the future of the company may prove as bright as the skies under which it builds.

DELEGATES to the Buffalo convention will recall the thrilling tale of woe of the Pennsylvania brethren, and their multitudinous burdens in the shape of taxes. All incorporated companies pay a state tax on gross receipts, and are therefore exempt from local taxation. It has been a time-honored custom, however, to levy a local tax on street car horses. President Sage, of the Easton Passenger Railway, at last became weary of this assessment on his motive power, and reasoned that as locomotives were not thus taxed, his horses should be exempt. Under an agreement with the County Commissioners, the road refused payment, and on trial Judge Reeder found for the company. Lines in other cities then made similar fights, but were all defeated. Mr. Sage then carried his case to the highest court where the Chief Justice affirmed Judge Reeder's decision. The ruling will effect a saving of many thousand dollars annually to the companies using horses, though it is hardly to be expected they can recover any of the money paid in past years.

LAW BREAKERS never become law enforcers except through motives of malice or self-gain. The enforcement of the Sunday law by a degraded saloon element in Sioux City, is very like the devil impaling himself on the barbs of his own tail. In retaliation against the enforcement of the liquor laws, the attempt was made to force public sympathy by striking at that necessity of modern city life—its transportation systems. Although traffic was paralyzed for the greater part of the day, the obstructionists found themselves in such ill-favor that very little would have sufficed to start the flame of public indignation, in which event fate would have aid a no very kindly hand upon some people. Later the court held that the operation of street cars was a work of necessity, and though not specifically exempted in the Iowa code, dismissed the prisoners and the charges against them.

THE good people of Leavenworth are experiencing a state of mind born of uncertainty. They generously raised a bonus of a quarter of a million to secure the construction in their city of a system of street cars operated by compressed air. The fact that the promoters of the air system had made a dismal failure in an eastern city, and that cars are not in regular service in any city in the country by this method, does not seem to have once entered into the considerations of the city council in endorsing the undertaking. The mere granting of privileges, however, was not so bad, as the subsequent attempt on the part of city officials to declare forfeited the rights of the old horse car company, which had served the public faithfully for eight years. Now that the latter are anxious to adopt electricity, and put in a first-class equipment, they are denied on the ground that the city has so committed itself to the compressed air company that no action can be taken. As the air line has nearly two years yet in which to complete its road and is doing nothing in the way of active construction, matters are thoroughly at a standstill.

The whole history, as related in another column, is a most forcible illustration of the folly of placing the control of street railways under municipal ownership and management. Such experiments would then be made at the expense of the taxpayers, and as in this case, real rapid transit and the interests of the public are hampered and made to suffer. Cable and electric lines, which have abundantly proved their efficiency, were not considered except incidentally, and the city fathers with one acclaim wildly seize the phantom to find within their grasp nothing but that most intangible of the elements—air.

THE facts and figures as to "Tramway Regulations in Europe," gathered by American consuls and ministers, form the subject for a second paper, published in this issue. The Department of State have rendered a no small service in securing this data. The reports will, however, be something of a surprise to American readers, who have always been educated to believe that rates of fare abroad were but a fraction of

those prevailing here; and when coupled with the vastly inferior accommodations rendered the public by European tramway companies, as contrasted with the facilities furnished in this country, conclusively prove that considering *quid pro quo*, our roads are carrying for, if anything, less, than foreign lines. The time of even the cheapest labor in this country is worth something, and when we read that in many cities abroad the omnibusses running on regular routes make much better time than the street cars, the difference in our fare is still more apparent.

The methods of fare collection and the frequent necessity in most cities for exhibiting the fare receipt to district inspectors, would be considered an unmitigated nuisance in this country, and would never be tolerated. The zone system about which so much has been said by newspaper correspondents and other self-constituted authorities who have had no experience in railway work, but who have held the system up in profuse commendation, is not found to yield either the public or companies the great advantages which were supposed to exist.

A careful study of the report cannot result in other than a settled conviction that our American system of intramural transit, like other Americanisms, lead the world. We have yet to learn of an American manager visiting Europe, and returning to adopt on his line any of the prevailing methods there; and there can be no doubt that our bretheren across the water, visiting us in 1893, will carry back new ideas and suggestions of improved management which will mark the commencement of radical changes in motive powers and methods which are at present unknown there.

SOMETIMES there is found a newspaper which realizes things as they are, without the enveloping mist of ignorance or superstition. The Wilkesbarre, Pa., Record says:

The immense business developed by the extension of the West Side electric road is a huge surprise, even to the projectors. Every mile of branch road built seems to bring out traffic, the existence of which was never heretofore suspected. The more accustomed people get to traveling on the street cars, the more they want to travel and do travel. The cutting in two of the fares has much to do with this, but aside from all this reason, the business is developing enormously and is already proving a bonanza for the stockholders.

GREAT advance can be noted in the plans under which power houses are now constructed as compared with those of two or three years ago. Not only have recent builders profited by the experience of others in securing a more sightly and economical distribution of room, but companies are learning the lesson of false economy in building only for immediate necessities. To remodel an old plant into a new one usually costs much more than the new building would have cost in the first place, and even then will always be a patched affair. Build for the future and save money.

PROGRESS OF TO-DAY.

FROM every quarter reports are pouring in of construction work already commenced, and reconstruction of old lines to an unusual extent. The present is most emphatically an era of transition in the motive powers of street railways. What few new horse lines are being laid are going down with heavy iron of sufficient weight to carry mechanical motive power as soon as existing and temporary obstacles can be overcome. In Chicago, New York, Baltimore, Cleveland and San Francisco large sums are being spent in extending the present cable systems. In Brooklyn, Philadelphia, New Orleans and Philadelphia the trolley has at last found entrance.

In smaller cities the trolley system is being extended, and introduced in many large towns where horse lines would have proved dismal failures. Much attention is being attached to the paying qualities of inter-urban lines, where light freight and express service can be handled in addition to usual passenger business. A large increase in mileage of this character may be confidentially expected. There is scarcely a road in the entire country but is either extending its lines, rebuilding old ones, or adding to present equipment. The demands on the supply houses were never greater, and this, too, in view of the fact that their number has grown rapidly in the last two years.

The above cannot but be interpreted as a general healthful business condition throughout the country. When money is tight, the street railway company feels the stringency, even more than is generally supposed, as their number of pleasure riders, and those who are not by necessity compelled to ride, is greatly reduced; and it is from these classes that most of the profit is derived.

Population is more and more centering in cities, and the street railways are playing a most important part in this great work. This rapid influx has largely been made possible by the modern methods of urban transportation, and this fact should receive due consideration from managers in estimating the necessities of future equipment. Indeed, this increase has been so rapid that comparatively few companies, especially in the larger cities, but find themselves short on rolling stock. The public, as usual, complain, and entirely lose sight of the fact that the manager has done the best that experience can teach to estimate the unknown quantity of cars required. This month, in Northern cities, is especially trying, as the riding increases—as it always does—with milder temperature, and yet it is impossible to displace all the winter cars with the much larger seating capacity of the opens.

Instead of complaining at crowded cars, each citizen should take pride in the unmistakable evidence of the great and unprecedented growth of his city. Orders for summer cars have to be placed early in the fall and winter, and it is not always in the scope of any human foresight to know exactly what the demands of a half-year later will be.

ST. PAUL'S NEW POWER HOUSE.

THE stations of the St. Paul and White Bear electric line, running out of St. Paul to a contiguous summer resort, is to be built at the corner of Pennsylvania and Lane avenues.

The building is to be of brick, 85 by 125 feet, and in the Gothic style. The floors are to be brick and hardwood. The cost will be \$13,000 for the walls alone. The architect is Walter Iffe.

The whole building, which will contain the offices as well, will be lighted by electricity, with stand-pipe and hose for fire protection. A repair shop is to be connected with the building, and every convenience will be added.

A feature is an octagonal smoke-stack 100 feet high, with 17-foot base, and will contain 105,000 brick.

The building will be finished about May 20, and electric light enables the construction men to work night and day.

Eight cars will be put on the line each with two 25-horse-power motors. This most popular of St. Paul's summer resorts, will receive additional boom, and vacant lots along the road are being sold at good figures.

EAST LIVERPOOL AND WELLSVILLE.

LAST December the REVIEW published an account of the Liverpool and Wellsville electric road of Ohio. This was just after the successful trial trip and as it completed a distance of 8 miles, and operated 8 cars in just three months after ground was broken, doubts were entertained by some as to its solidity. Now, however, after the winter add spring freeze and thaw have done their worst, it runs as easily as any well constructed steam road. This is mainly due to the personal superintendence of Al. Johnson, of Cleveland. The success of the road has been so great that a larger car equipment has been ordered from J. G. Brill & Co., 8 cars to be furnished, making 16 in all. To equip and run the additional equipment, the Short Electric Company will put on 16 20-horse-power motors, single reduction, and 2 additional 150-horse-power generators.

R. H. Jones & Co., of Cleveland, who put in the steam plant, are required to double their power.

The fact that the total population, 16,000 souls, supports a railway of this size, argues well for the management and the appreciation of the beauty of rapid transit.

ANOTHER county electric road is on the tapis, between Colton and Riverside, California, over the Santa Ana Bridge. The supervisors have granted franchises to ex-Governor Merrill, of Rialto, for construction.

SACRAMENTO, CALIFORNIA, recently had a horse sale to dispose of the noble animals, erst ornaments of the city railway, now electric. The prices brought were good, and 100 head were disposed of.

THE NEW MINNEAPOLIS POWER HOUSE.

Extensive Addition to the Facilities of the Twin Cities Transit System—A Survey of the Methods to be Used.

THE St. Paul-Minneapolis have been heretofore extensively noticed, but it is the habit of these lively twins to continually grow. It is a continued story to tell of their achievements in any one line of improvement. In the matter of rapid transit



NEW 31ST STREET POWER HOUSE.

it has been previous experiences that extended facilities demanded more extension, and as means of travel have grown the traffic has increased. To furnish sufficient power for the large demands that are now made and which will become greater as the summer advances and the numerous conventions that congregate in this vicinity, gather and disperse. A general remodeling of plans long contemplated was deemed necessary by the prophetic souls of the managers and the present extension plant located on Hennepin avenue and bounded by Thirty-first street, Thirty-second street and Blaisdale avenue.

The construction of the building was begun last October, and Contractors De Lancey & Cook brought the matter to a fair conclusion in April.

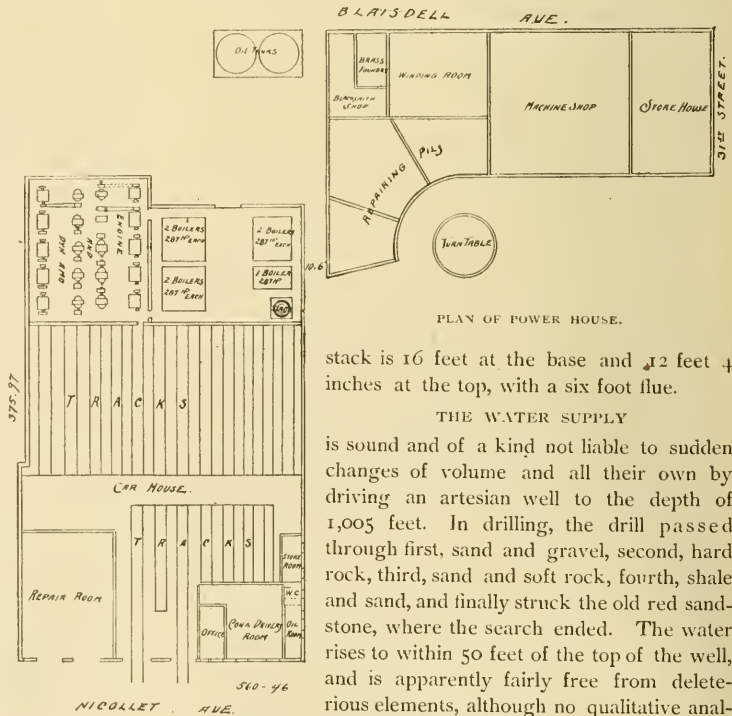
The original intention was to put in five engines and an equal number of dynamos, but subsequent thought, the settling of the Republican Convention in Minneapolis, and the rapid growth of real estate interests in that vicinity, all brought the determination of the plan of a power house that should be large enough for present use and future exigencies.

This caused a reconsideration of original plans necessary, and resulted in the present proportions of what is phrased, the Thirty-first street power house.

The power house from a front view, as represented in the first engraving, gives the impression of a building

much smaller than it is in reality. Fronting on Hennepin avenue 160 feet and running back to Blaisdell 375 feet. The building covers $\frac{3}{4}$ of a city block of ground. This area includes the following shops and rooms besides the trackage and spare room necessary: The engine room is 69 feet 7 inches by 86 feet 8 inches inside measurement and 19 feet 6 inches in height. The boiler room is 66 feet by 80 feet and has a 23-foot ceiling. The other rooms, the car house, machine shop, store house, winding room and armature room, are of ample proportions and will be fully equipped with every convenience for storage and repairs.

The structure was planned by Charles Ferrin, who is superintendant of buildings as well, and in building 1,250,000 bricks were used. The boiler room has iron trusses and brick arches while the lighter construction of the engine and dynamo room is supported by wooden beams and heavy posts. The floor of the boiler room is concrete and that of the engine room hard wood. There may be seen in the first engraving the smoke stack which rises 150 feet above the ground. The diameter of the



stack is 16 feet at the base and 12 feet 4 inches at the top, with a six foot flue.

THE WATER SUPPLY

is sound and of a kind not liable to sudden changes of volume and all their own by driving an artesian well to the depth of 1,005 feet. In drilling, the drill passed through first, sand and gravel, second, hard rock, third, sand and soft rock, fourth, shale and sand, and finally struck the old red sandstone, where the search ended. The water rises to within 50 feet of the top of the well, and is apparently fairly free from deleterious elements, although no qualitative analysis has yet been made.

The water will be raised by a 35-foot Cameron mining pump, manufactured by the Cameron Pump Company, of New York City. The advantages of artesian water over the city supply is the regularity of supply and the complete

control of the quantity at any time, and economy. The well was driven in 31 days' time.

THE STEAM PLANT

is more than sufficient for the needs at present and fully sufficient for all exigencies that may arise. But, as the territory to which the power is to be transmitted is large, supplying the lines south of Washington Avenue and between Minnehaha Falls and Lakes Calhoun and Harriet, the power will not be wasted nor the equipment inordinately large within a few years.

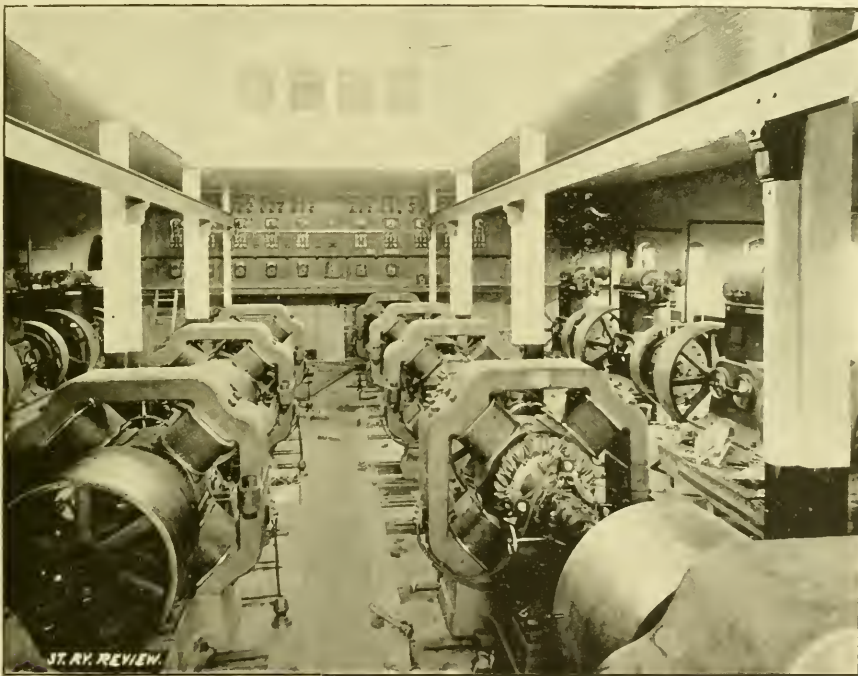
THE BOILERS

are of the Stirling water tube type, of which but four are shown in the engraving, three reserves being situated on the opposite side of the room.

engine can be cut off. At the engine there are cut-off valves between the distributing steam and exhaust main and each engine, so that any particular engine may be cut off entirely from its steam or exhaust connections in case of any exigency that may require it. The entire piping is planned on a basis of 150 pounds steam pressure.

THE ENGINES

are Westinghouse compound, non-condensing, ten in number, and arranged in two batteries of five each, with a rated horse-power of 250 and a maximum of 300 each. The cylinders are 16 inches by 16 inches stroke, and 16 inches by 29 respectively. The crank shaft is 7 inches in diameter, and 11 feet long. The dynamos are belted



ENGINES AND GENERATORS.

The boilers are rated at 287 horse-power each, and the feed water is heated to 212 degrees by Wainwright Corrugated Tube Feed water heaters, made by the Wainwright Manufacturing Company, of Boston. No purifier is expected to be necessary.

The piping is a feature worthy of more remark than our space allows. It is probably the largest line in the West. The steam pipes are 18 inches in diameter, and the exhaust pipes 22 inches. Each main is independent, and can be cut off entirely at will. The "header" is 28 inches in diameter, and 43 feet in length. The boilers pipe to this. An independent 18-inch line for each five engines is run from this header to the engine distributing main. Each main has a cut-off valve in the boiler-room so that either entire line from the cut-off valve to the

direct, and the belt wheel is 84 inches in diameter with a 25-inch face.

THE ELECTRICAL SUPPLY.

The direct power for transmission is generated by 10 Thomson-Houston multipolar dynamos, each capable of 275 kilowatts. The maximum will be 550 amperes, at 500 volts, and the minimum 250 with an ordinary load of 200. The coupling mentioned above is direct. The Nott Belting Company, of Minneapolis—a thriving institution in that invigorating atmosphere—made two belts, each 150 feet long and 73 inches wide, requiring 325 hides and weighing 2500 pounds each. This showing, for the belting company so young, is very flattering.

THE SWITCH-BOARD.

That portion of the system operated from the Thirty-first street power-house is divided into 8 sections, each having an independent feeder direct to the power-house, and each feeder supplied with automatic circuit breakers. As will be easily apprehended, the advantage of this arrangement is that of independence, so that if the trolley wire of any section should break, the other 7 would be undisturbed. This practice, it is claimed, originated in Indianapolis. Grounding the return is effected by burying old car wheels, about $\frac{1}{4}$ of a mile apart, connected with the supplementary wires between the rails.



THE SWITCH BOARD.

In our engraving of the switchboard, the portion to the right, seen but dimly, is the feeder-board, and that to the left is the switch-board proper.

The system of repairs is so effective that a trolley wire broken at Minnehaha, 6 miles out, is repaired by the linemen at power-house No. in 45 minutes.

A hundred-arc light machine "Excelsior"—Hochhausen system—will be also installed to light the lovely resort, Lake Harriet, which will induce considerably more traffic this year than before.

THE MCGUIRE MANUFACTURING COMPANY has put up more than its usual amount of work lately having among other orders contracts for trucks at Montgomery, Ala.; Lima, O.; Keokuk, Ia.; Logansport, Ind.; Cedar Rapids, Ia.; Jacksonville, Ills.; Clinton, Ia., and the Central Manufacturing Company, of Baltimore.

COLUMBUS CONSOLIDATION.

IN an interview with Emerson McMillan, of Emerson McMillan & Co., of 40 Wall street, New York, the report of the sale of the Columbus Consolidated railway was verified. The history of the deal begins with an option good until March 30, and a renewal good until April 30. The matter of sale was delayed by the purchasing syndicate because the West Broad Street road could not be brought into the combination. This caused a halt in proceedings until a majority of this stock was secured.

The consideration is generally supposed to be \$1,140,000. This sum, with \$800,000 bonded indebtedness and the liabilities, makes the road worth \$2,000,000 to the purchasers.

The syndicate making the purchase is composed of H. B. Hollins & Co., bankers, 15 Wall street, E. W. Clark & Co., bankers, Philadelphia, Seligman & Co., New York, and the men above mentioned.

The new manager will probably be E. K. Stewart, but changes will be few as possible.

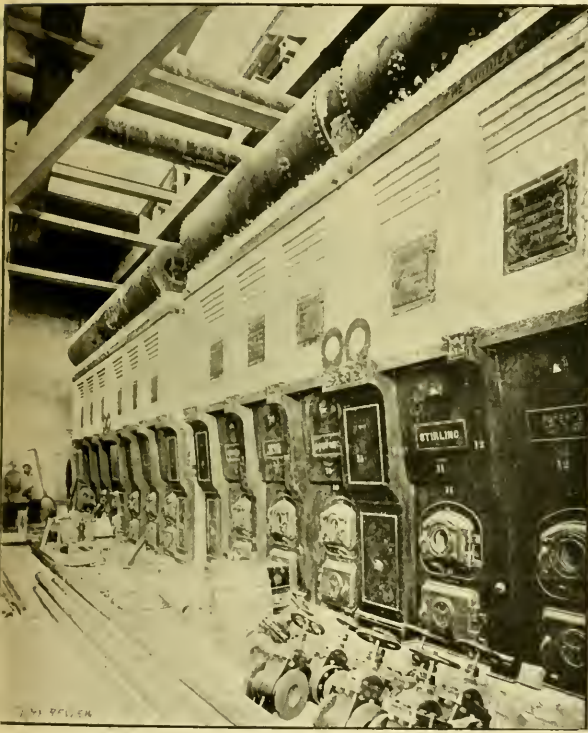
There will be a large number of extensions, and the number of cars will be increased from 25 to 50 per cent., and an attempt will be immediately made to get a greater degree of uniformity in the size and appearance of the rolling stock. Besides these improvements the track on many streets will be relaid and the entire road-bed made more substantial.

NEW PRESIDENT FOR CHICAGO'S ELEVATED.

DR. WILLIAM T. BARNARD, who has entered into the management of the Chicago & South Side Rapid Transit Railroad Company, comes immediately from New York, where he has been engaged in electrical enterprises in connection with Henry Villard and the North American Company, for the past few years. Prior to that, for the past nine years, he was in the executive management of the Baltimore & Ohio Railroad, as assistant to the vice-president, for four years, and assistant to the president for about five years. While in that service he developed and organized the

NORTHERN CAR COMPANY BURNS—BUT HAS ALREADY COMMENCED RECONSTRUCTION.

ON the morning of May 7 the Northern Car Company, of Minneapolis, passed through the fire test to the extent of \$60,000, but there was a full covering on insurance. The main plant was two stories high, frame, and built in "L" shape. The mill room was 160x160 feet in size; the construction room, 160x160; the blacksmith shop and engine room, 160x10. In addition to the main building there was a dry house, two sheds filled with the finest grades of hard wood stock,



BOILER ROOM MINNEAPOLIS RAILWAY.



RUINS OF NORTHERN CAR COMPANY PLANT.

a tan house and the office building. All these were burned. The books and papers and drawings in the office building were saved, as it was late in burning. Considerable stock was also lost in the flames, notably large orders from St. Paul and one from Rockford, Ill., and the cars for the Minneapolis Railway, in all enough to keep the works full until July. The ruins were yet smoking when the directors, A. B. Robbins, W. E. Steele, D. M. Gilmore, C. P. Lovel, E. S. Corser, C. P. Jones, and Samuel Thorpe, decided to rebuild, reorganize and continue. The new Northern Car Company has a capital stock of \$150,000, and the operations of reconstruction will begin at once. A. B. Robbins is president of the company, Geo. P. Stearns, secretary, and D. M. Gilmore, manager. The engraving presented, shows the ruins as they appeared when the meeting of the directors took place.

TORONTO'S EARNINGS.

THE city treasurer of Toronto, Canada, is in receipt of \$5,107, being 8 per cent. of \$63,849, the street railway earnings for April. The following are the amounts for the year to date:

| | Percentage. | Earnings. |
|---------------------|-------------|-----------|
| January, - - - - - | \$4,415 | \$55,107 |
| February, - - - - - | 4,285 | 53,562 |
| March, - - - - - | 4,821 | 60,266 |
| April, - - - - - | 5,107 | 63,849 |
| Total, - - - - - | \$18,628 | \$232,864 |

DURING an enforced temporary reign of mule power in a sister city, a young lady was heard to say as she stepped aboard, "summer cars and some're mules; let us bray."

Baltimore & Ohio Hospital and Relief Department; a beneficial organization which was afterwards substantially introduced into the Pennsylvania Railroad, the Chicago, Burlington & Quincy, Grand Trunk, of Canada, and other railroads, in all of which roads they are in successful operation.

Before engaging in his Baltimore service, Dr. Barnard was for a number of years connected with the War Department, and prosecuted his profession in Washington.

He is a man of large executive ability, and has already during his few days' official connection with the road here made a large number of friends.

A FAMILY PARTY.

ON Monday, April 25, at 11:30 a. m., a family party left the celebrated Baldwin Engine works, at Philadelphia. The family consisted of 20 little engines, intended to spend the rest of their lives on the South Side Alley Elevated Road in Chicago, convoyed by one of the largest Moguls ever seen on the western prairies. The group, *en passant*, is represented below.

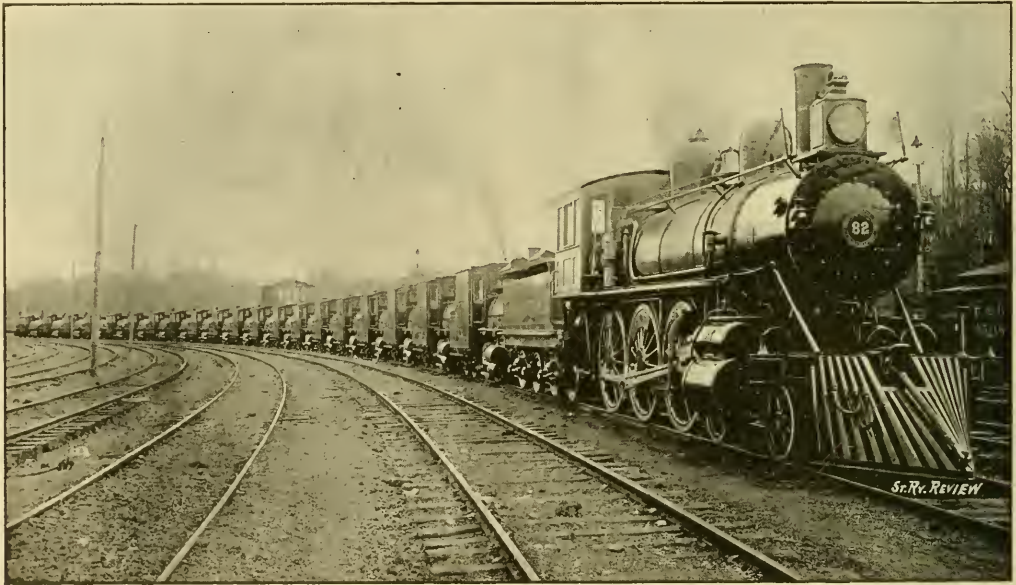
The locomotives are all of the compound type, having cylinders 9 and 15 inches in diameter, and 16 inch stroke. Diameter of boiler 46 inches. Fire-box 64x44 inches. Flues 167, 1¾ inches in diameter, and 76 inches long. High pressure 175 pounds; low cylinder pressure 160 pounds. Hard coal will be burned.

The general opinion is that 75 per cent. of the traffic will be done at the Congress street station.

Since the sudden death of the late lamented Col. Calvin Goddard, the managers have installed W. T. Barnard, of New York, as president.

The engines were lifted to the elevated tracks on an incline, and hoisted by a steam derrick. Several have already been fired up, and are making successful trial trips.

The cars, which are coming from the Gilbert Car Company's shops, Troy, N. Y., will be here in a few days, and the road will be in operation by June 1st. Construction on the extension is going forward at the rate of 20 foundations daily.



TRAIN OF BALDWIN ENGINES EN' ROUTE TO CHICAGO.

The headway contemplated is 2½ minutes, and the average speed 16 miles per hour, but between stations 25 miles can be made.

The employes will include 20 conductors, as many guards, 20 engineers, 25 firemen, 2 dispatchers, 5 telegraph operators and train-starters and wipers, cleaners, hostlers and roustabouts, making a total of 250, exclusive of clerical force.

The road is chartered to Seventy-first street, with a permanent spur through Sixty-third street, to Stony Island avenue, and a temporary spur to the World's Fair grounds.

The road has established nineteen stations, as follows: Congress, Twelfth, Eighteenth, Twenty-sixth, Twenty-ninth, Thirty-third, Thirty-fifth and Thirty-ninth streets, Indiana avenue, Fortieth, Forty-third, Forty-seventh, Fifty-first, Fifty-fifth, Fifty-eighth, Sixty-first, and Sixty-third streets, and South Park avenue.

ASSISTANCE ON GRADES.

THE matter of assisting cars up steep grades has received the thought, labor and attention of Harry L. Van Zile, of Albany, N. Y.

The culmination of his labors was reached lately in the successfully trial of his machine on a 30 per cent. grade of the Troy & Lansingburg Railroad at Cohoes, N. Y. The problem involved is to get traction by the same power used for propulsion and independent of the weight of the car. This is done by applying the power of a street car motor to two central horizontal wheels bearing against the sides of a center rail and having also wheels fitting to the outer rail. The machine does not rely on its weight for tractive effort. The power for the "helper" in the case of street railways comes from the wire.

A new design of brake is also used with the "helper," the invention of Mr. Van Zile.

STREET RAILWAYS IN THE SOUTH.

THE ELECTRIC LINES OF BIRMINGHAM, ALABAMA.

JUST why names are given to places it is often difficult to say. Why we find Romes and Athens, Parises and Londons, Berlins and Bostons, scattered over these United States without seemingly any proper reason, we cannot state. But we can easily apprehend why the great manufacturing center of the south, the great steel-producer of the new Alabama, should be called Birmingham, after the greatest iron mart in the world.

Birmingham, Alabama, is located in the very center of the mineral district, 620 feet above sea level, and just level or a little above the level of modern improvements. The present population of Birmingham is 30,000, and of Jefferson county, 88,000, against a county population of 12,000 in 1870, and 23,000 in 1880, and is not that a sign of life?

The great iron and coal output of Birmingham deserves full mention: Jefferson county's coal output in 1880, 182,394 tons; Jefferson county's coal output in 1889, 2,305,383 tons; Jefferson county's iron ore output in 1880, 45,975 tons; Jefferson county's iron ore output in 1891, (estimated), 2,700,000 tons; Jefferson county's pig iron

production in 1891, (estimated), 800,000 tons; Jefferson county's coke production in 1891 (estimated), 1,300,000 tons. There are twenty-five iron furnaces in Jefferson



CAR HOUSE—BIRMINGHAM, ALA.

county, with an aggregate capacity of 2,500 tons per day. Twenty-three of these furnaces are now in blast, and the other two are undergoing repairs. It is estimated that the seventeen most important coal mines now being worked in Jefferson county have a daily output of 14,300 tons.

HISTORY OF RAPID TRANSIT

states that in Birmingham the first street car rail was put down in 1884. Since that time more than ninety miles of track, used solely for rapid transit purposes, have been laid, and are now being successfully operated. In 1884 it was a rare sight to see any one except the driver riding on the cars in Birmingham. This state of things continued well into 1886, and we are told that the receipts during 1884 and 1885 did not average \$30 per day. The receipts from the present street railway system of Birmingham now average nearly \$1,200 per day. On October 10th of last year, the Birmingham Railway & Electric Company, controlling about two-thirds of the mileage of these different rapid transit lines, placed in operation the first electric car ever operated in Birmingham. They have just completed 15 miles of electric track, putting down new 40-pound steel rails, new ties, and in fact, building 15 miles of new track in the heart of the city.



LOOKING DOWN THE HILL—BIRMINGHAM, ALA.

The story of these lines and their passenger business is surprising even to street railroad people. The census giving Birmingham a population of a little over 30,000 inhabitants; they can't understand how a city of this size can support so many miles of street railroads. Once explained it is very plain. The corporate limits of the city of Birmingham are only about one and three-eighths



RESIDENCE OF GENERAL MANAGER JEMISON.

miles square, and takes in a very small portion of the inhabitants reached by these various lines. It is estimated that these 90 miles of track reach a population of not less than 85,000 souls. This vast collection of people are tempted to ride by the very best rapid transit facilities. All of these lines are being run by either steam or electricity, except about three miles of the track, which are being operated by mules until new track can be laid, and then they will be operated by electricity.

It will be seen at a glance that the receipts from the various street car lines operated in this section must be largely in excess, per capita, of the receipts usually reported from street car systems in other cities of this size. These people are all in a hurry, and can't wait to walk. It takes pretty quick transit to suit the people who have built up, within ten years, a city of such magnificent proportions. Where, in this time, have arisen six national and seven private banks, a County Court House, costing over \$300,000; churches of every denomination, the largest costing over \$150,000; United States Court building, costing over \$300,000; four public schools, each costing over \$100,000; besides many other public and private buildings.

THE ELECTRIC LINE

has 15 miles of track laid with 40-lb. steel T and 58 lb. girder rail. The T manufactured by the Belleville Steel Company, and the Johnson Company supplied the girder. The track is standard gauge.

THE POWER HOUSE

is a brick structure 50x140 feet in size, and is the protection of four 150-horse-power Taylor engines, one 150-horse-power Phoenix boiler and one 110-horse-power generator of the Thomson-Houston make.

THE ROLLING STOCK

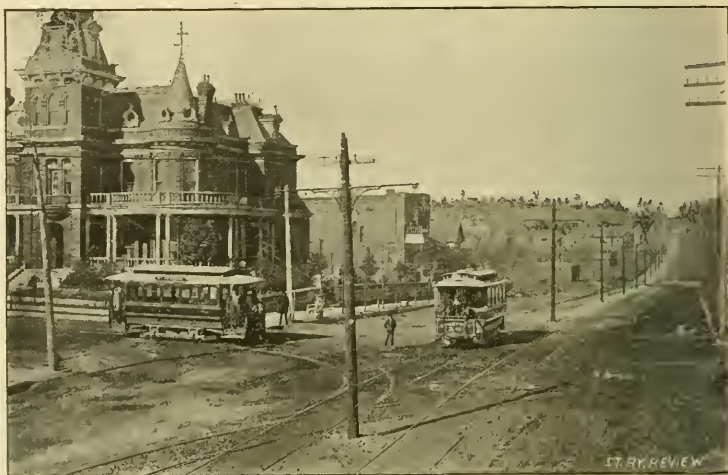
consists of 24 cars, 16-foot bodies, with 5-foot extended platforms, made by the old reliable firm of J. G. Brill & Co. Each car has four 15-horse-power motors, Thomson-Houston pattern.

The company displaced 185 horses by the substitution of electricity, and the gain in revenue of electricity over horses is 40 per cent.

The company employs over 200 men, and adds materially to every branch of trade by its cheap transportation.

The company is officered as follows: president, T. T. Hillman; first vice-president, Robert Jemison; second vice-president, William A. Walker; superintendent, J. B. McClary; secretary and treasurer, J. A. Stratton.

AS REGARDS street railway facilities, a city that would insist in adopting the turtle as a speed emblem shouldn't be surprised if like the turtle at times it found itself, in a civic sense, always in the soup.



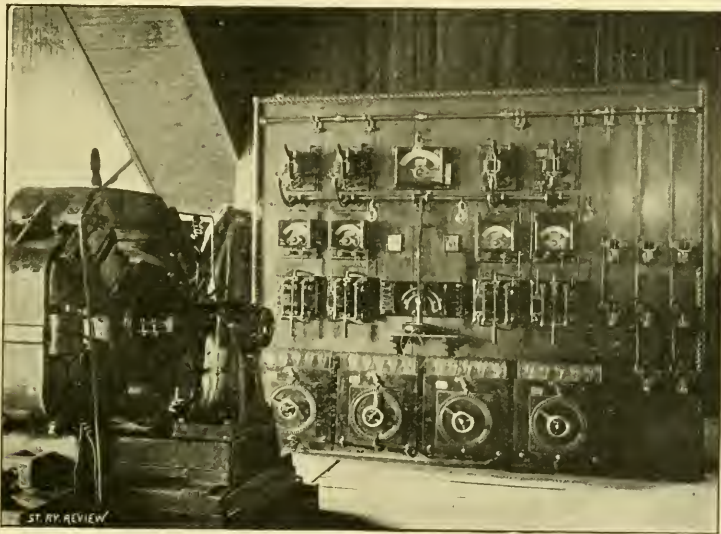
RESIDENCE OF MAYOR LANE.

MOSES HULL tells of a spirit who pleaded with a medium for a chew of tobacco. The fact that in the spirit world the floors of the street cars will be immaculate, unless a wandering spirit can strike a medium for a chew, takes away a part of the horror of death.

SHAKING THE BOXES.

ON the Three Cities Railway at Davenport, Moline and Rock Island they have fare boxes in which the nimble nickels are caged by means of toboggan slides which keep the nickels from reappearing except by the door appointed. However, the enterprising conductor has found out that the coin can be coaxed from its retreat by a judicious process of shaking, such as we used to practice on the little savings banks of our childhood.

After the company had noticed a falling off of \$5 to \$6 per day, detective work was begun and Henry Koebler was caught in the act. Hangué was immediately jailed and will probably reside in states' prison in the future.



THOMSON-HOUSTON GENERATOR AND SWITCHBOARD.—BIRMINGHAM ELECTRIC RAILWAY.

THE POLICE AND FIREMEN FREE.

THE Buffalo Street Railway Company through General Manager Littell has ordered that conductors will pass free (not to exceed two at one time) the regular policemen and firemen of the City of Buffalo, provided the said policemen and firemen are in full regulation uniform, and wear their badges in plain view on the breast of their coats while they remain on the car.

Mr. Littell says that he thinks the presence of a uniformed policeman on a street car is often a good thing. The business of a policeman is to enforce law and order, that the company will lose nothing by this concession to the police force. As to the firemen, it is mainly from a return of favors and a spirit of gratefulness for past services and future possibilities of usefulness.

The greatest satisfaction is expressed by the city papers and the public in general.

THE threatened strike in New Orleans has been averted by an arrangement of the Carrolton line, which the other companies in the city followed.

BUFFALO.

THE Cross-Town Street Railway Company bid in all Cross-town franchises in the city. The lines are all connections with the present system. The franchises include: Broadway, Bailey avenue to city line; Genesee street, Belt-line tracks to city line; Hertel avenue. Dearborn street to Niagara street; Huron street, from Pearl to Main; Huron street, from Prospect avenue to Niagara street; Pearl street from Seneca to the Terrace, and through the Terrace to the junction of Main and Exchange streets.

The bid put in by Manager H. H. Littell was on the percentage plan approved by the special citizens' committee, and adopted for the whole system: Two per cent.

of annual gross earnings upon less than \$1,500,000; 2½ per cent. when under \$2,000,000 and over \$1,500,000, and 3 per cent. when over \$2,000,000. The Company promises to conform to the various conditions of the general agreement made between the Buffalo Railway Company and the city, last January. The Cross-town Company offers the American Surety Company as bondsmen.

SURRENDERED.

THE West Side Street Railway Company, of Buffalo, has surrendered and transferred to the Buffalo Railway, the lessees of the road, the property and franchises of the West Side Company. President Henry M. Watson and Secretary J. S. Baecher have consummated the deal. This will add another line to the rapidly increasing system, and only further the progress of the road, which has been the model for so many lines.

THE Boston Council has introduced an order prohibiting newsboys from getting on the West End cars.

TRAMWAY REGULATIONS IN EUROPE.

PART II.

Some Striking Features About European Trams.

FURTHER advance information from the Department of State reveals many peculiar and striking features about Europe's street railway systems.

In Lisbon, Spain, individual owners run their own cars over the rails of the company controlling the franchise; but this franchise is not a monopoly, anybody seems to have the right to run cars on the company's tracks, and "pirate" cars, as well as those belonging to other companies run without regard to the owner of the tracks, except, when the regular cars come along, the "pirates are obliged to jump the track into the street and let the regular cars have the right of way. In other words, the tracks are looked upon in the light of a public convenience, a most original way of doing business. But the regular company makes good dividends.

ST. PETERSBURG.

St. Petersburg, Russia, has two tram companies, one of them controlling four different lines, is owned almost entirely by the Swiss consul to St. Petersburg, a right which the United States would not grant to its foreign representatives. But as this Swiss consul first introduced horse cars in that city, he is looked upon as a kind of benefactor; at the same time his profits are quite large. The streets of St. Petersburg are long and very wide, probably the widest of any city in the world, many of them have their gutters in the centre. The cars are double deckers, first class inside and second class outside. The fare is 2½ cents inside and 1½ out. The other company has twenty-six different lines, and its franchise requires that forty years after 1874 the whole property is to be turned over to the city. Whether the city then is to pay for the plant is not stated. The franchise tax is 2½ per cent. of the gross earnings for the first ten years, or a sum not less than \$6,000 per year; 3 per cent. the second ten years, or not less than \$9,000 for each year; 4 per cent. for the third period, or not less than \$12,000, and 5 per cent. for the last period, or \$15,000 each year. This company runs longer distances, so charges 3 cents inside, and 2 cents outside. It runs in the suburbs by the aid of steam. Profits are large. Distances are not given but our knowledge of the city inclines the idea that five mile trips are common. The drosky is the favorite conveyance, there being twenty thousand of them in the city during the winter; but one must haggle with their drivers long and hard before taking a seat in them, as no fixed prices are in practice. In winter the peasants, not having other work, bring their droskies into the city and compete for this business, after paying a small license. The drivers who drive for the regular drosky company, are fed and lodged, and given four dollars per month; they work twelve hours a day and are expected to turn in \$1.25 on week days, and

\$2.00 on Sundays, if they fail in so doing they must make the difference good; all they collect above the mentioned sums, they can put in their own pockets. The lowest bargain is 5 cents for a quarter mile, or 10 cents for a mile or more, which rates interfere with the tram cars, as the passenger is conveyed just where he wishes to go.

SPAIN.

Barcelona, Spain, has steam and horse cars, beside omnibuses, and they accommodate about 500,000 inhabitants, taking in the suburbs. The rates of fare are 2, 3 and 4 cents in the city, it is presumed according to distance, although this particular is not stated. Ten cents is the price to the suburbs. Tram companies pay a franchise tax of 20 cents per meter of track, double or single not stated. One of the companies is English, and its dividends are 5 per cent, annually. The omnibuses are the more popular as they make the quickest time; they run on the tracks whenever they can.

Cadiz, Spain, tried horse cars, then abandoned them because of a lack of patronage. This was mainly due to the compactness of the city and the narrowness of the streets. So omnibuses are entirely relied upon, but these are never called upon to do service for government officers gratuitously. Seville in the same district, is the only city which has horse cars.

Grao, of Valencia, Spain, has horse cars exclusively; they are owned by companies, and any new company can enter the field by bidding lower rates of fare for a franchise. Two cents is the fare in the city, or one circuit around the city. The suburban roads charge by the zone system, one cent or less, per five-eighths of a mile, (a kilometer). The corporations pay a franchise tax of 5 cents per running meter of track during the first ten years, and 10 cents for the subsequent time of their existence; also 10 per cent. of their yearly net profits. The municipality reserves the right to compel a better service if it is deemed necessary. A small omnibus service is maintained which charges 2 cents for a ride of fifteen minutes.

The Malaga district covers many towns. Malaga itself has, among other conveyances, "reperts," which are cars on high wheels that run without tracks; and "diablas," which means "she devil," a one-horse, two-wheel cart, and thirty horse cars. Granada is constructing, or about to construct, a horse car line; at present this place has about 300 public carriages. Odra depends upon donkey conveyances. Almeria is described as a place open for American improvements; it is a city of 40,000 inhabitants, which now runs one omnibus only. The tramway company of the district above-mentioned, pays a very small franchise tax, because it is obliged to keep the highways in repair through which it runs. The old

methods include the cars without tracks, which were drawn by three mules, constantly "yelled at by barbaric drivers." The tramways are constructed differently from ours, the rails are imbedded in stone and cement below the street surface; dirt gets in the grooves and requires much cleaning out, but the tracks are solid. The cars are large and very comfortable. They make five minute stops only, and run six miles an hour; all classes patronize them, which is thought odd for Spaniards. Financially the company has no cause for complaint. Some parts of Spain are offering splendid inducements for American street railway enterprise.

SWEDEN.

Stockholm, Sweden, has two tram lines, one of them being partly steam. The shares are held by the public. The fare is uniform at 10 ore, ($2\frac{1}{2}$ cents), with an increase of 5 ore, ($1\frac{1}{4}$ cents), for branches.

SWITZERLAND.

Switzerland has five tramway societies in as many cities, in length ranging from seven miles down to two miles. Geneva employs horses and steam: Sienne and Zurich, horses; Vevey, electricity, and Berne, compressed air. In Berne, the shortest line in Switzerland, the fare is 4 cents for the whole distance, and 2 cents for half way. This latter city gets no profits or taxes from the tram company, and granted a franchise for seventy-five years. There are a great many "funicular" railways (hydraulic), in Switzerland, serving local transportation. Zurich has probably the lowest horse car fares in the world with about $8\frac{1}{2}$ miles of track, the fare is first 1 cent, then 1 cent for each five-eighths of a mile; so an ordinary ride costs only 2 or 3 cents, and commutation packages of fifty tickets are issued at still cheaper rates.

TURKEY.

Constantinople, Turkey, has one line of horse cars; the first stockholders made it a speculative venture, and after unloading their stock at high figures the price dropped and spread about quite a ruin. The stock now, however, is paying 5 per cent. dividends.

VIENNA.

Vienna, Austria, has a fairly complete system of transportation, although all parts are not "rapid."

The nine separate methods include (1) public carriages and cabs of different capacity, seating two, three or four passengers. (2) Two tramways, companies running horse cars for urban and suburban transportation. These in the suburbs are run by steam motors. The cars are substantially of the American pattern, open and closed cars with platforms and smokers' compartments. The tracks are standard gauge, and, except on narrow streets, double tracks are in vogue. (3) Omnibus lines, with no outside seats, are common. The vehicles carry from ten to twelve passengers. These omnibuses resemble our cassettes, and carry conductor and driver. (4) Two suburban steam tramways, doing a large suburban business, and resemble the trams. (5) Regular steam lines

do a large business in far suburbs. (6) A suburban electric tramway, presumably Siemens-Halskes', with overhead wire, starts at Moedling and runs a distance of about 8 kilometers. (7) A petroleum motor, used during the exhibition of 1890, gave general satisfaction. The remaining two means of transportation do not interest our public, being steam ferries and a cog railway in connection, both for summer resort convenience.

The public carriages mentioned are owned by private individuals, as are also the omnibuses, to a great extent; but lately many have been acquired by an English syndicate. The steam trams are owned by a private company, but the other systems are joint stock companies.

The rates of fare for the carriages are one florin for the first half-hour, and half the sum for each succeeding half-hour. A florin is worth about 50 cents. The tramways company charge according to distance, 8 kreutzers to 20 kreutzers for adults, and from 6 to 10 kreutzers for children. A kreutzer is worth about one cent.

The tramway tickets deserve mention. As there are numerous lines running in various directions, exchange tickets are given, good in one continuous direction. The tickets are square pieces of thin paper, showing a running register number, and in large red print a certain control number and letter, of which a different one is used on all lines for every day. A border gives hour of day. When an exchange is asked, the ticket is punched for the line wished, and the hour current. Controllers examine the tickets from time to time to guard against fraud.

The electric railway charges 25 kreutzers per ticket for the entire distance.

The municipality exacts a percentage of gross receipts for the franchise, besides the government tax. The tramways pay 5 per cent., and the omnibuses a license per vehicle and are allowed to run only on routes and on schedule time. The franchises are usually for 50 or 90 years, and revert to the city on expiry, and the line may be bought by the city at original capital price.

The police surveillance of cabs and omnibuses is very strict. Tramways have to clean the streets free, the width of their track, and for a certain amount yearly for the entire width. The tramways are compelled to avail themselves of any technical novelty, and pay indemnity for stopped traffic, except by *force major*. Other regulations are stringent.

The means of transportation are inefficient generally. There are 2300 carriages, 900 cars and the two tramways carry 50,000,000 passengers per annum. The tramways pay 10 and $5\frac{1}{2}$ per cent., respectively, and all omnibus owners are rich men. The field is large and inviting for modern men and modern means.

 THAT LONG LINE.

THE air line electric St. Louis-Chicago road survey has been completed. The line runs 252 miles and the right of way is said to have been secured. Just how much is true is hard to say.

A PRACTICAL RULE BOOK.

THE words, "Be sure you are right" at the top, and "then go ahead," at the bottom of every page in the newly issued rule book of the Chattanooga Electric Railway, cannot fail to impress the employe as it does other readers. It constitutes, in fact, the essence of all good management. Superintendent C. P. Young has made one of the best compilations we have seen in some time, and has also adopted the very sensible plan of issuing his book in vest pocket size. The introduction is right to the point and is as follows:

"Study this book so well that all the contents will be an inseparable part of your mind. In running an electric car it is not muscle, but brain that is required. You should not be content to rest satisfied with getting your car over the road; almost anybody can take a car from one end to the other with very little training, but to run a car right requires a thorough understanding, not only of the car and its complicated mechanical and electrical parts, but also how to take the greatest advantage of momental force, and calculation of speed, weight of load, condition of track, using of brake as little as possible, accomodation to public without injury to car, and at the same time obtain the good will of the public. You should take pride in your car, and look upon it as the sailor does his ship. Have as small number of delays as possible, and study how to get the quickest way out of trouble if you have any.

"Street railway employes, more than any other set of men, must possess a large amount of patience and forbearance. You must assume two characters, one your own individuality, which you can use when off duty; but while on duty, you cannot be Mr. Jones, but you are then an employe of the Chattanooga Electric Railway, and as such you must learn the great virtue—self control. The easiest way out of a difficulty is always the best.

"Remember vinegar never catches flies, sugar always; soft words spoken at the right time disarm a hot temper nine times out of ten. Conduct yourself always as a true gentleman and you will be respected and admired by everybody."

From the rules we can make only a short quotation, as follows:

"Use as little electric energy as possible, and your brake as gently as possible, except in emergency.

In foggy weather, do not attempt to run on a schedule. Safety and caution first, time second.

In street railroading you must remember equal distance between the cars is the main point, and if cars get in any way mixed up, use your own judgement, and under no condition get nearer than 300 feet to your leader.

You must bear in mind this important fact: If you miss two fares each half trip, each car makes 36 half trips per day, which means \$3.60 per car per day; 20 cars is \$72.00 per day, or \$26.280 per year, which means five per cent interest on a capital of \$550,000.

The conductor who understands what to do in the case of breakages and prevent detention of the line, will be a more valuable man to us than the man who does not."

A CAPITAL CABLE CAR.

THE illustration is of a cable train of the Washington & Georgetown Railway, at the national capital.

The train is going north on Seventh street, and has just crossed G. street. At the right is seen the Patent Office, while the large building just beyond and far-



ther to the south is the Postoffice. The view is a common one during the base ball season, and is from a photograph of a train en route to the base ball grounds last summer. The ability of the cable system to carry all who can get on is fully demonstrated, every bit of space within the car and on the foot boards being fully occupied.

THE NEW JERSEY TROLLEY LAW.

THE Supreme Court of New Jersey recently decided that the council of Newark had no authority to grant franchises for electric trolley lines, and the legislature of the State was asked to pass a bill legalizing the electric lines, which was done. Now Gov. Abbett has refused to sign it, and consequently all the trolley lines in the State are operating contrary to law. An appeal may be taken to the Court of Errors in the hope that the decision will not be reached before the next session of the legislature.

A. Q. Keasbey is quoted as saying that he does not think that the veto will affect the wires already in operation, but that it will preclude any new ones. The anti-trolley counsel says in reply: "Certainly, we will be persistent, and if the poles are illegally erected they must come down, for they have no right to be in a street to obstruct travel."

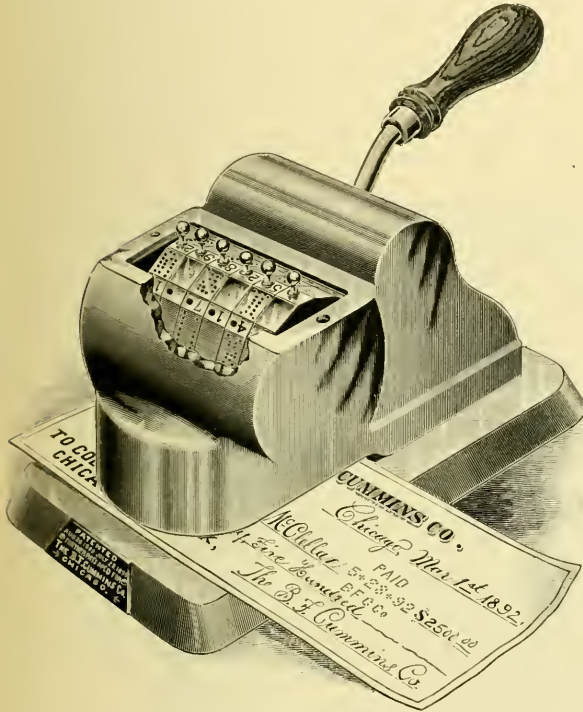
The managers of the traction companies say that they shall erect side poles on the streets until the Court of Errors shall decide as to the Halsey case.

THE Belding Motor and Manufacturing Company's plant was recently sold to F. F. Indermilk for \$71,800. His title is subject to a \$40,000 mortgage.

RECEIPTING AND DATING PERFORATOR.

THE Receipting and Dating Perforator, as shown in the illustration below, is the most perfect device ever offered for the use of treasurers of street railway companies and other corporations. It perforates the word "Paid" together with the date of cancellation, and the initials of corporation using it.

This is the only perfect device ever made for the proper cancellation of certificates of stock, and is worth many times its cost for canceling these valuable documents.



It is also the most perfect device made for the cancellation of notes and interest coupons, and for receipting bills, statements, etc., there being no ink to spread over or deface the instrument cancelled. One of the greatest objections to the use of ink stamps have always been



that of the paper marked "Paid," or "Cancelled," is folded up soon after the cancellation is made, that the ink blots and spreads out over the original writing, and in a great many instances erases the identity of the signature, which objection is entirely disposed of by the use of the perforator.

The dates can be changed more quickly than a rubber stamp. It requires but one stroke of the lever, and can be operated as quickly as a rubber stamp.

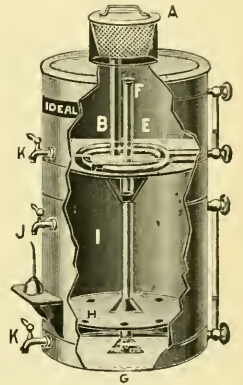
It is the most effectual precaution against changing the date of any receipt or cancellation that can possibly be used. It is full nickel-plated, made of the best material, and will last a lifetime.

It is made by the B. F. Cummins Company, manufacturers of all kinds of perforating stamps for street railways and corporations, 232 and 234 Clinton street, Chicago.

THE IDEAL OIL PURIFIER.

THERE is no disputing the utility and economy of the oil purifier. The latest bidder for place is the Ideal, manufactured by the Purity Oil Filter Manufacturing Company, of Pittsburg.

This filter claims: (1) Simplicity of construction, (2) automatic action, (3) can be operated by steam and water and (4) can be cleaned without drawing off the oil. The illustration shows very well the operation of the filter.



The chambers E and I are filled with water to a depth of six inches and steam connections made as shown. The dirty oil is poured into the receiver A, where it strains into the pipe B, flowing down to the bottom of chamber E through the water.

Steam is then turned on, and the refining process begins. As more dirty oil is added there is an overflow into pipe F down through the water to the bottom of reservoir L and up and around disc H. When the oil gets above the cock J it can be drawn off refined and pure. The two cocks K are for drawing off sediment and water. Whatever the gravity of the oil, the heat of the steam coil thins it and separates the grease and other deleterious matter, which settles to the bottom of chamber E.

ELECTRICS IN FORT WAYNE.

A NUMBER of men interested in the Cleveland Cable Railway have secured a franchise at Fort Wayne, Ind., to be called the Fort Wayne Electric Railroad Company.

The Short Electric Company, of Cleveland, will furnish thirty-two car equipments, comprising sixty-four 20-horse-power single reductions. The Robinson Brothers will order the entire road material. Ten miles of overhead construction will be used. At the rate the Robinsons are pushing the work, it will be in order by June 1.

The London Southern Tramways has declared an annual dividend of \$3,615, and will call the division at 1 shilling per share.

LEAVENWORTH'S COMPRESSED AIR HOPES.

What the System was to Accomplish. History of the Deal. A Street Railway blocked by Wind. Castles that are still in Air.



HAS long enjoyed the reputation as a portion of the footstool highly favored with and noted for a generous circulation of atmosphere, done up in bundles of zephyr or blizzard, according to the prevailing fashion at various seasons of the year. It may have been for this reason that the lively city of Leavenworth was made the object of the favorable choice of what is still promised to be the nucleus of a mighty revolution, which is to sweep the festive mule from off the face of the car tracks, and liter-

worked gigantic air compressors, and—raised the wind. The "grip" hung from the car through the slot as do cable grips, but instead of jaws a pair of vertical wheels on either side the revolving shaft were brought into contact with it by controlling devices handled by the driver, and as the angle of these wheels changed, the car was forced forward, held at standstill on grade, or reversed, as might be determined by the driver. The model attracted much attention, and loaded with weights, whose ratio to weight of model car was greatly in excess of any possible load on a working car, presented a very curious and surprising application of a well known mechanical law. Later an experimental line of some 300 or more



FORT LEAVENWORTH.

ally blow him out of his time-honored railway existence. The visions of future greatness, via the air line, seem to have taken the city by cyclone.

Delegates to the convention of 1889, held in Minneapolis, will recall the model of the "Threadless Screw," exhibited by the Judson Company then of that city, which contemplated a conduit in each track, very similar to ordinary cable road conduit, with the same slot opening, but instead of an endless cable, a hollow shaft was substituted of about 10 inches diameter, resting on bearings at frequent intervals and turning always in one direction. This shaft was intended to extend the entire length of each track, and to be propelled by engines placed in vaults beneath the street, and driven by highly compressed air conducted through suitable pipes from a central station, where immense engines

feet, containing difficult curves and grades, and both combined, was built in New York City, and was visited by many railway men. But as the system seemed to possess no advantages over that of a cable road, except the ability to reverse the car, and the construction was far more expensive and complicated, no company could be induced to adopt it. Finally the Judson Company succeeded in obtaining permission to construct a line in Washington, D. C., which was done, but has never been in practical operation. Last August the outfit was taken on a foreclosure by impatient creditors, and the honored representatives of the people were again secure in their monopoly of furnishing the country with wind.

The Washington venture having thus proved neither a mechanical or financial success, a big jump in operations was made, and landed the company, in the person of

Harry L. Earle, in the city of Leavenworth, about one year ago. Mr. Earle is an earnest worker, who thoroughly believes in the ultimate success of the Judson system, and withal a most genial gentleman to meet, and one who has made many friends among the street railway fraternity.

It was about the middle of July, 1891, that Mr. Earle crossed the Big Muddy and captured Leavenworth. The Board of Trade took up at once a consideration of the plan, which was a quite unique one, and with a sort of cyclone fever plunged into the enterprise so rapidly that on July 29, a committee of 32 of the leading citizens endorsed the scheme in writing. The fact that this system of city travel had never been adopted by any street railway, or ever been in practical, actual operation seems never to have been considered as a doubtful element of success in this instance by the Leavenworthers.

Mr. Earle's proposition is an interesting, as well as novel one. He agreed to do certain things if warrantee

once attempted to be complied with, by the city council passing an ordinance purporting to repeal the franchise of the horse car company. Although the daily papers, the public, and in fact almost everybody except the horse car people, were so enthusiastic over the new power, the raising of the quarter million bonds was not completed until the first of the present year; and on February 17th, after the subsidy had been raised, and the deeds placed in escrow, to be delivered to Mr. Earle upon the completion of his contract, the city council passed its three ordinances granting franchises to "Mr. Earle and his assigns."

The first granted the use of the streets, alleys and public grounds of the city of Leavenworth for the purpose of putting in pipes to convey compressed air throughout the city. The second granted a similar use of public grounds for the purpose of building a street car line to be operated by "compressed air, cable, electric or threadless screw" motors. (It will be noted that three systems are incor-



THE SOLDIERS' HOME—LEAVENWORTH.

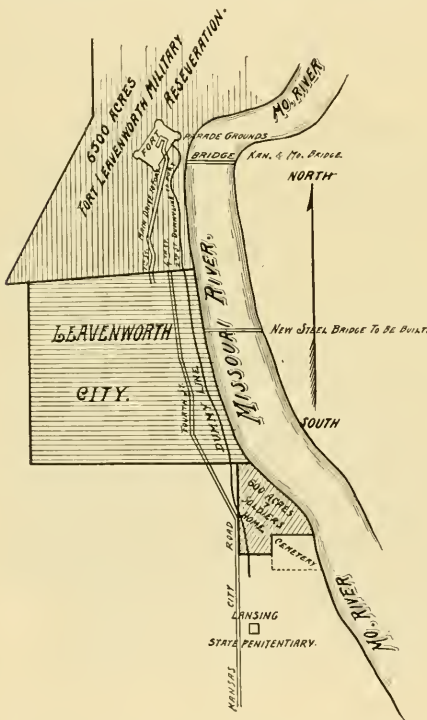
deeds to real estate within the city and adjacent county of Leavenworth, to the amount of \$250,000 be executed, acknowledged and placed in escrow, to be delivered to himself or assigns upon the partial and final completion of the enterprise, the accomplishment of which Mr. Earle was to undertake. He was to build 10 miles of street railway to be operated by compressed air; to procure not less than 10 factories, employing not less than 25 hands each, to locate in the community; and to put in operation a system of compressed air for driving machinery in the city, such power to be furnished at a low rate. The 10 miles of railway and driving plant was to cost \$250,000, and upon the completion of the road and its operation for 60 days he was to receive \$125,000, and when the 10 new factories were located the remaining \$125,000.

He first, however, required as a condition precedent that the city council should repeal the franchise of the present horse car lines, claiming that some of its features were too broad to suit him. This modest request was, at

perated in the franchise other than the original one of the "threadless screw," the Washington failure having culminated between July 29th, 1891, and February 17th, 1892). The third ordinance designated streets on which car lines might be built at once. Mr. Earle was by each ordinance given four months in which to accept the franchises, nine months in which to commence, and two years in which to complete his work. At this writing he has accepted the franchises, but no visible work has been done beyond a preliminary survey on one of the streets for one line. Immediately after the franchises were granted, and before going east, Mr. Earle stated to the city officials that he did not want any franchises given to any other line, and shortly after, notice was given the officials of the horse car company, the Leavenworth & Suburban Railroad Company, to tear up its tracks and cease operations! This the old company, which has been in operation for eight years, very sensibly declined to do, and at last accounts their cars "were still there." It is

believed this attempted violation of good faith by the city is due to a desire to get rid of a "blanket" feature in existence, which delegates to the old company authority in case any right of way is granted to any other company, over any other street, such grant to another company shall be considered also as a grant to the old company of a right to occupy such streets in a similar manner.

On March 23d last the old company applied in writing to the city council for permission to convert its present horse car lines into a first class electric line and for right of way over such additional streets as would give it a line from Fort Leavenworth, on the north of the city, to the Soldiers' Home on the south (see map), promising at once to begin, and as rapidly as possible to construct, such



road, and to equip it with the most improved electric appliances. This request has been denied on the ground, mainly, that it might jeopardize the City-Earle contract.

On March 4th last Mayor Hacker and a large delegation of the city council visited Chicago, and inspected, at Pullman, a car exhibited by the Judson people. It was not, however, of the "threadless screw" type, but merely a huge iron tank on wheels, filled with compressed air and driven by small engines. It ran a few times up and down a bit of track, and the demonstration was transferred to a big dinner at one of the hotels, where, between the popping of corks, time was found to adopt a set of resolutions endorsing the air engine and expressing confidence in the ultimate success of the air motor in Leavenworth.

The exhibition at Pullman, however, proved nothing, and could not be called a "test" as accepted by street railway managers.

The confidence which so generally prevailed in Leavenworth over the future of compressed air in that city, is really remarkable, and the compressed air castles which were built by hopeful and sanguine citizens, would make a good sized subdivision.

Meanwhile the people are beginning to wonder where the air and factories are coming from and are getting impatient for the electric service which the old company stand ready to install; and in many quarters doubt is arising as to whether compressed air cars, which are not to-day practically operating in any city this side the water, are after all the best thing; and if it is really an established success, why some of the older cities of the country have not tried and adopted it.

In addition to the horse lines in Leavenworth, a steam dummy road, known as the Leavenworth Rapid Transit Company, are operating a line between the Fort and the Soldiers' Home, passing through the city near the river. It is reported that the Earle people have endeavored to buy this line.

Just when the finale will come no one knows, but it is plain to see the city council have placed the city in a peculiar position and apparently have tied matters up in such shape as will be apt to defer the day of rapid transit indefinitely; nor can the parties who have placed the \$250,000 of property in escrow touch it for any purpose, until time solves the difficulty and releases them.

THE JUDSON SYSTEM IN WASHINGTON.

IT was in April, of 1890, that the Judson Pneumatic Street Railway Company opened an office in Washington, District of Columbia, and purchased what was known as the Brightwood Railway Company's franchise and real estate, at the head of Grant avenue and Seventh street, as site for the power house. Within a month work was begun on the station, which was a neat iron building of 112 by 175 feet, and on its completion excellent machinery was installed, consisting of a Corliss compound engine, having a 22-inch high pressure and 40-inch low pressure cylinder, running two 24-inch Ingersoll-Sargent air compressors. The Babcock & Wilcox boilers were used. The station equipment was first-class. A contract was made with Christie & Low, contractors, for track work, and construction was begun in June. The track conduit was very similar to cable roadway, although wider and less deep. One mile was built, with four engine pits each 20 feet square, and placed at intervals of 1,500 feet. In each of these was placed a re-heater and a 12 by 12-inch Payn high speed automatic engine. The centre line of engine shaft was the centre line of double track road. At these pits the 9-inch cylinder used in the conduit was depressed by universal joints and a 20-inch belt pulley was placed upon the shaft and connected to the engine by a link belt. The engine

ran at a speed of 250 revolutions per minute, and was fed with compressed air conducted through a 6-inch underground main leading from the power house. A coke re-heater raised the temperature of the air before entering the engine. There are two curves on the line—one a very long radius curve in the street; the other a 50-foot radius 90 degree curve leading into the car house. The engine driving the latter section was a small double 4 by 6 inch.

In October of the same year the north 1,500 feet was set in motion experimentally, cars being drawn out to it by horses. On this section the car ran slowly in one direction, but refused to reverse, as dirt had gotten into the "spider." (The friction wheels resting against the shaft, and whose contact with which was to move the car). That spider was then abandoned, and several weeks elapsed before a new one was completed. Mean-

while the track was completed and put in working order. The trials were first made late at night, with moderate success, and a daylight run was attempted. Trial trips were made with fair success for several days, and until a rain came, and wet the cylinder or shaft in the conduit. This would reduce the friction to such an extent that the car would not move, and in mounting the

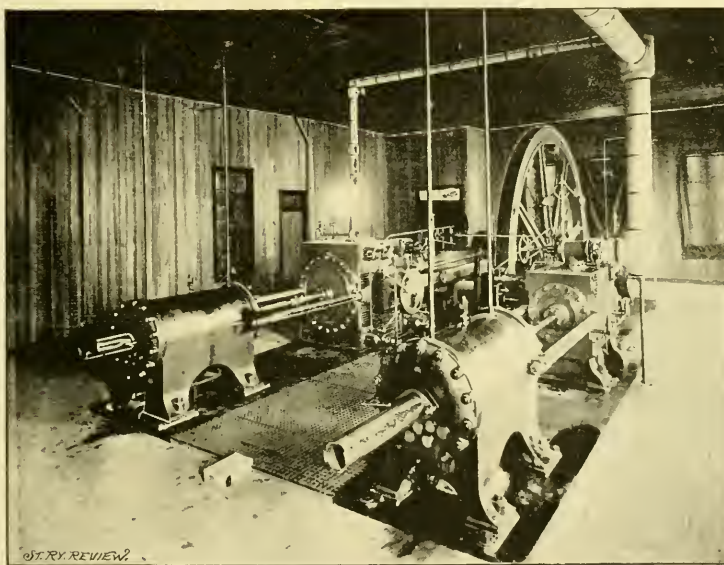
grade of a little over 3 per cent., the wooden rollers in the spider wore out very fast, not lasting over one hour. There were 8 rollers in the new spider. Snow gave the same trouble as rain, in destroying the friction. The engines in the pits also developed an untoward tendency to congeal, while the universal joints assumed a contrary inclination to get hot and frequently broke in two or three hours. Difficulty was also experienced in making the car work on the curves. As far as developed the threadless screw-roller system was a signal failure. Finally the sheriff sold the power house for \$22,000, and after spending many thousands of dollars the attempt was apparently abandoned. The machinery was then all removed. It is unfortunate, perhaps, that the company could not have prosecuted its experiments farther, as some of the difficulties it is believed could have been worked out had money been obtainable for the purpose. We can not, however, recede from our position that the

cable system which costs no more to install, and less to operate, precludes the possibility of competition from the system above described.

In the early part of 1891 the company seem to have lost faith in their system, and turned their attention to compressed air carried in storage tanks on each car. The result of this in the recent "test" at Pullman has already been mentioned.

The gentlemen who put their faith and money in the development of what they believed to be a great advance in street railway traction are deserving of much credit for the persevering efforts put forth in their endeavor to work out a difficult problem. Had they succeeded, their reward would have been proportionate to their success, and the world would have hailed the new candidate for traction power with cheers. Having demonstrated a

failure, the street railways are, without expense, the sharers of their costly experience, and to that extent indebted to the Judson people. The fact remains, however, that the system was already a demonstrated failure at the time the proposition was made to install it in the city of Leavenworth; and the recent franchise granted by that city to representatives of the Judson Company, permitting the latter a choice of "compressed air, thread-



JUDSON SYSTEM—INTERIOR VIEW OF WASHINGTON, D. C., PLANT. (NOW ABANDONED)

less screw, cable or electricity," would plainly seem to indicate that the compressed air promoters had themselves as great faith in cable and electricity as in their own much hoped-for system.

A NEW POWER HOUSE.

THE Denver Tramways Company has purchased the site for a new power-house for \$40,000. The new site embraces 16 lots and a plat 55x100 feet. Work will be begun at once on the building, and the foundation will be 180x400 feet.

THE Detroit Street Railway Employees' Union has celebrated the anniversary of their order. The speeches were all of a peaceful character, and reflected the intelligence of the men. Don M. Dickinson was one of the speakers, and visiting members from Toledo extolled the trolley.

FOREIGN FACTS.

A CABLE system is proposed for Newcastle, England, trams.

A RECEIVER has been appointed for the Midlands Tramways Company (Ltd.).

ANARCHISTS recently buried a bomb under the tramway track in Vienna. No one was hurt.

THE Tramways Company of Germany at the annual meeting declared a dividend of 6 per cent.

THE Calcutta Tramways traffic receipts have improved from \$15,000 to \$25,000 during the past year.

BUENOS AYRES City Tramways Company carried 21,000,000 during the past year, but the company had only \$775 left after paying all its indebtedness. The municipal authorities have refused to sanction an increase of fares and the question is "what will they do."

IT is proposed to build an electric railway on the Malay Peninsula from Singapore to Kranjie. English capital is at work.

A LONDON syndicate proposes to run an electric line at Hull, England, if the present horse car systems are turned over to it.

AT a meeting of the Lytham Improvement Commissioners it was allowed the electric road right to go through the district.

THE Dublin United Tramways Company has greatly extended their parcel express system, and now have given it international scope.

MR. DALZIEL, M. P., will introduce a bill regulating the hours of labor on tramway and omnibus lines, reducing the same to 12 hours out of the 24.

THE Dundee Tramways offers to pay a Police Commission of 6 per cent. on old lines and 5 per cent. on the new lines now asked for by the company.

THE Oerlickon Company, of Zurich, Switzerland, will try storage battery cars at Rome. The cars are to run 19 miles an hour, and to be charged every second trip.

THE Tramways Institute, of Great Britain and Ireland, recently held its quarterly conference and discussed the interests of tramway men and means in general and particular.

COLUMBO, Ceylon, asks proposals for the construction of tramways in the municipality. All communications should go to the Chairman of the Municipal Council. Colombo, Ceylon.

THE Leeds Electric Tramways Company will allow their present lease to continue until August, when it will go to the corporation of Leeds. The line is to be extended, and the track to be relaid in places.

THE Continental Metropolitan Tramways in the report for last year gives its total receipts as £160,027 and expenses £140,344 with a profit of £19,683. The Paris Company and the Omnibus Company suits have not yet been settled.

IN currency the Brazilian Street Railways Company largely augmented its receipts in 1891, and again from the 1st of January to the 11th of March last there was an increase of over 20 per cent., as compared with the takings for the corresponding period of 1891.

AN electric railway is proposed between Nauwuoya and the Dimbulla entrance to Nuwara Eliya Plain. The distance is 4 miles, with a rise of 900 feet, or a grade of 1 in 23. A route of six miles would make less of a grade. A speed of 10 or 12 miles per hour would be necessary in either case.

IN the event of reasonable terms being offered, the London Tramways Company, are said to be willing to hand over the whole of their line to the London County Council, although at the present time the Council under the Act only have power to take over a section four and a quarter miles in length. Sir Frederick Bramwell will act as referee in the arbitration.

NEW JERSEY'S RAILWAYS.

NEW JERSEY reports a number of interesting railway statements in the annual report of the State Board of Assessors. There are 16 roads in the state in actual operation, and 3 more contemplated if the promoters are not frightened at the report.

Of the 16 roads in commission, 4 pay dividends, varying from \$20,000 to \$900, with a total of \$33,000. The Newark and South Orange Railroad Company pays \$10,105.90, the North Hudson County pays \$20,823.00, the Patterson Horse Railway \$1,250.00 and the Pavonia road \$900.00.

The total cost of the railways including equipment is figured at \$21,806,183.32; the expenditures come at \$1,968,758.80, and the gross receipts at \$2,623,068.09.

The total miles of track is, 242.06, and the total capital stock issued, \$10,410,947.50.

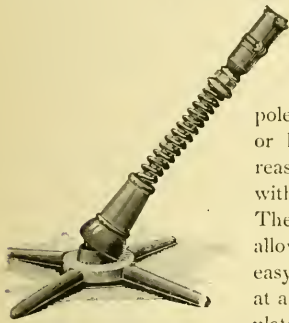
A SLICK NICKEL.

A COLORED man in Augusta, Ga., recently tried to pass a way-worn nickel on a street car conductor. The conductor refused to accept and ejected the colored brother, who now thinks, probably with the assistance of a small lawyer, that his feelings are damaged \$1,000 worth. The railway is fighting the case on every point.

THE street railway track at Covington, Neb., directly across the Missouri from Sioux City, which a few weeks ago was nearly a block from the river bank, had to be removed, the bank having caved in until it was unsafe for the car to run upon.

SILL TROLLEY BASE.

THE Sill Trolley Base is being introduced by A. G. Hathaway, of Cleveland Ohio, to the railway world. The claims made for the device are as follows: The action is universal, the design is artistic, one spring gives a steady pressure on the wire and is

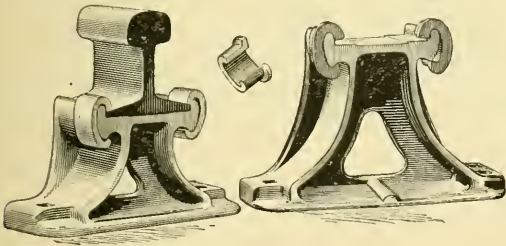


capable of allowing the pole to come to the roof of the car without injury to the car. The pole can be swung horizontal or left horizontal for any reasonable length of time without injury to the spring. The action of this base allows the trolley a free and easy movement on the wire at any angle, and can be regulated to any tension desired.

The spring is of the best oil tempered steel, and is compressed in its action instead of elongated, allowing no chance for an over taxation. The pole is held in a socket which allows the same to become disengaged if the trolley should catch in the wire, thereby preventing breakage in the wire. The castings are all of the best grey iron, mechanical and neat in their designs, having no angles, so preventing an easy breakage; it weighs but 55 lbs. complete, and bids fair to be a perfect success.

DUGGAN RAIL CHAIR.

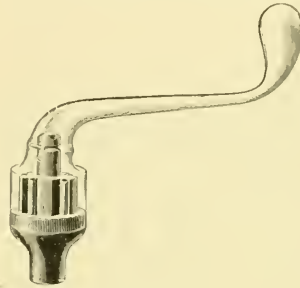
A CAST iron rail chair is being manufactured by the Burnham & Duggan Railway Appliance Company, of Boston. This chair, at an official test at the Watertown Arsenal, withstood a crushing strain of 78,000 pounds. Two chairs of other make broke at 11,700 and 15,000 pounds respectively. This chair weighs 9 pounds for a 4 inch, and 12 pounds for a six inch chair; the former using two spikes, the latter three. The clips



are malleable iron, and weigh 4 ounces each. Chairs carry either girder or tee rail. The flange of the chair against which the foot of the rail rests and over which the clip is driven, tapers so that when the clip is driven on it locks permanently. These chairs are being put on new track work at Savannah, Ga., and Newton, Mass. W. E. Butterfield, 19 Lake street, Chicago, is the general western agent.

THE LYON'S BRAKE HANDLE.

WE present with this issue an engraving of the Lyon brake handle, introduced by the Consolidated Electric Manufacturing Company, of Boston.



The points of vantage claimed by this handle is in construction and strength of leverage. A series of steel rollers is placed in a V-shaped recess between the steel barrel of the handle and the head of the brake rod. It is therefore ball-bearing and noiseless in one direction, but immediately grips when the handle is pulled the other way, there being nothing stronger than a leverage of this kind. The manufacturers invite correspondence and comparison.

ELMIRA'S SYNDICATE.

A CONSOLIDATION on a large scale has been consummated at Elmira, N. Y., by the organization of the Elmira Gas Company, two electric light companies, the Water Works, the Interstate Fair Grounds and the Elmira Street Railway. The price paid for the properties was \$2,800,000 and under one control ought to do a large business.

Walker Brothers, the bankers at 35 Broadway, New York City, originated and carried through the deal to the end.

A CHOICE LIST OF SUMMER RESORTS.

In the lake regions of Wisconsin, Northern Michigan, Minnesota, Iowa and the two Dakotas; there are hundreds of charming localities pre eminently fitted for summer homes. Among the following selected list are names familiar to many of our readers as the perfection of Northern summer resorts. Nearly all of the Wisconsin points of interest are within a short distance from Chicago or Milwaukee, and none of them are so far away from the "busy marts of civilization" that they can not be reached in a few hours of travel, by frequent trains, over the finest roads in the northwest—the Chicago, Milwaukee & St. Paul Railway, and Milwaukee & Northern Railroad:

- | | |
|---|-------------------------------|
| Oconomowoc, Wis. | Clear Lake, Iowa. |
| Minocqua, Wis. | Lakes Okoboji, Iowa. |
| Waukesha, Wis. | Spirit Lake, Iowa. |
| Palmyra, Wis. | Fronlenac, Minn. |
| Tomahawk Lakes, Wis. | Lake Minnetonka, Minn. |
| Lakeside, Wis. | Ortonville, Minn. |
| Kilbourn City, Wis. (Dells of the Wisconsin.) | Prior Lake, Minn. |
| Beaver Dam, Wis. | White Bear Lake, Minn. |
| Madison, Wis. | Lake Madison, South Dakota. |
| Delavan, Wis. | Big Stone Lake, South Dakota. |
| Sparta, Wis. | Elkhart Lake, Wis. |
| Pewaukee, Wis. | Ontonagon, Mich. |
| Wausaukee, Wis. | Mackinaw, Mich. |
| | Marquette, Mich. |

For detailed information, apply to any coupon ticket agent, or send stamp for a free illustrated tourist folder, to Geo. H. Heafford, General Passenger Agent, Chicago, Ill.

JOHN D. CRIMMINS.

THERE is a rising man in the rapid transit fraternity of New York. Not a particularly young man, or not an unknown man, but a man who is prepared to go into railway management, as he has gone into railway construction, that is, with brains and money; and that man is John D. Crimmins, of New York City, the new president of the consolidated lines.

Mr. Crimmins was born in New York City in 1844, and at the age of 16 entered his father's contract business, and at the end of four years became a partner in the firm of Thomas Crimmins & Son. Later the senior member retired, and the firm became John D. and T. E. Crimmins, by the partnership of a younger brother. The early start, the natural bent and the indefatigable industry of Mr. Crimmins enables him to personally supervise all large contracts, and to engage in operations on his own account.

The first conspicuous work done by Mr. Crimmins was in connection with the Croton department under the celebrated engineer Col. A. W. Craven. After the meteoric and volcanic end of the Tweed ring, all incomplete work was placed in the hands of Mr. Crimmins to finish, by recommendation of A. H. Green, comptroller.

The greatest public works of New York City since have been under the hand of John D. Crimmins. The changing of the Croton system and the sewers disturbed by the Fourth Avenue improvement was also performed by him.

For twenty years he has been probably the most prominent contractor in the metropolis, doing mainly private, corporate and estate work. Among his large clientage may be included the Manhattan Elevated, the Western Union Telegraph Company, the Astor, Beckman and Golet estates.

The difficult construction of the Third Avenue cable line, which was given up by one contractor, was finished by Mr. Crimmins in six months.

Now, as president of the metropolitan surface system, which has lately come into control of the Sixth Avenue line, Mr. Crimmins is a welcome addition to the brotherhood of street railway managers, and our best wish is that his success in this line may equal that of his other avocations.

A LARGE WOODEN FLY-WHEEL.

PROBABLY the largest wooden fly-wheel in the world has just been built at the Amoskeag Mills, at Manchester, N. H. It was designed by superintendent Chas. H. Manning, and built for their own use. The pulley weighs 104,000 pounds and is 30 feet in diameter, with a face of 108 $\frac{1}{4}$ inches, 12 inches thick. Over 20,000 feet of ash lumber and 18,000 lag screws were used in its construction.

CORNELL STUDENTS in the Institute of Technology, have finished their examination of Buffalo's electric railway.

ANDERSON ELECTRIC LINE.

THE energetic town of Anderson, Ind., famed for its natural gas, iron manufactures and tin plate, now rises to the dignity of a fully-equipped, properly opened electric road.

The county officers, the town officials, and the board of directors, under the charge of vice-president, J. C. Morgan, L. M. Cox, sec'y, and Charles L. Henry, manager, made the initial run to North Anderson, amid the greatest excitement among the people who lined the track.

The road is equipped by the Edison company, under the direction of Wm. Hand, of Chicago. The power house is a neat building of Alexandria stone facings, and provided with sufficient space for further equipment as it becomes necessary.

A 61-inch steel boiler furnishes power for a 125-horse-power Allis, Corliss engine of 42-inch stroke, which drives the Edison dynamo. The cars are provided with two, 15-horse-power motors, and are two in number, each one drawing a trailer. The system will be extended as further street improvements are made.

WAGES IN BUFFALO.

SOMETIME ago negotiations were entered into by the employes and managers of the Buffalo Street Railway Company in regard to the wage question. The matter culminated by a readjustment of the wage scale to the following effect, on horse lines:

For the first 3 months' service - - - 14 cts. an hour.
For the next 9 months' service - - - 15 cts. an hour.
After 1 years' service - - - - - 16 cts. an hour.

The pay of motor conductors and motor drivers will be:

For the first 3 months' service - - - 15 cts. an hour.
For the next 9 months' service - - - 16 cts. an hour.
After 1 years' service - - - - - 18 cts. an hour.

The term of service of a conductor or driver is understood to begin on the day when he first began work as such conductor or driver, on either an electric or horse car of the company, and provided he has continued in the service of the Company since that day.

The arrangement is altogether satisfactory to both parties of the arrangement, and all talk of any trouble may be considered as the efforts of agitators, and "paper" agitators at that.

STEALING A TROLLEY WIRE.

BESIDES classic Boston's bad men the thieves of Jersey City Heights show great discrimination, for recently a half mile of trolley wire was forcibly abducted by parties unknown.

AN ELECTRIC line is projected to connect Junction City and Ft. Riley, Kansas. The water power has already been purchased. Hon. John Eddy, of Bloomington, Ills., is at the head of the company.



JOHN D. CRIMMINS.
President of the Metropolitan Traction Company of New York City.

HYGIENE AND VETERINARY.

Edited by F. T. McMahon, Veterinary Surgeon, Chicago City Railway Co., World's Columbian Exhibition, and Chicago Police and Fire Department.

GLANDERS.

This fatal and loathsome disease has long been the scourge of that noble race of animals, the horse.

We have every reason to believe that glanders and farcy are but modifications of each other, and that both originate in one common poison. Innumerable facts and well conducted experiments have settled this matter beyond doubt. Horses have been inoculated with the matter of farcy, and the glanders has been the result; glanders has been produced by the inoculating with the matter of glanders; and farcy has been brought on by inserting the matter of farcy; and the artificial introduction of the matter of glanders has occasioned a true appearance of farcy.

Some deny that any weight is to be attached to such results, and assert that these diseases can even be produced artificially, by means of substances foreign to contagion or to individual poison. We would say that it is the very essence of all poisons to be governed by their own laws, and to own only certain modes of operation. Small pox, syphilis, and the rabid poison have remained the same in their symptoms, mode of propagation and terminations for ages. We have always, therefore, ourselves, felt convinced of the specific nature of this affection, which, for variety in its mode of production, continuation and termination, has no parallel; and to which only, we can attribute the unsettled state of opinions concerning it, but which do nothing to uproot its claim to the character of a direct and peculiar poison, that can always beget its like only. Glanders can be produced by great debility, induced by any cause, but once induced by any cause that undermines the constitution, can then by inoculation generate nothing but glanders or farcy. Glanders appears in two forms, the acute and chronic. It is the acute form of glanders which generally makes its appearance as the effect of some extraordinary circumstances, acting on a number of horses at the same time, as in a state of unusual deprivation of pure air.

The causes of glanders have occasioned much difference of opinion.

Both glanders and farcy originate in contagion, an hereditary defect in the structural capacity of the aerating organs, there is great reason to suppose, is a remote cause of much importance in glanders. Whatever acts obnoxiously on the air passages for a considerable time, by its irritation, fits them to develop it also: and thus either acute or chronic glanders may arise, as the cause is active or insidious. In this way it is that the impure air of close confined situations probably acts, by wasting the strength and destroying the constitution. In populous cities, in crowded unventilated stables, we therefore meet with this disease in the greatest numbers and the worst forms, a remote cause is a cold, humid state of atmosphere, acting upon a debilitated

frame; and thus it is more frequent in winter than in summer. The contagious nature of glanders is not disputed, although it may originate spontaneously. All horses, however, are not equally susceptible to the disease. It must be remembered, that there is a non-susceptibility in some constitutions, and also in the same constitution at particular periods to receive it, when at other times, the fatal disorder would be readily imbibed: a sound horse shut up in an unventilated stable, where the air becomes contaminated, might himself generate the disorder. In its general character it is contagious, and its contagious nature is exerted by the actual application of the morbid virus to some part of the body, and that generally an abraded surface.

THE SYMPTOMS

are increased secretions from the membranes of one or both nostrils, which continually flow in small or large quantities. This discharge is seldom at first perfectly purulent, but is more glairy and thick. It sometimes continues thus for a long time, at others it hastens to become muco-purulent and then purulent, but there always remains a peculiar degree of viscosity in it that sticks the nostrils together, as it were, from its tenacity, differing from all other mucus or purulent secretions, the very nature of which strongly characterizes the complaint, and a peculiar noise in respiration is the result. The general color of the Schneiderian membrane (lining of the nostrils) becomes changed, first to a violent color, often a dingy yellow, and afterwards to a leaden hue. As ulceration sets in the discharge becomes tinged with shades of green and yellow, intermixed with blood, and is often sanacious and offensive, which is always the case when the bones become diseased, and is an indication of the approach of the final stage. From absorption of the morbid matter by the lymphatics, near to the parts, the maxillary glands under the jaws become swollen and tender; when one side of the head only is affected, the absorbent glands of that side only grow tumefied. The enlargement of these bodies is too much relied on as an absolute criterion of the existence of glanders. Because, when the disease has existed some time, they are generally tumefied, although in mild cases of some standing they are not invariably so: and, again, there are other complaints besides this that will tumify them; whatever inflames the membrane of the nostrils, as catarrh, strangles, etc., may cause the glands to enlarge. The gland may or may not be firmly attached to the jaw bone, or the whole may form a tumid mass, very tender, but not adherent to the jaw on either side. They are, however, seldom found in this condition, for after the disease has attained any virulence, a distinct lymphatic glandular knob will generally be found in contact with the branch of the jaw bone on the affected side; as a rule the enlargement of the sub-maxillary glands is one of the earliest symptoms. The disease sometimes

remains long without producing ulceration in chronic glanders, and cases of this kind prove very puzzling; at other times, on the contrary, an ulcerating process is speedily exhibited, which in acute glanders invariably appears. The ulcers of glanders have a very peculiar character, and their appearance cannot be too attentively studied. They usually commence in small abscesses which at first may contain pus or a clear fluid, but they soon form small cavities with ragged edges and are seen in great numbers in the nostrils, they unite and spread all over the membrane, the eyes now become inflamed and a watery discharge flows down the face, the coat stares, and one or more of the limbs becomes swollen and tender, soon small abscesses appear along the course of the lymphatic vessels which secrete a watery fluid, and in a short time the whole limb becomes a mass of ulcerated sores.

TREATMENT.

Glanders, however, is something more than a mere local disease, and is, moreover, frequently the termination of other disorders. Supposing the discharge from the nostrils could be stopped, the glanders would not be cured, as the discharge is but a symptom, glanders being a general disease of the constitution. The great reward held out has stimulated many practitioners into unnumbered experiments, and an occasional success is heard from.

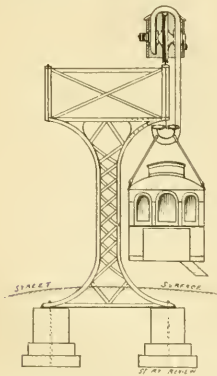
The proper treatment for glanders in the form we meet with in this country, is destruction of the animal and to isolate any other animals that may have come in contact with the one affected, and observe the isolated animal from time to time, lest some symptom of glanders may appear. The premises must be thoroughly disinfected daily for a week or two.

A BARN-DOOR SYSTEM.

THE numberless schemes for rapid transit, which subject we venture to say is interesting more people than any other phase of mechanical progress, sometimes evolve really interesting propositions regardless of practicability or economic value.

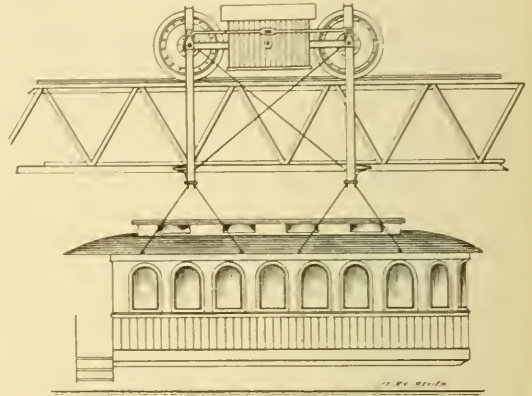
Recently, while rapid transit was agitating Montreal, Canada, H. J. Wickstead, a civil engineer, brought to light an elevated system of which he is inventor and patentee.

The idea as may be seen from the first illustration, is that of a suspended car. Two light, continuous double girders are supported at intervals of forty feet by wrought iron lattice framed posts between the tracks. On the upper cord of each girder is placed an insulated rail, one forming



the right and the other the left hand track of a double line. To the lower cord, and forming part of it, is riveted a T iron with the web downward. This elevated structure is light, little cross-bracing and no cross-

ties being required, and the only obstructions presented to ordinary street traffic are the posts. The essential feature of the invention is the truck which runs on this single rail. It is substantially composed of two double J forgings, suitably braced laterally. The upper J is sufficiently long to pass over the top of and afford a support for a carwheel, with a double flange, and in the lower J there are two horizontal rollers, so adjusted as to hardly touch the web of the T on the bottom of the girder. The car body is attached to this truss by a simple stay rod system.



Mr. Wickstead claims the following advantages for his system: First, lightness and strength in construction; second, that the cost will be \$60,000 per mile; third, safety; fourth, freedom from the interference of the severe climate of Canada.

This system is proposed mainly for suburban traffic in connection with sleighs and omnibuses.

A company has been formed to construct a railway upon this principle, and a charter has been applied for.

VISITING MAGNATES.

FINAL and amicable arrangements have been made whereby the Cleveland capitalists, mentioned last month in the REVIEW, have come into possession of the Newport, Ry., railway franchises. Col. Shippard stated that the entire lines can be completed and cars running in four months after work is commenced.

A brilliant assemblage of capital paid a visit to Newport in relation to the new road. Under charge of Samuel Bigstaff the party were composed of John J. Shepherd, Howard P. Eells, James H. Hoyt, Mr. Kimball, Cleveland; Capt. C. M. Holloway, Capt. J. D. Parker, Larz. Anderson, Francis H. Cloud, James M. Glenn, Richard Dymond, John W. Warrington, Thos. S. Paxton, Jas. E. Mooney, Chas. H. Kellogg, A. Howard Hinkle, Thos. T. Gaff, Chas. B. Timrall, Gov. J. B. Foraker, R. W. Nelson, F. P. Helm.

J. MAXWELL, the well-known St. Louis street railway magnate, has purchased five fast steppers from the Guttenburg track. Mr. Maxwell believes in all kinds of rapid transit.

A MAIL AND EXPRESS LINE.

THE general interest aroused by the articles on parcel express and street railway mail service, published in the STREET RAILWAY REVIEW for last year, should be supplemented by a description of the Dunkirk and Fredonia line at Dunkirk, N. Y.

The road in question connects the town of Dunkirk, situated on several trunk lines, with Fredonia, an inland town three and a-half miles distant.

The road has always maintained a baggage service since its construction twenty-five years ago, making a charge of 10 cents for regular 100 pound weights, and 5 cents additional for every fifty pounds above this limit. The road has always been a route for the American Express Company, carrying without messenger, at 15

Our engraving shows the officers of this pioneer express line by the side of the motor car: President: Wm. McKinstry; Attorney, ex-Judge George Barker; Directors, H. C. Lake, of Dunkirk, Frank May; Postmaster, P. H. Stevens, and M. M. Fenner, Secretary-Treasurer and Manager of the road, all of Fredonia.

THE DENVER PLANS.

THE Denver, Lakewood and Golden offers for a bonus of \$30,000 to build a line out through Sheridan Heights, Garfield Heights, Loretto Heights to Fort Logan. The amount has been subscribed and the road will probably soon be built. The section traversed will be of great natural beauty, and a natural lake at the terminus will be made into a pleasure resort.



cents per 100 pounds; no package being rated at less than twenty pounds. As a mail route it receives \$600 a year from the government for service between the towns. The express company pays about the same amount per year. An independent express is not run, so as to favor the American company.

The engraving presented herewith, shows a train of three cars, including their new express and mail car, a reconstructed 12-foot box, lettered "U. S. Mail. Baggage & Express." Ten dollars per month extra is earned for carrying the express safe. The express company does all the collecting and delivering.

The road makes the following report for the quarter ending April: Earnings, \$3,525; other income, \$817; operating expenses, \$2,658; other expenses, \$108; net income, \$1,575; surplus, \$9,623.

THEY CAME DOWN.

THE street car fiend sat with his legs crossed and his thumb-hand foot covered with a No. 11 boot, oscillating with the action of the car. Presently a man came down the aisle and halted opposite the barrier, saying, sarcastically: "Take down the bars, please." It seemed to be very neat until the quick, angry retort came: "Yes, certainly, and let the cattle go through."

THE altogether-too-prevalent incident of car robbing has an additional chapter in Kansas City, where a car was held up about 11 o'clock at night, and \$10 taken from the conductor. Four passengers were requested to "shell out," but produced only 15 cents.

SIOUX CITY'S SUNDAY.



SINCE his most Christian majesty of France joined hands with the infidel Turk against the Spanish Emperor there have been few more unique experiences in the good State of Iowa, than was recently witnessed in Sioux City.

As is known to all our readers, there exists in Iowa a law known as the Clark law, prohibiting the sale of intoxicants. The history of this law and its failure to prohibit, except as the municipality rules, is patent enough. There is also another law in the State, known popularly as the Sunday law.

The Iowa code in regard to Sunday provides:

"If any person be found on the first day of the week, commonly called Sabbath, engaged in any riot, fighting or offering to fight, or hunting, shooting, carrying firearms, fishing, horse-racing, dancing, or in any manner disturbing any worshipping assembly, or private family; or in buying or selling property of any kind, or in any labor, the work of necessity and charity only excepted, every person so offending shall, on conviction, be fined in a sum not more than five dollars nor less than one dollar, to be recovered before any Justice of the Peace in the county where such offense is committed, and shall be committed to the jail of said county until said fine together with the costs of prosecution, shall be paid, but nothing herein contained shall be construed to extend to those who conscientiously observe the Seventh day of the week as the Sabbath, or to prevent persons traveling, or families emigrating, from pursuing their journey, or keepers of toll-bridges, toll-gates, and ferrymen from attending the same." (McClain's Annotated Code of Iowa p. 1574, Sec. 5438.)

The consequence of the enforcement of the prohibitory law by the present Mayor, Mr. Pierce, is that the only liquor sellers in the city are two varieties of toughs and bums, known popularly as hole-in-the-wall men and boot-leggers. These two classes have been vigorously fought and brought to justice by the present municipal administration which was inaugurated last March.

Without entering into the merits or demerits of the prohibitory law, it is safe to say that what is known as the liquor men of the various prohibition States are of the lowest type, not recognized by law as legitimate traders, and only those without reputations to jeopardise enter the lists.

Without doubt, according to very good authority, the street railway men in Sioux City, as is the case with most of liberal-minded citizens, are in favor of the legal repeal of this law, and have united their efforts to this end in order to bring this element into law-abiding citizenship and introduce high license and local option, and its consequent limitation of the evil.

The above-mentioned liquor element, therefore, in retaliation, without reason and without resource, began a

crusade against Sunday cars, eating-houses, cigar-stands, and newspapers, with the avowed intention to "enforce every law on the statute-book." Under the name of the "Sunday Enforcement League," the leaders of the retaliatory movement began by issuing warrants for the arrest of Sabbath-breakers. The restaurants and eating-houses were not molested, and but few other places closed. Although threats had been repeatedly made, it was not believed by the citizens generally that so radical measures would be adopted as to tie up the transportation of the entire city. But on Easter Sunday the scheme was carried into effect.

As the law requires specification in apprehension, the legal fiction, in use from time immemorial, was brought into requisition, and as the "enforcers" did not know the names of the victims as the cars should come to the downtown crossing, the warrants were made for the apprehension of "John Doe and Richard Roe alias ——." These were served against the motor-men and conductors of the electric cars about 10:30 a. m. The warrants were issued by Justice Foley, who kept open his office that day, and were filled in when the arrests were made and the proper names ascertained. J. F. Peavey gave general bond and bailed his men out and kept his cars running until 1:30 when the arrest of firemen and engineers was threatened. This caused the paralysis of the system, as inexperienced men in such places might have caused serious damage to the machinery. The Cable fared better, as the company kept putting new men on the cars as fast as the old men were taken off. This, and giving bonds for the regular employes, kept the system on time the entire day. President Pierce and Secretary Moller ran cars when no one else presented himself. As a rule, however, Mr. Pierce had his forces massed, and the battle was carried on with great generalship. It seemed as if all he had to do when the train came to a stop was to give a snap of his fingers and an unknown, ununiformed man would spring out of the crowd, grasp the grip, and away the train would go through the crowd.

The elevated road was not molested, except in one instance, when bail was given and they resumed work.

The Riverside line seemed to attract less attention of the enforcers, and was, by judicious shifting of crews, kept open all day. The Peavey line, however, seemed to be the butt of particular vengeance, and Mr. Peavey wisely guarded the interests of his company, as inexperienced men at the power-plant might easily have wrecked his entire system.

The Ferry to the Nebraska side was stopped early in the morning.

The populace of course, was anxious as to the outcome, and never except during Corn Palace time had the streets of this lively city been so crowded, and as the crowd is wont, cheered or groaned as popular fancy received the men arrested. The cheers were in the minority.

All informations were sworn out by two parties, and four constables did the arresting. By night 15 men had

been bailed out for Mr. Peavey's line; 8 men were released for the Riverside electric and one fireman on the Leeds suburban was released on his own recognizances.

On Tuesday the cases were brought up before Judge Foley, who decided that street cars were works of necessity, and all the defendants discharged.

The law provides imprisonment until the fine of \$5 is paid. The hardship wrought the companies, besides the extreme anxiety and risk connected with it, was very great.

No further trouble is apprehended and the voice of the people is that all Sioux City must ride on its fine systems of rapid transit. The enforcement people are in extremely bad odor, while Mayor Pierce, President Peavey and President Pierce are more popular than ever.

ARMATURE VENTILATION.

APAPER by M. Rechniewski, in *L'Electricien*, has provoked some discussion among foreign electrical periodicals. The paper is on the results of a series of tests on the heating of dynamos. There seems to be some difference of opinion as to the practical value of the results. The heating of an armature is caused by three things: The heating of the wire due to the flow of current through it; the heating of the iron due to rapid change of magnetization, commonly known as hysteresis; and the heating of the iron due to eddy currents in it.

The author of the paper referred to, considers the eddy current heating loss so small as to be negligible. It is claimed by some that this is not a correct view. The results of the tests show what former tests seem to have shown, that there is no definite rule for determining the amount of ventilating surface to be allowed on all forms of armature, in proportion to the heat wasted in them. Practice in the last few years has been steadily tending in the direction of better armature ventilation.

The ability of a dynamo to keep its armature cool, has a great deal to do with its efficiency. The fact that the armature temperature is always dependent on the surrounding temperature in that it is always a certain number of degrees above it, shows the necessity of keeping the outside temperature as low as possible. It is well known in every day practice that a difference of a few degrees in the dynamo room, makes a very noticeable difference in the power required.

A rise of 30 degrees Centigrade, above the surrounding air is the commonly accepted allowance for armature heating.

M. Rechniewski considers that fifty degrees Centigrade is not too much in many cases but, as was said before, the temperature of the surrounding air and the power of the insulation to resist heat determine this. In some cases only seventeen degrees rise is allowable, where the dynamo is obliged to run in a confined atmosphere.

The smallest machine tested by M. Rechniewski was one of 3,300 watts capacity. It proved to have 7.14 square centimeter ventilation area on the armature per watt wasted in heat in the armature. This was the larg-

est area found during the test, the armature being of the unventilated drum type. The machine giving the smallest area per watt, was a large multipolar ring armature machine having a central opening in the core. The result in this case was 3.30 sq. c. m. per watt. The author attributes this to the fact of the central opening in the armature, which would seem to be a very correct surmise, as whatever chance the outside of an armature may have to cool, it fails in ventilation unless the central part has a chance to cool also. When the losses from hysteresis and eddy currents are large, that is when the iron is heating a good deal, such internal ventilation is specially needed, and when it is possible, will greatly reduce the loss by putting the cool air where it is most needed. The question of dynamo-heating is one which has to be largely settled by the manufacturers. Users can only see to it that the temperature of the surrounding air is kept as low as practicable. Indeed, it is rather a surprise that there is not more care taken in this respect.

A NEW SHOE.

AFRENCHMAN has invented a horse shoe that claims several points of vantage over usual methods of procedure; the principal one being that it is impossible for the horse to slip and consequently the animal can pull every pound of its weight. The peculiarity of this is the affixing to the under part of the shoe of two strips of cork, one on each side. The cork strips are held in position by two very thin sheet iron plates firmly fastened together by a rivet. The outer edges of these plates are slipped between the shoe and the hoof. The inner edges are turned upward, forming flanges, between which and the inner edge of the shoe the cork blocks are tightly fixed. Between these flanges is fitted a screwed bolt with nuts at either end, so that when the nuts are tightly screwed against the flanges the whole is perfectly immovable. In order to hold the cork still firmer in position, the corners of the flanges are turned down over it, thus forming a couple of sockets, into which the cork, which at first tightly projects over the surface of the shoe, is jammed and compressed more firmly every day by the weight of the horse. These shoes are successfully run on the Brussels, Belgium, Tramways and on the London Omnibus line.

HIS FIRST RIDE.

PORTLAND, OREGON, is surprised by discovering a man 80 years old who has just taken his first ride on a street car. The man said he came across the plains in 1859, and has been a resident of that state almost continuously since that time and owns considerable property. The ride in an electric car was quite a novelty to the old man, as he expected to find nothing there but horse-cars.

JOSEPH M. BRENNAN, of Lincoln, Neb., a street railway conductor, has fallen heir to \$50,000 by the death of an uncle in the east.

STREET RAILWAY LAW.

EDITED BY MR. FRANK H. CLARK, ATTORNEY AT LAW, CHICAGO.

Action Against a Corporation for Slander.

An action for slander will not lie against a Street Railway Company for language used by its superintendent when discharging an employe.

Plaintiff was a conductor in the employ of defendant, the St. Paul City Railway Company. He was discharged by the superintendent of the company and was told by the superintendent as the reason for his discharge, "You have turned in a short register and have traded transfers." In sustaining a demurrer to the declaration the court said: It is broadly stated in Townshend on Slander and Libel, Sec. 265, pages 505-506, (and for that matter in all elementary works on the subject to which my attention has been called) that a corporation cannot be guilty of slander, no case tending to hold to the contrary save that of Gilbert vs. Crystal Fountain Lodge, 80 Ga. 284, (reported also 12 Am. Repts. 255.)

In that case the court says: "On principle we think of no reason why a partnership might not slander a third person through agents or members authorized or empowered to defame orally, or by adoption and a ratification after defamation by slanderous words." It will, however be noticed that this remark was not necessary to the decision of the case, it being placed on other grounds. However that may be, the complaint at bar is radically defective in failing to show authority from defendant corporation to the person who is said to have uttered the defamatory words to so utter them on defendant's behalf or any ratification or adoption by defendant after they were uttered. True, it says Mr. Sloane was the superintendent of defendant's business, and authorized to hire and discharge men, and that he used the objectionable language on behalf of defendant in discharge of his duties. But it does not follow that he was authorized to give false and defamatory reason or indeed any reason for his action. There is nothing in the nature of the business of the defendant for which authority to its superintendent to gratuitously utter a slander can be applied.

(Murphy vs. St. Paul City Ry. Co., Dist. Ct. Minn., Ramsey Co., not reported.)

Liability of Street Railway for Repaving—Ordinance—Provision for Arbitration.

A borough ordinance, giving permission to a passenger railway to occupy its streets, provided that the company should reconstruct the streets used with the same kind of material as used by the borough authorities, and keep the same in repair, does not authorize the borough to compel the company to pay the cost of repaving with Belgian blocks a street macadamized with cinder, etc., and so reconstructed by the company when it laid its tracks.

The ordinance further provided that, if the street was not macadamized, the company should use material furnished by the borough. Having failed in this case to furnish the material, they could not recover on any construction of the ordinance.

It seems that the provisions of a borough ordinance for the collection of cost of paving, one by the apportionment of arbitrators, and another by filing the claim and collecting it in the manner prescribed by an Act of Assembly, reciting the Act by title only, do not oust the jurisdiction of the court in an action of assumpsit, the provision as to arbitration being too indefinite, and the other provision being a special law for collecting debts, etc., in violation of art. III, § 7, of the constitution, and an extension of the provisions of an Act by reference to its title only, in violation of art. III, § 6 of the constitution.

Sup. Ct. Pa., Norristown vs. Passenger Ry. Co., 1 Leg. Intel. adv. Rep. 460.

Lease of Franchise—Compensation for use of Street—Joinder of Plaintiffs.

The legality of a lease by one street railway corporation to another, of its franchises and roadbed can only be called in question by the commonwealth, or by a private suitor who has sustained a private injury for which he has legal redress.

The use of a street for a passenger railway, whether the cars be propelled by horse-power, cable or electricity, imposes no additional servitude upon the street, and hence does not entitle the owner of property abutting on the street to compensation under art. XVI, § 8, of the constitution.

The first section of the Act of March 22, 1887, which provides that corporations organized thereunder shall have power to "enter upon any street upon which a passenger railway now is, or may hereafter be constructed, etc." authorizes such corporations to enter upon streets not before occupied by passenger railways, and lay their own tracks thereon in the first instance.

Where the cause of complaint is common to all the plaintiffs, the right under which all claim is the same as to each, the complaint of all is against the same defendant for acts which affect all alike and in the same manner, the defence set up is common to all the plaintiffs, and the testimony, proofs and decrees are alike as to all, a bill filed by several such plaintiffs against a common defendant is not multifarious.

Sup. Ct. Pa., Rafferty v. Central Traction Co., 1 Leg. Intel. Adv. Rep. 419, S. C. Pittsb. Leg. Jour. 319.

Collision of Cable Trains—Presumption of Negligence—Error Cured by Remittur—Evidence—Physician's Bill.

When the evidence of an injury to the plaintiff and the circumstances under which it was inflicted, are alone sufficient to raise a presumption of negligence on the part of the defendant, and no evidence is offered to rebut that presumption, so that the plaintiff is entitled to recover regardless of the evidence admitted, such evidence, though variant from the allegation, will not be such an error as to require a reversal.

As a general rule, proof of an injury occurring as the proximate result of an act which, under ordinary circumstances would not, if done with due care, have injured any one, is enough to make out a presumption of negligence, and this rule applies even when no special relation like that of passenger and carrier exists between the parties.

In a suit by a passenger for an injury, the mere proof of the accident by which the injury was inflicted may be sufficient to throw the burden on the carrier to show that he used due care; and when there is an absence of *vis major*, and it is shown that the injury happened from the abuse of agencies within the defendant's power, it will be inferred from the mere fact of the injury that the defendant acted negligently.

Even if such presumption is one of negligence generally and not of any specific negligence, it will be sufficient to throw upon the defendant the burden of rebutting the specific negligence alleged.

When a train of cable cars on which the plaintiff was a passenger, standing on the platform of the rear car, came to a stop when about half way through a tunnel, and remained standing several minutes, when another train descending through the tunnel collided with the rear car of the standing train and thereby inflicted a personal injury, it was held that the mere fact of the injury raised a presumption of negligence, and which was sufficient to sustain a general charge of negligence in the running and operating of the defendant's road and the cars propelled thereon.

Under a general charge of negligence in the running and operation of the defendant's cars, whereby an injury was received by a collision of cars, evidence of the structure and condition of the colliding car and of the fact that it was not supplied with a sand-box or appliance which would have made it more easy to slacken or arrest its progress on a descending grade, is material and proper, as bearing on the question of the manner in which it should have been run and operated and the character and degree of care with which it should have been managed, although the structure of the car and the want of a sand-box may not be alleged specifically as negligence.

The fact that evidence admitted in an action based on negligence may tend to support a charge of negligence not made by the declaration, will not render it improper if it has a material bearing upon one or more of the charges of negligence made. The defendant may, by instruction, limit such evidence to the charge made in the declaration.

In an action to recover for an injury resulting from a collision of cars through negligence, the declaration alleged, as an element of special damages, that his artificial leg, of the value of \$200 was destroyed, but there was no averment as to the purchase of a new one. On the trial there was evidence of the value of such leg. The plaintiff was allowed to testify that he paid \$207 for a new leg. The Appellate Court required plaintiff to remit \$207 from his judgment and affirmed the same as to the residue. *Held*, that the error in the admission of the

evidence as to the cost of the new leg was thereby eliminated from the case.

Where the plaintiff in an action to recover damages for personal injury, alleges that he was compelled to and did pay out and expend large sums of money in and about being cured of his injuries, it will not be sufficient for him to prove merely that he has paid a certain physician's bill in order to his recovery, but he must also show that by reason of his injuries he has necessarily incurred such bill and that it is reasonable.

In such case the court, on specific objection may, before admitting proof of the plaintiff's liability incurred in curing himself and its amount and reasonableness, require an assurance from counsel that he will follow up the evidence by proof of payment. On failure to prove that such a bill has been paid, defendant should move to exclude all evidence in relation to the physician's bill, or ask the court to instruct the jury to disregard it.

Where the question of a physician's qualifications and right to practice in his profession arises only collaterally, proof that he has practiced medicine in this State for a long time will show *prima facie* that he was lawfully entitled to practice. But if he were to sue to recover for professional services, he would doubtless have to show affirmatively his compliance with the law regulating the practice of medicine.

In an action to recover for a personal injury, the plaintiff was called but no question was asked him as to his health prior to the time of his injury. Defendant proposed on cross-examination to ask him questions as to whether, at any previous time, he had been afflicted with any diseases, which the court on objection refused. *Held*, that such questions were not within the scope of a proper cross-examination, and the exclusion was justified on that ground, though the record failed to show that the objection was on that ground.

Where a party suing for a personal injury had a leg amputated ten years before the injury complained of, the defendant sought to prove that at a period anterior to such amputation the plaintiff had some disease, which, though dormant from the time of the amputation to the date of the recent injury, may then have manifested itself again, and have been the real cause of some portion of his sufferings. *Held*, that the matter thus sought to be investigated was too remote and the inference sought to be drawn from it too conjectural, and that the proposed evidence was properly refused.

Sup. Ct. Ill. North Chicago Street Ry. Co. vs. Cotton, 24 Chi. Leg. News 252.

Street Railway Crossing—Care Required—Collision with Team.

Upon the trial of a case for injuries to the team of the plaintiff by being struck while crossing the tracks of an electric railway by a car upon said tracks which ran at right angles to the street upon which the team was traveling, the judge instructed the jury, *inter alia*, that there was no rule of law that required the driver to "stop, look and listen," but it was for them to determine what

it was the driver's duty to do, and whether he actually did it on this occasion. *Held*, error thus to leave the jury without any rule of law to apply and at liberty to make one to suit themselves.

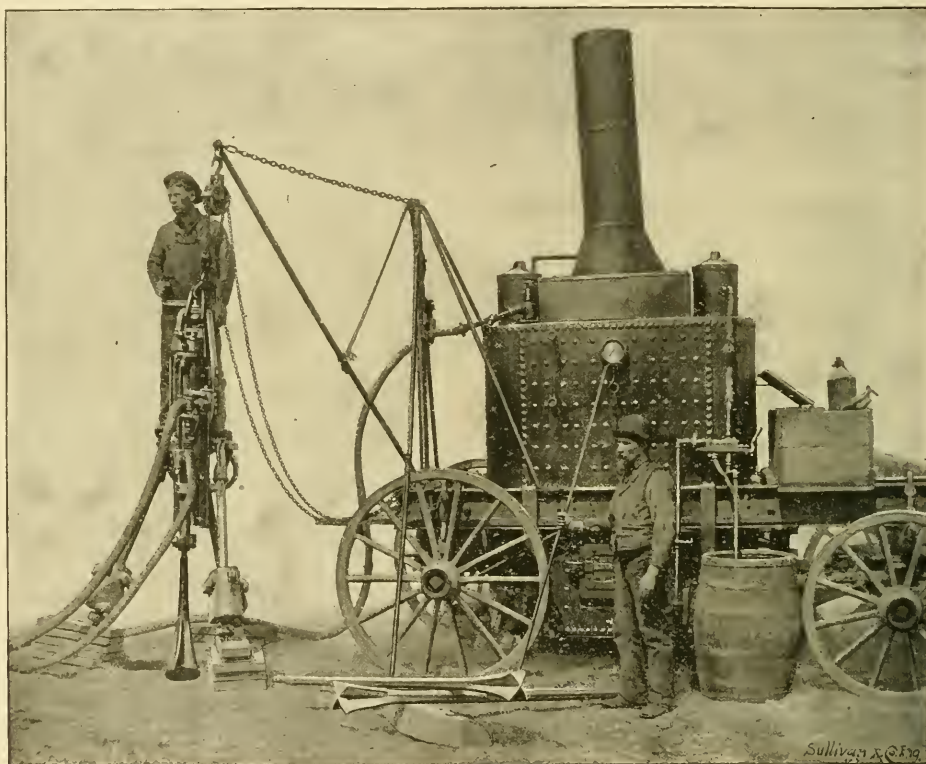
A person about to cross a street upon which is located a street railway must exercise a reasonable amount of care to avoid contact with a moving car. It may not be necessary to stop on approaching such a crossing, but it is necessary to look before driving upon the track.

Sup. Ct. Pa. *Carson vs. Federal St., etc., Passenger Ry. Co.* 22 Pittsb. Leg. Jour. 345.

SETTING POLES IN ROCK.

WE illustrate in the accompanying engraving, a very complete portable steam drilling plant for drilling holes in surface rock for setting poles for electric railways and telegraph wiring. The engraving was made from a photograph of a portable drill plant used by the St. Paul City Railway Company, on their St. Paul and Minneapolis line.

The facility for fast work by such an apparatus is apparent from an inspection of its details. Holes of 7



DRILLING HOLES IN ROCK FOR ELECTRIC RAILWAY POLES.

DETROIT'S TROLLEY.

JAMES H. VIHAY, president of the Fort Wayne & Elmwood Railway, states that a decision has been arrived at and that the power plant is to be erected on the site of the car barns on Clark avenue. All lines west of Woodward avenue will be equipped with the trolley. The Fort Wayne & Elmwood line during May will build a line from the Dearborn road to the Rouge River, about one mile in length, and has an arrangement with the new road to Wyandotte, which is expected to be running by July 1, by which the passengers of the latter road will be taken at the Rouge and carried to the city on a rebate or differential.

A NEOLOGIST suggests Motoritor as the name for the man in charge of an electric car.

inches in diameter or any other size within the scope of the drilling machine can be put down in an exceedingly short time, plumb and of a size to fit the poles, so that when the poles are set in place, they are as firm as the rock itself. This method saves much labor and blasting as in the ordinary way of excavating holes in surface rock, and which only gives the poles a loose bracing. The drilling machine best suited for this purpose for holes of 7 or more inches in diameter is the "H" 5-inch cylinder with a 15-horse-power boiler mounted on wheels.

The machine illustrated was made for the St. Paul City Railway by the Ingersoll-Sargeant Drill Company, 10 Park Place, New York City.

A SARCASTIC exchange remarks: If all the proposed motive powers fail. Chicago might run her street cars by compressed nerve.

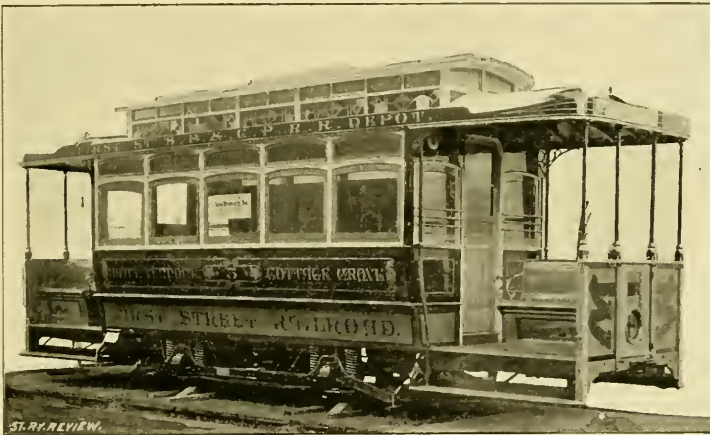
PACIFIC COAST CAR BUILDING.

THE wonderful development during the past two years in street railway interests on the Pacific coast has encouraged the Stockton, Cal., Combined Harvester & Agricultural Works to add a street car building department to their very extensive works.

The illustration herewith is of one of an order built for the San Jose electric lines, and indicates a combined open and closed car of a style especially adapted to that land of flowers.

In the cars now being built for the Stockton lines, the open air seats, which are of ash, are placed across the car—with an aisle between—instead of lengthways as shown in the San Jose car.

The cars are 22 feet long, 12 foot body, and a 5 foot platform at each end. Interior finish is mahogany with brass trimmings. Venetian and enameled glass on roof.



PACIFIC COAST CAR BUILDING.

They will be mounted on Brill extension balanced trucks, and will be altogether the most handsome ever built on the Pacific coast. Special pains are being taken in the construction, and the Stockton people will soon have on their streets a line of cars which many an eastern city may well envy.

JOY FOR JERSEY.

AN amendment to the writ of certiorari has been filed by Judge Dixon, of the New Jersey Supreme Court, in the case of the Central Street Railway, of Patterson, so that the company can go ahead in its construction, so that it does not place poles or wires on the property of complainants, or operate cars in front of their premises.

On the basis of this opinion, the Trenton Passenger Railway, through Col. Perrine, says that this decision will form a basis for this construction of the Trenton road. The trolley will probably be still alive in New Jersey.

THE GENERAL ELECTRIC COMPANY.

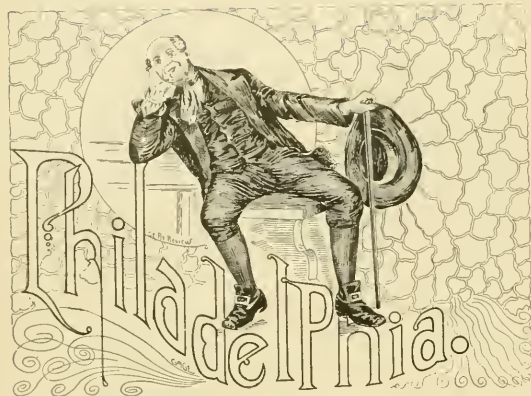
THIS amalgamation of electrical interests now bearing the above name and controlling the patents of Brush, Thomson, Houston, Edison, Van De-Poele, E. W. Rice, Jr., Hunter, Knight, Bently and a score of others, formerly held by the Edison and Thomson-Houston general companies, is ready for corporate work. The officers recently elected are: C. A. Collin, president; Eugene Griffin, vice-president and general manager; S. Insull, second vice-president; A. S. Beves, treasurer; B. F. Peach, Jr., first assistant treasurer; W. F. Pope, second assistant treasurer; E. I. Garfield, secretary; A. S. Beves, assistant secretary; J. P. Ord, comptroller; E. Clark, auditor, and \$50,000,000 capital stock sets the company on a pinnacle of interest. The personnel of the officers insures a success commensurate with its power. Mr. Collin was one of the

mainsprings of the Thomson-Houston Company's success. A. S. Beves has been with the Edison Company since 1884 and was also secretary and treasurer of the Sprague Electric Railway & Motor Company. So it is down the list, all men of eminent success with the old and with greater advantage will make the new organization proportionally powerful, as there is strength in union.

The consolidation was engineered by J. Pierpont Morgan, of Drexel, Morgan & Co., and H. McK. Twombly, brother-in-law of Cornelius Vanderbilt.

E. A. SOULE, roadmaster of the West End Street Railway Company, of Boston, has resigned that office to go into business on his own account. He has been in the service of the street railway company 33 years.

BENJAMIN GRAHAM, vice-president of the Rochester Railway Company; Director Murray A. Verner, of Pittsburg, and H. Sellers McKee, of Pittsburg, have been in Rochester, N. Y., visitors during the past month.



Nearly all the street railways in the city are under the ban of the Committee on Highways, for not paying for the paving of the streets from rail to curb, claimed by the committee, which threatened to resort to a "poling" of the streets; which means the placing of poles across the streets, prohibiting traffic, and to pass which would be a violation of law.

The Pneumatic Railway Company of the United States is the title of the company that are trying to build a line along Broad street, from Snyder avenue to League Island. It is claimed that the system is so fast that cars can be run 100 miles per hour.

Workmen have found that the cable machinery in the power house of the Philadelphia Traction Company was only slightly injured by the fire, and that it could be started at once.

Judge Reeder, of the Pennsylvania Supreme Court, has decided that if the horses and stables of car companies can be proven as "necessary, appurtenant and indispensable," they are exempt from local taxation. As all railways depend for their franchises on their ability to run cars, this exempts them from taxation. This decision is opportune and important, and will save many good dollars to the railways of Pennsylvania.

The Frankfort and Southwark Company has been in charge of the Tenth and Eleventh street line since the 1st instant, and announces that on and after Friday passengers on the latter road will be transferred east or west on Lehigh avenue for one fare. This will give an outlet to the Park (Strawberry Mansion) and to the various cemeteries in the vicinity.

It will be about six months before the Traction Company commences the work of construction. It is estimated that the cost of the plant will be between \$4,000,000 and \$5,000,000, and require about two years for completion. No decision has been reached as to the system to be used.

President Widener, of the Traction Company, says in relation to the Company's plans for equipping its lines with the trolley system, that they were now investigating all the trolley systems in use, with a view to get the best. Plans for all the lines have not been perfected yet.

So far, plans for the lines on Darby road, West Market street, to Haddington, on Lancaster avenue and Baring street, in West Philadelphia, have been filed in the Department of Public Works.

The Empire Passenger Railway, the Catherine & Bainbridge, and the Twenty-second & Allegheny roads applied for trolley license.

Robert M. Carson has been elected President of the People's Passenger Railway Company, to succeed Howard A. Stevenson, who declined a re-election, Mr. Carson thinks the People's Line cannot be rightfully or consistently denied permission to use the trolley, inasmuch as the Traction Company has been granted the privilege. The People's line, it will be remembered, asked permission of Councils, eight months ago, to operate their cars by the trolley system, and a committee of Councils was taken on a visit of inspection to Boston, but the bills were never acted upon.

The contract for the construction of the trolley lines for the Traction Company has been awarded to the Field Engineering Company. It is understood that the company will furnish everything required for the operation of the trolley system, even to the cars, and will attend to the erection of the system, with the exception of laying the track, which work will be done by the Traction Company. Some of the poles for the West Philadelphia lines have arrived, but as the plans for the system have not been fully determined upon it is not yet known when the work will be commenced.

The "Trolley Tourists," Director Beidler and Chief Walker, of the Electrical Bureau, in their recent trip to various towns of trolley fame, found in all nothing but praise for the transit afforded.

OBITUARY.

EUGENE H. COWLES.

There died, during the past month, in El Paso, Texas, a man whose career was as brilliant as it was short and erratic. Eugene H. Cowles, the son of the editor of the Cleveland Leader, had the most brilliant promises darkened by death at the age of 38, and the mechanical and business world loses a man that might have been its first luminary. When very young, Mr. Cowles found his sight failing, and turned from his books to tools and business. His successive achievements were: director and secretary of the Leader Printing Company, electrical expert and manager of the Cowles Electric Smelting and Aluminium Company. Besides being the inventor of the smelting system he made several important improvements in the trolley system.

THE Q. & C. COMPANY, Phoenix Building, Chicago, have issued in tasty booklet form, the paper by Benjamin Reece, on "Economies in maintenance of Way," read March 17th before the New York Railroad Club. While addressed to steam railroaders it contains much gospel of profit to builders and operators of surface tracks. It will be mailed free to any address on request.



The last quarterly report of the Ninth Avenue Railroad shows:

| | 1891. | 1892. |
|-------------------------|----------|----------|
| Gross earnings, - - | \$64,299 | \$69,293 |
| Operating expenses, - - | 53,316 | 66,441 |
| Net earnings, - - | 10,983 | 2,851 |

The Eighth Avenue road makes the following showing:

| | 1891. | 1892. |
|-------------------------|-----------|-----------|
| Gross earnings, - - | \$160,873 | \$166,771 |
| Operating expenses, - - | 123,681 | 121,204 |
| Net earnings, - - | 37,191 | 42,567 |

The new cable cars on Broadway are to have smoking compartments.

The West Side Railroad Company, of New York City, has been incorporated, with a capital of \$100,000, to build a street surface railway about five miles long, beginning at Twenty-third street and Eleventh avenue, running up Eleventh avenue to Sixty-sixth street, along Sixty-sixth street to Columbus avenue, up that avenue to One-hundred-and-tenth street, and along the latter street west to Riverside Drive. The directors are W. W. Newcomb, August L. Martin, John Byrne, John C. Furman, John G. Hyatt, John A. Bowers, Frank S. Smith, and George D. Patton, of New York, and Richard M. Elliott, of Philadelphia. I. B. Newcombe & Co., bankers, No. 54 Wall street, are said to be most heavily interested in the enterprise.

John Roebling's Sons, of New York and Trenton, have contracted with the Orange Mountain Cable Company to build and equip a cable road up the side of the Orange Mountain, near St. Cloud. The consideration named in the contract is \$50,000.

The road is to be completed by July 1. It will be a two-track road, and the cars will accommodate two wagons and forty passengers.

Passengers are to be carried from the foot of the mountain for 5 cents a single trip.

The New York, White Plains and Mamaroneck Railroad Company has been incorporated with a capital of \$90,000, to construct a street surface railroad six miles in length. The New York, Elmsford & White Plains Railroad Company was also incorporated with a capital of \$60,000; it is to construct a street surface road about four miles in length.

Each road will have the same directors, as follows: James H. Moran, Richard T. Montgomery John W. Digny, John P. Moran, James B. Lockwood and James E. Campbell, of White Plains, and Theodore G. Gross, John R. Stein and Virgil O. Krepps, of New York City.

The lease given by the Sixth Avenue Railway Company, of its property and lines, to the Houston, West Street and Pavonia Ferry Railway Company, for 800 years, has been filed with the Secretary of State.

The Crescent Railway Company, of Brooklyn, has filed its articles of incorporation. Its route is as follows: From Third and Front streets thence along Front to Fourth street, to Jackson avenue, to East avenue, to Twelfth street, to Ely avenue, to Nott avenue, to the Crescent, thence along the Crescent to Freeman avenue, to Academy street, to Washington avenue, to Rapelye avenue, to Graham avenue, to Jackson avenue, to the boundary line between Long Island City and the town of Newton, at the centre of the old Bowery Bay road; also along Academy street, from Washington avenue to Jamaica avenue; also along Nott avenue from Ely avenue to Van Alst avenue, to Fourth street, to Jackson avenue, to Third street, to Front street, a distance altogether of about six miles. Capital stock \$100,000, divided into 1,000 shares of \$100 each.

The directors are: Daniel S. Jones, of Long Island City; A. A. Banker, of New York; Charles B. Buckingham and Wayland Tuck, of New York; John Quinn, of Brooklyn; J. H. Smedley, Henry F. Jones, A. M. Werner and Frank W. Scott, of Long Island City.

At the annual meeting of the Atlantic Avenue road, the following directors were elected: Austin Corbin, C. M. Pratt, Benjamin Norton, F. L. White, E. R. Reynolds, D. S. Voorhees, George S. Edgell, James D. Campbell, William G. Wheeler, William B. Kendall, E. B. Hinsdale and Daniel Lord, Jr.

At Sioux City, Iowa, the Detroit Electrical Works have furnished completed car bodies and trucks; six 40-horse-power equipments and all overhead construction for 6 miles of road.

For the Calumet Railway Company, 6 Detroit motors 40-horse-power, have been ordered.

The Detroit City Railway Company will change from horse to the Detroit Electric system and this company will completely furnish the plant, installing the generators, furnishing the motors, supplying the overhead construction and putting in the electric plant.

With their other business hitherto mentioned, there is no doubt that the Detroit people are growing in influence in their field of trade.

A CRAZY man in Waterford, New York, has a peculiar and uncomfortable mania for holding people who try to run. Recently the madman embraced a gentleman who had struck a 2:40 gait after a street car, and held him for the next car.



A new company, backed by C. Lawton Bonney, Senator Noonan, C. C. Bonney, et al., have filed application for permit to lay track on Twenty-second Street, from Grove Street to Johnson Street and from May to Crawford Avenue, with other connections, making six miles in all. The company, if permitted, will use the overhead wire and 80-pound girder rail. The ordinance was passed last January. The petition asks condemnation of 3 acres of land for offices and power house, belonging to Cyrus H. McCormick.

The Hammond Railway Company, composed of O. W. Brookes, F. W. Short, J. H. Burt, et al., have secured a franchise at Hammond, and will connect that interesting suburb with South Chicago. The overhead system and Short motors will be used. It is proposed to extend lines from Hammond to surrounding points and give the entire Calumet region a satisfactory rapid transit system.

The Chicago City Company contemplates an extension to South Chicago. A motor of some description will be used to propel the cars, and the company is now figuring on electricity.

The Lake Street "L" has certified to an increase of capital from \$3,000,000 to \$5,000,000. The plan is now to abandon Lake Street east of the river, and extend the eastern terminal down Market to Van Buren.

The Chicago & Jefferson Urban Transit Company has paid into the city treasury \$4,043, the first installment of the \$20,214, which they are to pay the city for their franchise.

The West Division Railway Company has taken out a permit for laying its loop line on Franklin, Van Buren, and Dearborn Streets, and only awaits the casting of the curves for the street corners to begin operations. The loop will be laid before July 1. The tunnel north of Van Buren Street will be completed by that time, and the cars for the southwestern section of the city will be run through it. The cable lines are already laid on Halsted Street and Blue Island Avenue.

The Evanston Electric will probably be finished by September 1. John J. Cochran, the owner of Edgewater, is president of the company and a large stockholder.

Alexander Clark is secretary; John J. Mitchell, the banker, is interested and Bernard Sunny, representing the Thomson-Houston Electric Company, and George Lauterbach, of the Edison Electric Company, are interested.

The Illinois Central will run open cars during the World's Fair.

It is expected that the tracks of the Calumet Electric Railroad on Cottage Grove Avenue will be laid as far as Ninety-fifth Street by the last of May.

Engineers of the Chicago City Railway have surveyed the new down town loop and marked out the curve at the corner of Madison street and Wabash avenue for the Wabash ave. cars. The present track on Wabash avenue, between Madison and Randolph streets, now used by the Wabash avenue and State street cars, will be moved about three feet to the west, and another track laid east of it for the Wabash avenue cars. A single track will be built from Wabash avenue to Michigan avenue on Madison street and north on Michigan avenue to Randolph street, thence to Wabash avenue. The two horse car tracks on Randolph street between Wabash and Michigan avenues, will be taken up. The work of making the change will begin this week.

WESTERN ENGINE MATTERS.

THE Risdon Iron Works, of San Francisco, have gone into the engine business to considerable extent. They made two, 600 horse-power machines for the Sunnyside power house.

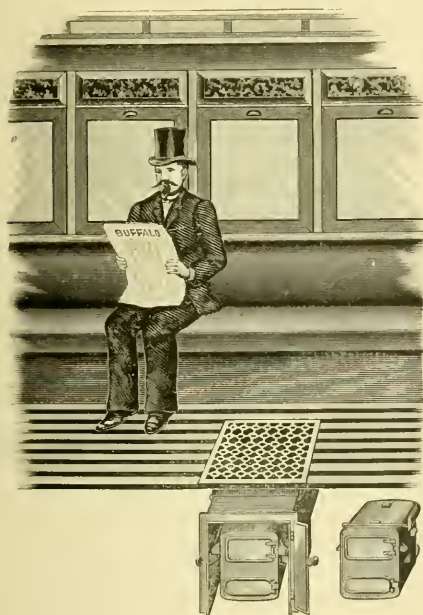
Furthermore, they have made one, 500 horse-power Reynolds-Corliss engine for the Metropolitan Electric Railway of San Francisco, and two, 250 horse-power engines for the Sacramento Electric Light Company, as well as furnished two, 130 horse-power engines for the San Leandro & Haywards Electric Road and one, 500 horse-power engine for the Los Angeles Electric Lighting Company. The Risdon Iron Works is agency for the Ball engine, manufactured at Erie, Pa., and has contracts to put this pattern of engine in for the new electric light works at Stockton, for the Santa Cruz Electric light & Power Company and the Fresno Electric Railway Company.

J. M. JONES SONS, West Troy, as usual are full of orders, besides the large orders for Brooklyn, Fort Wayne, Ind., and Boston, they have many smaller orders and are fast booking for closed cars for fall delivery. The new additions which they are now building will place them in a position to deliver cars equally as fast as any builder in the country.

WE are indebted to George S. Rice, chief engineer of the Boston rapid transit commission for a copy of the committee's complete report, which is a most complete resume of the labors of the commission. The report occupies 300 pages and contains also a large number of maps of foreign cities and plans for Boston. It is probably the most complete compilation extant on the subject of rapid transit in cities.

A NEW STREET CAR HEATER.

THE heater, as seen in the illustration, is under the car, and is fed from the outside, with hard coal or coke. The fire-box or drawer is connected with several small pipes, or flues, through which pass the smoke and gases. As shown, the heat is brought into the car through a register in the floor. The outside air, passing around the fire-box and flues, comes up through the register and fills the car with pure, heated air, and at the same time causes a current from below which carries off through the ventilators the impure air.



A feature of this heater is that the fire-box is removable and can be withdrawn and placed in another car, as when one car runs into the barn and is relieved by another. The inventor is C. S. Dean, of Buffalo, N. Y.

DOWN ON THE DELTA.

WHILE Philadelphia is coming to the front, New Orleans, in the language of Bill Nye, "has come." The Carrolltown Street Railway Company having decided to equip electrically, spent but a short time in gathering itself together and bringing A. Langstaff Johnson, the well-known civil engineer of Richmond, to superintend the construction.

The contracts for material and equipments have been awarded as follows: Electrical equipment, 50 car equipments of single reduction motors Thomson-Houston pattern and three 250-horse-power, (200 kilowatt), Edison generators. The St. Louis Car Company will build 50 18½-foot closed cars. The rail is divided as follows: 5 miles of 50-pound steel T. made by the Belleville Rail Company, of Birmingham, Alabama, and sold

by G. Herbert Ellerbe. A considerable amount will be laid of the Duplex Track, manufactured by the Duplex Street Railway Track Company. This order is specially noticeable as indicating the interest taken in this form of rail which is thus introduced for the first time in New Orleans. The Johnson Company, of Johnstown, also furnish girder rail sufficient for 5 miles.

J. G. White & Co., of New York, have contract for the overhead construction and the Ansonia Brass & Copper Company furnishes the wire.

THE POWER PLANT

will consist of three 300-horse-power Compound Condensing Corliss engines, made by Bodley & Lane and will be furnished by C. S. Burt & Co., New Orleans. The boilers of the Babcock & Wilcox manufacture, are three in number of 300-horse-power each.

Chas. Munson Company furnish the belts from their New Orleans house.

The road will be 20 miles long, principally on a wide street with center poles.

The Johnson electric current disconnecter, a safety device by the Johnston Safe Automatic-Electric Company, will be used on this road.

A PROGRESSIVE PLANT.

THE Pennsylvania Iron Works Company, of Philadelphia, is one of the most progressive manufactories in the country. Recently the company contracted for the erection of a new machine shop, 300 feet by 75 feet in size, to keep pace with their growing trade in cable railway, winding and driving machinery. This new shop will be equipped with the most improved machinery for the turning out of the heaviest class of machinery manufactured in the country. The shop will contain a 30-ton electrical crane, a 90-foot pit lathe, capable of turning wheels of 40-foot diameter, 10-foot face, and weighing from 100 to 125 tons. The company has also just moved into their new office building, 100 x 50 feet, at the corner of Fiftieth and Lancaster avenue. The old office apartments will be used to supplement the engineering department. The Pennsylvania Iron Works Co. have recently bought the Compression Ice Machine business of David Boyle's estate, Chicago, and do a large business in the Greene engine.

THE DUPLEX STREET RAILWAY TRACK COMPANY, of New York City, have received the second order for their track from the Fourth Avenue Railway Company, of that city. Among some of their late contracts are the following: The New Orleans & Carrollton Street Railway Company, of New Orleans, La. The Steinway & Hunters Point Railway, at Long Island City, N. Y. The Lakeside Electric Railway, at Fort Wayne, Ind. The new Electric Railway, at Kansas City, Mo. The Atlantic Avenue Railway Co., of Brooklyn, N. Y. The Rochester Railway Company, of Rochester, N. Y., and the Camden Horse Railway Co., of Camden, N. J.

PHILADELPHIA TRACTION COMPANY'S LUCK.

THE great Gilmore Central Theater fire at Philadelphia has left a number of mementos of its destructive course, and to-day we present, in our engraving, the share that the Philadelphia Traction Company took in the orgies.

As it is well known. \$1,000,000 and several lives were lost by the burning of the theater, the Times building,



Paulson's restaurant, and other places of note. The falling walls, however, of contiguous edifices, caused the ruin we illustrate.

At midnight of the night of the fire the workmen had cleared away the debris from the machinery at the eastern end of the building and found that no vital part of the machinery had been injured, and that it would be but a question of a short time until the cables should again begin their travels.

NEW PUBLICATIONS.

BRICK FOR STREET PAVEMENTS is the title of an interesting work recently issued by Robert Clarke & Co., Cincinnati, and edited by M. D. Burke, C. E. It contains tests of 15 different makes of brick, and is a valuable treatise on this subject, now attracting much attention. Price 50 cents, prepaid.

LEON JEWELL, Superintendent of Time Tables, Chicago City Railway, sends us a copy of their new book of rules for the government of drivers and conductors. It is a most complete compilation, and bears on the title page a blank in which to enter the date and name of

employe to whom issued. A noticeable feature is the index, so complete as to enable any one to find his instructions on every point, in an instant.

UNIVERSITY OF WISCONSIN. We are indebted to Prof. D. C. Jackson, of the University of Wisconsin, for a catalogue of the "College of Mechanics and Engineering," which is one of the divisions of the University. Four courses are offered, namely, two in civil engineering, (Railway and Structural Engineering,) one in Mechanical and one in Electrical engineering. Electric railways are made one of the studies in the latter course, and are in charge of Prof. Jackson.

THE BROWNELL CAR COMPANY, St. Louis, has issued a series of illustrations showing the advantages of the accelerator car, under the many adverse conditions which arise in the daily operations of a street railway. The illustrations are handsome products of engraving, and printed on heavy paper form an interesting portfolio of railway scenes. A few words only, under each illustration, calls attention to the point in question, and the photograph does the rest, the reader furnishing his own argument and conclusion. Fifty of these cars are now building for the North Chicago Cable line.

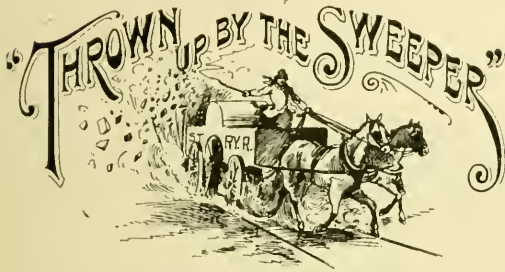
A NEW CATALOGUE. The originality of the advertisements of the Electrical Supply Company, Chicago, and the attractive appearance of their printed matter, has long been a wonder to all beholders. But their latest production in this line, a veritable encyclopedia of information on "Electric Light and Power Supplies," is a marvel of completeness and information. Manager E. S. Terry modestly terms it his "Illustrated Catalogue, No. 23," though it is a publication in handsome cloth covers, prettily embellished, and containing 500 pages. But few pages throughout the book but are illustrated, and the engravings are all artistic and interesting. Paper and press work are in keeping.

The wiring and other tables will be found very useful, while the general index at the end is a short road to any supply needed. The extent and completeness of the Electric Light and Power departments of the Electrical Supply Company were never more forcibly set forth than in this work, which is an honor to the company and a credit to D. E. Goe, the versatile compiler, who has charge of all their advertising and printed matter.

THE Des Moines Street Railway Company has been sued for \$5,000 for alleged damages to one Charity J. Van Horn. The company thinks this is "charity in a horn," with a vengeance.

JUDGE SWAN has refused to appoint a receiver for the Lansing City Railway Company, as asked for by the Continental Trust Company, of New York, and the suit in the United States Circuit Court has been discontinued.

THE Western Dummy system, backed by the Thomson-Houston Company, has acquired the World's Fair intramural transit contract.



A SAFETY MATCH.—Street Car Driver (mysteriously)—That young woman wot got in at Tenth street, and the other young woman wot got in at Eleventh street, is both company spotters. Look out for y'rself.

Conductor (confidentially)—That's all right, I'm engaged to both of them.

A BETTER WAY.—He offered the conductor a nice, new ten-dollar bill, which that official refused to receive and change. After a lengthy discussion, the conductor reached for the bell rope and said: "Now git off!"

With the fire of honest indignation blazing in his eyes, the man turned to his fellow passengers.

"Gentlemen," he said, "it's a shame to put a man off a car when he has plenty of money to pay his fare and is willing to pay it. If this conductor makes me get off, can I depend on your love of fair play to help me see that justice is done? Just as sure as he puts me off, I shall sue this road for damages, and I'll need you for witnesses."

"There's an easier way out of it than that," suggested a sympathetic man in one corner of the car, taking out his pocket-book. "I'll lend you five cents, and it doesn't make any difference whether you ever pay me or not."

"No, no," replied the other, struck by an idea, "but I shall be obliged to you if you will give me change for \$10. Any kind will do."

The sympathetic man in the corner counted out small bills and silver coins to the amount of \$10, handed them over and took the bill in exchange, the passenger clinging to the strap paid his fare, rode a few blocks further and got off.

And now, says the Chicago Tribune, the sympathetic man is hunting for him with blood in his eye and something heavy in his right-hand coat pocket. The ten-dollar bill was a counterfeit.

A MATTER OF LATITUDE.—"The whole thing is matter of latitude," confides an old gentleman to Kate Field's Washington, in referring to street car etiquette. "In Boston I never give up my seat on any account. There is nothing about a Boston woman—I say it in no spirit of disparagement—to suggest such a course. She lacks that sort of aggressive femininity which makes a man uncomfortable when he ventures, further south, to sit still while a woman is standing. In New York I give up my seat to elderly women or women with children to care for, or with their arms full of packages.

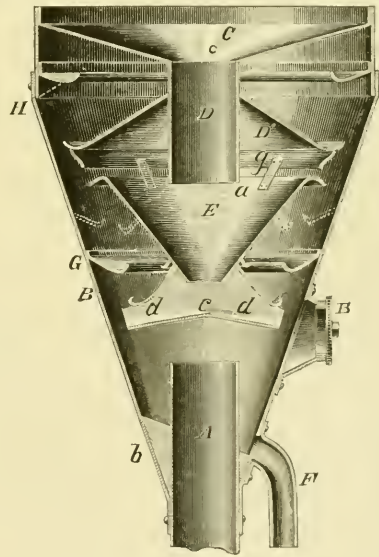
In Philadelphia I vacate in favor of any woman old enough to wear a bonnet. In Washington my place is at the disposal of the veriest bud, and further south than that I never ride on a street car at all, as I feel that I must get up for every school girl, whether she has entered upon her teens or not."

WAS NOT THE REVIEW EDITOR.—"He's a great editor, isn't he?" said one reporter to another.

"I should say so. Why, he gets so used to saying 'we,' that he often puts two fares in the street car ticket box."

THE LYMAN EXHAUST PIPE HEAD.

THE accompanying illustration shows a sectional view of the Lyman Exhaust Pipe Head, manufactured by W. C. Lyman, 49 Michigan street, Chicago. Few appliances so simple have so wide-spread use as the exhaust pipe head of the various makes. The main purpose of the head is to stop the spray from escaping with the exhaust steam, and to prevent the noise that



THE LYMAN EXHAUST PIPE HEAD.

is made by the exhaust through the exhaust pipe. The continuous spray of greasy water that is thrown out through the exhaust is very damaging to the engine-house roof, and unpleasant for pedestrians passing near. The various deflectors shown in the cut, so stop the escaping steam in its passage, that before it reaches the top of the pipe head the water is thoroughly disintegrated from steam and carried through the drip outlet to the nearest down-spout. It is claimed by the manufacturers that the pipe head will separate the water from the steam without causing any back pressure on the engine. The hand-hole shown in the illustration has brass-screwed cover, which permits easy access to interior of the head should the drip become clogged by accumulation from the exhaust.



WORLD'S FAIR—THE ELECTRICAL BUILDING.

THIS most novel and brilliant exhibit will be displayed in the Electrical Building, which is 345 feet wide and 700 feet long, the major axis running north and south. The building was designed by Brunt & Howe, of Kansas City, and will cost \$375,000. The exterior walls are composed of a continuous Corinthian order of pilasters 3 feet 6 inches wide and 42 feet high. The total height is 68 feet 6 inches.

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

JOHN G. HOLMES, PRESIDENT, Pittsburg, Pa.
 THOMAS H. McLEAN, FIRST VICE-PRESIDENT, New York, N. Y.
 JAMES B. SPEED, SECOND VICE-PRESIDENT, Louisville, Ky.
 ALBION E. LANG, THIRD VICE-PRESIDENT, Toledo, O.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE PRESIDENTS, and HENRY M. WATSON, Buffalo, N. Y.; LEWIS PERRINE, JR., Trenton, N. J.; W. WORTH BEAN, St. Joseph, Mich.; MURRY A. VERNER, Pittsburg, Pa., and THOMAS C. PENNINGTON, Chicago, Ill.

Subjects for Discussion and Committees Appointed to Report Thereon.

"Power-House Engines."

T. W. WENNE, President United Electric Railway, Nashville, Tenn.; L. H. McINTIRE, Engineer, Harlem Bridge, M. & F. Railway, New York; F. S. PEARSON Chief Engineer, Electrical Department West End Street Railway, Boston,

"Relative Cost of Operation of Horse, Cable and Electric Roads."

WM. MC C. RAMSEY, Electrical Superintendent Federal St. & P. V. Passenger Railway, Pittsburg, Pa.; F. R. GREENE, Secretary Chicago City Railway Company, Chicago; JOHN L. HEINS, Superintendent Brooklyn City & Newton Railroad, Brooklyn.

Next meeting will be held in Cleveland, O.

Massachusetts Street Railway Association.

President, CRAS. B. PRATT, Salem; Vice-Presidents, H. M. WHITNEY, Boston, AMOS F. BREED, Lynn, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON, Lawrence.

Meets first Wednesday of each month.

Ohio State Tramway Association

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice President; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus, Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice President, THOS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee, OFFICERS and C. B. THURSTON, Jersey City; H. ROMALINE, Paterson; LEWIS PERRINE, JR., Trenton.

The Street Railway Association of the State of New York.

JOHN N. BECKLEY, PRESIDENT, Rochester, N. Y.
 THOS. H. McLEAN, VICE PRESIDENT, New York, N. Y.
 GEO. LAW, SECOND VICE PRESIDENT, New York, N. Y.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—D. F. LEWIS, Brooklyn, N. Y.; C. DENSMORE WYMAN, New York, N. Y., CHAS. CLEMENSHAW, Troy, N. Y.
 The next meeting will be held at Saratoga, September, 30th, 1892.

Alabama.

MOBILE.—Work of construction has commenced on the Mobile Electric Railway.

California.

DIXON.—An electric railway is much talked of. It is to be ten miles in length and run through Vaca Valley.

OAKLAND.—An ordinance has been introduced granting to the Oakland Railroad Company a franchise to construct a street railroad in Oakland township, on Alcatraz avenue to its junction with Humboldt avenue, to its junction with San Pablo avenue, and on San Pablo avenue from its junction with Park avenue to the southern boundary of the town of Berkeley, and Park avenue from Emery station to its junction with San Pablo avenue.

The new carhouse of the Piedmont Cable will be built at the corner of Fourteenth and Peralta streets.

T. D. HASKINS has been granted a franchise for the construction of a cable or electric line on 23rd avenue and Harland avenue. Work must be commenced within 90 days and the road completed within six months thereafter.

The Haywood Electric line has been opened and is operating very nicely. The terminus will be at the foot of 13th avenue until the company can secure franchise into the city, which they hope to obtain before long.

The Consolidated Piedmont Cable Company will make substantial improvements this season. It is the intention to put electricity on three branches of the line, including Market and Peralta streets. The big stables on 14th street will also be transformed into a substantial carhouse, and an additional wing will be constructed also.

SAN FRANCISCO.—The Metropolitan Railway Company have been permitted by the Board of Supervisors to use basalt blocks for paving on all portions of street required to be kept in order by them. The Cliff House Railway have been permitted to abandon their franchise for a branch of their road on Union street, between Baker and Lyon streets.

The San Francisco Electric road, discussed last month in the REVIEW, was opened with great eclat. The grade of 1:3 was climbed successfully, and a fine dinner closed the exercises. The road promises to be a financial success, and a system of transfers with the cable will be arranged for.

P. T. TAYLOR has recently invented a side-drop grip that meets the approval of many practical men. Taylor is 19 years old, and was directed into this channel by the stranded cable accident. In this device the power is applied to the jaw at a point equally removed from the pivot as the center of the bite of the jaw itself.

SAN DIEGO.—The cable road has been put in the hand of an assignee, C. W. Pauley, who succeeds the receiver. It is reported that the road will pass into the hands of the Spreckels and become part of the electric system.

SAN JOSE.—The San Jose and San Francisco Transportation Company has been incorporated to build and operate a standard gauge road by steam, motor or electricity, between San Jose and Alviso, and steamers to San Francisco and all other parts of the word; also telegraph lines, warehouses, etc. The capital stock is \$500,000. The road is promised to be built and in operation in six months.

TEMESCAL.—The bricklayers are finishing the wall of the new electric power house. Twenty cars are now being made in Newark by Carter Bros.

Canada.

BELLEVILLE.—Richard Potter has purchased the Belleville, Ont. street railway, and intends to introduce the electric system and extend the line.

COTE ST. ANTOINE.—The town council have petitioned the Montreal Street Railway, asking for a car service through the town this summer.

NIAGARA FALLS.—Five hundred men are at work on the electric railway that is to connect the Niagara Falls with Queenstown, Ont.

Connecticut.

BRIDGEPORT.—McMahon and Wren are said to be negotiating the sale of the East End road.

HARTFORD.—The residents of South Glastonbury have petitioned the Hartford and Glastonbury Electric Railway to extend their line to South Glastonbury.

MERIDEN.—Outside capitalists are trying to purchase the franchise of the Meriden Street Railway Company with a view of introducing electricity.

NEW LONDON.—Ex-Gov. Waller, E. P. Shaw, of Newburyport, and Mr. Bond, of Boston, have secured franchise from the city council for an electric line in this city, which is to be put under way immediately, and completed on or before the 1st of August next.

WETHERSFIELD.—The horse railroad company are replacing the old rails on the road with a new steel rail much heavier than the old one. The improvement will be appreciated by the public. The cars run now with great regularity.

NEW HAVEN.—The West Haven Street Railway Company say the electric system will be in operation by July 1. The contract for the generators and engines has been awarded to the Westinghouse company, and that for the motors to the Short company.

THE NEW HAVEN selectmen have granted permission to the New Haven & Morris Cove Railroad Company to build and operate an electric railway three miles long.

Colorado.

DENVER.—The Rocky Mountains Electric Power Company capitalized at \$500,000 in a new one for Denver.

District of Columbia.

WASHINGTON.—The Railroad Committee of the House have reported on a bill, making it unlawful for any company to use one-horse cars within the city limits after Jan. 1, 1893; and imposing a fine of \$25 per car per day for violation of the same.

THE bill authorizing the Anacostia Street Railway to extend its line from the present terminus over Ninth and G. streets and on 11th street, has been approved by the president. This plan brings the Anacostia road to the business part of the city with the construction of very little new track. Work must be begun within three and completed within six months.

Florida.

TAMPA.—The Tampa Street Railway & Power Company has been organized. The directors of the company are Mr. J. Rush Ritter, trust officer of the Solicitor's Loan & Trust Company of Philadelphia, Mr. Alfred G. Clay, Joseph Wright, manufacturer in Philadelphia, and Mr. Bradstreet, of the Bradstreet Agency fame of New York City, and Mr. J. H. Ahren, president of the Florida Electric Company of Tampa. It is a strong combination and everything bids fair towards Tampa's having at an early date, a good system of electric street railway.

Georgia.

AUGUSTA.—The Augusta Railway Company will soon be double tracked throughout the city.

Illinois.

BLOOMINGTON.—The Short gearless motors give general satisfaction here.

BELLEVILLE.—Belleville is to have an electric street railway. The work of construction has commenced.

CHAMPAIGN.—The city council have granted an ordinance to the Champaign & Urbana Electric Street Railway Company for an extension of its lines on Church Street. Most of the women residing on that street presented a protest, but as a majority of the property holders wanted the extension the women were downed.

PINCKNEYVILLE.—The Pinckneyville Street Railway Company, with a capital stock of \$5,000, has been incorporated. The incorporators are Geo. W. Clark, John B. Davis and Charles D. Kane.

PEORIA.—The Ft. Clark Street Railway Company have filed a trust deed to the Illinois Trust & Savings Bank, of Chicago, for \$250,000.

AN ordinance granting rights of way for the Peoria Rapid Transit Company has been passed.

STREATOR.—John Baer is asking for franchises for a line to be operated by electricity or dummy between this place and Kangley.

Indiana.

BRAZIL.—Brazil also is after electric cars. A company will be organized.

C. A. JAY, of Kokomo, and **W. E. Avery**, of Detroit, obligated themselves some time since to build an electric line to the new fair grounds and the agreement specifies that the parties are negotiating the purchase of the Broad Ripple franchise. The new road is independent, however, and the Board of Agriculture say that the provisions for the construction shall be enforced.

EVANSVILLE.—The electric railway work is progressing rapidly. "When finished," says President Shipherd, "Our car and power-house will be a fine brick building, fire proof, and as elegantly-constructed as possible. We will have two carhouses, one for the trailers, near Cook's park, and the other for the motor cars at the power-house. Our rails and track material has already cost us \$103,000. We have purchased sixty of the best Westinghouse motors, latest pattern, with all modern improvements. Then we have ordered three 250 horse-power generators also of the Westinghouse pattern. The Illinois Steel Company made the rails and the Westinghouse, Church Kerr engines will be used. The company has filed a mortgage with the County Recorder for \$1,000,000 on their plant, in favor of James H. Cutler, trustee. They will issue 1,000 bonds of \$1,000, at 6 per cent. per annum, payable semi-annually in gold.

INDIANAPOLIS.—The Street Car Brotherhood men have adopted a ribbon badge, which members will wear, bearing the initials of the union.

LAFAYETTE.—George S. Brown, James L. Caldwell, H. H. Vinton, T. J. Levering and J. T. Henderson, of Philadelphia, have been elected directors of the street railway.

MUNCIE.—A street railway company with \$100,000 capital stock has been incorporated, and composed of W. L. Little, John M. Kirby, David Commack, Roscoe C. Griffith, D. C. Mitchell and several capitalists in Chicago and Cincinnati. The trolley system will be used on the lines, which will traverse the most important streets and touch the suburbs of Boycelon, West Side, Riverside, Avondale, Congerville and Industry.

Iowa.

BURLINGTON.—It is reported that the Burlington Electric Railway Company have purchased the Burlington Electric Light and Power Company.

INDEPENDENCE.—A franchise has been granted C. W. Williams to build three miles of electric street railway from the Illinois Central depot, past the Burlington depot and Rush Park to the Iowa Hospital for the Insane. The cost of the line will be \$40,000. It will be completed July 4 and opened with a grand celebration and races.

DES MOINES.—The Des Moines Street Railway Company contemplates some extensive improvements this season. The East Ninth Street line will be extended out Walker street to Easton Boulevard and then to Easton Place. The East Walnut street line will be built from Fourth street to East Sixteenth street as soon as the approaches to the Walnut street bridge are completed. As soon as the Rock Island shops are constructed at Valley Junction a line will be built to that suburb of the city. In all six miles of road will be built and equipped before fall. The work will be under the immediate supervision of General Manager Hippee.

LE MARS.—Le Mars is agitating the electric railway question.

MARSHALLTOWN.—G. Van Ginkle, of Des Moines, made a proposition to the city for an electric railway, provided that the citizens of Marshalltown grant a reasonable charter for thirty (30) years, allowing the use of the public streets for track and necessary equipment. The entire plant to be exempt from city taxes for the period of five (5) years.

OTTUMWA.—Work has commenced on the tracklaying of the electric railway company's extension.

Kansas.

JUNCTION.—John Eddy et al have applied for a railway franchise, work to begin in six months.

KANSAS CITY.—Three applicants for public favor are before the city council, each desiring franchises for the construction of electric lines on prominent streets. The several companies are the River View & Northern Railway Company, the Stock Yards & Northwestern Railway Company and a syndicate headed by E. L. Martin.

Kentucky.

MAYSVILLE.—The electric railway company have placed their order for new rails, to be used on the extension to the fair grounds.

Maine.

AUGUSTA.—The Silver street electric line has been abandoned and tracks will be laid on Water street instead.

Maryland.

BALTIMORE.—The Lake Roland Elevated Railway Company has been incorporated as a consolidation of the North Avenue Electric Railway Company and the Baltimore, Hampden & Lake Roland Railway Company; capital, \$1,000,000. President, Wm. H. Whitridge; vice-president, Jesse Hilles; secretary, E. H. Bouton. The City Passenger Railway has awarded contracts for boilers for the new cable plant, to the Campbell & Zell Company, of Baltimore.

THE Baltimore, Townson & Suburban Railway Company, recently incorporated, intend shortly to build a new road in this city and Baltimore County. The intention is to lay tracks for an electric system from North avenue to Townson.

THE Belt line people are considering a proposition of the Thomson-Houston people for drawing trains through the tunnel by electricity.

AN agreement has been signed by the presidents of the Union Railway Company and the North Avenue Electric Railway Company by which their lines will use North avenue jointly.

THE foundation walls of the East End power house of the Baltimore City Passenger Railway Company are well under way.

CAPE MAY.—The Cape May Electric Railway has been enjoined from building its line.

Massachusetts.

AMESBURY.—President Odell, of the Newburyport & Amesbury Street Railroad, says that he intends to enlarge the power station of that road by putting in a new boiler, engine, and dynamos.

BOSTON.—Mayor Matthews states that the expenditure of fifteen million dollars, as recommended by the Rapid Transit Commission, is entirely within reason and should not stand in the way of desired improvement. Over forty million dollars have been already spent in street widening, and the proposed system would undoubtedly be of far greater value than any change which has been made in many years.

THE Boston and Revere officials wish to gain access to the East Boston ferries, and overtures with the West End road for use of tracks are now being made.

THE West End Street Railroad has put on sale and will continue the same until September, new issue of stock, amounting to 40,000 shares in all. It is to be sold at public auction.

BROCTON.—The aldermen have reconsidered the location granted to the Brocton & Halbrook Street Railway, and made another grant more favorable to the company.

ESSEX.—The Essex Electric Street Railway Company have petitioned the railroad commissioners for leave to increase its bonds from \$100,000 to \$180,000.

FALL RIVER.—Workmen have begun track laying on North Main Street and the poles are already going up.

HUDSON.—At a vote of taxpayers to allow an electric railway to enter the town 216 were in favor against 18 nays.

LOWELL.—The bill to incorporate the road down the Merrimac Valley from Lowell to Haverhill has passed.

The bill constitutes Charles W. Morse, George A. Hall, Alexander B. Prince, James R. Simpson, Charles E. Adams and Joseph S. Brown, their associates and successors, a corporation under the name of the Lowell, Lawrence and Haverhill Street Railway Company. Any power except steam may be used.

NEWBURYPORT.—Engineers have finished the survey of the line of the proposed street railway from West Newburyport to the Newburyport & Amesbury line.

NEW BEDFORD.—A syndicate represented by James Irwins, of New York, has purchased a controlling interest in the Union Street Railway.

NORTHAMPTON.—The Northampton Street Railway Company carried 3,000 more passengers in March this year than in the corresponding month last year.

WORCESTER.—The first ten per cent of the capital stock of the Worcester & Millburg Electric Railway has been paid in by the subscribers.

Michigan.

DETROIT.—The commissioners of public works recently gathered together and removed the track of the Citizens Street Railway Company on Cadillac Boulevard. The track is about three-quarters of a mile long and has been run on for two years. The rail was T pattern and the company filed no injunction.

THE Electrical Suburban Street Railway is progressing rapidly with its work and promises to be completed before the specified time. The grading is all finished, and something over a mile of track is already laid.

THE Citizens Street Railway Company have decided not to place trolley poles in the center of the street in equipping Jefferson Avenue, but to place them next to the sidewalk.

LANSING.—The courts have refused to appoint a receiver for the Lansing City Railway, as asked by the Continental Trust Company at New York, and the suit in the United States Circuit Court has been discontinued.

MENOMINEE.—The Menominee Electric Light and Power Company is incorporated, \$111,000 capital.

PORT HURON.—The contract for rebuilding and furnishing the Port Huron electric railroad system has been secured by W. C. Turner, manager of the Windsor electric railroad.

Minnesota.

MINNEAPOLIS.—Interurban passengers are soon to have an open trailer on each trip. Now single motors run every six minutes, and motors with trailers every ten minutes.

THE new vestibuled electric motor just turned out by Northern Car Works, was given a trial on the Interurban line and gave such satisfaction that the Minneapolis Street Railway Company may adopt them next winter.

THE Twin City Rapid Transit Company of St. Paul and Minneapolis, which has a capital of \$20,000,000, held its annual election for directors recently at the National State Bank building in Elizabeth, N. J. The following were chosen: Thomas Lowry and C. G. Goodrich, of Minneapolis; John Kean, Jr., Elizabeth; J. Kennedy Tod, New York; Charles Fairchild, Boston.

THE power house contract for the St. Paul & White Bear line has been let and two gangs of men will rush the construction. The building is to be of brick and stone, and will be in part two stories in height, with a trussed roof. It will be a substantial structure 125 feet long and 87 feet wide. The contract also calls for the erection of chimney 110 feet high.

STILLWATER.—W. M. Hewitt, receiver for the Stillwater Street Railway Company, reported the receipts for the month of March as \$1,547.64, of which \$1,427.14 were car receipts. The disbursements for the month were \$666.54.

Mississippi.

VICKSBURG.—The chances for a first class street railway are at the present time excellent. A gentleman, representing ample capital, is now in the city and will open negotiations with the mayor and aldermen with the object of getting a franchise to construct an electric railway here at once.

Missouri.

FARMINGTON.—The survey has been completed for the new electric railway from this place to Doe Run Junction. The road will be built by a stock company.

KANSAS CITY.—A certificate of increase of capital stock has been filed by the South Suburban Railway Company. The increase is from \$2,000 to \$100,000. First mortgage bonds to the amount of \$100,000 will be issued.

THE Northeast Street Railway Company have bought the tracks on Independence avenue, from Grand avenue to Highland avenue, and will rebuild them this spring. They have also ordered six open cars, from the American Car Company, of St. Louis.

ST. LOUIS.—James Campbell, treasurer of the Belfontaine Electric Street Railway Company, was severely injured recently by a casting falling on him in the power house.

DIRECTORS of the St. Louis County Railway voted to grade Hunt avenue and extend tracks from the present terminus to Edon on the St. Charles road and to Normandy on the Natural Bridge road.

THE bill authorizing the consolidation of the Cass avenue and Northern Central lines to change from mule to fuel has passed.

Nebraska.

OMAHA.—The street railway system of Omaha is said to have carried over 12,000,000 people during the last year. There are in operation 266 cars on sixty-five miles of electric motor, six miles of cable and twenty-five mile of horse railway in this city.

North Carolina.

WILMINGTON.—An electric railway has been completed to Hilton Park and the entire line throughout the city was opened for traffic on May 1st.

New Hampshire.

CONCORD.—There is much talk of building an electric line to connect East Northwood with Epsom, a distance of eleven miles.

New Jersey.

BRIDGEPORT.—The Bridgeton Street Railway Company has been organized with Dr. H. K. Trask, president; William S. Scull, vice-president; Alexander R. Fithian, secretary, and G. G. Browning, treasurer. Over \$20,000 was subscribed, and the capital will be increased. It is intended to cover five miles of streets in Bridgeton. It is the intention of the company in the near future to continue the road to Carmel and Millville.

CAMDEN.—The Camden Horse Railroad Company has given out a contract for the extension of its electric car system to Merchantville.

JERSEY CITY.—The Jersey City & Hoboken line will lay track along Henderson Street and invade Hoboken.

NEWARK.—The New Jersey Traction Company has applied for an electric franchise to Elizabeth.

PLAINFIELD.—The Plainfield Street Railway Company have been granted a franchise by the council for an electric system.

RED BANK.—Red Bank & Seabright Street Railway Company is incorporated for \$50,000; C. S. Hobart, J. W. Chandler and W. W. Conover.

STEINWAY.—William Steinway has been granted permission to run an electric line through the streets of Steinway.

New York.

BUFFALO.—The Buffalo, Kenmore and Tonawanda Electric Railway have been granted a franchise by the Tonawanda town board. The road will run from the village of Tonawanda and connect with one of the Buffalo lines.

THE Buffalo Railway Company has begun active work on the new electric line on Main street from Cold Spring to Niagara street.

HERKIMER.—The Herkimer and Mohawk street Railroad Company has reported for the last quarter the following: Gross earnings, \$1,524.15; operating expenses, \$972.75; fixed charges, \$75.07; net income, \$476.32. The balance sheet profit and loss surplus is \$1,205.65.

ITHACA.—Workmen are busily engaged in rebuilding and extending the electric railway.

OSWEGO.—A number of small extensions and improvements will be made on the street railway line here.

JOHNSTOWN.—The State Railroad Commission has approved the application of the Johnstown, Gloversville and Kingsboro Railroad Company for a change of motive power to the overhead electric trolley system.

NIAGARA FALLS.—The Niagara River Railway Company will be finished July 1st. Contracts have been let in five sections, with one hundred men in each section.

SARATOGA.—The electric road people were recently cited to appear before the Police Judge to give evidence as to the parties alleged to be illegally occupying Lincoln avenue, on the trolley plan. The company is called the Saratoga Rapid Transit Company inside, and the Saratoga Union Electric Company outside the corporation. C. E. Arnold, of Albany, and J. L. Henning and George I. Humphrey, of this village, are the parties apparent, and the local lot owners on the line fear that it is intended as a blind to get a steam railway in Lincoln avenue.

SYRACUSE.—The quarterly report of the Syracuse Consolidated Street Railway Company shows for 18 months the following statistics: Gross earnings, \$54,200; operating expenses, \$42,484; other expenses, \$18,301; deficiency, \$6,246; cash on hand, \$3,926; total deficiency, \$6,899.

EXTENSIVE changes and improvements are on hand for the Syracuse system. The People's line will run direct to Elmwood Park, a pleasure resort where last season many picnics were held. Here a dam has been built across a gulf, making a lake covering about four acres, and row-boats will be provided. There will also be a dancing pavilion, summer houses, etc. The question of using electricity on the People's line is not yet fully settled.

Ohio.

ASTABULA.—The line between Astabula and the Harbor has opened operations. The company operating the road is composed entirely of Cleveland capitalists, at the head of which is W. W. Hazzard, who has constructed electric lines in several northern Ohio cities. The electric road in this city, which represents a capital of \$90,000, will be a paying investment.

ALLIANCE.—The Street Railway Company will spend between \$15,000 and \$20,100 the present season, adding to their equipment new boilers and dynamo, and will also undertake an incandescent light service, a number of contracts for which have already been received.

CLEVELAND.—The bill, the first one of its kind to pass the State Legislature, has been granted, authorizing a company to build an electric railway from Cleveland to Chardon, a distance of 30 miles. It is to be built in two sections, and occupy public highways.

THE Woodland Avenue & West Side Street Railway Company has decided to erect a power house at Sycamore Street, near the Valley Railway track. Secretary Hanna says that the main line will be equipped this summer.

COLUMBUS.—The inauguration of electric cars on the Oak Street line removes the last street car horse from High Street and presages the very early transformation of every mile of car line in the city on the electric system.

DAYTON.—The Dayton Street Railroad Company re-elected their old officers last week, as follows: President, C. J. Ferneding; vice president, G. W. Rogers; secretary, W. H. Simms; superintendent, A. W. Anderson.

LIMA.—The city asks bids on two street railway lines through W. V. Smiley, city clerk. Each bidder put up \$100 ante to pay for advertising the scheme.

MASSILLON.—The incorporators of the Canton-Massillon Electric Street Railway Company are W. A. Lynch, A. J. Underhill, H. M. Layman, L. A. Loichot, T. R. Catlin and J. W. Underhill.

TOLEDO.—Plans are under way for the construction of an electric railway between this city and Point Place. Some of the most prominent citizens in the city are behind the project, which has no connection whatever with the existing companies there. The road will be equipped with open cars to be run as often as business will permit. The road will be built for solid business.

TIFFIN.—Papers have been filed for the incorporation of an electric Street Railway.

PRESIDENT GROMPERS, of the American Federation of Labor, has called the local Street Railway Employees' Unions to answer as to a date for a national convention.

UHRICHSVILLE.—Contract has been made with Wilkins & Davidson, of Pittsburg, for the construction and operation of a street railway.

Oregon.

PORTLAND.—The change of the Third Street line from horse to trolley throws 40 horses out of a job.

The extension of the cable line to the base ball park has induced much travel. The extension is a mile in length and 8 minutes is the average run each way. The total cost of constructing this extension is in the neighborhood of \$100,000. The work has been done in a most substantial manner. It was commenced about the middle of last November. At the intersection of Eighteenth and Jefferson streets there is a very complicated system of switches and cable, which works admirably. This was arranged and perfected by William S. Dillon, the general road superintendent.

It is now hoped to have North Mount Tabor Electric Railway in operation by the 1st of June.

The new car-house of the Multnomah Street Railway Company, at the head of Washington street, is completed.

Pennsylvania.

BRADFORD.—Now that the Bradford and Kendall Railway has changed hands a rapid transit line is being agitated.

CHESTER.—Chester and Media Electric Railway Company is organized, capital \$100,000, \$10,000 paid in; President, A. T. Anderson, Beaver, Pa.

HARRISBURG.—The town council has passed an ordinance giving the right of way to the electric railway company.

LEBANON.—The Lebanon and Myerstown Electric Railway Company have had \$72,000 worth of capital subscribed.

PITTSBURG.—The West End Street Railway Company has commenced the work of turning the horse car line into an electric road.

The Liberty Avenue Street Railway Company, of Pittsburg, has been chartered, with a capital of \$50,000, with Charles Hook, Isaac Reece, M. F. Leslie, P. O. Byrne and S. J. Wainwright stockholders. The road will begin at Main and Liberty avenue, thence along Liberty to Twenty-fourth, to Spring alley, to Gamm alley, to Liberty avenue, to Seventh avenue, to Grant street, to Liberty avenue, to Eleventh, to Spring alley, to Twenty-fourth, to Liberty, to place of beginning. The road will be operated by electricity.

ROCHESTER.—The Rochester & Beaver electric incorporates for \$60,000 to build a line 2 miles long. Simon Harold, of Beaver Falls, has the contract. Directors are Alexander T. Anderson, president, of Beaver; Almond R. Leydor and Albert M. Jolly, of Beaver Falls; Thomas L. Darragh, of Rochester, and Alfred C. Hurst, of Bridge-water.

WILKESBARRE.—Work has been commenced on the branch of the Traction Company's Electric road running to Nanticoke.

WILLIAMSPORT.—Center West End Passenger Railway Company is incorporated for \$15,000; president, Elias Deemer.

Rhode Island.

PAWTUCKET.—An ordinance has been passed, regulating the headway of cars at 100 feet.

Tennessee.

CHATTANOOGA.—The Chattanooga Electric Railway has received a new 40-horse-power motor which runs in line with the rails and not at right angles, as is the case with other motors. It will be used on the Lookout Mountain Line.

Texas.

ABILENE.—It is probable that Abilene will soon have an electric street railway.

DALLAS.—The Polytechnic Street Railroad, which will run to the college will be in operation in a short time.

HOUSTON.—The City Railway is putting down track on Montgomery street.

Utah.

SALT LAKE CITY.—Stockholders of the West Side Rapid Transit Company elected as directors: W. H. Shearman, R. C. Chambers, M. K. Parsons, S. F. Walker, John J. Snyder, C. S. Wilkes and F. Beyle. J. G. Jacobs is general manager. It is reported that the necessary arrangements have been perfected for the early completion of this route to the lake, and the erection of commodious bathing houses. The line starts at the corner of First West and Second South.

The Salt Lake City road elected as directors and officers: R. C. Chambers, A. W. McCune, Francis Armstrong, W. P. Read, and Spencer Clawson. A. W. McCune was re-elected president; R. C. Chambers, vice-president, Joseph Wells, secretary and treasurer; W. P. Read, superintendent.

Virginia.

ALEXANDRIA.—The Mount Vernon Street Railway Company has completed the changes of its office building on Fairfax Street near King, and has awarded the contract for supplying.

NORFOLK.—Workmen have commenced to raise the street railroad track.

Washington.

FAIRHAVEN.—The Fairhaven & New Whatcom Electric Street Railway have added two new cars to their equipment and established a 15-minute service between the two cities.

SEATTLE.—The Rainier Power & Railway Company are extending their lines from Lake Avenue and Albert Street to Third Street and Yesler Avenue, thus giving the inhabitants of Brooklyn a direct line to the city.

VANCOUVER.—The city council has passed an ordinance granting sufficient space on the city's levee to the Columbia Land & Improvement Company for the construction of power houses for the proposed electric system. Another ordinance giving the same company a franchise of the most important streets has also been passed.

Wisconsin.

ASHLAND.—A company has been formed to build an electric railway around the head of Chequamegon bay, connecting Ashland, Washburn and Bayfield.

BELOIT.—A company of local capitalists are visiting a number of cities inspecting the electric railways with a view to organizing and building one here. The object has been under consideration for some time.

JANESVILLE.—On May 25 the Electric Railway will celebrate its opening with great eclat. Everyone in this enterprising and progressive town is interested in this road.

LA CROSSE.—The council has refused the electric proposition, and La Crosse takes a back seat, to the intense disgust of everybody.

MADISON.—The Madison Street Railway Company is offered for sale and would make a desirable purchase for parties desiring to put in electricity.

MILWAUKEE.—Cars are now running on regular trips over the North Avenue extension of the Milwaukee Street Railway Company's system.

It is expected that the electric line between this city and Wauwatosa will be in operation in a few days. Contract for operating the road has been let to a large syndicate.

RACINE.—The Belle City line will be equipped with electricity this year. New track will begin to be laid about May 20 and the St. Louis Car Company will furnish new cars of handsome design.

THE owners of property along Howell Avenue have subscribed \$30,000 to be paid the Milwaukee Street Railway for the extension of the electric line from the terminus of Bay View one and a half miles south. This covers about half the cost of construction.

MANAGER HOMMELL, of the Milwaukee Street Car Line is enthusiastic over the outlook, and the prospect that by October 1 there will not be a horse car running in Milwaukee, numerous extensions besides the electrical improvements will be made.

PUGET SOUND NOTES.

From Our Own Correspondent.

SEATTLE, Wash. May 9, 1892.

Noiseless motors have been put on most of the cars of the Consolidated Street Railway Company.

The Rainier Avenue Electric Railway has sued J. S. Kloeber to recover \$1,000 for an alleged breach of contract. The complaint is that in July, 1890, Levin Johnson agreed to give the company two acres of land, in case the road was completed to Johnson's property by January 1, 1891. In October, 1890, Johnson sold the property to Kloeber, and it is claimed that the latter agreed to deed the two acres to the company. The line was completed within the specified time, but the defendant refused to convey the land.

The power-house of the Grant Street Electric road is nearing completion. A considerable portion of the machinery is in, but the failure of the big boilers to arrive causes some delay. When the cars now under contract are finished, the total equipment will be eleven cars.

The first of the new cable dummies for the Union Trunk Line have begun running. This dummy is built with ends like those of a closed car, and seats along the sides, facing outward. In winter the seats will be turned in, and sides and windows put in, making the car a closed one.

The construction of the Rainier Power and Railway Company's Electric road into the heart of the city has begun, and the projectors expect to complete it by August 1. The line is now in operation in the northern suburb, but it will run through the main part of the city on Third street, paralleling the Consolidated line on Second. The road will also be extended a mile or two further north. The track will be of 45 pound girder rails, laid on stringers. The Short system of motors has been selected, and the St. Louis Car Company will build the cars, of which there will be six—enough to give a ten-minute service. The contract for construction has been let to the local firm of Charles H. Baker & Co. A 300-horse-power "Ideal" steam plant will be put at the power station, and two 80-horse-power National Railway generators. The present lighting plant will be increased by 2,000 incandescent and 100 arc lights.

Surveys are being made for a ten-mile electric road from the other side of Lake Washington, which lies back of this city, to Gilman, a coal mining town. The steam railway line to Gilman is forty-two miles long. The electric road would have easy grades, none over 1½ per cent., and would open a stretch of rich agricultural land, the produce of which would find a ready market in the city.

The employes of the Front Street Cable road objected to a rule recently made that in case of any damage by carelessness or negligence to the property of the company or of others, the man to blame should pay \$25 out of his current month's wages. The difference was settled without a strike, by an agreement to leave the question of liability in any instance to a committee of the three oldest employes.

President Schulze, of the Tacoma Railway and Motor Company, denies the rumor that his company had secured control of the Point Defiance and Edison lines. Electric power will be furnished the latter company's lines by Mr. Schulze's company. It is said that the latter will shortly assume control of the Tacoma and the Tacoma and Steilacoom line. The latter will build its club house and summer resort on the narrows directly west of the city. The company will expend \$25,000 on the improvement and will christen the resort Inglenook.

The Point Defiance Railway has been extended to the entrance of Point Defiance Park.

George W. Gabriel, formerly superintendent of the Tacoma Railway & Motor Company, is running a locomotive on the Lake Shore road.

The Superior Court has reversed the decision of John G. Campbell, the arbitrator, who awarded J. H. Cummings a claim of \$33,000 against the Tacoma Railway & Motor Company. Cummings, who was formerly manager of the line, claimed to have advanced \$60,000 for various purposes, and Campbell made the award, as above stated. It appeared that

while the case was originally pending Campbell believed, or thought he had knowledge, that Cummings brought \$50,000 or \$60,000 to Tacoma for investment. This belief was based on alleged erroneous premises. The court allowed Cummings \$250 a month for wages. The case will be appealed.

The employes of the Tacoma Railway & Motor Company struck last month, because a new rule went into effect, paying them by the hour. The company finally agreed that the new pay roll should not fall below that of the month before, and if it did, the surplus should be distributed pro rata among the men.

Work on the Olympia & Tumwater Electric Road is progressing. An injunction suit has been brought by the Portland & Puget Sound Railway Company to enjoin the Olympia Light & Power Company from extending its electric railway across the right of way of the former.

The Lake Whatcom Electric Railroad has deeded all its property, including road-bed, franchises, power house, real estate, and personal property, to the Atlantic Trust Company, of New York, in trust for \$300,000. The trust company has bought the bonds of the railroad to that amount.

The Northwest Thomson-Houston Company has taken possession of the Fidalgo City & Anacortes Electric Road, because the equipment was not paid. Julius Potter, the president of the road, says that he will try to put on a steam motor.

Contracts have been let for the bridges of the Snohomish & Everett Electric road, and work will begin at once on the grade. There is some talk of obtaining power from a plant to be erected at Granite Falls, ten miles distant from the line.

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days; reported especially for the STREET RAILWAY REVIEW, by Munn & Co., Patent Attorneys, 361 Broadway, New York.

ISSUE OF APRIL 22, 1892.

| | |
|--|---------|
| Motor for Propelling Cars, W. L. Davis, Chicago, Ill..... | 472,524 |
| Brake for Street Cars, T. W. Wood and J. Fowler, Los Angeles, Cal..... | 472,597 |
| Street Car Door, F. Mansfield, New York, N. Y..... | 572,737 |
| Street Car Heater, J. Allingham, Minneapolis, Minn..... | 472,779 |
| Safety Attachment for Overhead Electric Wires, E. D. Brown, Minneapolis, Minn..... | 472,784 |
| Electric Railway Wire Suspension, A. Philipsborn, and W. Reicheb, Berlin, Germany..... | 472,810 |
| Trolley-Wire Support, T. C. Prickett, Kansas City, Kas..... | 472,953 |

ISSUE OF APRIL 19, 1892.

| | |
|--|---------|
| Conduit and Trolley for Electric Railway Systems, C. W. Caril and J. W. Phillips, Trenton, N. J..... | 472,982 |
| Sand-Box for Street Cars, H. H. Hennegin, St. Louis, Mo..... | 473,070 |
| Safety Gate for Street Cars, F. C. Cash, Lynn, Mass..... | 473,210 |
| Cable Grip, E. R. Guerra, Hoboken, N. J..... | 473,221 |
| Cable System, J. B. Mahaffey, Baltimore, Md..... | 473,233 |
| Converter System for Electric Railways, M. W. Dewey, Syracuse, N. Y..... | 473,253 |
| Gearless Motor for Electric Railway Cars, S. H. Short, Cleveland, O..... | 473,365 |

ISSUE OF APRIL 26, 1892.

| | |
|--|---------|
| Brake Mechanism for Street Cars, H. H. Kelley, Willoughby, O..... | 473,510 |
| Cable Railway Switch, J. Bishop, and F. L. Bell, San Francisco, Cal..... | 473,652 |

ISSUE OF MAY 3, 1892.

| | |
|---|---------|
| Trolley-Wire Circuit Breaker, J. M. Anderson, Boston, Mass..... | 474,037 |
| Insulating Support for Electric Railway Wires, A. A. Shobe, and W. Embly, Jerseyville, Ill..... | 474,049 |
| Cable Grip, F. Otto, Schkenditz, Germany..... | 474,185 |
| Conduit Trolley, J. J. Cosgrove, Jr., Philadelphia, Pa..... | 474,218 |
| Grip Mechanism for Cable Ways, W. Hewitt, Trenton, N. J..... | 474,249 |

THE NEW YORK CONSOLIDATION.

THE Metropolitan Traction Company, treated of last month, has now brought the Sixth Avenue road under its wing by a vote of 16,910 shares for and 155 against.

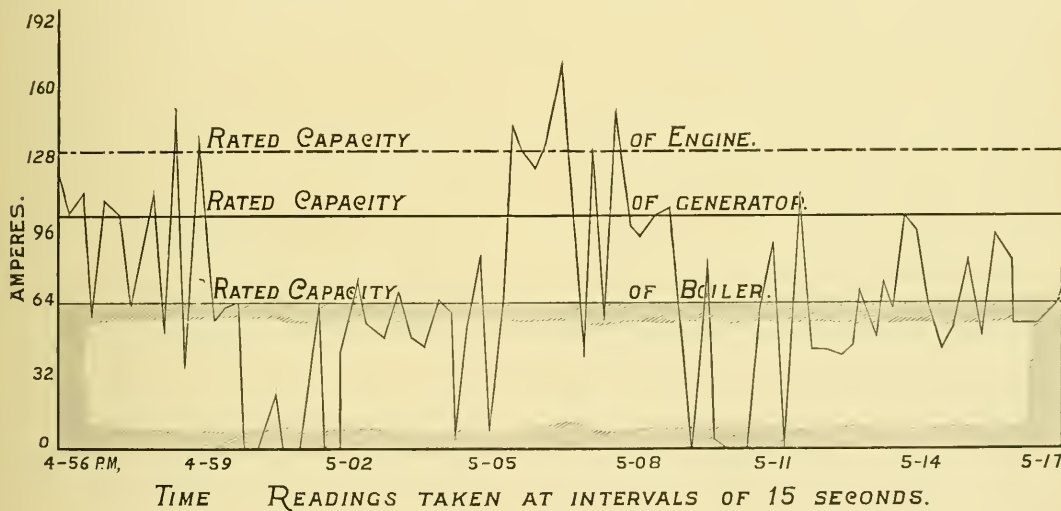
NOTES ON POWER STATIONS.

BY WM. LEE CHURCH.

NOT the least marvellous feature of the extraordinary development of electric railway interests, has been the comparative freedom from disastrous mistakes. Looked at from the other side, this is equivalent to saying that street railways have paid from the start. As much as this can hardly be said for any other parallel industry. Electric lighting was notoriously prolific of financial disappointment for many years, and it is only at a comparatively recent date that capitalists have come to understand that electric lighting can profitably be conducted only under the direction of the highest grade of engineering, supplemented by close business management. It is undoubtedly true that the experience gained in the exploiting of electric lighting has been turned to account in the development of electric railways, but the marvel still remains that an industry

electric railways. It is our purpose to give the benefit of this experience as freely as may be to the railway interests at large, and random articles may be expected in the columns of this journal from time to time accordingly.

The subject under consideration at this moment is that of the relative capacity of engines, generators and boilers in the power station. To go at once to the root of the matter, we refer to the diagram which is the chart of amperé readings from a single generator operating an extension line to a cable railway. The generator in question was of the direct-coupled, multipolar, slow-speed type, popularly known as the "Kodak." Readings were taken at intervals of fifteen seconds, and the portion selected for the diagram covers a total time of twenty-one minutes. While following in general appearance



which three years ago was practically unknown, except as a curiosity, should in this short time have attained to a first magnitude among business enterprises, with so little to regret in the way of failure. It is also undoubtedly true that there are many roads now doing well, which under still better engineering, might have done better, and indeed, very notably better. Nevertheless, the disposition to let well enough alone, serves as an equalizer of what might otherwise be at least a relative disappointment.

It is a narrow mind which will attempt to keep to itself special knowledge on subjects of this nature. The broad education of the public leads through a general increase of intelligence to a greater certainty of success which, in its turn, redounds directly to the interest of the educator. The writer and his associates have, in the course of events, accumulated certain well grounded experiences which are of interest to the promoters of

similar charts taken from all railway service, it is noticeable that at several points the load entirely vanished for a few seconds. This was due to the fact that but few cars were operated on this extension, and the grades were numerous and abrupt in both directions. It would frequently chance that for an instant all cars would be on a down grade, and the circuits entirely open. The most abrupt change is seen to be from 10 amperes to 135 amperes in less than one half-minute. At 4:59 there was a change from 130 amperes to no load, occurring in three-quarters of a minute. It is worth remarking that under this violent treatment, which is never ceasing throughout the day, the change of speed of the engine and coupled generator could not be noted by any ordinary speed counter. So closely has instantaneous and complete governing been secured through the use of inertia as the governing force, that variations of speed can no longer be detected by the speed indicator and expressed in variations per

minute, but must be searched for by the chronograph and expressed in variations per stroke.

Passing to the question of capacity, we will take the generator as the unit of measure. This is, moreover, the natural unit, since the expression for the capacity of a station is in terms of electrical horse-powers at the ammeter. In dealing with a problem of this kind, there has been sufficient data accumulated to insure a very close estimate of the nominal amount of generating capacity required to operate a certain number of cars, taking always into account in each special case the grades and curves of the road, nature of the special holiday service, frequency of stops and other governing considerations. In some respects it would be better if the maximum demand upon the generator could be known, as indicated by the summit of the curve occurring at about 5-06 on the diagram; but this is, in the nature of the case, hard to determine. But to facilitate our discussion of the

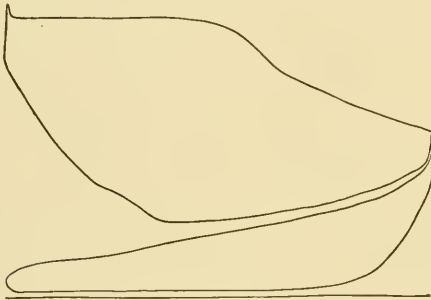


FIG. 2.

problem, assume that the maximum capacity were known to be 175 amperes, as indicated. We would then locate our nominal generating capacity at some point as indicated by the heavy black line. The reason of this is found in the fact that an electric generator can stand an overload, or even an excessive overload, provided it does not have to stand it long. The question is simply one of heat. The overload here was seen to continue about one minute, during which time the generator could carry it with ease, with no perceptible rise of temperature to injure the insulation. If this load had been continuous for an hour or so, as would occur in an electric lighting station, a much higher relative generating capacity would be required, approximating the maximum load.

In this connection it is well to point out that, generally speaking, a long, easy grade is more trying on the generating plant, and will call for a greater capacity of the generator than a short, heavy grade. I recall an instance where the lowest point of the road was on a bridge crossing a stream, on the other side of which was an abrupt, heavy grade for not over 100 yards. Beyond this the grades were comparatively easy, but persistently up-hill. Although not obvious to the untrained eye, it was the long-continued and easy grade which governed the proportioning of the power, and the short grades at the bridge, were practically ignored.

Having settled upon the capacity of the generator and located it in the relative position indicated, we next determine the capacity of the connected engine. I am speaking, of course, in this, of power stations in which the generation is in independent units, and I shall undertake to show in subsequent articles what is rapidly becoming established—that a railway station can only reach its minimum capitalization and minimum earning capacity when so designed. Now an engine has no such capacity for excessive overload as a generator. In other words, the element of time does not enter into the engine problem, but it becomes a question of how much the engine can actually lift by main strength without taxing the governor to an extreme which shall slow down the speed. In general terms the engine should not be called upon to perform, even for a short time, more than 20 per cent. or possibly 25 per cent. above its rating; this assuming, of course, that it is honestly rated. I append herewith three indicator diagrams from a non-condensing compound engine, of which the intermediate size indicates about the fair load at which the engine would be rated, and the largest shows the ability of such an engine to meet excessive over-load. I do not know that I have ever seen this latter card equalled, since it represents 33 per cent. over-load, with an absolutely perfect distribution of steam, and no loss between cylinders. The smaller card indicates the load which might occur in a few seconds later in the performance of railroad work.

The engine capacity, therefore, must be sized up with reference to the maximum load, and would have a nominal rating greater than that of the generator, being located at some point as indicated by the broken line. It will, of course, be understood that the ability of the valve-motion of the engine to take care of momentary over-load beyond its own rating is further supplemented by the value of the fly-wheel, although recent practice in connection with the inertia governor, tends towards exacting less from the fly wheel, and more from the steam distribution. The final selection of the engine as to size will depend in every case upon the local conditions of steam pressure as the principal factor.

I will point out further, that the capacity of the engine should be determined without reference to condensation. In the vast majority of cases water for condensation cannot be had, and compound engines of this type are so designed as to yield an almost uniform fuel duty when non-condensing over the full ranges of load that occur in railway service. But even where it is determined to condense, the condenser should still be treated simply as an adjunct of economy, and not as a part of the power. This is for the obvious reason that a condenser may become choked or disabled, or leaky, and the vacuum may be poor, or lost entirely under sudden fluctuations. The engine must by all means be of adequate capacity to walk away with the load without leaning upon its comparatively uncertain assistant. This caution is, by the way, no discredit to condensers, but is simply a necessary consequence of the conditions under which condensers are generally called upon to operate.

We next reach the boiler capacity. It will be obvious that the boiler has to deal only with the average of the total load. In the diagram this average is indicated by the shaded rectangle, and is somewhat startling as compared with the apparent power of the remainder of the plant. In this particular, electric railways exactly resemble rolling mills, saw mills, and kindred industries, where the load is spasmodic, with variations lasting but a few seconds, or at most but a few minutes. The stored heat in the water of a boiler is enormous in quantity, and responds instantly to a release of pressure. That is to say, the boiler is an immense reservoir of power, as to volume, and, provided the drain upon it is not continued too long, it will stand exactions far beyond its normal capacity, and without any effect whatever upon the firing. In the early stations which we constructed, we did not give sufficient consideration to this fact, which ought to have been obvious. The result was, a boiler plant approximately

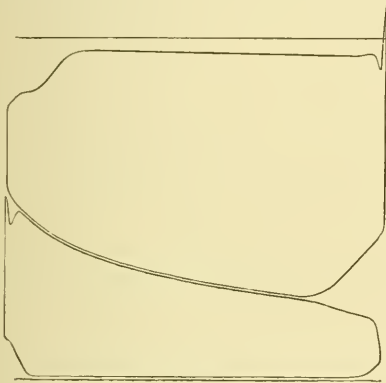


FIG. 3.

equal to the engine capacity, a large portion of which plant is perforce lying idle and unproductive of anything but interest account. Having first encountered this relation as a matter of experience, it did not take long to arrive at the reasons lying back of it, and, as a consequence, all our stations are now designed with some such proportion of boiler power, as indicated in the diagram.

There has been altogether too much "rule of thumb" in electric railway work, as in other departments of engineering. For instance, "rule of thumb" says, in ordinary mill work, that there should be twenty per cent. more capacity of boiler than of engine. This rule applied without judgment to electric railways, and without considering the characteristics of the engine used, would result in doubling the necessary investment in boilers, and the buildings to accommodate them.

In this discussion I would not be for a moment understood as advocating cheese-paring in the matter of any of the items comprising the general unit. I am referring to a question of relative proportion. The intelligent engineer who knows the results of his work are to be interpreted in the light of dollars and cents earned, will follow the excellent advice: "While you are a gittin', git a plenty." The relative proportions, however, will be found very closely as indicated. We would introduce th

caution that a relay boiler should always exist in every station. A large station will carry a relay outfit throughout, but even a moderate station should show one relay boiler and a relay feed pump. The engine and dynamo can be fairly trusted to take care of themselves, since

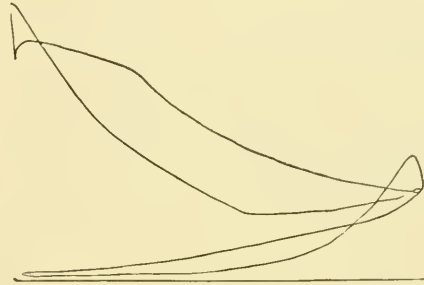


FIG. 4.

any ordinary repairing can be quickly made between running hours. Not so with the boiler, which is liable to occasional repairing or cleaning that will throw it out of service for one or more days, and this is not thinkable in connection with street railways.

The actual size of the boiler will, of course, depend upon the type of engine used. With the compound engine above described, making such diagrams as are here shown, and running non-condensing, an allowance of 30 pounds of water actually evaporated for each indicated horse-power, will give abundant margin for all contingencies. It must be borne in mind that the duty, under an average uniform load, is a very different thing from the duty under a variable load represented by the average. Under the uniform load, 23 pounds of water would be the actual engine performance, and the boiler could be proportioned with reference to this figure. Under the violent fluctuations of railway service, the average duty of the engine will rise to about 28 pounds, and if the maximum average load is taken and the boiler proportioned for 30 pounds, there will be a sufficient margin. These remarks apply only to the particular type of engine under discussion, as other compound engines not possessing the feature which secures uniformity of duty, will range up to at least 45 pounds under light loads, and often to 60 pounds, and represent an average duty not better than 35 to 40 pounds. The same is true of every form of non-compounded engine, whether high-speed or low-speed, both of which show a tremendous falling back of fuel duty under variable load. But, in the language of Rudyard Kipling, "that is another story," and is worth another article.

A CONTRACT has been made between the United States Government and the People's Street Railway Company, of St. Joseph, Mo., for the transportation of mail in pouches, between the general post-office and Station "A" situated on the Union Line, and Station "B" on the Wyatt Park branch. Once each morning and afternoon mail is carried to these sub-stations and outgoing mail returned to the post-office in the same way.

POOR THINGS!

WHILE glancing over the rapid transit facilities of our day. The Philadelphia Times thus sums up the rapid transit situation in that city and it fits many cities like a glove.

Elevated steam roads are costly and unsightly. They could not be made to pay.

Surface steam roads are impracticable.

Horse cars are too slow.

Cable cars are only possible where there is heavy and constant traffic. They are also subject to inconvenient stoppages, and are dangerous when run rapidly.

The storage battery car is a pleasing toy.

The trolley is "cheap and nasty."

Carriage riding is not to be thought of except by millionaires.

The Japanese jinrikshas are out of the question.

Walking is tiresome.

Therefore, men and brethren, Mr. Mayor and gentlemen of the select and common councils, let us stand still and ripen and rot away where we are! All is vanity, saith the preacher, but the kicker flourisheth every day with his head in the sand.

PERSONAL.

JOHN FINLEY has been made manager of the Peoria (Ill.) Central Company.

B. V. HILL, general superintendent of the Trenton N. J., Street Railway, has resigned.

THOMAS WOOD has been appointed manager of the Sandusky, Ohio, electric railway.

H. B. P. HOLLYDAY, of Easton, Pa., is superintendent of buildings of the New Baltimore cable plant.

PRESIDENT THOMAS LOWRY and wife, of Minneapolis, spent a short time in Chicago during the month.

PRESIDENT UNDERWOOD, of the Underwood manufacturing Company, has been in the city for ten days.

PRESIDENT BARIHAM, of the Janesville, Wis., Railway Company, spent a day in Chicago during the month.

PRESIDENT H. M. WHITNEY, of the West End Company, paid an extensive visit to Canada during April.

MANAGER HOLMES, of the Racine, Wis., Electric road, paid a visit to the World's Fair City during the month.

GENERAL MANAGER A. W. LYNN, of the Cream City Company, Milwaukee, was an April visitor in Cleveland.

PRESIDENT LOWRY and Secretary Goodrich, of Minneapolis, spent some time in New York during the month.

CHAS. HATHAWAY and J. J. Shepherd, of Cleveland, and F. M. Faber, of Pittsburg, were on business trips further west during the last month.

WILLIAM C. WHITNEY, whose great work in the surface road syndicate was mentioned last month is in Europe for a summer tour.

PRESIDENT JAMES CAMPBELL, of the Bellefontaine road, St. Louis, was badly hurt at the power house of the road, but is now rapidly recovering.

MAYOR FLEMING, accompanied by Aldermen, Lamb, Hallam, Carlyle, Crawford and Stewart, all of Toronto, Canada, inspected Chicago's cable system.

GEO. B. HATHAWAY, of Cleveland, Ohio, formerly manager of the Racine Railway, was a caller, recently, and will engage in mercantile pursuits in Milwaukee.

PRESIDENT McNEAR, of the Consolidated Company, Oakland, California, has invented a slot system of electric traction of which he has a working model.

C. T. YERKES has recently bought, through Preyer & Co., of Amsterdam, a fine Rembrandt portrait, of the date of 1632. The subject is Joris de Courlerly of a naval officer of Holland.

E. L. BABCOCK, president of the Falls Rivet & Machine Company, was a recent Chicago visitor. His factory at Cuyahoga Falls, O., has a night and day shift to keep up with orders.

CHAS. FERRIN, superintendent of building of the Minneapolis power houses, in conjunction with a Mr. Carr, has devised a slot electric system that will try to adapt itself to cable railways.

SARGENT & LUNDY, general selling agents for Chicago and vicinity, for the McIntosh & Seymour Manufacturing Company, have moved from the "Rookery" into the new Monadnock block, at the corner of Jackson and Dearborn Streets.

GEORGE O. FAIRBANKS has been made manager of the Chicago agency of the Westinghouse Electric & Manufacturing Company, vice J. L. Barclay, resigned. Mr. Fairbanks needs no introduction or recommendation, and has taken hold of the work with his usual vigor and intelligence.

F. H. MONKS, for several years general manager of the West End System, of Boston, has resigned to give his attention to personal affairs. Mr. Monks has been a most thorough and prodigious worker, and is recognized as among the foremost street railway men in the country. The board of directors passed resolutions extremely complimentary to their late manager, who leaves with the best wishes of all. He will make his office at 35 Congress street.

THE plant of the Keokuk Street Railway & Power Company has been sold at commissioner's sale for \$21,000, to S. P. Townsend, of Hartford, Conn., and in its stead the Gate City Electric Railway Company has been organized.

ECHOES FROM THE TRADE.

THE HEALY MOTOR will be put on the suburban line of the Wyandotte, Mich., road.

CAMPBELL & ZELL, of Baltimore, will furnish the boilers for the Red Line cable road in Baltimore.

ABE COOK, C. E., the popular secretary of the Laclede Car Company, was a Chicago visitor this week.

THE LACLEDE CAR COMPANY has its hands full, and is just now getting out 44 cars for the Lindell Railway, of St. Louis.

THE PENNSYLVANIA STEEL WORKS have been awarded the contracts for rail for the Baltimore Blue Line by President Bowie.

EDWIN R. GILBERT, New England manager of the Eddy Electric Manufacturing Company, has very pleasant quarters at 30 Oliver Street, Boston.

CURTIS & DEAN, the New York City agents of the Thomson-Houston Electric Company, have removed to 38 and 40 New street, from 150 Broadway.

THE THOMSON-HOUSTON COMPANY will equip the Gloversville & Johnstown Interurban. The change from mule to fuel will be completed by August.

E. SAXTON & Co., of Washington, have established a branch office at Baltimore in order to supervise more thoroughly the large contract for cabling the Blue line.

THE NEW PROCESS RAWHIDE COMPANY, of Syracuse, have issued "Hard Facts or Plain Truths," a tale in short chapters, telling why their pinions are so popular.

THE LA CLEDE CAR COMPANY, of St. Louis, has delivered 8 new cars to the Superior Street Railway Company, of Duluth, Minn. The cars are very satisfactory.

GEORGE CUTTER, Chicago, is supplying a number of the new electric railways, both in this country and in Canada, with the Morris pole tops, of which he is the sole maker.

A. W. DUTTON, the Southwestern Agent of the Short Electric Railway Company, with headquarters at 515 Walnut street, St. Louis, spent several days in Chicago last week.

THE PETTIBONE REGALIA COMPANY, Cincinnati, have furnished the uniforms for the conductors of the electric lines in Lafayette, Ind. A fine blue tricot, with brass buttons, is used.

THE PECKHAM MOTOR TRUCK & WHEEL COMPANY, of Kingston, N. Y., report business as rushing. They recently received three very nice orders from New York City and Brooklyn. The Atlantic Avenue Railway of Brooklyn ordered 50 truck. The Coney Island & Brooklyn Railway gave an order for 20 trucks, and the New York Electric Company want 60 trucks.

THE ST. LOUIS OFFICE of the Falls Rivet & Machine company, of Cuyahoga Falls, Ohio, has been moved from the Commercial Building, and now occupies commodious quarters at No. 520 Olive Street.

THE GRIFFIN WHEEL & FOUNDRY CO., of Chicago, have moved their offices from 602 Phenix Building to still larger quarters on the floor below and their entrance is room 508 of the same building.

THE Central Railway Company, of Baltimore, have awarded the contract for twenty miles of steel center-bearing steel rails, weighing eighty pounds to the yard, to the Johnson Company, of Johnstown, Pa.

THE EDDY ELECTRIC COMPANY, of Windsor, Conn., is now running day and night in order to keep up with orders. A large force of workmen are laying the foundation of an addition which is soon to be completed.

W. S. REED, the well known contracting engineer, has opened an office at 1,222 Monadnock Building, where he will devote his attention to furnishing plans and specifications for electric railway plants, and other engineering.

J. MANZ & Co., the artistic engravers of Chicago, have removed their new plant to Nos. 183 to 187 Monroe street, where they have facilities unequalled in the West for the prosecution of half-tone and process engraving.

C. A. CAVAGNA, Neave Building, Cincinnati, has taken the agency for the R. D. Nuttall Company, and will look after and supply the territory reached by that city. The new branch starts out with several nice orders and cannot fail to succeed.

THE ILLINOIS STEEL COMPANY report excellent sales of section T rails for the street railway service. Among the recent orders received by them was one for the new rails of the Evansville City Railway Company of Evansville, Ind.

SARGENT & LUNDY, the successful consulting mechanical engineers and western agents for the McIntosh & Seymour engines, have moved their offices to No. 1421 Monadnock Building, where they have very commodious and handsome quarters.

A. GROETZINGER & SONS, of Alleghany, Pa., are now mailing to their friends and customers a neat pamphlet catalogue. The trade in their line is eminently satisfactory and the excellent qualities of both makers and products are coming rapidly to the front.

THE JOHN PRATT COMPANY, of Hartford, are now very busy filling orders for their vulcabeston and mica specialties. This company have the order for manufacturing the insulating material for the Philadelphia Traction Company, of Philadelphia, comprising the line insulators for the span work, together with the strain insulators, center pole bracket arm insulators, guy insulators, and feed cable insulators.

THE MCGUIRE MANUFACTURING COMPANY, Chicago, have 65 of their trucks on the Grand Rapids, Mich., line, and have also furnished 35 set to the Metropolitan Railway of San Francisco.

THE BALTIMORE CAR WHEEL COMPANY, in addition to usual run of car wheel work are getting out 200 sets of wheel gear for the new cable line of the Third Avenue, New York, road, and 250 sets for the cable equipment of the Washington & Georgetown railway, Washington.

N. W. HARRIS & Co., of Chicago, have negotiated for \$250,000 of first mortgage 6 per cent. gold bonds, of the Consolidated Street Railway of San Francisco, California. The principal part of the proceeds of the bonds are to be used in completing the system as an electric line.

AN ACTIVE campaign into New England is being made by the Short Electric Company. Edward J. Wessels, of the New York office, has recently secured orders from the Warwick, Conn., New Haven, Conn., and Natick, Mass., lines. The total of the orders is 52 motors and the time for delivery is early in June.

THE DETROIT ELECTRICAL WORKS have sent a second order of 3 motors to the Jacksonville, Ills., Railway. In January the road put on 3 Detroit motors for a trial order. In the light of this test, the Detroit people have a reason to feel proud of their work. The motor in question was of the double reduction type.

H. W. TALLANT, of the Fort Worth and Arlington Heights Electric Railway, of Fort Worth, Texas, has closed a contract with A. L. Ide & Sons, for two 125-horse-power Ideal engines. The Ideal engine is very popular in Fort Worth, as is also the southwestern manager for the Ide Company, Willis H. Post.

THE BALL ENGINE COMPANY, of Erie, Pa., are now represented in New York City by Frank R. Chinnock, one of the best known electrical men in the East. Mr. Chinnock has for many years represented the Edison interests in the East, and his experience has given him a thorough insight into the engine and steam business.

THE EUREKA TEMPERED COPPER COMPANY, North East, Pa., have issued a 16 page circular brim full of the choicest testimonials, the voluntary offering of their customers. Their tempered copper is suited to all purposes where copper is used in any form and for commutators, brushes, trolley wire, and kindred uses, has made a splendid record.

THE BALDWIN LOCOMOTIVE WORKS have sold a new motor named appropriately, "Rapid Transit," to the Seymour, Ind., lines. The motor is working to the entire satisfaction of the local company and the populace.

Baldwin motors have also been recently bought for use on the Mt. Tabor & Eastern Railway and the City & Suburban Railway, both of Portland, Ore.

THE SHORT ELECTRIC COMPANY announce recent sales to:

The Braddock Electric Railway Co., Braddock, Pa.

The Union Passenger Railway Co., Chester, Pa.

The Fort Wayne Electric Railway Co., Fort Wayne, Ind.

The Schuylkill Electric Railway Co., Pottsville, Pa.

THE FAME of the Walker Manufacturing Company, Cleveland, extends even to the islands of the sea. They are just in receipt of an order for four differential cable drums to go to Sydney, New South Wales, Australia. This brings the number of drums now on their books up to 48, certainly an unprecedented amount of cable drum business, and inquiries are still coming in from all quarters.

THE AMERICAN CASUALTY & SECURITY COMPANY, of which Beecher, Schenck & Company, 120 Broadway, New York City, are general managers, shows for the present year, receipts reaching probably \$3,000,000, an unprecedented thing in a company so young, street railways particularly appreciating the protection afforded. Their liberal terms and business-like methods have secured the managers a good showing and the concern healthy growth.

R. B. PIERPONT, formerly the Western Agent for the Gould & Watson Company, now represents the H. W. Johns Manufacturing Company, as manager of the electrical department, at 240-242 Randolph Street, Chicago. Mr. Pierpont is too well and favorably known to the entire Western trade to need any introduction, and the most generous wish we can make is that his success with the new may be as extensive as with the old firm. Mr. Pierpont still holds the agency for the Whitney Volt and Ammeter, made by Gould & Watson.

THE BALL ENGINE COMPANY, of Erie, Pa., are in receipt of a letter dated April 18th, from C. E. Peers, president of the Warrenton, Mo., Electric Company, which reads:—

"We started the engine purchased from you for our electric plant, last night, and the way it moved off was beautiful to behold. It is certainly a very fine and powerful piece of machinery. No vibration, no noise, in fact and in short, it is perfect in every part and way. The satisfaction it gives is a pleasure to us, as it must be gratifying to you."

THE WIGHTMAN ELECTRIC MANUFACTURING COMPANY, of Scranton, Pa., are to be complimented on their enterprise. The following named roads are now using their electric railway system: Brooklyn City Railroad, of Cleveland, O. The East Cleveland Railroad Company, of Cleveland, O. The Wheeling Railway, of Wheeling, W. Va. Auburn City Railway, of Auburn, N. Y. Du Bois Traction Passenger Railway, Du Bois, Pa. The Pennsylvania Motor Car Road, at Easton, Pa., and the Peoples Street Railway Company, of Scranton, Pa.

THE STEARNS MANUFACTURING COMPANY, of Erie, Pa., have now acquired by purchase, the remaining franchises of Woodbury, Booth & Pryor and the Woodbury Engine Company, of Rochester, N. Y., including all patterns, patents, special tools, trade marks, good will, etc., etc. This puts into the hands of the Stearns Company, not only the sole ownership of the Woodbury high speed automatic steam engine, which they previously purchased, but also the world renowned "Woodbury medium speed automatic engines," and the means of producing both.

The name "Woodbury" has been for forty years synonymous with good steam engines, and with something over three thousand of the two classes here named, all bearing the "Woodbury" ear-marks, to point and refer to, the Stearns Company ought to be satisfied that they have made no mistake in adding the medium speed automatic Woodbury to the Woodbury high speed they have already pushed to the front rank of its class.

THE CROSSLEY FRICTION CAR BRAKE COMPANY, of Cleveland, O., are placing their brakes on the cars of the Brooklyn Street Railway Line of that city.

THE DENVER CITY CABLE COMPANY and the Tramway Company recently paid their annual licenses. The former paid on 40 and the latter on 100 cars at \$25 each.

THE WESTINGHOUSE-CHURCH-KERR COMPANY will install three of their direct coupled engines and dynamo units at the power plant of the New Haven and West Haven railway.

THE LAMOKIN CAR WORKS, of Philadelphia, are very busy. Among their late orders were one from the Harrisburgh Street Railway Company, Harrisburgh, Pa., for sixteen thirty-three feet car bodies, and one from the City Passenger Railway Company, of Altoona, Pa., for three open seat tract cars.



HOW IT FEELS,

—until a passenger gets aboard, taking the seat behind you, and who is in possession of shoulder-blades—

—Judge.

THE SIOUX CITY ENGINE WORKS, of Sioux City, Iowa, have been so crowded for the past two months that a double force have worked night and day. They have recently received orders for a 33 by 48 inch Corliss engine for the U. S. Electric Light Co., of Dubuque, Iowa; one 24 x 48 for the Rhomberg Street Railway Line, of Dubuque, Iowa; one 36 x 43 to be used as a twin compound, with an 18 x 43, in the Sioux City Electric Light & Power Co.'s works. They will soon ship to R. D. Hubbard, Mankato, Minn., one 150 horse-power Compound Automatic engine. They are now erecting for the B. & M. Ry. Co., at their new shops at Havelock, Neb.; one 18 x 42 Corliss engine, and also one 100 horse-power Compound Automatic for the State University at Lincoln, Neb., a number of engines for factories in Chicago, Rockford, Ills., and have established agencies in Minneapolis, Chicago, St. Louis, Omaha, Kansas City, Dallas and Denver.

THE GOUBERT MANUFACTURING COMPANY, 32 Cortlandt street, New York City, reports an increased demand for the valuable device, the Goubert Feed-Water Heater, manufactured by this company. A few of the most important sales made lately are, are: Three 1,000-horse-power heaters for the Third Avenue Cable Road, one 1000-horse power heater for the New York Mutual Gas Light Company, besides a number of smaller orders.

CINCINNATI'S CABLE.

THE Mount Auburn Cable Road, which has withstood many reverses which would have long since daunted a less determined organization, is busily rebuilding its fire-wrecked power house at Highland Avenue and Saunders Street, Cincinnati.

The new building will be of but a single floor, instead of two, as had its predecessor.

A number of luxurious summer cars are being built for the road, by the Brill Company. All of the little bob-tail grip cars with which the company began operations, were destroyed in the power house conflagration.

The permit for a down-town loop terminus, granted by the Board of Public Improvement, the very last day of its notable existence, is still under the injunction secured by property holders along the proposed line.

The Mt. Auburn Company will, however, for the time, obviate this by maintaining a line of handsome omnibuses, which are to connect with the road at Fourth and Sycamore, and to which passengers will be transferred. This is President Martin's idea.

AN INSANE man, armed with a big strap, recently requested passengers on a New York L car to "clear out," and give him the car. They all cleared.

HEARD HIS FATHER'S VOICE.

TRUE stories are always the best ones. Some of the best stories moreover are furnished by street railway people. The following is both true and a street railway narrative:

The street cars in Galesburg have always been hurred along at the dizzy speed of 3 miles an hour by mules, although the company have decided now to let the mule go for good and put in electric power instead.

Soon after the Opera House in that city was opened a company played several heavy pieces, and one night the house was packed to listen to Hamlet. Everything went as merrily as things ever go in tragedies until the ghost scene came on with a Manitoba chill to every spine. When Hamlet paused to listen and remark:—"Whither wilt thou lead me? Speak, I'll go no farther,"—a pin



could have been heard to drop with a dull sickening thud;—but as Hamlet inclined his head as the last word passed his lips as if to catch another message, he was answered by a most vociferous reply from the old street car mule in waiting at the door below, the effect was instantaneous and wonderful. Hamlet turned himself to the wall to weep, the ghost went out to look for a gun, the audience rolled beneath the chairs, the other members of the company went into hysterics, and the manager of the company vowed he would cancel the balance of the engagement unless mule blood was shed at once.

Even now, when a new company comes that way, they are unable to account for the uncontrolable and apparently unwarranted outburst of hilarity which convulses the audience when that passage is reached. The above offers one more and heretofore unadvanced evidence as to why the mule should "go."

NONE BUT THE BRAVE DESERVE THE FARE.



OBBED the Conductor! With this scare head the citizens of Kansas City, Mo., and Omaha, Neb., have been kept in mortal terror, and the policeman has retired further into the alley or saloon to avoid creating any disturbance on the streets at unseemly hours of night.

All the way from 5 cents to \$10 has been secured from the frightened ticket-takers of the Kansas City cables, and any belated passenger, who may have been sitting up with a sick friend, or may have been returning from his arduous toil, has been compelled to pass over his last nickle that was to cure his thirst before going to bed.

At least four times during the past year have we chronicled these interruptions of rapid transit, and, until recently, the robber had not been apprehended. But the highwayman went just one time too many on his marauding raids, and when the black mask was unconventionally ripped from his countenance by the hand of law there was disclosed a boy about 18 years old, and measuring the gigantic height of 5 feet!

Now, in Kansas City, report is that all conductors carry arms of carnal warfare, and are obliged to defend the nickle.

To be serious, robberies have been much too frequent of late, at other points,—notably, Washington City, Louisville and Dubuque, Ia., where a conductor was killed by two yellow-covered novel fiends of 16 years, and the only dose that can have any effect in stopping this species of insanity is a half-ounce of lead administered externally in allopathic form.

It is well known that if the idea spreads, as such ideas will, among the tough boys who are not smart enough to hold up a railroad train, untold damage and ruined lives may be the result.

THE Detroit Citizens' Street Railway Company some time ago placed a safe in the hallway of their building, 12 Woodward Avenue, and connected it with a tin spout opening on the entry door for the convenience of conductors who had to make their trip deposits. Not long ago an unknown man was discovered cutting open the spout and frightened way before he could secure anything. The man had cut a piece eight inches long out of the spout before he was interrupted.

A NERVOUS little woman recently boarded an electric car in Champaign, Ill., and spying a bolt in the floor anxiously said to the ticket taker:

"I suppose this is perfectly safe; but if I should put my foot on that bolt, would I get a shock?"

"O, no, madam," said the conductor, "not unless you put the other foot on the trolley wire at the same time. Let me have your fare, please."

RAILWAY EQUIPMENT COMPANY.

SINCE our last issue a new company has been organized for the purpose of manufacturing and selling electric railway supplies, and, for reasons well known to the trade, took at once a very prominent standing. The manager of the company occupied a similar position with the Electric Merchandise Company, since the starting of that popular concern. At the suggestion of a number of the strongest men in the business, he was urged to organize a new company, which he did on the twelfth of last month. The standing and prominence of the parties interested in the new company led the owners of the Electric Merchandise Company to offer for sale the entire capital stock of that company, and it was finally decided on the part of the Railway Equipment Company to make the purchase.

While the new company was prepared to meet the wants of the trade, yet it deems itself fortunate in being able to offer to the trade some of the standard appliances manufactured by the Electric Merchandise Company and which are now specified in many contracts where the best possible material is wanted. Besides this standard material, which has unusual merit, the new company will offer many new and improved devices, which will undoubtedly be appreciated by the trade. Several new agencies will also be taken by this company, and it is stated that everything for the complete equipment and maintenance of electric roads, of all systems, can be furnished out of the large and complete stock which will be carried. A new catalogue of such material, also containing much valuable information regarding the building of electric railway, is under way, and everything is being done to place the trade and the new company in good working relation.

The benefit of the long and practical experience of the owners and employers of the company will be cheerfully given to parties interested in this line of business. Arrangements have been made for convenient office, stock and fixture rooms, but until such rooms are ready for occupancy, the company will make its office at 11 Adams street, which location is so well known to the electric trade generally.

Mr. Mason, who was general manager of the old company, and who made it what it was, is one of the most popular men in the ranks of supply houses, and, aside from his splendid executive ability, a wide and popular acquaintance places him in an unusually fortunate position to guide the fortunes of the Railway Equipment Company on a long and prosperous voyage.

AS PREVIOUSLY noted in the REVIEW, John C. Shaffer, of Indianapolis, has bought the Sea Shore railway at Asbury Park, N. J. He is now having it reconstructed with girder rail, and will add two miles of new track. The electric power plant will exert 400 horse-power, with 650 horse-power in the engine-room. Twenty new car equipments of 25 horse-power Wightman motors are already contracted for, also.

Florida and the Sunny South via. the Big Four Route.

To all persons contemplating a southern trip, the Big Four Route offers special attractions and advantages possessed by no other line. Solid Vestibuled trains, heated with steam and equipped with palace sleeping cars, reclining chair cars and elegant parlor cafe dining cars run daily, making connection in Central Union Station, Cincinnati, with through express trains of the Queen and Crescent Route, Louisville & Nashville, Kentucky Central and Chesapeake & Ohio Railways, avoiding the tedious transfer necessary via other lines, and affording practically through train service to Old Point Comfort, Asheville, Chattanooga, New Orleans, Savannah, Jacksonville, St. Augustine, Tampa, Indian River and all winter resorts of the South. Tourist tickets via the popular Big Four Route at special low rates are on sale at all coupon ticket offices throughout the country. Ask the agent for tickets via the Big Four Route. D. B. MARTIN, General Passenger and Ticket Agent, Cincinnati, Ohio.

Two Daily Trains to Montana and Pacific Coast.

On and after April 3d, trains on the Northern Pacific Railroad will run as follows: Train Number Three will leave St. Paul 9:00 a. m. daily, running through to Spokane, Seattle, Tacoma, and Portland, via. Butte, Montana. Train Number One will leave St. Paul 4:15 p. m. daily, running through to Spokane, Seattle, Tacoma and Portland, via. Helena, Montana. Both trains carry complete equipment of Pullman first-class sleepers, tourist sleeping cars, free colonist sleepers, day coaches and dining cars.

Through Pullman and tourists sleeping cars will leave Chicago 10:45 p. m. daily, via. Wisconsin Central Line, for Montana and the Pacific Northwest. First-class vestibule sleeper will leave Chicago 6 p. m. daily, via. C. M. & St. P. Ry., for Butte, Spokane, Tacoma, and Portland. These through sleeping cars afford the best of accommodations, and enable travelers to avoid all trouble or delays from change of cars en route.

The dining cars on the Northern Pacific Line continue to meet with favor with the traveling public. No efforts are spared by the company to make this an attractive part of the service. With the superior accommodations now offered, tourists, business men or settlers will find the Northern Pacific Line the best route to Minnesota, North Dakota, Manitoba, Montana, Idaho, Oregon, Washington, British Columbia, Alaska and California.

Montana, Eastern and Western Washington folders "Wonderland" book, Sportsmen's Guide, Yellowstone Park, Broadwater, Hot Springs and Alaska folders for the season of 1892 are now out of press. Any of these publications will be mailed free on application to General or District Passenger Agents, Northern Pacific Railroad, or to Chas. S. Fee, C. P. & T. A., N. P. R. R., St. Paul, Minn.

PRESIDENT NORVELL, of the Superior, Wis., Company, has contracted for 10 new cars to be delivered by May 25. The cars are 19-foot bodies, and will be made by the Northern Car Company, of Minneapolis. Another order will be placed later.

C. E. LOSS & CO., General Railway Contractors.

Estimates made on all classes of Engineering Work.

—MAUR EGAN, ILL.

WE PURCHASE TOTAL ISSUES OF : : : :

STREET RAILWAY BONDS.

: : : : CORRESPONDENCE INVITED.

N. W. HARRIS & CO., BANKERS.

163 Dearborn Street, Chicago.
15 Wall Street, New York.
70 State Street, Boston.

ADVERTISEMENTS FOR HELP OR POSITIONS WANTED WILL BE PRINTED IN THIS COLUMN FREE.

WANTED. A position as Superintendent or Assistant with an Electric Road, by a young man thoroughly competent in all branches. Address J. E. M. P. O. Box 792 Syracuse, N. Y.

WANTED Draughtsman. To a good man, with experience in car-building, an excellent position with a large manufacturing company is open. Address J, care STREET RAILWAY REVIEW.

FOR SALE. 125 Tons 38 lb. Second Hand Steel Tram Rails in excellent condition. 100 Tons 25 lb. Second Hand Steel T Rails, but little used.
D. E. GARRISON & CO.,
219 N. 4th St., St. Louis, Mo.

WANTED: Second-Hand 250 or 300 Horse Power Corliss Engine, for street railway use. Must be in good condition. Ready for delivery by May 1st,
Address X R.
Care STREET RAILWAY REVIEW.

FOR SALE. 2 No. 20 500-volt Edison Railway Generators, 65 H. P. complete, with regulating devices, and in perfect working order, for \$1,625 each. 3 No. 10 2200 volt Edison Dynamos, complete with regulating devices, and in perfect order, for \$700 each. 1 Hawkeye 220-volt Dynamo, 20-Amperes, for \$500. 1 Hawkeye 220-volt Dynamo, 150 Amperes, for \$350. 3 Baldwin Steam Dummy Locomotives, from 8 to 11 tons, 2 for \$500 each. One as good as new for \$2,500. All of them were in daily use last summer. Address
DAVENPORT & ROCK ISLAND RY. CO.,
Davenport, Ia.

FOR SALE. 1 Baldwin Saddle Tank Engine, weight, 9 tons, cylinders 9 x 12 in., built in 1881. Price, \$1,000. 1 Baldwin Steam Motor, weight, 20 tons; cylinders 9 x 12 in.; built in 1884. Price, \$1,500. 1 Baldwin Steam Motor, weight, 11 tons; cylinders, 10 x 14 in., built in 1887. Price, \$2,000. All the above standard gauge, have Eames brake, and are in excellent condition. Also 300 Tons 48 lb. Slot Rail, 2 Walker U Frames with 12 ft. Staggered Arm Sheaves, 1 Set Double Cable Driving machinery, with four Ring Walker Differential Drums. 1 Hazelton Tripod Boiler, 150 H. P. 1 Hazelton Tripod Boiler, 300 H. P. All the above but little used and in excellent condition. CONSOLIDATED STREET RAILWAY CO., Grand Rapids, Mich.

NOTICE Public notice is hereby given, that the interests of Garson Myers and the Calorific Ventilating Heating Company has ceased under the license heretofore permitted them to manufacture Street Car Heaters, and to sell the same, under patents Nos. 336,392 and 358,432; and all persons are hereby warned not to purchase or deal with the said Garson Myers, or the said Calorific Ventilating Heater Company, in reference to the purchase or use of said stoves or heaters or any infringement of same, after date hereof.

LYMAN P. CONVERSE, Inventor,
707 Wells St., Chicago.
Lyman P. Converse, Peter Fish, Proprietors.
Chicago, Ill., April 6, 1892.

WANTED.

An offer for ten twelve-foot Cars, gauge, 3 feet, 6 inches.
Address:

DULUTH STREET RAILWAY CO.,

Duluth, Minn.

Fred. S. Wardwell, Gen. Mgr.

For Sale. One United States Dynamo 80,000 Watts, 500 Volts good as new.
EAST READING RAIL ROAD,
Reading Pa.

Wanted. A man to wind T. H. & Co. armatures, 30 to 50 H. P. railway car motors. Address
JOHN F. GIVAN,
Hewitt and Hackberry St. Cincinnati, O

Notice to Managers. A competent Electrician and Superintendent desires a change, and will be pleased to receive offers from those desiring his services. Good references. Address, D. 62, care of Street Railway Review.

Second-Hand Engines for Sale.

One 150 H. P. Russell automatic engine with line shaft pulleys.
One 50 H. P. Russell automatic engine with line shaft pulleys.
Two 25 H. P. Rice automatic engines.
One 35 H. P. Westinghouse engine.
One 25 H. P. Chandler & Taylor engine.
Taken in exchange for Ideal engines and will be sold at less than half original cost. For further particulars, address
A. L. IDE & SON,
Springfield, Ills.

WHY NOT BUY

CAR WHEELS

Known to be

good like those made by the

Griffin Wheel and Foundry Co.

THE PROOF? TRY THEM.

THE LATEST — FOR —

Electric and Cable Cars.

STREET CAR

SEATS

Of Every Description.

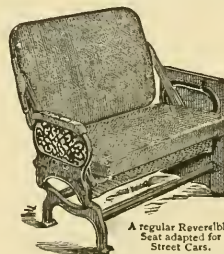
With or without springs, covered with Carpet, Plush and Rattan.

Hundreds of References.

Thousands in Use.

Catalogues, Estimates and Samples on Application.

THE HALE & KILBURN MANFG. CO.,
Philadelphia New York Chicago.



A regular Reversible Seat adapted for Street Cars.



WINDSOR & KENFIELD,

PUBLISHERS AND PROPRIETORS,

334 DEARBORN ST., - - - CHICAGO.

Published on the 15th of each month.

SUBSCRIPTION, - - - ONE DOLLAR.

FOREIGN SUBSCRIPTION, - - - TEN SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW,
Coxton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR,
Editor.

F. L. KENFIELD,
Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW.

334 Dearborn Street, Chicago.

Entered at the Post Office at Chicago as Second Class Matter.

This paper member Chicago Publishers' Association.

VOL. 2. JUNE 15, 1892. NO. 6

THE commendable zeal with which the American Street Railway Association is attacking the problem of a street railway exhibit at the World's Columbian Exposition should meet with the unqualified approval of every manufacturer and inventor in the Union.

The project will undoubtedly give to the street railway world the broadest view of equipment, plans, improvements and ideas ever gathered beneath one roof.

As stated in the circular, 50,000 square feet of space has been secured in the transportation building and no classes will be formed by reason of nationality but all will be grouped by natural classification.

Willard Smith, Chief of the Department of Transportation, will be assisted by John B. Parsons, of the West Division Railroad Company, of Chicago, thus insuring intelligent management of the exhibit.

THE Augusta, Ga., News, in speaking of the electric railway described in the REVIEW last year, says: "The Electric Railway Company has done more for Augusta's development than any one agency in a half century, and Augusta should show its appreciation in a practical and public-spirited way. This can be done by the authorities giving the company a fair chance to make some return on its big outlay of money and improvements in this city.

The coming of the Electric Company started Augusta's boom and caused real estate owners to realize on property which had been a dead weight for years. These real

estate owners now owe the Kansas City capitalists some return, or at least a chance to make some money for themselves. As yet, they declare and show that they have not done so."

SOME opposition is noticed in various parts of the country where it is proposed to connect a smaller with a larger town, by an electric line. The same fear governs the objectors in each case, namely, merchants in the smaller place believe the construction of the line will take business from them and divert it into the larger town at the other end of the line. The citizens, who are in the majority of course, should not allow this jealousy to stand in the way of the improvement if that is the only real difficulty. It is but an echo of the opposition which surrounded the birth of the steam engine, the cotton gin and a long list of inventions which mark the march of progress and civilization. Even though business should be temporarily lost, the great facilities of travel will open up what are now undeveloped avenues of resource, and in the end the benefits will far outnumber the temporary disadvantages. He who fears honest competition either fails to rise to the necessities of the times or is hiding behind an infant monopoly, in which he deserves little protection.

Recently, in an Ohio town the citizens brought the objecting merchants to time by organizing a co-operative store with a capital of ten thousand dollars, which had the desired effect and acted as a magnet to draw the objectionists from the track of progress.

IN a western city recently, a person without regard to the convenience of the public or the rights of the railway company undertook to move an old house along the tracks. Traffic was blocked for the best part of the day and the house mover was anathematized for what he did and the company for permitting the outrage. At last the house was side-tracked on an injunction obtained by the company. The court, however, dismissed the injunction on a demurrer and company and public are again at the mercy of any person who may see fit to move every old shanty in the town. More often than otherwise it occurs that the buildings moved are well nigh worthless and not infrequently possess less value in dollars than the amount of receipts lost by the company through delay in traffic. It is manifest injustice, and it would seem as though a determined effort on the part of the surface roads in each city might secure protection to the extent of the passage of an ordinance whereby buildings should cross or move upon street railway tracks only between the hours of midnight and five o'clock in the morning, and for the deposit of an amount sufficient to cover all loss sustained by the company in case the building did not leave the street at the expiration of the allowed time. With such a law it will in most cases be found possible to move a building which under any other circumstances would remain as founded upon a rock.

The city requires from those opening streets for the purpose of laying service pipes, a deposit against the

satisfactory replacing of the pavements, and there is no good reason why the same arrangement should not prevail for the protection of the railway company and its patrons, the public.

We believe that this, as too many other matters, are allowed to go by default, because no positive, determined effort is made by railway management to secure suitable and necessary protection; and with right so clearly on our side, there should be no hesitation on the part of the petitioners, as there can be little excuse from those in authority for granting the much needed protection.

IN a goodly western city, of some twenty thousand souls, the street railway came to grief, one morning, recently, through the failure of the waterworks to furnish that needful ingredient for making steam. The result was that no electric cars were put in service until along towards noon, causing a no considerable loss to the company, and a very considerable amount of inconvenience to a friendly public, who had never given any occasion for such treatment. It is an accident which may not again happen to that road in ten years, or it may occur within ten days. The lesson is a pertinent one. No company has a right to fail to protect itself against delays, which, by the expenditure of any reasonable sum, can be prevented. This road, at a purely nominal expense, could have put in wooden cisterns, which would have carried a day's supply of water, and thus have moved its cars without interruption, instead of undergoing the humiliation of having a dead line, and the patrons complimenting the officials as a "dead management." Policy, alone, should dictate the proper course in these matters, without the necessity of public pressure being brought to bear.

There are other weak points in other roads; some unthought of, others fully realized by the manager, who thus far has failed to secure a proper realization on the part of his board. Such directors are doing the manager an injustice by placing him in a position, where, some day, he will be held up to public censure as incompetent, and, with his hands tied, so he cannot clear his own skirts, by placing the blame where it really belongs.

The transportation of the residents of present-day cities is exceeded in importance by but few of the necessities of city life, and that corporation which undertakes to assume the responsibilities of providing this service should use every effort in its power to fulfill the requirements and discharge its obligations to the public.

WE were on an electric car in a large western city the other day when a slight mishap occurred to the trolley standard, necessitating a wait of two minutes and a piece of small rope with which the conductor remedied the difficulty. The man knew exactly what to do, but what was more striking was the prompt and thorough manner in which he set about his task. Less decision and earnestness on his part would easily have caused a delay of ten or more minutes. When the car again started he

took out a report blank and carefully filled in a complete statement of the occurrence, noting place, time, nature and cause of accident, and delay occasioned; also the signature of two passengers to the statement that he had used due diligence in what he had done.

The "accident" certainly did not deserve the name of such, so trifling was its nature. The delay was less than is frequently caused in waiting for a team to pull out of the track. The damage probably amounted to fifteen cents. No one on the car had any fault to find. The conductor could have simply mentioned the occurrence to the barn foreman on the return trip, which was completed on time.

But that was not the point. The very fact that the conductor knew what to do and did it, gave evidence of a complete and thorough discipline of which the full report was but one thread in the texture. Laxity and unconcern about little things begets carelessness and disregard when more important interests are at stake. A small company of disciplined troops will repel a multitude of unorganized forces, and the comparison is no less true when the interests and reputation of a road are at stake. A well governed road is but the summary of countless little things rightly done, and a firm, just management inspires confidence and respect, improves the employee and makes him more contented. Few things in any business more tend to create dissatisfaction among the men than the want of a firm hand at the helm. We do not believe in red-tape which goes to the other extreme, but there is a vast difference between business methods and red-tape.

A WELL meaning but evidently not well-informed editor of the Pittsburgh Dispatch, advocated in that paper the construction in his city of what he terms "Universal Street Track;" prefacing his endorsement of the plan by pointing to the fact that heavy teaming seeks the smooth rails of the surface roads in preference to the less yielding and uneven surface presented by stone paving. He advocates the construction of a double track on all the leading streets of the city, which are forty or more feet wide.

He further recommends the construction under an assessment of \$1.50 per front foot and holds out the delusive idea that railway companies will readily rent the same, from the city, at juicy rates, and a grand procession will march in endless lines up and down the thoroughfares.

In the first place, a double track cannot be laid with the requisite weight of rail for the purpose named, on the assessment stated, and few property owners would voluntarily invite heavy teaming in front of their premises. As to securing railways as tenants, it is doubtful if in these days they would care to accept the tracks under such conditions, if tendered free. Teamsters who move their loads at barely a walk, would naturally insist on holding possession of the rails and refuse to pull out for the cars. This would reduce the speed of the cars to such an extent that few persons could afford the time to ride in them, preferring the much quicker alternative of walking. Under such conditions a car would not be able to earn wheel grease. As already stated in these columns, in many

cities the wear to tracks is found to be fully 75 per cent. due to wagon traffic which, turning in and out, wrenches the track and destroys the gauge.

The sensible solution of the street traffic question is in the passage of municipal laws which will fix the width of tire used on teaming wagons on a sliding scale, proportioned to the load desired to be carried, and under which conditions a driver would not be allowed to haul a load in excess of the weight permitted to the width of tires on his wagon; and on a smooth pavement such as asphalt. This plan is already in force in all European cities where, in fact, no vehicles are found with so narrow tires as used on carriages in this country; while the tires on traffic vehicles will be found full twice that in use here for the same weight of load. This is eminently fair and just, and even on the pavements in use here to-day would effect an annual saving of hundreds of thousands of dollars in all our cities. In the business streets of Chicago the best stone block pavement becomes almost unfit for use in four to five years. A pair of tracks in the center of the street would, however, render no improvement, for they would last a much less time, and require constant inspection and repair.

With wide tires, a smooth pavement becomes a possibility, as has been abundantly proved in Buffalo, where a change from a terrible condition of the rockiest cobble stone, to the present elegant and perfectly smooth street surface makes the streets of that city one of its greatest attractions and chief wonders.

Street railway managers should interest themselves in the character of the paving to be adopted on the streets occupied by their lines, and use every effort to secure a street surface which will not make it at least necessary for teams to travel on the rails. In many western cities paving brick is being used with excellent results, and in such places drivers seem to have little desire to haul on the iron.

Under these conditions it would be folly to track a street for teaming purposes, and we have no hesitation in saying it would never be tried more than once in the same city.

WE wish to call the particular attention of our ubiquitous friend, the kicker, to a fact in relation to the regulation of the number of passengers carried by our street railways on the American plan.

A London paper of recent date makes the following observations on the "well regulated and lawfully conducted" systems of traffic in vogue in the mother country.

"Londoners who complain of the overcrowding of trains, omnibuses, and trams, and who feel that it is an indignity to be wedged into an underground railway carriage with six on the top and the hat racks full, should go to Blackburn to learn how well off they are. In the case of one particular car there were forty-two passengers looking for elbow room inside, four hanging on to the platform behind and three on the steps. After nine had alighted at the first stopping place, the investigator mounted to the top of the car and there found thirty-four. The fact shows the wonderful packing qualities of the tram patrons

of that town, for the car was licensed to carry sixty, thirty inside and thirty out. Instead of this number it was conveying nine-two. It is unnecessary to go into other instances; the facts speak for themselves. It was suggested that each car should be provided with a "chucker out."

It will no doubt be a surprise to the editors of some of the recalcitrant papers to be apprised of the fact that people will ride if there is the shadow of a contrivance to accommodate them. Now, although a slight fine was imposed on the above mentioned tramway, the same state of things remains and will remain in spite of theory and theorists.

Take, too, as another instance of municipal regulations, the paternal government of Germany, where more officialism "doth hedge" the street car passenger than is comfortable. Notices ad infinitum stare him in the face, and regulations, miles in length, require his attention and unless he takes his life in his own hands the passenger must remember each and all of the innumerable "protective" points."

DULUTH'S DINNER.

IN relation to the competition between Duluth, Minnesota, and West Superior, Wis., the men interested in the advancement of an interurban road, invited Thomas Lowry, of Minneapolis, to dine and to tell of the advantages of an interurban line.

Over the cigars, Mr. Lowry spoke as follows:

"It has been our endeavor to connect the two cities of St. Paul and Minneapolis. It was better to have one large city than two smaller ones. The two would vie with each other as to which should be the larger end. It has been eighteen months since electric car communication was opened between the two cities. In ten days the line took nearly all the traffic. At the head of the lake you are little farther away from the agricultural district. It is a little harder for you to attract outside capital. I have been surprised, in looking over the city to-day, at your growth since my last visit here. You have now pulling against you Superior. The sooner you arrange for, not one bridge between the two cities, but for two or three, the better. A bridge between the two cities for general traffic will do more than anything else to build up both of them. In a very short space of time the population of both of them will double. I drove to-day down Garfield avenue and was surprised at the short space it would take to connect the two cities. I am surprised that an attempt has not before been made to connect the two cities."

Mr. Norvel, of the street railway of West Superior, was also present, and spoke favorably of the scheme, and Vice-President Goodrich, of Minneapolis, corroborated Mr. Lowry's statement.

As to the advantage of interurban roads in general we commend to the promoters the almost monthly chronicle of like lines in Ohio, Pennsylvania and New York, as recorded in THE STREET RAILWAY REVIEW.

ALLEY "L" OPENING.

SHORTLY after 2 o'clock p. m. on Friday, May 27, 1892, there occurred an event which the rapid transit world regards as one of the most important of the year. This event was the formal tour of inspection and experiment, opening for service the elevated steam locomotive system of the Chicago South Side Rapid Transit Company.

About a week previous to the opening the favored friends of the road received invitation from the managers accompanied by the following card:

"Admit bearer to the Congress street station of the Chicago and South Side Rapid Transit Railroad, and to

During the journey south and north the back windows of the dwellings along the route were stuck full of grinning and smiling faces; men, women, and children waved handkerchiefs and in various ways expressed approval of the passing spectacle. It was plain to those on board that life through a second story back window can be very effectively studied at certain times, from the cars of the "L" road.

Small crowds were collected on street corners along the way, and looked up wonderingly at the train. But there was nothing exciting or note worthy in the way of demonstration. The "L" road has been a good while building, and since the locomotives and cars were hoisted to the structure a few weeks ago interest has



JUST BEFORE THE FIRST TRAIN—CORNER OF FORTIETH STREET.

the excursion train leaving there at 2 p. m., the 27th day of May, 1892.

W. T. BARNARD, General Manager."

Shortly before 2 o'clock the guests, to the number of 300 gathered at the Congress street station, and at 2:07 Superintendent Wetmore called the first "all aboard" of the Chicago "L" road.

The run from Congress street to Thirty-ninth was made without stop and the time-keeper reported the distance traveled $3\frac{1}{2}$ miles, and the time 10 minutes. In other words about 20 miles per hour. There was very little noise from the train, the structure upon which it ran being perfectly smooth and solid. Besides, the rails are heavier weighing ninety pounds to the yard.

waxed less. People seemed to take the appearance of a train as a matter of course.

Pending the halt at Thirty-ninth street a buffet car was shunted into the middle of the excursion train, and every one began the pleasure of anticipation. At 2:30 o'clock the return stage was begun. The scheme on the return was not to make time, but to stop at every station, allowing the passengers to disembark and inspect the same. The stations, starting with Thirty-ninth street, are at Thirty-fifth, Thirty-third, Thirty-first, Twenty-ninth, Twenty-sixth, Twenty-second, Eighteenth, Twelfth, and Congress. Myron H. Church, architect of the stations, was aboard and pointed out the beauties and conveniences of his handiwork.

A memorial tablet was inspected at Twelfth street, it contains, besides the name of President Calvin Goddard, now deceased, the following list: R. I. Sloan, chief engineer; D. McAllister, construction engineer; J. H. Glade, secretary and treasurer; Herman Benze, right of way; M. H. Church, architect; W. W. Gurley and E. J. Harkness, solicitors; M. McDermott, builder. All these officials except Colonel Goddard, now dead, were in the party. In Colonel Goddard's place was Dr. W. T. Barnard, his successor.

It was 3:30 o'clock when the party got back to Congress street and alighted, all apparently well pleased with the journey. The road opened for public travel on Monday, June 6. In the meantime, trains will be run for the instruction of employes, of whom there are about 150 in the operating department. The company has twenty-five cars here; twenty-five more have now arrived from Wilmington, Del., and ten more were received from Troy, N. Y., June 1. Ground was broken for the alley "L" January 9, 1890. It is now finished to Fortieth street and is expected to reach Sixty-third and Jackson Park before the World's Fair opens. The road has cost an average of \$500,000 a mile.

LABOR COMPLICATIONS.



VER a month ago there was instituted what promised to be a temporary difficulty between the New Orleans car drivers and the companies.

The difficulties did not at the time seem an occasion for apprehension, but the ill-advised sympathy of a few added fuel to the flames, until a street car, says our correspondent, was a sight worthy of note, and great inconvenience was caused by the stoppage—workingmen and girls having to walk a number of miles, oftentimes, to reach their labor, and return by the same conveyance. The hardships worked the community in general will make sympathy a less prevalent disease, and the depredations committed by the strikers turned the tide against them. The most serious damage was done in several cases to the cars and mules.

The police were absolutely powerless to manage the rioters, and so there was a riot every time a car was started, even the hundred extra officers could do but little.

On Magazine street, track was torn up by the rioters as a sort of dernier resort. The same amusement was practiced on other streets, while on another thoroughfare the fellows piled a barricade that would have been a matter of pride to a Frenchman of the commune. There was no demonstration when the damage was repaired.

A favorite plan of annoyance was the cutting of traces and driving away of the mules. This was done repeatedly, in the face of the police, who, in several instances, showed great gallantry in facing the crowd of angry and belligerent men.

The postal delivery was well nigh paralyzed by the extra number of trips occasioned, and the unusual time expended in walking all the distance. All the carriers did extra hours' duty.

The mules, in fact, were the only ones in New Orleans that really enjoyed the strike. The forage wagons were not stopped, and the swan-necked quadrupeds had nothing to do but eat for the greater portion of the time.

After the riot at the corner of Johnson street and Tulane avenue, a number of drivers were arrested for inciting a riot, and all fined, bound to keep the peace, or remanded for trial. The summary vengeance dealt out rather dampened the ardor of the others, who thirsted for vengeance, and the prompt action of the police in a few cases averted several conflicts that promised serious disturbance.

The non-union drivers were, in several instances, assaulted with bricks, clubs and other tokens of esteem, from the Brotherhood men.

Several serious mistakes, in the matter of sympathetic resolution, were afterwards atoned for in sack cloth and ashes, as the strikers became riotous and prevented the sympathizers from riding to and from their place of business. Many of the resolutions had political significance, and some were from other labor organizations. Finally, on May 27, a committee of the street railway presidents and the strikers, with Mayor Fitzpatrick as umpire, came to an agreement, and the strike was declared off, and terms made, to be binding until April, 1893. By these terms, the non-union men, already employed before May 18, will remain with the company, but new men must come from the union ranks.

CLEVELAND.

Cleveland had a quiet strike of 5 hours duration, with an amicable settlement by arbitration.

YOUNGSTOWN.

The striking employes at Youngstown, Ohio, took a day off to confer with President Parmelee, in regard to wages. A settlement was peacefully made, and work resumed. No riots or violence attended the affair, and the employes were granted their requests.

THE CASE OF THE HORSE.

THE Detroit Journal in discussing the scare head articles on the killing of horses by broken trolley wires, speaks as follows: "Even granting that the trolley has been the occasion of the death of several horses, as a matter of fact, the 'deadly trolley' has not killed as many horses in the whole United States since the introduction of the trolley as the horse car companies have killed from over-work in one month. So that the 'deadly trolley' is not as deadly to horses as the horse car, and is far more cleanly. A very good portion of the filth in the principal streets of any city will be prevented by the substitution of electric for animal traction."

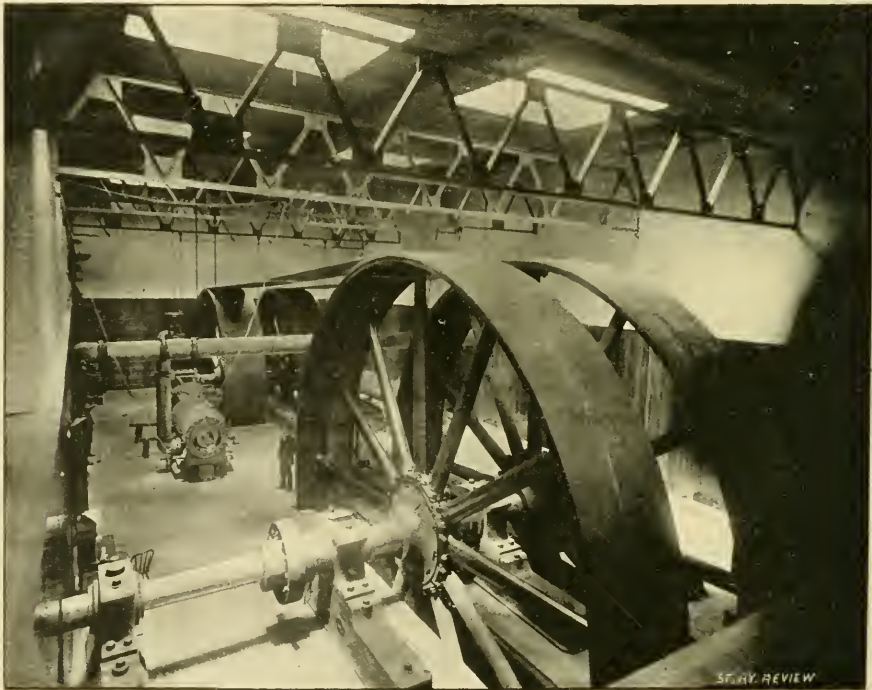
CHICAGO'S NEW POWER.

The Twentieth Street Station of the Chicago City Railway—Ten Thousand Horse-Power—
The Man at the Wheel.

THE little, old bobtail car, which first navigated State street in this city, would create a smile, if set beside the magnificent cars which now operate, in trains of three or four cars, at intervals of one minute, along this same thoroughfare; and the solitary horse which furnished the motive power in 1859, would not even constitute the historic drop in the bucket, when considered as a part of the mammoth power plant which is situated at 2020 State street.

and massive machinery, and, for many months, guides were necessary to conduct strangers through the building, taking them in parties of twenty-five each.

The power then required was less than 200 horse-power, one 250-horse-power engine doing easily all the work. But four of these engines were installed, as no one imagined the business would increase to require more for years to come. But it was only a short time when the traffic so largely increased that more cars were added, and soon two engines were put at work,



NEW ENGINE ROOM CHICAGO CITY RAILWAY.

The growth, both in mileage, number of cars, and passengers carried since 1859, is at once remarkable, and illustrates, as can be shown in no other manner, the wonderful growth of Chicago. From a mile and a half in 1859, the City Railway has extended and branched and put in cross lines until its tracks aggregate 160 miles, to which will be added fifteen miles of new roads the present summer. Of these lines, 35 miles are cable and 20 miles of the cable lines are driven from the original power station at 2020 State street. When this power house was put in operation, in 1881, it was the largest of its kind in the world, and was the first to be constructed east of San Francisco. Hundreds of thousands of visitors thronged to witness the movement of the novel

leaving two in reserve. Later, two of 500 horse-power were installed, and again the first two pair were removed and replaced by two of 500 horse-power each, but even this has become insufficient, and a few days ago steam was let into another pair of twins, whose nominal power is 1,000 horse-power each, thus making the rated power of the plant 4,000 horse-power, but which, under the high pressure carried by the boilers, will easily yield 6,000 horse-power.

Even in the past the limits of reserve power have been reached and with the great influx of floating population, that has already begun to attend the Columbian Exposition, the gigantic machinery must be increased. The greatest strain rested upon the power station situated at

Fifty-fifth street and Cottage Grove avenue. At this station the Wheelock engines were removed to give place to engines of the same make and design but of greater capacity. These engines were then set up again at the Twentieth street power house, under the skill of Robert Poole & Son, Baltimore.

We are enabled to present to our readers this month an engraving of the new engine room which is about 100 feet east and west by 60 feet north and south. Our engraving gives an east and west view. The room is sky-lighted, and at the east end has a gallery for visitors and opens into the engineer's office.

Twenty-four feet of concrete was laid as a foundation for these great machines and the engines run almost noiselessly despite their heavy load.

The Wheelock engines mentioned, two in number, have a rated capacity of 2,500 horse-power. The cylinders are 36 x 72 inches. The main journals to the engines are 18 x 30 inches. The journals in the center of the crank shaft between the band wheels are 18 x 36 inches with water bottom, in order that the water may flow in and out of the bearing without coming in contact with the shaft. The distance between the center of the crank shaft and the center of the line shaft is 50 feet. The crank shaft itself is 18 inches in diameter. The band wheels are 25 feet in diameter with 62-inch faces and are made in ten sections for the rim and ten separate arms, securely bolted to wheel center on the shaft and the rim securely bolted to the outer end of same. Each wheel weighs 28 tons. Another pair of band wheels are connected to the before mentioned wheels by means of a 61-inch Underwood belt, made by the Underwood Belting Company, Tolland, Conn. These latter band wheels are 32 feet in diameter with 62-inch face, and weigh 38 tons. Each wheel is made in twelve sections for the rim and twelve separate arms securely bolted to the wheel center on the shaft, and the rim securely bolted to the outer end of the same. The line shaft is connected to the original plant by a special sleeve and clutch.

All bearings and line shafts for the new plant are 18 by 36 inches, water bottom, and eight feet from center to center. All the shafting is made of hammered steel and the whole plant is carried on extra heavy wall plates.

As another convenience, the engineer can go down into the band wheel pits and examine the bottom ends of all anchor bolts, which is an important consideration.

The 24-foot fly wheel, of 45 tons weight on the north pair of engines in the old plant will be removed and replaced by one of 70 tons, of 14 feet, 6 inches diameter, in order to allow the line shaft to pass through and make connections with the cable winding machinery.

The main steam piping to the engines is 14 inches in diameter, with twelve inch branches to each engine, and each pipe is provided with stop valves.

To the west of the engine room is the boiler room, where, in connection with the plant, there have been installed four 72-inch by 18-foot Otis steel tubular boilers, with 66, 4-inch flues each. These boilers were made by John Mohr & Son, of Chicago. Each boiler has a steam

drum 30 inches in diameter and 8 feet long, connected to the boiler by two nozzles each 12 inches in diameter and 12 inches high. Each boiler has also a mud drum 16 inches in diameter and 7 feet long, connected to the bottom of the shell by a nozzle nine inches in diameter and 18 inches high. As mentioned, the boilers are of Otis steel, 55,000 pounds tensile strength and are capable of carrying a working steam pressure of 114 pounds per square inch. Each boiler is nominally rated at 150-horse-power.

The furnaces are provided with a Murphy mechanical stoker and the best results are reported of its use.

A coal storage over the top of the boiler is a considerable convenience. This tank will hold 120 tons and is equipped with automatic conveyors to the furnace. There is also room for 50 tons on the floor in case of an emergency.

In the boiler room are two 1000 horse power Baragwanath feed water heaters, fitted with brass tubes. The exhaust piping is provided with valves so that either or both heaters can be operated or thrown out entirely by means of a by-pass.

The main exhaust pipe is 24 inches in diameter, with 16-inch branches from each cylinder to a 24-inch pipe. There are also 16-inch branches from each heater.

The steam piping for the boilers has 8-inch branches from each boiler with stop-valves, connecting with a 12-inch head. All the steam piping in the plant has been carefully designed with allowance for contraction and expansion. All flanges in the piping are extra heavy and faced off after being screwed to the pipe.

Among the minor conveniences of the plant are found two No. 12 Shaffer & Budenberg exhaust steam injectors and a duplex 10-7-10 Worthington pump, delivering 14,800 gallons per hour.

The smokestack for the new boiler equipment is 150 feet high with a 6-foot 6-inch flue, and lined with fire brick for 85 feet of this distance. With this magnificent plant it will, no doubt, be of interest to all to know something of the ruling genius of the place, and we take pleasure in telling something of the life of the chief engineer

ROBERT HILL.

Robert Hill, chief engineer of the Chicago City Railway Company, was born in the little town of Woodstock, Canada, in the year of 1852. His early education was obtained in the public school of his native town. At an early age he was placed by his father in a machine shop to learn the trade and with instructions very forcibly given, that he was not to think that because the shop was small that there was nothing to learn outside of the limited work performed there.

By close attention to his work and by hard study, he had so mastered the machinist's trade that at the age of 29 he found that it would be to his interests to associate himself with more experienced machinists, and in a field that gave him a larger scope for his ambition.

In 1879 Mr. Hill, on leaving his birth-place, came to Chicago and accepted the first position open to him in his line, which was as stationary engineer in a mill.

After about two years residence in the city he accepted a position at the car barns of the Chicago City Railway Company on Archer Avenue. In a short time he was transferred to the engine room at Twentieth and State streets.

His first position in the big engine room was that of a "wiper," but it did not take long for the chief engineer to see the traits of character and knowledge of mechanics that have since made him one of the leading mechanical engineers of the country.

From "wiper" Mr. Hill became assistant engineer and upon the retirement of Mr. Goulding, the chief engineer, in 1885, the subject of our sketch was promoted to that position which he holds very creditably at this writing.

When, in 1889, the question of greater power was agitated by the directors of the Chicago City Company, many were in favor of rebuilding the plants entirely. Mr.



ROBERT HILL.

Hill's opinion differed, and after showing plans and specifications, his ideas were adopted. With the co-operation of Poole & Hunt everything was placed in their hands. These plans were followed out, and to-day we see the result.

Every person that rides on the "South Side cars" knows what the effect was, and without the delay of an hour, the great system was changed from 1,000 horse-power to 10,000 horse-power. Mr. Hill shows in his advancement that the man that stokes his fire or wipes his engine well, is the man that pays strict attention to his business and is the one that is on the lookout for opportunities for advancement. Though he began at the bottom of the ladder, with the same chances of

thousands of others, he reached the top because he did his duty as he found it, and in a way that showed his ability to his superiors.

To the young engineer the life of Robert Hill is a whole catechism of how to get on in the world, and the lesson of his life will no doubt fall into good ground in the lives of many young men.

MEMPHIS MERRIMENT.

A GREAT mid-May festival was held, last month, in this charming city, to celebrate the triple event of the completion of the Memphis railroad bridge, the deepwater convention, and the formal opening of the new electric road.

In honor of the event the Citizens' Street Railway Company sent out sixty motor cars, and thirty trailers, all of which were handsomely decorated with flags and bunting, in national colors. The "Green line," completed the night before, was open, and brought many people to the celebration, which was perhaps the biggest Memphis ever held.

Not only were the cars decorated, but the Main street office and the power house. The decorations there were more elaborate. Flags and bunting draped the outer doorway leading into the office. Here Capt. William Phoenix's chair was covered with the bright tri-colors, and was gracefully draped over his desk. The switchboard was glowing in the same bright colors. Standing tent-fashion over the gateway to the engines were two trolley poles covered with the flag colors and suspended from the chandelier were the initials W. P., and just below them C. S. R. R. It was a pretty design, and a pretty compliment paid Capt. Phoenix, superintendent and mechanical engineer, by the employes of the power house while he was down town. The beautiful engines were also artistically decorated in flags and streamers. The engine-room floors were scrubbed until they were as clean as the old-time kitchen floors.

The throngs carried by every street car line in the city were enormous. As soon as the parade passed Union street, the throng of people from there to Vance street started for the bridge by way of the Madison and Shelby street line. There were fifty-four cars on the line, twenty-seven motors and as many trailers. The time occupied for the round trip was sixty-seven minutes. Estimating that 150 people rode on every one of these trains, there were over 30,000 people conveyed there by this line. To handle this throng of tired and impatient people took generalship, but General Manager Semmes, and his force of able assistants, were equal to the emergency. To encourage the conductors to carry all the people their cars would hold, a prize was offered to the conductor who carried the largest number, and a second prize for the second largest number. The motormen and conductors worked hard to accommodate the public. They carried both dinner and supper with them on the cars, and did not leave them from the time they went on duty in the morning until they left them at night.

A PACIFIC PARADISE.

IN the year 1776, while France and America were boiling with the discovery of a new era of thought, political and theological, and while England was having her royal hands full, in an effort to prove that she was mistress of the seas, a hardy sailor-man, named John Cook, was beating about the great Pacific water-ways, seeking what he might discover for the glory of Britannia and the honor of J. Cook.

The low-lying isles of the Pacific, which, for many years eluded the most careful search of the Spanish galleons, came under the spy-glass of the great circumnavigator, and his greatest discovery was the Sandwich Islands, lying between north latitude $19^{\circ} 22'$ and west longitude $155-161^{\circ}$. The Malay inhabitants, with unpleasant anthropophagous tendencies, incontinently slew Mr. Cook, on his second visit, and no doubt, devoured him.

Since then, the greater number of the original inhabitants have been either improved out of existence or brought in civilization through the efforts of missionaries and Martini rifles, until in 1840, the 13 islands, the principal of which are Hawaii, Oahu, Maui, Molokai, Lanai, Nihau, Kahoolani, and Atuai,

were united politically into a native constitutional monarchy, under the protection of England, Germany and the United States.

Topographically, the islands are most picturesquely beautiful, rising, as they do, volcanically from the bosom of the ocean of great peace, and diversifying between ex-coriated, lava-incrusted mountains and lovely verdure-filled valleys, teeming with all the tropic life of the latitude. The two great volcanos, still smoldering, mountains Loa and Koa, have been already the subject of description and illustration, and are familiar to all, while the stranger can gain but little from any description of the magnificent scenery.

A day in Hawaii, begins early with the first rising of the sun from the great ocean, until in the evening the sun sinks, without any warning dusk, into the bosom of the sea, whence it came.

During the rainy season it may pour for seven days, but dust will be flying on the eighth, so rapidly does the moisture sink into the porous coralline soil. Occasionally

furious showers sweep across the islands, drenching everything and everyone on one side of the street, without a moment's warning, and leave the other side of the thoroughfare laughing at their discomfort and basking in the radiant tropic sunlight. There is nothing so brilliant, so inexpressibly bright, as the Pacific sunlight. The nights, with the almost electric moonlight silvering and witching the tropic landscape, is indescribably affecting. In the absence of moonlight, Honolulu calls into requisition myriad electric lights. The mauka, or mountain wind, is invigorating and conducive to health, but there is a southerly breeze, known among the natives as a "sick wind," while the trade winds blow: the air is usually invigorating for nine or ten months in the year, beginning in April.

St. Patrick is remembered in Ireland for his snake-exterminating piety but not even the name is recorded of the Hawaiian deity who rid these lovely isles not only of snakes but of every other vertebrate. The pigs introduced by the European resident were the largest animals seen by the natives for many years. Only a few varieties of birds are to be found on the islands but articulates and insects by the million make



KING STREET CAR IN FRONT OF GOVERNMENT BUILDING.

up for the paucity of other living things. The flora of the islands is magnificent and varied. The cultivated plants growing without cultivation and towering palms, spreading banyans, bread fruit, algaroba, oleander, tamarind, monkey-pod, alligator pear, traveler's tree and the hibiscus grow and flourish in profusion. Sugar cane, with its concomitant industries, is grown easily and the manufactured product is the principal export of the islands.

Land here for the small farmer, as well as for the large planter, is cheap. The Oahu Railway and Land Company controls 70,000 acres under fee simple, title and lease, hold, varying from 20 to 50 years, besides 10,000 acres of sugar land, sub-leased to two corporations recently formed, each with a capital of \$500,000. Through the development of water supply several thousand acres more of this fertile land will be brought into cultivation. This company owns also 10,000 head of beef-cattle and 300 head of horses. All this property, it is intended by the company, to sub-let to small holders.

The principal exports of the islands, besides the well-known sugar trade, are rice, hides, bananas, wool, goatskins, betel leaves and coffee, although the entire group is rich in possibilities of all kinds. The kingdom exported 12,073,361 pounds of sugar of a domestic value of \$344,231.61 during the last quarter of the year 1891. The value of exports may be largely increased, as capital and men go into Hawaii and the sister isles for trade and manufacture.

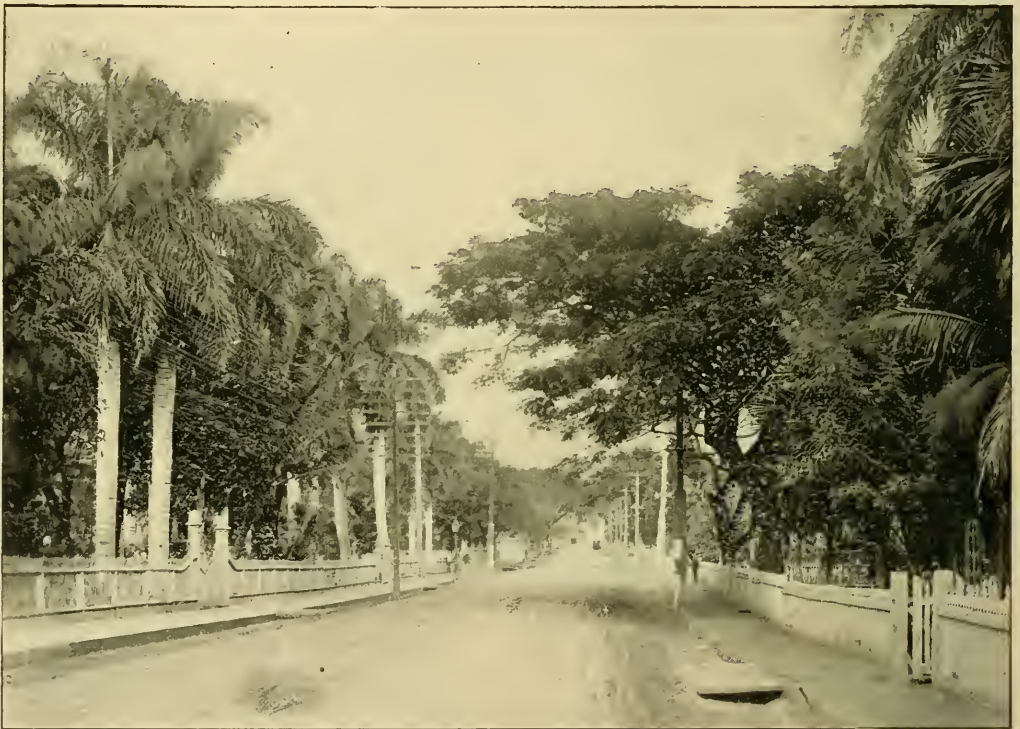
SOCIAL LIFE.

The islands have for many years been the resort of every class of invalid, to whom a warm, even climate and dry sea atmosphere are beneficial. This in itself is a

These unpretentious dwellings, usually of one story of wood or stone, over which the blooming passion-vine or bougainvillia cluster, are supplied with verandas on every side. The vines are usually brought over the lava driveways upon trellises and every point shows beauty and bespeaks comfort.

The wide main piazza or lanai, where wicker sofas, lounging chairs and hammocks rest the physical man, is the rendezvous of the household. On tables, the latest magazines may be found, to pass the time and keep the islander in touch with the world.

When the mosquito, the only blood-thirsty animal on the islands, begins his probing process and the attacks must be escaped, the wary Hawaiian resorts to a wire



NUUANU AVENUE.

matter of no little importance to the inhabitants and of great benefit commercially. The ocean steamers, which constantly ply the Pacific water waste, bring thither patients suffering with all kinds of pulmonary and nervous disorders, to be recuperated under the bland influences of climate, people and food.

Taking Honolulu as a representative of the best that is afforded there, the stranger finds himself among a most hospitable people and whether introduced or depending upon individual merit is brought into a society that can not be improved upon anywhere on earth.

Along the wide avenues shaded by magnificent palms are found the homes of Honolulu, embowered in vines of dark tropical greenness and surrounded by wide lawns of Bermuda grass.

net cage. From this retreat, double doors lead into the house. These portals are open night and day for visitors, and open safely too, for burglars, beggars, peddlers and junk-men are absolutely unknown.

The floors, from cellar to garret, are uniformly covered with white Chinese matting, which is rendered necessary on account of the heat and insect ravages.

The home dress of the foreign, i. e., white women consists of a muslin holoku or "mother-hubbard" gown while the street costume is of white lawn, pongee or India silk. One of their comfortable customs is to slip into the ever-ready carriage in morning dress, slippers and shade hat and shop from the curb.

Society in Hawaii is divided into two cliques, known as the "Government crowd" and the "Missionary set."

The Government faction consists of Hawaiians, half-whites and English and the Missionaries of Americans and descendants of the early missionaries.

Social life at the islands almost seems to be the chief end of existence, so regularly is the attendance on five or seven o'clock teas, dances, "Luau's" or "poi" suppers, lunch parties, pic-nics, base ball matches, drives to places of scenic and historical interest, lawn tennis, musicales and lectures, amateur theatricals, bathing parties, and last but not least, the general conclave and celebration that accompanies the arrival of the steamers to the islands, bearing their loads of tourists from all eastern climes and the luxuries and necessities of life not produced even on these prolific isles.

The public buildings are deserving of attention in their really luxurious appointments. The Royal or Iolani Palace is an imposing three storied building of concrete, a favorite material in the dry climate, containing 40 rooms

feather cloak, which has covered generations of dusky monarchs, the crown and scepter, coat-of-arms and other insignia of the royalty that habitates the structure.

The reception-room and banquet hall occupies the opposite wing, while in the upper story are the sleeping apartments, the library and the music room.

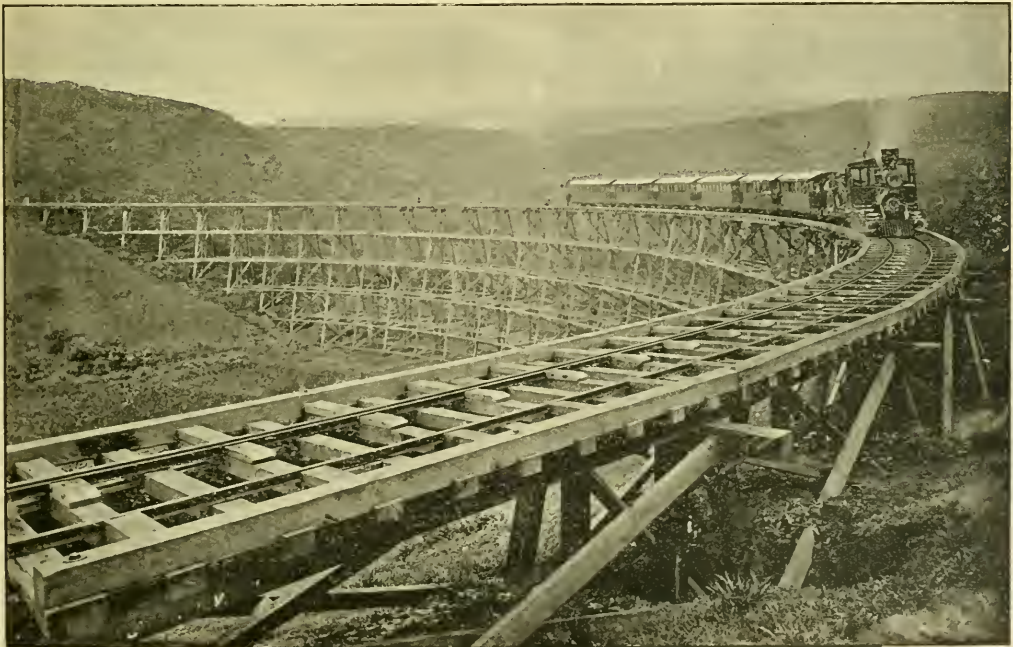
The professional decorator has had full swing, and every appointment rivals those of some of our American princes, besides the royal presents added by brother and sister kings and queens in Europe and Asia.

The court consists of the following named titles and persons:

Her Majesty Queen Liliuokalani, Her Majesty Queen Dowager Kapiolani, Her Royal Highness Princess Victoria-Kawekiu-Kaiulani-Lunalilo-Kalaninuihahilapalapapa, heir apparent, The Hon. Archibald Scott Cleghorn, father of the heir apparent, H. R. H. Virginia K. Pomaikelani, H. H. Prince David Kawanakoa, H. H.



STEAM RAILROAD STATION, HONOLULU, S. I.



TRESTLE, TRAIN, PASSENGERS AND FREIGHT, MAHUKONA R. R., S. I.

and surrounded by a park of several acres. On the interior, to the right of the main entrance, is the throne room, an immense apartment, hung with draperies of deep crimson and in which are the dais, the famous yellow

Prince Jonah K. Kalaniana'ole, H. M.'s Chamberlain, Major James W. Robertson.

Queen Liliuokalani is an intelligent, cultivated Hawaiian woman in middle life, endeavoring to perform

creditably the duties of her difficult position. She is now in mourning for the late Prince consort, although very active in all charitable and social enterprises. The Dowager Queen is the widow of the late King Kalakaua, and her quiet, retired disposition is much admired by the natives. The heir apparent is a sweet, half-white girl of 16, now being educated on the continent.

From time immemorable it has been the custom of the reigning queen to give monthly, out-door receptions or garden parties to residents and tourists. These very enjoyable occasions are participated in by all the royal retinue, dressed in gorgeous satin holokus, the native militia, and the Royal Hawaiian band.

Behind the palace (as may be seen in our engraving) is the "Bungalow," a low, latticed structure, containing the private apartments of the monarch. Near this is a castellated building called the barracks, which harbors household troops, gun carriages, cannon ball, and other means

Here are the offices of the ministers and justices, treasury department, law library, and the national museum. In the latter may be found a most interesting and unique collection of spears, war-clubs, war-drums, necklaces of human teeth, feather plumes or "kahilis," "tapas," and a

great helmet made of red and yellow feathers. Each has its history attached, and here we find an anomaly in the history of the world—a people looking back upon the barbaric methods and utensils of their fathers, for not until 1824 did Hawaii break its idols and don garments, approaching the amenities of civilized life.

In the grandly proportioned court room the ceremonies attending the legislative gatherings are held. This affair is a bewildering assembly of the notables of the land, clothed

according to race and taste, and the tout ensemble is a kaleidoscope of feather cloaks, stars, badges, swallow-tailed coats, ministerial vestments, gold lace, brass buttons, startling uniforms, judicial wigs and gowns, clank-



CAR BARN—HAWAIIAN TRAMWAY, HONOLULU, S. I.



BIRD'S EYE VIEW OF ROYAL PALACE, BARRACKS, BAND STAND AND BUNGALOW, S. I.

of defense in case of insurrection or attack, and the gilded chariot of state, a resplendent affair used on special occasions.

Immediately across the road is the government building, which may be seen (front view) in our engraving.

ing swords and scabbards, decollete dresses, gold lace, flaunting bunting and inspiring triumphal music.

THE CITY OF HONOLULU.

On the coast of Hawaii is the metropolis of the islands, and it is not only a representative colony of the commercial

and social life, that the exigencies of the times and place have occasioned, but is the representative, also, of half-a-dozen other nations of the earth that have gathered in the beautiful city of the sea, drawn thither by lucre, light, or the pursuit of health.

Such a cosmopolitan group as it is, too, with natives, Englishmen, Japanese, Chinese, Americans, Portuguese, negroes and nondescripts, all trading, working and recreating under the tropics together.

The population of Honolulu is 23,000, and with this number of cosmopolites come all the ordinary, and some of the extraordinary conveniences of civilized life. For instance, protection against fire is assured by a fine fire-department, with a chemical engine, assisted by two water torrents; an electric light plant supplies private and public places with the most modern illumination, and a system of

chairs and lawyers, living in their own snug residences, surrounded by all the comforts of life, and keeping their own carriages.

Numbers of coolies, or Chinese laborers are employed in the plantations, and the alarmists, of which even this favored land is possessed, prophesy a Chinese invasion, but this incident is, perhaps, as far removed as any other calamity.

Besides the nations mentioned as the principal inhabitants of the islands, the surrounding islands contribute to the general wealth of variety by sending delegations of immigrants from the New Hebrides, the Gilbert Islands, Australia, Samoa and Micronesia.

Personally, the natives Hawaii are usually large and finely formed, inclined to stoutness, which is considered a beauty, with bronze-brown skin and black straight hair.



SCENE ON MAIN STREET, HONOLULU, S. I.

street railways, which we shall hereinafter describe, gives ready, if not very rapid transit to the various points of interests.

Natives are employed as guardians of the peace, but their duties are not even so onerous as that of our own Mulligans and O'Shaughnessies. Perhaps, because of the quieting effects of a warm climate. The natives also hold government positions of trust, although the higher business of international welfare is conducted by the shrewd Yankee and canny Scot.

The Chinese gather in their own quarters, clanning, as is their wont, and so densely populated is Chinatown that one can well imagine that the place must be Dupont or Sacramento street in San Francisco.

It may be noticed that here the Chinese are, often in great esteem, and some of them are respected mer-

The males wear workingmen's dress, adding by way of ornament gaily colored bandana handkerchiefs and wreaths of flowers; while the women in calico *holokus* and *leis* of peacock feathers, shell, beans or fragrant maile vines.

This love of flower decoration is one of the most distinctively Hawaiian customs, and pervades all ranks, ages and conditions of the native population.

The list of secret societies of Honolulu records lively branches of Masons, Odd Fellows, Knights of Pythias, Foresters, Legion of Honor, and even a Grand Army Post, to whose various halls, temples and camp fires the visiting brethren are made welcome. Almost at every turn some familiar badge meets the eye and some familiar grip shows the bond of secret sympathy, which knows no clime or condition.

The various religious denominations are well represented by almost every faith from Joseph Smith to the great Joss.

The Central Union Church is a Congregational institution of healthy growth and numbering large numbers of natives among the communicants. Notre Dame du Paix Cathedral is the Roman Catholic place of worship, while the Episcopalians gather at St. Andrew's Cathedral, and the Christian Chinese place of worship holds regular services. The native churches are two in number, both Congregational. Besides these, "heathen Chinese," the Japanese, the Latter Day Saints, and hosts of other beliefs gather in this and other isles.

Advertiser, issued every morning (except Sundays). The Daily Bulletin, issued every evening (except Sunday). Daniel Logan, editor and manager. The Hawaiian Gazette, weekly, issued on Tuesdays, H. M. Whitney, manager. The Friend, issued on the first of each month, Rev. S. E. Bishop, editor. The Planters' Monthly, issued on the 15th of each month, H. M. Whitney, editor. The Anglican Church Chronicle, issued the first Saturday of every month, Rev. A. Mackintosh, editor. The Paradise of the Pacific, issued the middle of every month, Frank Godfrey, editor. The Hawaiian Almanac and Annual, T. G. Thrum, publisher. The Kuokoa, (native), issued every Saturday morning. Ka Elele, (native), issued every



WAIKIKI ROAD, HONOLULU, S. I.

Education in Hawaii is at a high pitch of excellence. The islands have 178 schools, superintended by 368 teachers, 195 male, 173 female; and have a certified attendance of over 10,000 pupils; of these, over 9,000 are between 6 and 15 years of age; and of a total of 30,161 native male and female, over 6 years of age, 79.80 per cent. are able to read and write.

Higher education is supplied by Oahu College and Punahan Preparatory School.

These schools give a very fair working education, and among the wealthier classes of citizens the homes are supplied with American, English, and French teachers.

The newspaper and the publisher are fixed and flourishing institutions in Hawaii. The Daily Pacific Commercial

Saturday. Ka Leo, (Hawaiian), daily, Jno. E. Bush, editor and proprietor. Aurora Hawaiiano, (Portuguese), issued weekly. O Luso Hawaiiano, (Portuguese), issued weekly. The Hawaiian-Chinese News, issued weekly. With this array and 80 per cent. of the population able to read, every inhabitant of the islands ought to be well informed.

Hotels are numerous and the accommodations good. The principal ones are: The Hawaiian Hotel, situated on Hotel street near the Palace grounds, T. E. McTighe, manager; the Eagle House is on Nuuanu avenue, Mr. Krouse, proprietor; the Hamilton House, on King street, near Fort, Hamilton Johnson, manager, and Waikiki Villa, is a suburban resort, Hamilton Johnson, manager.

The other appointments of the city are not much variant from those of a city of the same size in California or Australia.

Steam railroads are in active and paying service on the islands of Oahu, Maui and Hawaii. The efficiency of the passenger service of the Oahu Railroad Company, at Honolulu, cannot be surpassed. We present an engraving of the Oahu road as it appears bridging the chasms that present themselves before the engineer.

The street railway system of Honolulu is perhaps one of the most interesting in the world and for this reason we have gone to some lengths to prepare the way for an understanding of the peculiarities that lead to it.

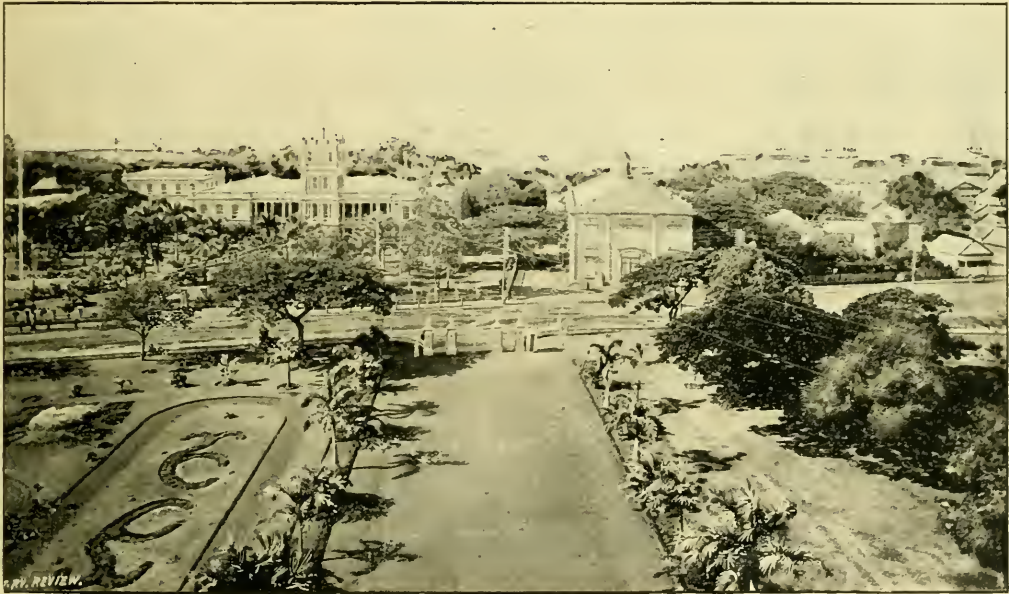
THE HAWAIIAN TRAMWAYS COMPANY, LIMITED, was organized in 1889, in London, England, by English capital.

THE ROLLING STOCK

consists of 24 cars of two seating capacities, the larger accommodating 28 passengers, and the smaller 20, with a few "bobtails," seating 18. All cars are practically open, having no requirement for protection from the elements other than curtains, so equable and mild are all the seasons.

The cars are made by Hammond & Co., of San Francisco.

As the hot sun is rather exacting on human flesh, it is not surprising to learn that the average mileage per horse, per day, is about 14 miles, generally a little less. The small cars are drawn by two horses and some take 12 and some 14 horses per day to work them. The large cars require as high as 16 animals per day, as each is worked but two hours. The horses last 6 years.



GOVERNMENT BUILDING, OPERA HOUSE AND PALACE YARD, FROM THE ROYAL PALACE.

The nominal capital of the road is £130,000, or roughly \$650,000, of which there have been issued 11,793 £5 shares or an amount of £58,965 and £30,000, or, \$150,000 in debenture bonds.

The directors of the company are: Col. C. M. Davidson, chairman, H. R. Armstrong, R. H. Fowler, Col. C. E. McDonald, secretary and R. D. Fell. The home office is, of course, London, with the management in Honolulu, under W. H. Pain, to whom we are indebted for many favors, and who has made the Hawaiian tramways a profitable undertaking.

THE TRACKAGE.

In the entire length of the road there are 12 miles of single track of 3 feet 6 inches gauge, and laid with English groove rail, weighing 30 pounds to the yard. The rail was made in Leeds, England.

The cars begin their trips in the beautiful early morning at 5:45 and run up to 11:47 p. m.

The heaviest part of the day is in the afternoon and at 5 o'clock in the evening, when the day and walking are most oppressive. At these hours trippers are put on to relieve the pressure of traffic.

From June to October the traffic is heaviest.

A license of \$10 per car per year is paid to the Hawaiian government, and in turn the company is protected in its rights.

THE CHARTER

of the company runs 30 years, from September 15, 1886, at the expiring of which term the government may purchase or grant a longer lease by arbitration.

Conductors are employed on the King street line, which is 5 miles long, but the remaining lines put up with money

boxes made by Landgrove & Wills, and by Beaman, of Tennessee, the latter being preferred.

The conductors and drivers usually work 10 hours, except under press, when they labor as long as is neces-

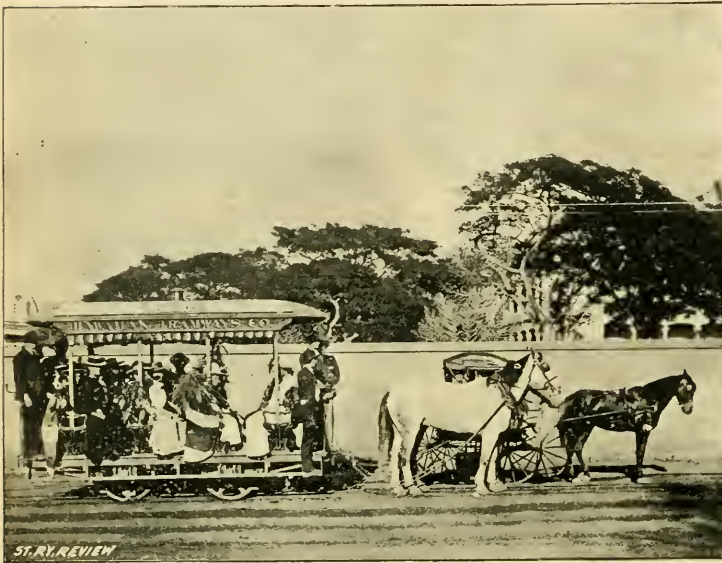
There are two ways of reaching these islands in the Pacific. The first, and possibly the most comfortable, by the steamers of the Oceanic Steamship Company, of which John D. Spreckles and brothers are proprietors.

There are five large and commodious steamers on the route, and the interisland steamers give grand opportunities for sight-seeing all through this volcanic beautiful and salubrious Pacific paradise.

With another poetic mind, the stranger may say:

The sights and scenes of this lotus-eating land, with its grand volcanic scenery, its wealth of tropical vegetation, its political pomp and commercial enterprise, its happy homes and loyal hearts, its summer air, its music and gorgeous sunsets, dwell ever in the memory; and no stranger leaves its hospitable shores without a lingering backward glance and a regretful Aloha Oe to Hawaii Nei.

One more word we have, and we are done. There is constant and growing necessity of our great government for power on the sea. Our export trade is growing, our manufactures are coming into greater demand. Especially in the far east our machinery and mechanical devices are finding an increasing market, and the orient will at no long distant time in the future demand our superior equipments for use in their great empires. To do this creditably, coal-
ing stations for the transpacific steamers and protection



AN AFTERNOON LOAD, HAWAIIAN TRAMWAYS, HONOLULU, S. I.

sary. Their wages are 20 cents per hour, straight, so that if 8 hours are made \$1.60 is drawn, and if 12 hours are required \$2.40 is the remuneration.

The cars are run by schedule, at the rate of 5 miles per hour, with an average of 6, and a legal right to 8 miles. The cars stop anywhere for passengers, and the rates of fare are 5, 10 and 15 cents, according to distance. Altogether the line is a model one for all tropical countries, and compares favorably with the ordinary tramway of England, France or Germany.

The islands are fast becoming the most pleasant and popular tropical resorts in the world, and well may it be, for almost every visitor can say, with Mark Twain:

"No alien land in all the world has any deep, strong charm for me but that one; no other land could so longingly and beseechingly haunt me, sleeping and waking, through half a lifetime, as that one has done. Other things change, but it remains the same. For me its balmy airs are always flowing, its summer seas flashing in the sun, the pulsing of its surf beat is in my ear; I can see its garlanded crags, its leaping cascades, its plummy palms, drowsing by the shore, its remote summits floating like islands above the cloud-rack; I can feel the spirit of its woodland solitude; I can hear the plash of its brooks; in my nostrils still lives the breath of flowers that perished twenty years ago."



READY TO START—HAWAIIAN TRAMWAYS, HONOLULU, S. I.

by our growing navy will be in demand. Annexatic is against our national policy, but when the times demand it, may little Columbia be the fortunrate isles of the vast western waterway.

HYGIENE AND VETERINARY.

EDITED BY F. T. MAHON, VETERINARY SURGEON, CHICAGO CITY RAILWAY CO., WORLD'S COLUMBIAN EXHIBITION
AND CHICAGO POLICE AND FIRE DEPARTMENT.

General Treatment of Disease.

AS there are symptoms which may be considered general indications of disease, so there are principles of treatment applicable to the invalid horse independent of those particular remedial measures which will be detailed in our notice of individual cases. Stable accommodation is the greatest consideration. There is, it may be safely stated, no case of internal disease in which it is not advisable to give the animal a loose box, well ventilated and supplied with clean straw. The same principle generally applies to lameness and accidents, although it may sometimes be necessary to confine the horse to a stall in order to prevent his touching an irritating wound with his mouth, or endeavoring to move a lame leg to a greater extent than is desirable. These cases are, however, exceptional. A loose box is, as a rule, the proper infirmary stable. In diseases of the air passages a roomy box with the door open is one of the most important points of treatment; and as the purity of the blood depends upon its due oxygenization, it is difficult to conceive any disease in which an extra supply of fresh air may not be beneficial. The impunity with which a horse may be subjected even to exposure is so remarkable that the experiment has been successfully tried, of turning him entirely into the open air, when affected with disease. We will, however, abstain from going quite so far as this, and content ourselves with recommending the most thorough ventilation of the sick horse stall, by which is meant windows and doors open day and night, provided no direct draught is allowed. While obeying this law of supplying the purest possible atmosphere, a due regard to healthy circulation in the superficial parts of the body must be had; for as it is essential that the blood should be purified in the lungs, it is known to be equally necessary that the fluid so revived should circulate with due energy through the system. It cannot be said that this theory agrees with the principle of thorough exposure above mentioned as experimentally tried; but, it may be fairly stated, that practically a rug or two, with a set of flannel bandages, are found to conduce to the vigor of the circulation through the skin and extremities, and consequently may advantageously be advocated as part of the general treatment. The diet of the sick horse is a matter of great importance. The choice of food is not extremely varied, but we will take into consideration some of the changes which may be grateful to the fastidious appetite, or best adapted to the debilitated condition the animal may be in.

Food when introduced into the disordered stomach, acts as an irritant, no matter of how soothing a character it may be deemed. Nature under such circumstances is inadequate to healthy digestion, and consequently aliment is an encumbrance. It is frequently feared that the

animal will die from starvation, that he must sink if no nourishment can be supplied. So he will; but it is not because we can get none into him, but because he can assimilate none. He will die as the consequence of the disease, which prevents the appetite; not because the food is withheld. Much mischief is done by irritating the stomach and the animal generally, with the humane intention of preserving his life. In estimating the value, or otherwise, of the forgoing remarks, let the reader consider what takes place in his own person under the circumstances. He either exercises a wise obstinacy in resisting the kindly meant intentions of his nurse, or his stomach, obedient to nature's dictates, rejects the ill-timed succor. The horse, being unable to vomit, is obliged to retain the substance forced upon him, and it acts, as before said, as an irritant. This doctrine does not apply, of course, to cases where there is inability, but solely where there is disinclination to feed. Nor is it intended to prevent the utmost solicitude in inducing the patient to take nourishment, as the human sufferer sometimes has a craving for the very thing that may be beneficial, so we may by perseverance select the food most grateful to the sick horse; but at the same time must not forget to make allowance for a morbid appetite, which may induce him to take things absolutely prejudicial. A nurse, acting judiciously in this way, frequently does more than the doctor. We do not intend to curtail his efforts,

The principal substances from which we select articles of diet for the sick horse are bran, carrots, oatmeal, linseed, etc.

Bran stands decidedly foremost, as the food most generally in use for the invalid horse; it acts as a laxative; is frequently tempting to the appetite, and is easy of digestion. There is no part of general treatment more universal than offering this substance as a change of food. Is the horse very weary, and his powers of digestion weakened in consequence, we induce him to take a warm bran mash, which comfortably distends the stomach, and satisfies any craving for food, thereby enabling him readily to lie down and rest his enfeebled system, until repose restores its wonted vigor. Does he show slight symptoms of cold or fever, a warm bran mash is a convenient plan of steaming, and consequently soothing the irritable mucous membranes of the air passages; it is a substitute for the more stimulating diet he is accustomed to, and gently promotes the activity of the digestive apparatus: it is also a convenient medium for the exhibition of certain simple remedies, to be mentioned hereafter. Is he incapacitated by lameness, a lower diet than that with which he is indulged when in full work is judicious, and bran is selected. Is it necessary to administer purgative medicine, a bran mash or two renders the bowels more susceptible of its action, and a smaller portion of the drug is therefore required to produce the

desired effect, there being, at the same time, less risk of painful spasms accompanying its operation. Bran mashes may be given hot or cold, cold are perhaps quite as grateful to the horse, but the nibbling of the hot mash in catarrhal affections is particularly beneficial, from the necessary inhalation of the steam arising therefrom.

Of all the roots of which horses are tempted, the carrot, as a rule, is the favorite, and perhaps the most beneficial one. It is said to be somewhat diuretic in its effect, and to exercise a salubrious influence on the skin. Certain it is, when cut and offered frequently by the hand of the groom, a sick horse is coaxed into eating it when disinclined to partake of other nourishment, and the greatest benefit results. For the ailing horse, then, carrots are most valuable as an article of diet, and a few may be given with advantage even to the horse in healthy condition.

Oatmeal is most nutritious, and, as a food for the convalescent horse, is most valuable; the bruising process the grain has undergone breaks the husk, and renders it more easily acted upon by the digestive powers. It is usually given in the form of a gruel, as which it is one of the most essential articles of diet for the infirm. It is also a ready mode of supplying the tired, thirsty horse with nourishment after exertion, when he returns to the stable.

Linseed is decidedly included in the sick diet roll. It is nutritious, and from its oleaginous nature, soothing to the frequently irritable mucus membrane of the alimentary canal, and hence, to be particularly recommended in the treatment of sore throats; nor is its bland effects local only, its more general influence is particularly observable in affections of the kidneys. It may be given either boiled, forming, when cool, a gelatinous mass, mixed in that state with bran, or the liquid after boiling may be offered as a drink.

Grass, hay tea, etc., are also very useful in the treatment of disease, and should be used in connection with the other remedies.

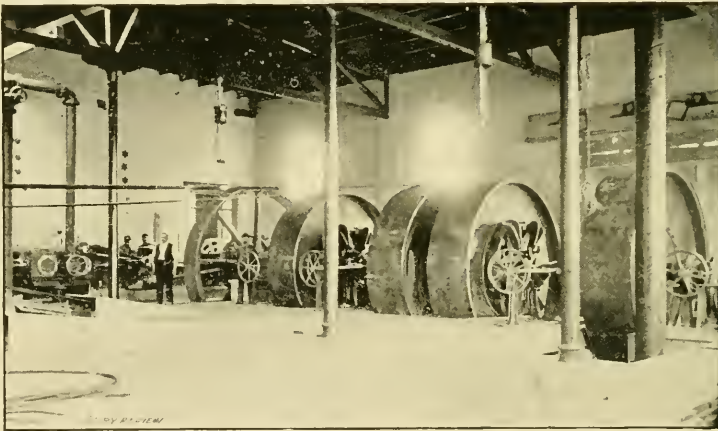
THE Hamburg, Altonaer & Northwestern Tramway Company, Limited, owning the Hamburg, Germany, tramway lines, reports a good and increased business in spite of the adverse circumstances against which they contended during the past year. A resolution was passed winding up the business of the company in favor of the Hamburg-Altonaer Trambahn Gesellschaft, organized under the existing laws of the German empire.

GIANT CLUTCHES AT COLUMBUS.

AT the power plant of the Consolidated road, in Columbus, Ohio, may be seen a very interesting arrangement of monster clutches, which were built and installed by the Falls Rivet & Machine Company, of Cuyahoga Falls, Ohio.

Four friction clutch pulleys, each 12 feet in diameter with a 38-inch face, are carried on a single steel shaft 36 feet, 6 inches long and 9½ inches diameter. The clutches were built to drive 500 horse power, but tests have shown they transmitted over 700 horse power each, onto a single pulley at 120 revolutions, which was as great a surprise to the railway company as it was satisfactory to the builders. The pulleys are made of wood with a steel rim on the outside, which makes them very desirable for large pulleys, being so much lighter than iron.

This line of shafting is driven by two Buckeye engines of 1000 horse power each, connected together by clutches at each end of the line shaft. This arrangement of one engine at one end and another engine at the other end with a clutch from each engine, permits of either engine driving any generator, or when necessity requires, the second engine can be connected to service without reducing the speed of the working engine in order to do so. The building being built before



FALLS RIVET AND MACHINE COMPANY GIANT CLUTCHES.

contract was placed, prevented the addition of a friction cut-off coupling in the center of shaft so that one half of the plant, including shafting and two pulleys as well as one engine, could stand idle, if desired.

The Columbus people are highly pleased with the arrangement and working of the machinery installed, which is one of the largest and best placed in railway service in some time, and no competent engineer questions the value of this transmission.

Our engraving shows the mechanism to very good advantage.

THE ordinary half-yearly report of the Manchester Carriage & Tramways Company shows an increase in the half-year of £3,657, but an increased expenditure of £14,154, making a net decrease of revenue of £10,497. The directors proposed to pay, in addition to the 2½ per cent. to preferred stockholders, a dividend for the six months to the ordinary shareholders, as against 4 per cent. at this time last year, and to carry forward a balance of £660 7s. 3d. to next year.

STREET RAILWAY LAW.

EDITED BY MR. FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Ordinance requiring Street Cars to run all Night.

An ordinance of the Common Council requiring street cars to be run at least one car every twenty minutes both ways, between the hours of twelve, midnight, and six in the morning, is presumptively a reasonable regulation, and the burden is upon the railroad neglecting to comply therewith, to show that it is unreasonable.

This was an action to recover a penalty for an alleged violation by the railroad company of an ordinance of the Common Council of the City of New York, which required the several street surface railroad companies to operate their roads "as frequently as public convenience may require, and not less than one car every twenty minutes between the hours of 12 midnight and 6 o'clock a. m. each and every day, both ways, for the transportation of passengers."

In 1860 the Legislature passed "an Act to authorize the construction of a railroad in Avenue D, East Broadway, and other streets and avenues of the City of New York." In its second section it was provided as follows:

"Section 2. Said railroad shall be constructed on the most approved plan for the construction of city railroads, and shall be run as often as the convenience of passengers may require, and shall be subject to such reasonable rules and regulations in respect thereto as the Common Council of the City of New York may, from time to time, by ordinance prescribe."

There is not here any question of an alteration of a charter or of any impairment of a contract with the State. The defendant took the charter, with all the conditions expressed in it, and by acceptance has agreed that the operation and enjoyment of the privileges and franchises conferred shall be in subordination to such reasonable regulation as the Common Council of the City shall ordain. By accepting the charter the grantees voluntarily consented to be bound by all of its provisions and conditions, and the corporation cannot complain of the enforcement of any, if by a fair reading of the language the enforcement in the particular manner is authorized. The question then simply is whether this ordinance of the Common Council, which was adopted with respect to all the surface roads in the City, was a reasonable regulation with respect to this defendant; for, if it was not, then it is not obligatory within the meaning of the act of incorporation.

The authority of the Common Council in prescribing regulations was qualified as to this defendant, and when it is sought to recover a penalty, it is competent for the defendant to show that it should not apply to it, because unreasonable. As in this case the regulation affects the running of cars at stated intervals of time, its reasonableness, I think, may properly be considered in connection with the other language of the second section of the charter, which requires the corporation to "run as often as the convenience of passengers may require." Not that that language controls or decides the question of reasonableness; but it bears upon and illustrates the design of the Legislature in subjecting the corporation to regulations

upon that subject. In the passage of the ordinance in question, the presumption is in favor of its reasonableness, and the burden was upon the defendant to show the contrary. The presumption is open to rebuttal by this defendant by giving in evidence facts which show that in its case its enforcement would be reasonable, and that the convenience of the public or of passengers did not require such a regulation. It was therefore competent for this defendant, upon the trial, to give evidence of such facts as would establish, or tend to establish, that the convenience of passengers or of the public did not require the running of its cars during the ordinance hours specified. Such facts were relevant to the issue and bore upon the question of the reasonableness of the ordinance in the defendant's case. Undoubtedly, the reasonableness of the ordinance was a question of law for the court to decide, upon a consideration of all the facts and circumstances of the case.

That the evidence offered related to a period of time subsequent to the date when the ordinance went into effect, is not a ground for objection. Nor is the question controlled by considerations of the expense to defendant. It received its franchises and privileges for the public convenience and to be operated as the public interests should require. No provisions or condition of the law of its being, qualified its obligation to use its franchises, by permitting the operation of the railroad to be controlled solely by questions of profits. The objection should be upon the ground that the convenience of passengers does not require it.

For the error committed in excluding evidence offered by the defendant to show that, with respect to the running of its cars over the Avenue D branch, the regulation embodied in the ordinance was not a reasonable one, the judgments below should be reversed and a new trial ordered.

(Ct. App. N. Y. *Mayor v. Dry Dock R. R.* 22 Chi. Leg. News 277.)

Power to extend Tracks—Interference by City—Injunction—Charter Rights—Pennsylvania Constitution.

From the bill, answer and affidavits produced at the hearing of the motion to dissolve the preliminary injunction, it appeared that the Harrisburg City Passenger Company, complainant, was incorporated in 1861 by Act of Assembly, whereby it was empowered to lay out and construct one or more railways, extending to any point within the city, and for such purposes to occupy any of the streets of the city opened or to be opened. By city ordinance of 1867, it was provided that any passenger railway desiring to lay tracks, or change or extend its routes, must first submit plans showing the streets to be occupied, the character of material and the kind of rails to be laid. By ordinance of 1890, complainant was authorized to equip its road for the use of electricity. On May 1, 1891, complainant leased its road to the East Harrisburg

Passenger Railway Company, which latter company equipped the same with electrical appliances, and petitioned councils to pass an ordinance granting it permission to cross a certain bridge, for the purpose of connecting the tracks of the two companies. The ordinance was passed, but, owing to the addition of certain conditions, was not accepted by the East Harrisburg Company. In the meantime complainant had likewise petitioned for a similar ordinance, such petition being accompanied by plans, etc.; but action upon the same was indefinitely postponed by councils, who then adjourned for six weeks. Complainant thereupon proceeded to lay its tracks across the bridge without permission, employing the workmen of the East Harrisburg Company for the purpose. The city attempted to stop the work by force, whereupon the complainant filed its bill for an injunction. The Court continued the injunction, after hearing, filing an opinion showing the facts above cited, and holding that the leasing of complainant's road to another company did not prevent it from making extensions; that the complainant was not subject to the Constitution of 1874, nor the subsequent legislation, providing that the construction of street railways should be subject to consent of local authorities; that councils had no power to indirectly prevent the exercise of complainant's rights by declining to act on its petition; that the city's police regulations must be reasonable, and that complainant could employ whom it pleased to do its work. He directed the entering of a bond of indemnity by complainant, to cover charges entailed upon the city by the railroad's occupation of the bridge.

Per curiam:—This was an appeal from the decree of the court, below continuing a preliminary injunction. The decree is affirmed and the appeal dismissed at the cost of the appellants. (Sup. Ct. Pa. Harrisburg City Pass. Ry. Co. v. Harrisburg, 1 Adv. Rep. (Leg. Intel.) 656.

Electric Railroads—Failure to have Headlights—Collision with Vehicles—Negligence—Driving on Tracks.

In an action against an electric railroad it appeared that plaintiff and her husband, while driving along the track after dark, were struck and injured by a car; that there was no headlight on the car, nor any light either inside or out; and that it was running 15 or 20 miles an hour. Previous to that time the cars had used headlights. The husband testified that when he went upon the track he looked for a car, but did not see any; and that, if the car had had a headlight he could have seen it 1 or 2 miles. The wife testified that she, too, looked for a car when they went upon the track, but that afterwards she did not look particularly, as she thought they would see the headlight. The first warning she had of the car was the sight of the flame on the trolley, and the glitter of the car window. It was then too late to get out of the way. *Held*, that the plaintiff and her husband were not negligent in driving upon the track, and that whether they used ordinary care to prevent the collision was a question for the

jury. It is admissible, in such a case, to show that the public were in the habit of driving on the track, as bearing on the question of defendant's negligence in running a car without a headlight or other light.

Sup. Ct. Mich. *Rascher v. East Detroit & G. R. R. Co.* 20 Wash. Law Rep. 298.

Unlawful Ejection of Passenger—Assault by Company's Servants—Violation of Rule in Boarding Car.

The defendant contends that because the plaintiff boarded the train in a manner forbidden by its rules, its servants were justified in inflicting upon him the injuries of which he complains.

The rule violated did not interdict access to the car, but only access in a specified mode. The plaintiff had paid his fare; he had a right to go by that train; he was in a place appropriated to passengers; and at the time of the assault he was in no way misconducting himself. Although where he had a perfect right to be, the effort to eject him was made merely because of antecedent misconduct in reaching the place, for the privilege of occupying which he had paid his money. His presence on the train being rightful, no matter what the irregularity in getting there, his removal would necessarily have been wrongful. The defendant has no power of retribution, and is incapable of compelling conformity to its rules by the imposition of a penalty.

N. Y. Ct. Com. Pls. *Smith v. Manhattan R. Co.* 7 N. Y. L. Jour. 313.

Electric Railway Crossing Private Bridge—Compensation—Expense of Changing Bridge for Use of Electricity.

The plaintiff, an electric railway company, desired to lay tracks for an electric road across the bridge of the defendant company, which was a private bridge, the owners of which had the right to collect tolls from persons passing over it. *Held*, that the plaintiff, by its charter and the General Passenger Railway Act of 1889, had the right of passage over the bridge subject to the payment of tolls by way of compensation, which is to be determined by the size of the cars, the number of persons to be carried, and their frequency.

The expense of any change in the rails upon the bridge to suit the purposes of an electric road must be borne by the plaintiff.

Pa. Ct. Com. Pls. *Pittsburgh & West End Ry. Co. v. Point Bridge Co.* 22 Pitts. Leg. Jour. 367.

Master and Servant—Appliances—Electric Car—Injury to Conductor.

A street railroad company operating its cars by electricity is not guilty of negligence towards its conductor in not having adopted and provided on its cars a resistance coil for the purpose of making the starting of the car more gradual, at a time when such coils have not become known, approved, and recognized as a useful appliance for that purpose.

Sup. Ct. Minn. *Lorimer v. St. Paul City R. Co.* 51 N. W. Rep. 125.

THE WHEELS OF COMMERCE.

An Interesting Account of the Baltimore Wheel Works—Some Facts, Figures and Fancies of Men of Wheels—The Iron and the Images.

THE weary business man returning to his home at night, the student buried in his thought, or those merry young people laughing in the corner of the car, probably never give a passing thought

to how varied and extensive were the manufacturing arts, nor the immense investment they represent, which are necessary to procure even so common-place and matter-of-fact a thing as a street car.

In this article we will touch on but one feature of car building, and that properly is the wheels, for are they not the foundation on which the car stands?

Although there are a number of manufacturers engaged in the production of high grade street car wheels, and whose products are scattered over the country from ocean to ocean, the subject is too broad to do justice to them all in the limits of a single article, hence, we shall confine our visit this month to the works of but one concern.

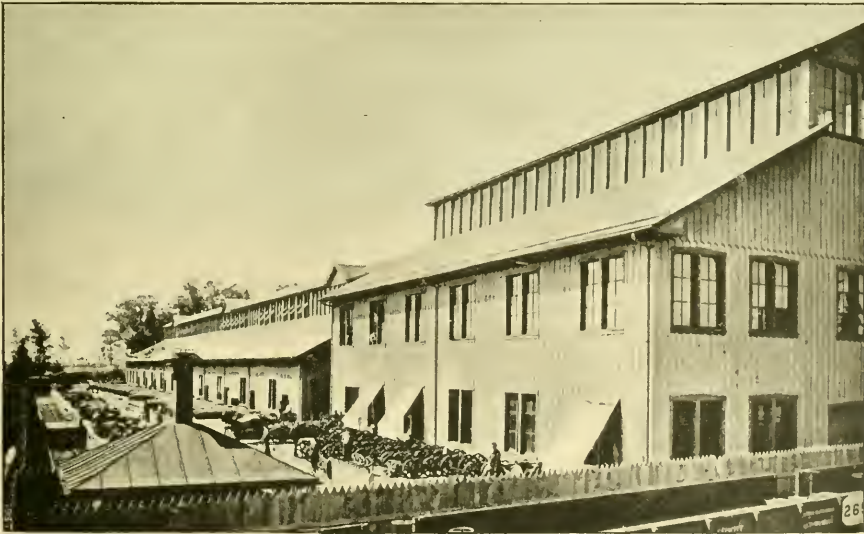
facilities then at hand would be ample for many years, business so increased that it was impossible to obtain sufficient space at that point, and the entire works were removed, in 1882, to Fulton Station, on the outskirts of

the city, where 22 acres were purchased to accommodate the plant. The location was desirable, being prettily situated, and at the junction of the Pennsylvania, Baltimore & Ohio and the Western Maryland Railroad. Switches from each road are laid in the yards. The main building covers 51,000 square feet, in addition to which are the stock houses, blacksmith shops and stables. The melting capacity of the works is 100 tons per day. The ordinary stock of street car wheels carried on hand at the works is from 8,000 to 10,000 wheels.



THE OFFICE—BALTIMORE CAR WHEEL CO.

The buildings extend north and south, and include the foundry, which is 375 by 100 feet. The moulding floor is 320 by 67 feet, and divided into 20 wheel floors, each



SHIPPING YARD—BALTIMORE CAR WHEEL COMPANY.

In 1873 the Baltimore Car Wheel Company was incorporated, and works built at Canton, then the manufacturing center of Baltimore. Although it was believed the

equipped with a crane and fixtures for moulding 20 wheels. The pits have a capacity of 1,200 wheels, and are placed at end of moulding floors and adjacent to the

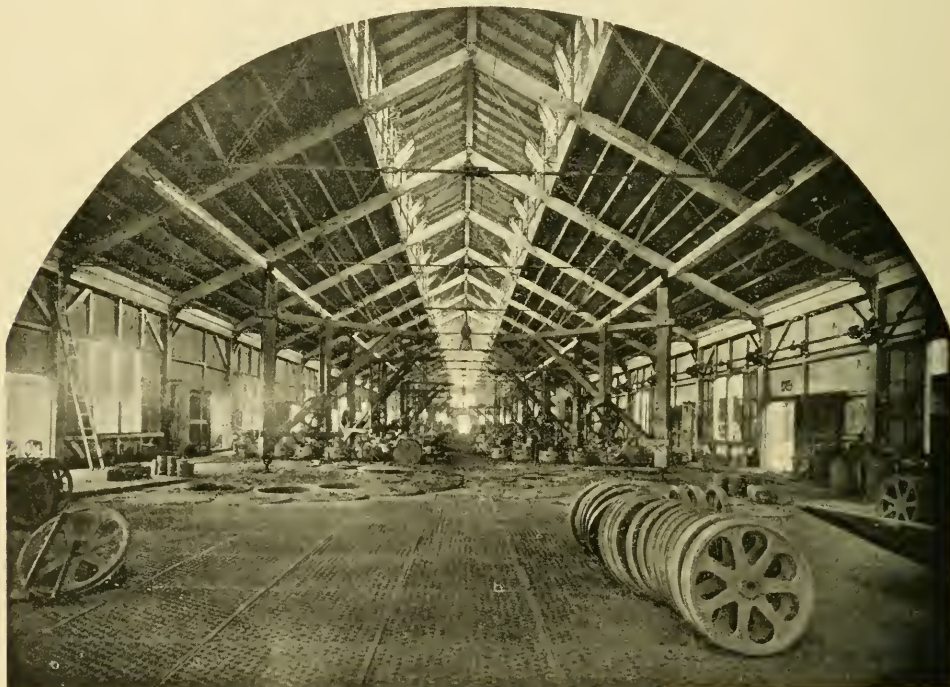
cleaning and inspecting rooms, as are also the stock houses, sand vaults and mixing rooms. The charging houses are 15 feet above the foundry floor, and level with stock yard.

The machine shop is a commodious, well lighted building, 200 by 66 feet in size, and fitted with all necessary tools, including wheel and boring mills, axle lathes, hydraulic presses, enabling all work to be fitted to gauge.

A notable feature of arrangement is that all material is handled by gravity, the stock being on a level with the charging floor, descending in melting, to the wheel floor, and, when finished, to the storage yards, which are on a level with the platform of freight cars.

Each wheel has a number and date cast upon it; a perfect record being kept of each one, good or bad, as to

against the work of the day. In addition, test pieces are taken against chills, sample pieces being of same proportion as the wheels cast. With such close inspection there is necessarily a large per cent. condemned, as all that do not reach a fixed standard are scrapped. Great care must be taken as to selection of metals, melting, pouring and finishing. Wheels are made exclusively from charcoal irons made from the celebrated hematite ores which are found in and around the City of Baltimore. The great ductility and tenacity of this iron, its admirable chilling qualities, its freedom from defects, make it peculiarly suitable for wheels. The first chilled wheels ever made were of Baltimore iron. The high tensile strength of the Baltimore iron is shown from the following tests taken at random:



THE FOUNDRY—BALTIMORE CAR WHEEL CO.

pattern, circumference, tread, flange and weight; as well as name of the moulder. Street railway wheels have assumed so many varieties that there are now over 100 patterns in use. Although there are a number of small factories in the country that make wheels, it is impossible for the lesser brethren to give the inspection, chemical analysis or mechanical tests that the larger manufacturers are able to make.

All wheels are carefully inspected, and when passed as to moulding, strength, etc., are measured as to circumference, all not coming within a fixed size, are condemned as being either too hard or too soft, upon rims where they are chilled. Test pieces are made with each draught of metal from cupola, each of same size, one being poured in sand and the other against a chill on one side. These pieces are tested transversely and recorded

TENSILE STRENGTH OF BALTIMORE IRON IN FIG.

| | |
|--------|-------------------------|
| 28,560 | pounds per square inch. |
| 33,320 | " " " " |
| 26,180 | " " " " |
| 23,086 | " " " " |
| 27,370 | " " " " |
| 33,000 | " " " " |

TENSILE STRENGTH REMELTED BARS MADE FROM BALTIMORE CHARCOAL IRON, SAME AS USED IN WHEEL PLATES.

| | |
|--------|------------------|
| 42,000 | per square inch. |
| 41,600 | " " " " |
| 40,800 | " " " " |

TENSILE STRENGTH AFTER TWO YEARS' SERVICE OF
WHEEL PLATES MADE FROM BALTIMORE
CHARCOAL IRON.

| | |
|--------|-------------------------|
| 23,800 | pounds per square inch. |
| 33,320 | " " " " |
| 53,900 | " " " " |
| 28,560 | " " " " |

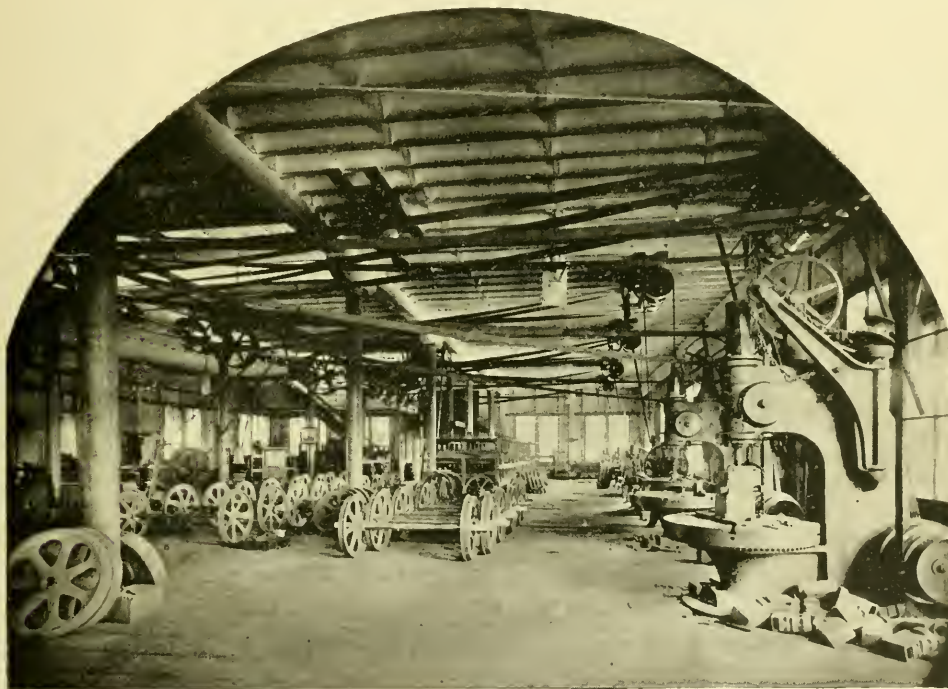
ANALYSIS OF PIECE OF BALTIMORE PIG IRON.

| | | |
|--------------------------|-----------|--------|
| Iron | - - - - - | 95.60 |
| Silica | - - - - - | 1.50 |
| Lime | - - - - - | .30 |
| Sulphur | - - - - - | .15 |
| Oxygen and carbonic acid | - - - - - | 2.45 |
| | | 100.00 |

more importance that the car wheels should be balanced than that they should be perfectly round. Dr. Dudley, with his dynograph, has found that the vertical irregularity of rails in poor condition is from one to one and one-half inches, and of those in good condition it is from one-eighth to one-fourth inches.

The irregularities of track are therefore in most cases very much greater than any that are due to eccentricity or irregularity in the circular form of wheels.

There can be little doubt that unbalanced wheels have much to do with lack of smoothness in motion of cars at high speeds. It seems to be quite as important to test the equilibrium of cast iron wheels as to pair them or measure their circumferences, so as to get wheels of the same diameter on the same axle. This will apply with as



FINISHING SHOP, BALTIMORE CAR WHEEL CO.

Wheels made from this iron are of a superior quality, and are cast with great care, by an improved method, by which moulds can be poured, with metal at a very high temperature and with great rapidity, (a few seconds being required to complete the wheel) and in such manner as to insure almost perfect equilibrium, which is a matter of much importance. If one side of a car wheel contain more metal than another i. e. if the wheel is not "evenly balanced" in all its parts, its motion is irregular, and at each revolution this irregularity in the distribution of the metal is felt in the rough motion of the car, which of course occasions much greater wear and tear on road-bed and rails than would result from a perfectly smooth motion, to say nothing of the car itself and the comfort of the passengers. Experiments have indicated that it is of

much force to steel tired wheels, as it is found that such wheels although perfectly round and true, are in many cases more out of balance than many cast iron wheels.

Cast iron wheels are invariably more or less out of round, yet they may be nearly in equilibrium. Should such wheels be turned to make them round, they may be thrown out of balance, as by removing the metal from outside of rim, besides destroying the very best wearing part of the wheels, it may unbalance the structure and prove a greater evil than eccentricity.

Wheel manufacture requires not only superior facilities, a large investment of capital, but an unremitting vigilance to insure a compliance with the established system and policy of the maker. It is of as great moment to maintain a high standard of product as it is to win a

reputation for good work. A short lived poor wheel means more to the railway manager than the mere loss of three or four hundred pounds of iron, and where an order of wheels for any reason chances to fall below the standard it is no easy matter to convince the buyer that a second order would be any improvement. The wearing qualities of car wheels have been very greatly improved during the past few years, and the standard raised, so that the user pays less and gets more than formerly. The breakage of wheels from severe cold has been largely reduced, and the advent of the chill gave a new lease of life.

The Baltimore car wheel has long since earned and now enjoys an enviable reputation. To mention the name of the company is but to suggest that of the officers of the company, who are well known to our readers: W. S. G. Baker, president and treasurer, and J. Paul Baker, secretary. John Pugh, their popular general traveling agent, probably travels as many miles and visits as many railway companies in a year as any one engaged in handling street railway supplies.

THE DENVER TRAMWAY'S POWER HOUSE.

TO provide a heart for the Denver Tramway's System. Architect J. B. Roberts has planned a power house to be located at Thirty-second and Blake streets. The building at present will be made to accommodate ten boilers, four Corliss engines of 450-horse-power each, and four big dynamos of the same capacity. The boiler room will have a frontage on Blake street of 110 feet, and will be seventy-five in width. The height will be 35 feet to the roof truss.

In the rear of the boiler-room will be the engine and dynamo room, 90½ x 100 feet. The company has changed its original principle in regard to dynamos, and will use four big ones instead of a greater number of smaller ones, having an equal power to the larger ones. This room is 30 feet in height from the floor to the roof truss. The space of the roof is 90 feet.

The foundations for the building are of heavy stone, and those for the machinery to rest upon are placed deep in the earth and are big pillars of solid masonry. The walls will be of brick. An artesian well is being sunk on the place. It is contracted to be 700 feet in depth. The contractors have it down about 125 feet.

The building will cost about \$35,000 and the machinery, boilers, engines and dynamos will run the entire cost up to exceed \$100,000.

The plant will be in operation by the middle of July.

INFORMATION has been received from Bogota, Colombia, that the commercial house of Mr. Charles R. Flint, New York, has recently sent there a civil engineer provided with everything necessary to complete the system of street railways of that capital. It is said to be intended to at once enter upon the work of putting all the lines in first-class condition so as to render satisfactory service to the public and to the government.

JOHN B. PARSONS.

SINCE 1887, John B. Parsons has been intimately connected with the growth and advancement of one of the largest street railways in the world. To the West Chicago Street Railroad Company Mr. Parsons has been in great measure, the cause of its excellent service and the institutor of numerous economic and managerial successes.

Mr. Parsons was born May 17, 1850, and is consequently 42 years of age. His father was a farmer at Whitesville, a little village in the southern part of Maryland, where Mr. Parsons first saw the light of day.

When about six years of age, Mr. Parsons removed with his family to Salisbury, where the elder Parsons engaged in mercantile pursuits for a number of years.

After gaining his education at the Salisbury Academy, the subject of our sketch associated himself with his father at the age of 17.

Not taking kindly to a mercantile life, young Parsons began his railroad career as assistant freight and ticket agent at the railroad offices in Salisbury.

After two years in this position, Mr. Parsons moved to Philadelphia and became a clerk in the Chestnut and Walnut Street Railway Company's offices, but was shortly afterwards made division superintendent. In this position he remained until in 1881, when he was elected president of the Lombard and South Streets Road. In 1886, the majority owners of Lombard and South Streets Road bought a controlling interest in the Peoples' Passenger Railroad of the same city, which controlled several other roads by lease, and was elected president of the road.

The year 1886 saw him married to Miss Katie F. Flickinger and in the following year the position of vice-president and general manager of the West Chicago Street Railroad was offered to him. Accepting this responsible place, he removed to Chicago, where he has been since, gaining each year the greater confidence of the corporation.

Mr. Parsons is a member of the Masonic fraternity and past master of his lodge. Of late years his onerous duties have precluded his regular attendance on the conventions but whenever he is able his sound advice upon rapid transit affairs and discussions are always welcome.

A NEW RULE.

AN order has been issued to the conductors of the Pittsburg and Duquesne Traction lines that all baskets and parcels occupying sitting or standing room shall pay fare as an individual. In remarks on this rule, among the bright people who spend so much valuable breath for naught, the affair is roundly denounced, until some evening after a day's work they find the available seats and standing room occupied by a market basket, furniture, fishing poles or other articles of the uncomfortable kind, when they wonder that the company allows such things to be carried. Without doubt the order is aimed for the greatest good to the greater number.



JOHN B. PARSONS,

Vice-President and General Manager West Chicago Street R. R. Company.

THE STIRLING BOILER.

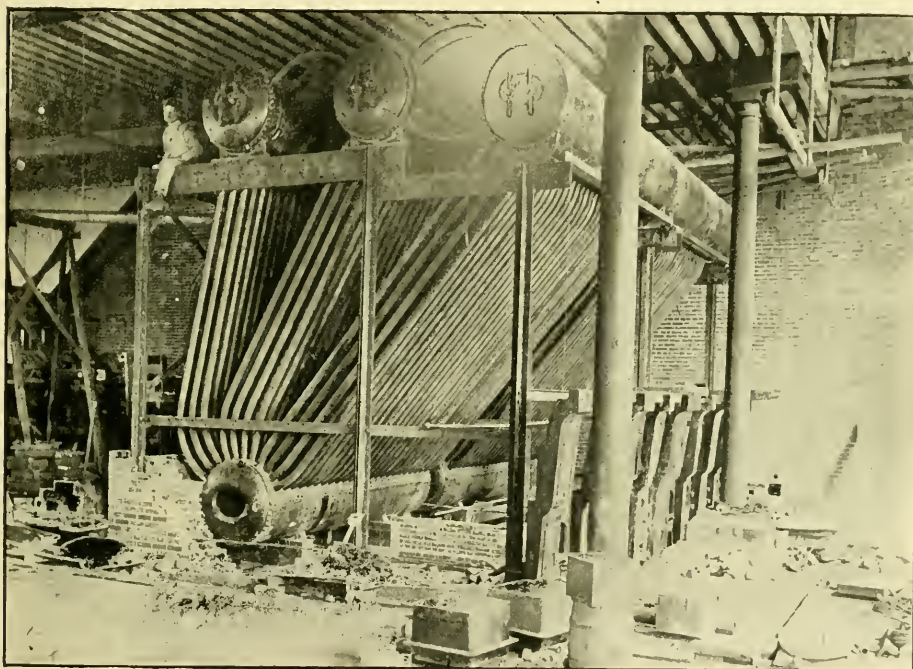
WITH this issue of the REVIEW we are able to illustrate the Stirling high pressure water tube boiler, which is coming into such prominence as a boiler for electric railway plants, where high pressure steam is necessary.

The construction of the Stirling boiler is a departure from the general construction of other water tube boilers, and possesses many excellent features. The boiler consists of three upper steam drums and one lower or mud drum made of the best flange steel. In one end of each drum is a man-hole faced elliptically, against which a man-hole plate is fitted and held in place by wrought steel bolts and arches. The removal of these man-hole plates gives access to every tube in the boiler, and the

the comparatively cool mud drum, where they are easily blown off. As a result the two front banks of tubes are filled with chemically pure water and do not scale.

Engineers generally are not willing to believe that this boiler will not scale, but inquiry among a large number of its users shows it to be a fact. This is a very important feature for many localities. Given a clean heating surface inside and out, fuel economy is a natural result. The entire absence of hand-hole plates, which caused much annoyance from leakages, is another feature.

The manufacturers claim to have sold 17,000 horsepower since January 1st, 1892, including some of the best street railway companies in the country, who speak very highly of the boiler. General offices of the company are located in Chicago and the factories at Haberton, Ohio, with agencies in all principal cities.



THE STIRLING WATER TUBE BOILER.

boiler, and the drums being three feet in diameter, are large enough for a man to work inside conveniently.

Expanded into these drums are $3\frac{1}{4}$ inch tubes, so bent as to enter the drums at a proper radius, and to allow for unequal expansion and contraction. There is no cast metal of any kind used in the construction of the boiler, which permits a high pressure to be carried with absolute safety.

The water is fed into the rear upper drum, and, during its passage to the mud drum (which requires from twenty to thirty minutes when the boiler is working at its rated capacity), it comes in contact with the ascending gases and becomes heated to a temperature over 300 degrees. At this temperature the lime, magnesia and other impurities, are separated from the feed water and deposited in

NIAGARA POWER.

PROFESSOR FORBES, an English electrician, who has been lately inspecting the Niagara Falls as a power center predicts a great future for this long mooted question.

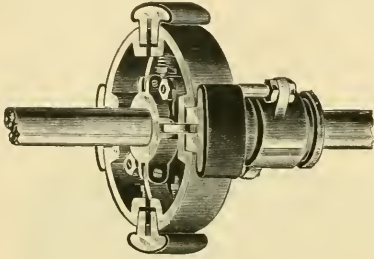
With just what intentions Mr. Forbes visits the great falls is not stated and whether he comes as visitor or envoy of capital is not known.

Mr. Forbes, contrary to Mr. Edison's opinion, advocates laying the transmission wire on top of the ground instead of along the river bed to Buffalo.

The Niagara Street Railway is now putting in its electric construction and the road promises a successful future.

GOLDSWORTHY FRICTION CLUTCH.

THE mechanical possibilities of the friction clutch are so well recognized by engineers, that this class of device needs no introduction. The latest clutch is made by the Montgomery Brothers, of Moline, Ill. The clutch is shown herewith, the external friction rim or pulley being omitted, as not necessary to an understanding of its workings. The friction blocks are expanded outwards against the inner surface of the driving rim by



means of a lever and movable hub, which latter carries the links to which the blocks are attached. The hub is given sufficient movement to allow it to slide a little past the center of pressure of the links, so as to lock the clutch securely when thrown in. When thrown out, it moves still farther past the center in the reverse direction, so as to throw the blocks entirely free from contact with the rim. When the clutch is thrown out, the blocks are held well away from the rim by spiral springs.

DETROIT'S POWER PLANT.

SINCE the decision of the Detroit Citizens' Railway to travel by trolley, the contracts for equipments have been closed as follows:

The power station will be completed by August 1, and will operate the Jefferson avenue line.

Three horizontal return tubular boilers, 66 inches in diameter, and sixteen feet long, each having 60 4-inch flues, will furnish power for three 14-24 by 14 Westinghouse compound engines. Feed water will be heated, and the station will be supplied with all necessary accompaniments.

The electrical equipment will consist of three 100 kilowatt multipolar generators, from the Detroit electrical works, as well as a slate switchboard. Twelve 40-horse-power motors, of the Detroit electrical works, will equip the cars.

BROAD STREETS.

AMONG the cities of the United States possessed of broad streets, the city of New York is credited with 133 miles of thoroughfares from 100 to 160 feet wide, Washington has 87 miles of such roads, Philadelphia 37 miles. In Chicago, some of the boulevards are 250 feet wide, while a few Massachusetts country towns probably beat the record with roads measuring from 300 to 330 feet.

THE KID AND THE CABLE.



NOT long ago, in the considerably cabled city of San Francisco, an enterprising youth named George Raicevich asked his five-year-old brother Spiro if he would not like to have a ride. The youthful and enterprising Spiro expressed his burning desire for rapid transit. Then the older boy procured a rope, and tying one end around his brother's waist, dropped the other into the slot. The rope caught. So did the boy. The cable traveled, so did the boy, as fast as his little legs could carry him. Soon he could not keep up with the pace and fell to the ground.

The little fellow was dragged block after block, across streets and over crossings, his body turning at every twitch of the rope and his head bumping at intervals on the cobble stones. Close behind him was George, crying as though his heart would break and calling out for some one to save his brother's life. Spiro was dragged over the crossing at Polk and Hayes streets, where the cars of the Omnibus and Hayes street lines cross, and only owing to the fact that the rope of the former line passes under that of the latter one was his life saved.

As the body was carried along to Larkin Street, W. E. Murphy saw the occurrence while standing in front of his store. In an instant he grasped the situation, and, rushing to the boy, made an effort to save his life by cutting the rope with a small penknife. The unfortunate child was only about thirty yards from the crossing of the Larkin street rope which passes above that of the Hayes street line, and if the clothes-line attached to the boy's body had come in contact with the former rope he would have been killed.

Murphy had a difficult time keeping up with the boy and trying to cut the rope. The blade of his knife was not an inch in length, and he found it impossible to catch hold of the rope. Finally he managed to crouch down close to the track and caught the rope close to the slot. Then with his knife he cut the rope and the life of the boy was saved.

Spiro did not appear to be badly hurt, but he was so frightened he could not talk.

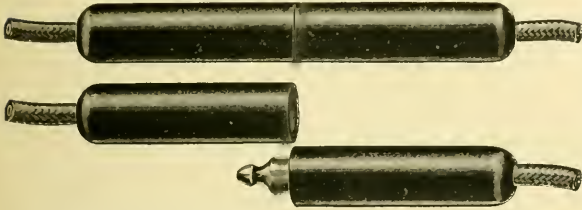
A SUMMER PROGRAM.

THE management of the City Electric Railway of Decatur, Ills., believes in inducing traffic, and to this end Manager Ferguson has made extensive preparations for summer sports at Riverside Park. The park will be provided with a merry-go-round, a photograph gallery, picnic grounds, places for family gatherings and dramatic entertainments. "The Streets of New York" will probably be the opening play. The shows will be free to all who go to the park on the street cars. It is the expectation of the street car company to have some attraction at the park every fine night this summer, after May 30.

STREET CAR TRAILER CONNECTION.

THE Great Western Electric Supply Company, Chicago, brings forward a new device for connecting trailers.

The device, as shown in the engraving, is very simple in construction. When connected, there is no metal



part exposed to the touch on the section of the connector belonging to the motor car. Each pair of connectors is supplied with enough flexible wire to insure ease in attachment. Hard rubber is the material used in the connector, and it is very substantially made.

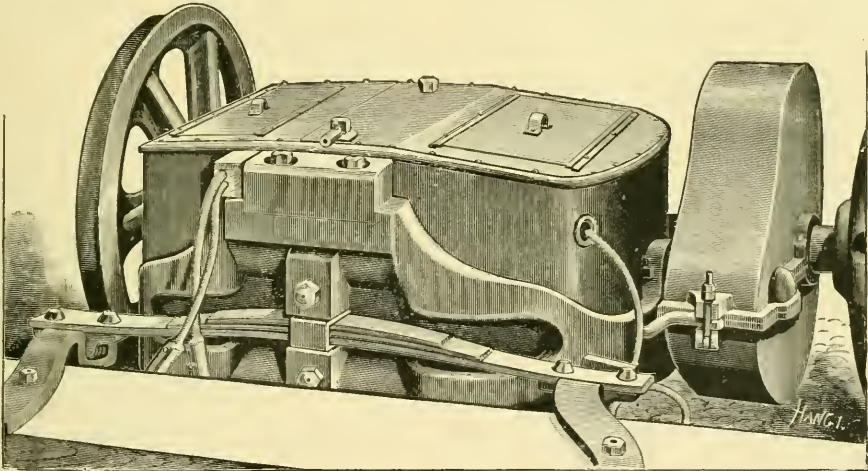
WIGHTMAN'S IMPROVED MOTOR.

WE are enabled to illustrate, this month, a new motor, put upon the market by the Wightman Electric Manufacturing Company, of Scranton, Pennsylvania.

The improvements intended relate chiefly to protection of the working parts and field windings, and, as the illustration shows, the motor is fully protected by a sheet steel casing, riveted to the motor frame, and waterproof. The weight of the casing is not material, but the protection afforded is as complete as if it was much heavier.

The gear case used with the Wightman motor has also been greatly improved. It is now made of malleable iron, and is in three parts, very easy to attach or take off. The arrangement of the gear case is such that no bearing parts are necessary, thus eliminating all wear on the case. It is absolutely dustproof, and the parts are so fastened together that they will not work loose.

The controlling switch used is of the standard Wightman type, having speed controlling handle and reversing



WIGHTMAN'S IMPROVED MOTOR.

WHY NOT OFTENER?

JUST at present the gentlemanly and considerate attention of the conductors and motormen of the St. Louis lines is the subject of popular comment in that city, and unwonted as the praise is, it will have more effect in making the men attentive and polite than any amount of growling and uncalled-for criticism.

The fact is that in more cities than St. Louis, the street railway employes are the most gentlemanly officials in public service, and perhaps for that very reason are subject to the gibes and flauts of Tom, Dick, Harry, Mary and Susan. We more frequently see the protest of vox populi in regard to some one slight than in praise of the 99 other occasions when the vigilant conductor saved inconvenience and perhaps life or limb.

The discipline that is exercised on street railway lines is and ought to be strict, but the good people for that reason should not assume that all politeness is perfunctory.

handle combined in one, making the operation of the simplest possible character. Speed regulation with this controller is obtained without the use of any external resistance above a car speed of three or four miles an hour. There are five speed contacts possible for either direction of operation.

The consulting and mechanical engineer, at St. Joseph, Mo., J. T. Gardner, recently superintended some tests of the Wightman system, in competition with others, and the result made a flattering testimonial for the Wightman device.

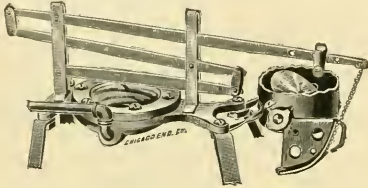
The Wightman system is now in successful operation on a large number of roads, and is steadily growing in favor.

At Glastonbury, Conn., the local trotters and fast horses in general run races with the electric cars with varying results, as the cars have to stop for passengers and the horsemen do not.

THE NEWTON & SNYDER DAMPER REGULATOR.

THIS automatic damper regulator manufactured by Newton & Snyder, Chicago, presents some unique features and claims of superiority.

The damper varies with the steam gauge, thus holding the heat around the boiler by saving a great amount of fuel which otherwise would be liberated through the smoke stack. The construction is simple and compact, not liable to get out of order and more sensitive than ordinary dampers.



The intelligent engineer does not need to be told of the waste of fuel caused by ordinary damper methods, and to this class and especially to street railway plants, that above all others should practice every economy, the advantage of the automatic damper regulator should be commended.

The damper is put in on trial and is guaranteed to pay for itself in saving fuel from one to three times over per year, and will not interfere with any smoke consumer.

The illustration shows its construction, and further information Newton & Snyder, 117 Clifton Avenue, Chicago, will gladly supply.

A NEW STREET RAILWAY SWITCH.

A SWITCH of novel design has been brought out by Mr. J. Y. Porter, 53 Wade Building, Cleveland, Ohio. It is intended to take the place of any street railway switch, and its claims of advantage are as follows: It requires no care after placing in position, as it removes all dirt, gravel or sticks, and is so constructed that it will not get out of plate or jaw, and will not bend or bind. Dirt cannot get under the tongue to elevate the point, it having no pivot at the heel, therefore, the wheels cannot throw back the point after passing the heel. The flange of the wheel cannot ride on the point when passing the switch, nor can the point be thrown back; therefore, all wheels or trail cars must follow the motor on the same track.

If the point be worn on top or sides a few inches, it may be replaced in two minutes. The point is secured to a solid base, and cannot be broken. Instead of its being supported at the pivot and point, it lies against either side-rail, from point to heel, giving its support its entire length. This point is only one-third the length of the ordinary "point," being only from 18 to 28 inches in length, as may be required. Any part of the switch can be duplicated and set in place in five minutes. The switch may be turned in the usual way, or it can be turned by the conductor without going in front of the motor car. It can also be turned at the side of the track, and away from the

car, by a man's foot. Instead of the usual jolt or jar, when crossing from the main rail to the switch plate to T rail there is a continuous rail, without jog or jar at any part, and the switch is always easy to move, as there is no friction. Any rail will fit it, and the switch will fit any curve.

THE BALDWIN VACUUM TUBE BOILER CLEANER.

THE practical engineer, who takes into consideration the small things that make, or unmake, him professionally, will be interested in the device above named, which, as the name implies, is to remedy the serious and ever recurring difficulty of the filling of the tubes with soot, which not only fills the entire tubes, but gathers in large quantities at the back of the fire bridge wall and at the back end of the boiler. The heating surface of a boiler in this dirty condition is seriously impaired, and many devices are in use, more or less effective, for cleaning out the tubes and chambers.

Baldwin's cleaner essays several new and important features, utilizing the principle of air pressure, which, we believe, is a new feature.

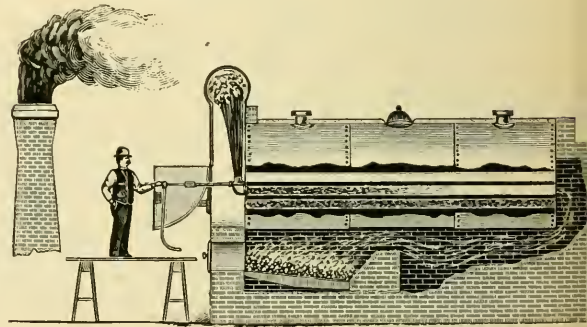


Fig. 1 shows a section of a boiler, illustrating the method of applying the cleaner, with the soot and dust being drawn out of the tubes, and forcibly ejected up the chimney. Fig. 2 shows the cleaner in section, from which the principle of its action will be readily understood. The heater is made of a brass composition, and is shaped like an elbow. It has a conical-shaped mouth, for insertion in the tube. The steam is admitted into the back of the cleaner, and passes into an annular chamber, surrounding the passage for the gases and soot, with small perforations on the upper side. When the steam is turned on, it rushes upwards, through these holes, and creates a vacuum, thereby drawing out all the accumulation of soot in the tube, in the direction of the natural draft, and sending it where it ought originally to have gone, that is, up the chimney. By this method no steam is admitted into the tube, and, therefore, no scale is formed, and the inside of the tube is always kept dry. The steam being wire-drawn through the small apertures, is first superheated, and becomes thoroughly dry, so that it is impossible for the soot to stick in the chimney or passages. One of the greatest advantages of this method

is the fact that, as the soot is drawn out in the direction of the draft, and not blown around the boiler-room or into the other tubes. This prevents, in a large measure, the disagreeable work of cleaning out the back connection. It is the opinion of many who have used this cleaner, that it is the best ever invented, as it works on the right principle, and is most practical and clean. It keeps the stack and combustion chamber clean, and will actually even draw out all the soot and dirt which accumulates back of the fire bridge wall.

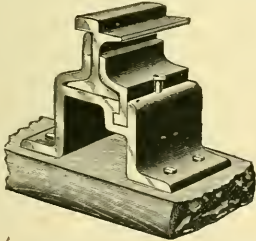
The device is the invention of F. R. Baldwin, a mechanical engineer of New York City, while the Oliver P. Clay Company, of Cleveland, Ohio, is the exclusive sales agent.

The value of the device cannot but be appreciated by the large power users, to which class all street railway plants belong, and, judging from the sales already, the device has a good future.

GRAHAM'S RAIL CHAIR.

THE rail chair shown in the engraving provides a simple and secure fastening for the rails. The device has but two parts other than spikes, and is easily applied.

The foot of the rail is secured on one side by a clamping extension of the chair and on the other side by a locking slide which is made slightly tapering and which fits into a reverse L groove correspondingly tapered.



When the slide is driven in, the rail is clamped securely to the chair and the slide is prevented from working loose by dropping a spike into a slot formed half in the chair and half in the slide.

On the double chair the clamping extension and the slide are extended upward and bolted through the web of the rail, making a solid joint.

George H. Graham, of Chicago, is the patentee and the chair will soon be put on the market.

GRAND LARCENY.

AN enterprising gentleman named Chas. H. Lawrence, is under sheriff's care in Lockport, N. Y., for stealing a street car line. Lawrence was manager of the Lockport line when it was changed from horse to electric power, and took the opportunity to sell the old cars and track, pocketing the \$5,000 consideration. He was arrested in Lockport but escaped and has just been recently arrested in Pennsylvania.

PACIFIC COAST CABLE PROCESSION.

OF all the many interesting sights which the visiting Society of Mechanical Engineers, witnessed when in San Francisco last month, none was as unique and striking as that arranged by A. S. Hallidie, the father of cable roads.

It consisted of an enormous reel of cable manufactured by the California Wire Works, San Francisco, for use on the Ellis Street Cable line. It was 28,020 feet long, $1\frac{1}{4}$ inches diameter, and weighed 72,830 pounds. The reel on which the rope was wound weighed 6,000 pounds, and was ten feet in diameter. The truck weighed 30,000 pounds and the entire weight drawn was 108,830 pounds. The cable was made in 52 hours.

Attached to this magnificent load was a cavalcade of 60 beautiful horses, mounted by 15 riders, the horses being arranged in fifteen teams of four horses each, and as they passed along the street drawing the mighty load, the sight was witnessed by many thousands, and was loudly applauded by the society, in whose honor the display was given.

A TRANSFER STEAL.

THE conductors of the Duquesne and Fifth avenue lines, of Pittsburg, have a plan for stealing transfers and working a little on the side, that is really as sharp as it is expensive to the company.

When the Pittsburg traction company combined with the Duquesne traction company, the Fifth avenue and Forbes street roads were made trunk lines, and all the others, such as the Wilksburg, Negley and Center avenues, Larimer avenue and Highland avenue, were made feeders, and transfers given on them for the main line. Transfers were also given on the branches for the trunk lines.

Every conductor is given 35 Wilksburg transfers a day. They have to account for everyone they use, and must turn in all that are not used. They are given 300 apiece of the others, and what are not used are destroyed. This is where the opportunity came. It was an easy thing for conductors to trade transfers. The conductor coming down town would probably carry fifty passengers or more. Every time a fare was collected it was "rung up." Every cent had been accounted for. The fine work came when the proceeds of the trip were turned into the office.

Out of the fifty fares, thirty cash fares would be turned in, and the conductor would then punch and hand over twenty transfers, instead of so many cash fares, and put \$1 down in his pocket. The man with whom the trade had been made would do the same thing, save that his profit would come off the other end of the line. Of course, the transfer accounts would not balance in the office, but it was hard work finding just where the money went to.

Investigation has led to the dismissal of the peccant ticket-takers.

RAILWAY EQUIPMENT IN NORTH CAROLINA.

ONE of the first small towns in the United States to equip with electricity was Asheville, N. C., which adopted electricity soon after the successful construction of the Richmond road.

The success of Asheville's road was particularly gratifying, as with it began an impetus toward like undertakings throughout the southeastern states, until four out of five towns of 15,000 had electric traction, namely, Asheville, Winston, Charlotte and Raleigh.

On May 1, the new road was opened at Wilmington, a town of 23,000, changing the Wilmington street railway, operating seven small horse cars on four miles of track into a modern electric railway.

The new track laid was furnished by Lewis and Fowler, while the over head construction and road-bed building was done by J. C. White & Co., of New York City.

The steam plant so far installed consists of two, 100-horse-power horizontal return tubular boilers, 66 by 16 inches, and two 15-by 16-inch Ball high speed engines, one Goubert feed water heater and one 300-horse-power Davidson independent air pump and condenser.

The electrical equipment is two, 100-Kilowatt railway generators of the Edison pattern. Six 8-seat open cars and two 16-foot closed cars built by Lewis & Fowler, and equipped each with two 15-horse-power Thomson-Houston motors, will be the transportation equipment, supplemented by four converted, open horse-cars.

The company has already made an extension of a mile to a lovely, live oak park, which will do duty soon as an inducement to traffic.

The road will no doubt be a grand success and give heart of courage to other towns in the great new south-east.

PENNSYLVANIA ACCIDENTS.

IN the past five years the accidents on the Pennsylvania railways give the following totals: 1886, 14 killed and 29 injured; 1887, 11 killed and 63 injured; 1888, 11 killed and 38 injured; 1889-90, 20 killed and 118 injured; and in 1890-91, 22 killed and 121 injured. Ad interim, the number of passengers carried has increased as follows: 1886, 156,975,420; 1889, 184,835,994; 1888, 190,506,017; 1889-90, 219,506,616, and in 1890-91, 237,781,172.

No statement of the increase of mileage can be found, but the above ratio of accidents will be seen to be not unduly large for the increase in traffic.

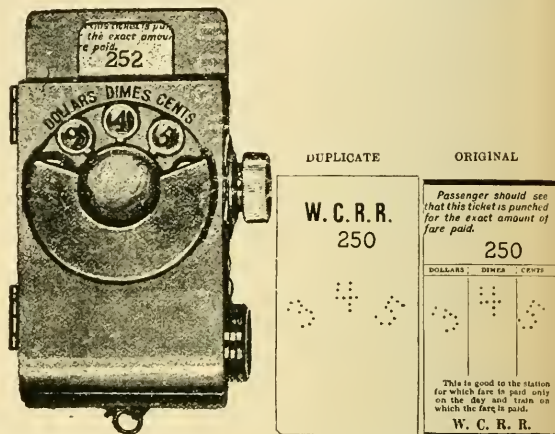
A NEW PLEASURE SCHEME.

THE street railway company at Winona, Minn., will give to the Winona Bicycle Club a cash bonus to assist in constructing a bicycle track to cost \$1,000, provided it is built on the company's line. The offer comes through Howard C. Lewis, of the Thomson-Houston company.

COFFIN'S COMBINATION PUNCH.

FOR the convenience of roads that have different rates of fare for different distances of travel and for interurban lines or for elevated roads and suburban steam lines, A. W. Coffin, of 228 California street, San Francisco, has invented a conductor's punch and fare register that meets such requirements.

The illustrations show method of use and the machine. The instrument is small, simple and absolutely reliable, as



as it registers a receipt for the passenger and a stub to be turned into the auditor of the road. The points of vantage claimed beside these are that 12 tickets can be issued per minute, no ticket or stub can be altered to lower value, no bell attachment is necessary and its small size makes it easy to handle. The punch is made of aluminium, weighs 5 ounces, is $3\frac{1}{4}$ inches long, 2 inches wide and three-fourths of an inch thick.

MILLBURY CONTRACTS.

THE Worcester and Millbury Electric Railway Company has awarded contracts as follows:

The contract for building the road was awarded to E. P. Shaw, of Newburyport; for building the power station, to Geo. F. Chase of Millbury; for furnishing the boilers, to the Stewart Boiler Works of Worcester; setting up the boilers and the piping, to the Jarvis Engineering Company of Boston; for two 200 horse power condensing engines, to Armington & Sims of Providence; paving, to C. O. Richardson, of Worcester; generators, Thomson-Houston Company, of Lynn; belting, Graton & Knight, of Worcester; paving stones, the Webb Construction Company of Worcester.

It was voted to call another assessment of 40 per cent. from the stockholder, payable on or before June 15.

The rails are on the ground and work of building the road has begun, so that everything will be in running order by August 1.

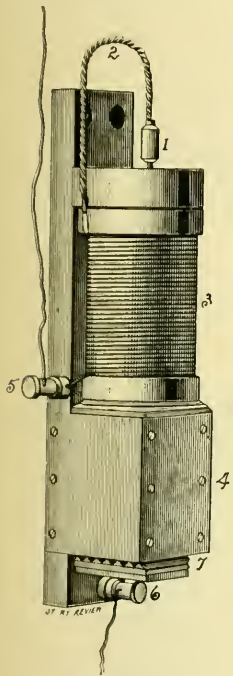
The directors have elected Samuel Winslow president, and T. T. Robinson secretary.

GARTON'S LIGHTNING ARRESTER.

THE unfortunate experiences of the Keokuk, Iowa, electric railway plant in being struck by lightning at three different times has been the cause of the successful experiments of Superintendent W. R. Garton, to devise a lightning arrester that arrests the destructive "loose lightning."

Mr. Garton's device has been successfully in use in Keokuk where several others were total failures, and where the wheels were stopped three weeks at a time from lightning strokes.

The arrester consists of a solenoid with hollow center, an armature which consists of a brass or copper guide rod which also acts as a conductor for the lightning. At the lower end of this rod is a magnetic substance not more than one-third the length of the coil, and at the lower end of this is fastened a short carbon point.



Just below this solenoid, and directly under the center, are two carbon plates, separated from each other at any desired distance, from an inch to one-fiftieth. The surfaces of the carbon plates toward each other are saw-toothed in shape. The bottom plate is connected to the ground by means of a binding post. The top plate is connected to the line by means of the carbon point on the armature.

On the top end of the guide rod of the armature, is fast a binding post and one end of the winding of the solenoid is inserted by means of a flexible conductor long enough to allow the armature to rise and fall with ease.

The other end of the solenoid is connected to the line by means of a binding post.

The armature when at rest is not inserted in the coil, but hangs just outside, so that the coil has no more resistance than a straight wire of the same length.

Just below the solenoid, and resting upon the top carbon plate, is an air-tight chamber in which the armature is inclosed. The top carbon plate forms the bottom of the chamber, and the bottom of the solenoid the top of chamber. This chamber is made of non-combustible material or lined with such material and hermetically sealed, with the exception of a small hole in the top of the solenoid, through which the guide rod passes.

When the lightning passes through the arrester, it first enters at the binding post marked line, thence through the solenoid through the flexible conductor, to

the arm armature down to the first carbon plate and across the air space, and then into the ground, an arc is established between the two plates completing the circuit to the ground.

The flow of current through the coil energizes the same, and draws the armature into the coil, thus establishing an arc in the air tight chamber, and also drawing the arc into the center of the solenoid, which, by the lines of magnetic force, tend to drive the arc downward away from the carbon point on the end of the armature, and by the armature being drawn up against the top of solenoid, the hole in the top is sealed, thus making it air-tight. By the heat of the arc the oxygen in the chamber is burned out, and the result is the destroying of the arc, the armature, then, drops to its resting-place of its own weight, the chamber is then opened at the top for a new supply of air, which immediately rushes in to take the place of that which was burned out; in this arrester the air is burned out instead of a fuse on an armature in the armature. It is almost noiseless in its action, and will act in quick succession, without injury to either arrester or generator.

A PHILADELPHIA STORY.

THE following story in the New York Sun, is like the little boy's fish story, "good, if it ain't true." The correspondent says:

"This is a concession by the company to social distinctions; the people with fathers can only ride in one car, the people with grandfathers in another, and the people with great grandfathers in a third. No one is allowed to smoke. None of the people with great grandfathers or grandfathers would think of smoking in public, of course, and as the grandfatherless ones sit in the front car, their smoke would drift back and annoy the owners of ancestors, which would never do in the world."

CUDAHY.

A VILLAGE near Milwaukee has recently been re-baptized in the name of the big pork packer, and besides this evidence that the magnate will locate his plant there, Patrick Cudahy has secured right of way for an electric railway. The new line will run from the Ellen Street terminus of the Cream City.

Some of the contracts for the construction of the new packing house have been let. The new town will have a population of about 8,000. The Cudahy house will employ 2,000 men.

A MESSAGE FROM THE LORD.

SOME time ago a young man visited Governor Northen, and informed him that the Lord had sent him to demand the stopping of street car travel on the Sabbath. The Governor received him courteously, but intimated his doubts as to the genuineness of his commission, as the Lord would have known that the executive of the State had no authority to interfere.

THE BRADFORD ELECTRIC CAR.

THERE has been mentioned from time to time in the STREET RAILWAY REVIEW the experiment of Holroyd Smith, at Bradford, England, with an electric car that was especially constructed to overcome the serious difficulty of curves and grades presented at that place.

The success of Mr. Smith's device has made it worthy of reproduction, and to the London Electrician we are indebted for the description and drawing.

The car was built by an English company, as were the motors and gear. The wheels are 28 inches in diameter, and have a 5-foot 10-inch base on a 4-foot gauge track, and the car accommodates 36 people.

inches in diameter and 11 inches long. With a test on a brake the combined efficiency of the motor and gear was 65 per cent.

The weight of the under frame with two dual motors, gearing, axes, etc., is $4\frac{1}{2}$ tons, and the entire car weighs $6\frac{1}{2}$ tons.

The object of the number of motors was to overcome the difficulty of starting and of climbing the steep grades.

There are three ways of arranging the armatures; all in series, multiple parallel, or in parallel. A resistance coil is provided for turning on the current gradually. The four armatures are used in series for ordinary running. The dual arrangement, called by Mr. Smith, multiple parallel is used for heavy work or for occasional easy starting. The complete parallel is reserved for heavy

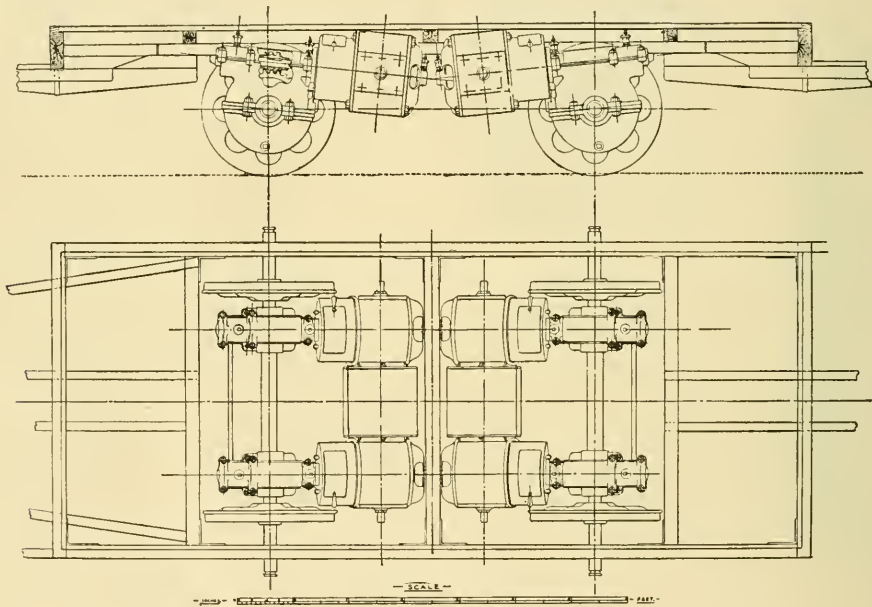


FIG. 1.—Side elevation and plan of under-frame.

THE BRADFORD ELECTRIC CAR.

On account of the large motors, the shafts, as can be seen in the cut, are slightly inclined. Ball bearings are provided for the thrust collars, thus reducing the friction which has always been an objection to worm gear. A fairly fine pitch is desirable on account of mechanical efficiency, but with such a gear the car would be immovable except under current. Mr. Reckenzaun has used a long-pitch screw to allow the car to be pushed and run down hill freely, and Mr. Smith has given special attention to the details of the thread and the shape of the teeth. The worms in this design have three threads of $4\frac{1}{2}$ -inch pitch. Thus the worm wheel has a pitch of $1\frac{1}{2}$ inches and 34 teeth. One of the worms is shown in the side elevation. The gear is boxed and runs in oil.

There are two armatures between a single pair of magnets called by Mr. Smith a dual motor. This device has been employed before. The armatures are $12\frac{1}{2}$

starting, being more than sufficient to run the loaded car up a 1 in 14 $\frac{1}{2}$ grade.

In order to run freely around curves the wheels are not keyed together on the axles. Two wheels at diagonally opposite corners are keyed to the axles, the right hand wheel at one end and the left hand wheel at the other being so fixed, and the worm wheel next to these are also keyed direct to the axles. The other worm wheels are keyed to sleeves which drive the remaining car wheels.

Mr. Smith's experiment has created much favorable comment among English electricians, and we think the foregoing will be of interest to American electric railway experimenters.

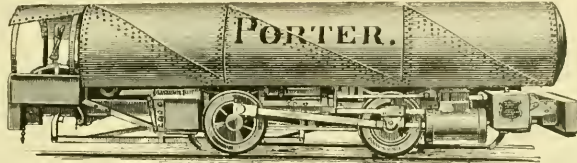
A STREET car conductor, in Buffalo, not long ago, seized his wife's nose, in his sleep, and rang up three fares upon it before her shrieks awoke him.

COMPRESSED AIR TRACTION.

IT may be indirectly interesting to the readers of the REVIEW, in retrospect of the Leavenworth article of last month, to see a representation of a compressed air locomotive that is reported to have been successfully used for several months in the interior of the old Eagle Mines, near Pittsburg.

These locomotives were built by H. K. Porter & Co., of Pittsburg, for the express use above mentioned.

Generally the construction is the same as a steam locomotive with the omission of the boiler and water tank, these being replaced by two large cylindrical tanks holding the compressed air. These tanks are 36 inches in diameter and 16 feet long. The connection of the air reservoir with the cylinders is simple and no difficulty is experienced from freezing either in summer or winter. The locomotive carries air at 500 to 600 pounds pressure but ordinarily the pressure varies from 250 to 450 pounds.



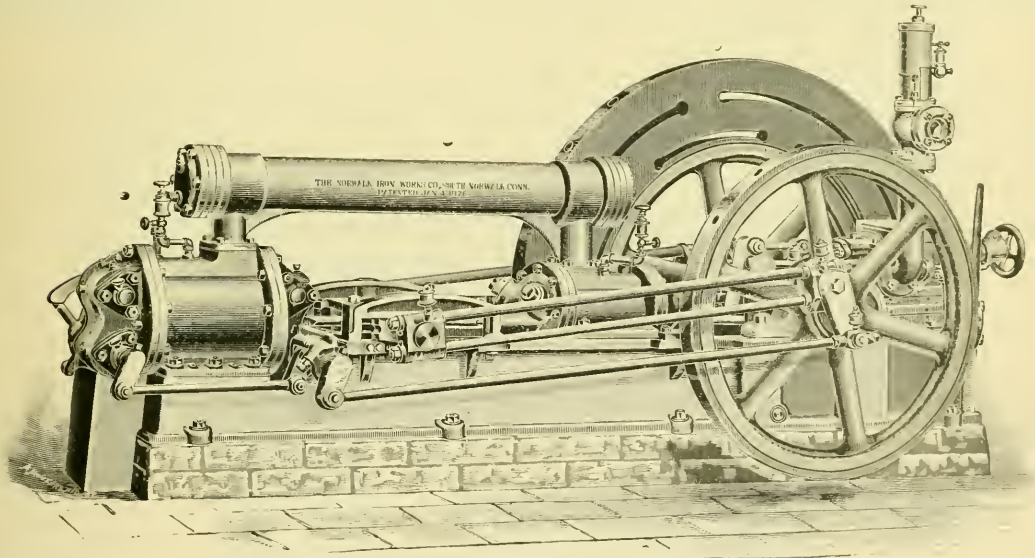
COMPRESSED AIR LOCOMOTIVE.

having 141 pounds pressure left at the end of each trip.

The air is compressed by a Norwalk compressor (made by the Norwalk Iron Works, of South Norwalk, Conn.) and situated for convenience, 2,400 feet from the charging point of the engines. No loss of pressure is noticeable, although the air is conveyed through 3-inch pipes. The time for charging is one minute.

If charged to 500 pounds, the engine can make a distance of 1 1/2 miles, doing heavy work, and it is practicable to make a running capacity of 4 miles with one charge.

The compressed air locomotive is peculiarly fitted for this work, inasmuch as the narrow quarters, short curves, presence of fire-damp, water seepage and ventilation require a motor fulfilling most difficult conditions. The air locomotives are built in various sizes of cylinders from 5 to 10 inches in diameter. The smaller sizes will run on 16-pound rail in 4-foot entries. The larger sizes require 20 to 30-pound rail and 4 1/2-foot entries.



AIR COMPRESSOR—NORWALK IRON WORKS, CONN.

In the mine where the locomotives run, the grades are varied. The largest up-grade is 1,200 feet at 1 1/2 per cent. but varying to 5 per cent. Curves average 25 feet radius but 17 feet are successfully rounded. An ordinary day's work of 20.5 miles or 31 round trips does not develop more than half the power of the motor. Over the longest entry up maximum short grades of 5 per cent. from 8 to 11 cars are hauled each trip, the weight of the car being 1,250 pounds and of the load 3,360.

The average charge of air doing this work was 334 pounds, running the pressure down 193 pounds and

THE NORTHERN CAR COMPANY, of Minneapolis, is about ready to ship the first of the new car bodies ordered by the Duluth Street Railway Company. These cars will be equipped with two, 20-horse-power gearless motors of the Short pattern. The new order is intended to be placed on the line at the head of the incline and back of the city. This line is 1 1/2 miles in length and 650 feet above sea level. The maximum grade to be overcome is 4 1/2 per cent., and the line was made possible by building the incline at an expense of \$250,000.

SOUTHERN RAILWAYS—HOUSTON, TEXAS.

THE Lone Star State, sacred to the memory of the men who severed it from the dead past of Mexico, and grafted it on to the living trunk of the great Union, shows every succeeding day, of each progressive year, that she is destined to become one of the greatest states of the sisterhood, in more particulars than that of size.



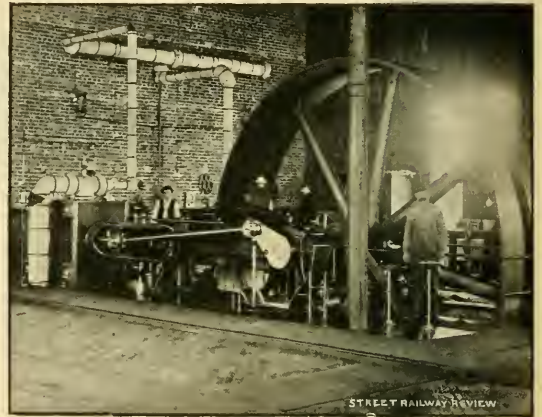
CAR HOUSE UNDER CONSTRUCTION.

In judging a state, we usually look to the cities as thermometers of its enterprise, intelligence, commercial importance and probable wealth. Here are gathered of necessity, the combined efforts of educational facilities, thrift, charity, and the great question of transportation and exchange are herein solved.

As a gauge of the growing independence of the great southwest, as a sample of what is, and as a promise of what will come ere many years, we beg the privilege of introducing to our rapid transit world a city that is making rapid transit towards being a great center, Houston, Texas. Houston, besides bearing the name of a great-hearted and loyal Texan, is called by her proud inhabitants, the Magnolia City, the Hub City, or the Bayou City, as is most appropriate and descriptive of its beautiful shade trees, its central importance, or its location on the Buffalo River and Buffalo Bayou.

Here in easy reach of the gulf and its port of entry, and in touch with the great plains north and west, are

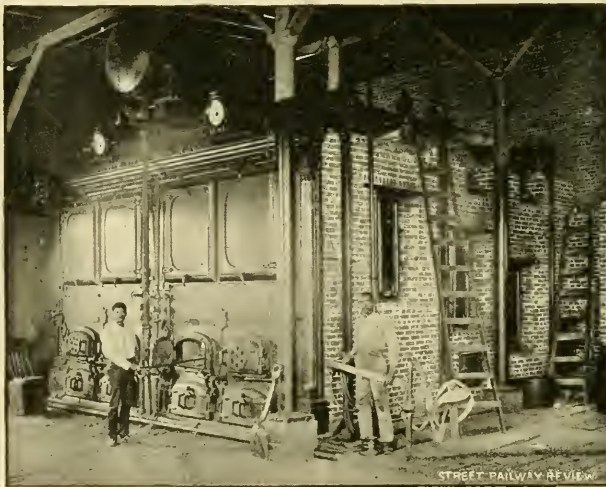
gathered 50,000 people where twenty years ago only 16,000 were congregated. The city boasts 27 institutions of learning, 44 churches, 281 industrial plants, a milling capacity of 900 tons of cotton seed daily, fine water facilities by means of artesian wells, electric light plants, gas works and a complete system of sewerage.



ENGINE NO. 1.

Within the past year the capstone has been laid that makes Houston a modern city, and on her forty miles of paved streets she has laid the iron for an electric railway. General transportation facilities have existed

for many years with the Houston and Texas Central Railway, the Southern Pacific, the Texas Transportation Railway, the Houston, East and West Texas Railway, the Texas Western and the Houston Direct Navigation Company, each with their general offices, besides the division offices of the International and Great Northern, the Galveston, Houston and Henderson, the San Antonio and Aransas Pass Railway and the Houston and Columbia Railway. To this is now supplemented the fine



SECOND BATTERY, BABCOCK AND WILCOX BOILERS.

system of intramural transit known as the Houston City Street Railway.

The history of this system dates back a little more than a year ago, when a Northern syndicate, of which O. M. Carter, of the American Loan and Trust Company, of Omaha, Neb., was prime mover, brought out and con-

solidated the Houston City Street Railway Company and the Bayou City Street Railway Company, into one of the finest railway systems in the south.

Immediate construction was begun, and to-day we can present to our public the fruit of their labors.

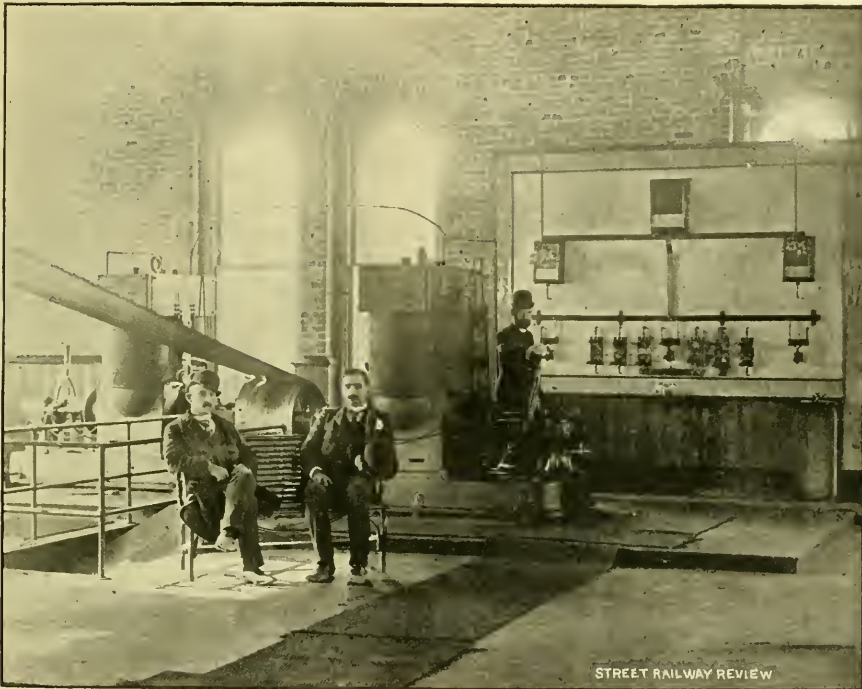
THE POWER HOUSE,

car shops and car house are located between Austin and Le Branche streets and Commercial avenue, on Buffalo Bayou. The car house is 250 feet by 115 feet and can accommodate 125 cars on the twelve tracks. The carpenter, paint and electrical repair shops adjoining, are 160 by 27 feet and contain all necessary conveniences.

Depots, all hotels, opera houses, the Masonic Temple, City Hall, markets and near all churches, finally reaching the Glenwood and German cemeteries.

THE ROLLING STOCK

includes 31 motor cars with as many trailers, besides 40 horse cars now being rapidly supplanted by electric traction. The cars are models of car-building art, and 24 feet in length. They are made by Brill, of Philadelphia, Brownell Car Company, and the St. Louis Car Company, of St. Louis. The motors are divided as follows: Edison, 12 cars with 15-horse-power motors, one with a Short gearless and 18 with the Thomson-Houston pattern.



SUPERINTENDENT MUNDES, GENERAL MANAGER M'GREGOR, AND SECRETARY M'KINNEY; EDISON GENERATOR AND SWITCH-BOARD.

The power station proper faces Le Branche street, and is 100 by 125 feet in dimensions. Here are housed four 270-horse-power Allis Engine Company's, Reynolds-Corliss compound engines and five Babcock-Wilcox tubular safety boilers, provided with Hoppe's live steam purifiers. The engravings presented herewith show one battery of boilers and the engines in action.

THE ELECTRIC POWER

is generated by Edison generators capable of developing 100,000 kilowatts each. The dynamos and the complete switch-board are also shown in the engravings.

THE ROAD-BED

is very substantial and laid with 45-pound steel rails, making a smooth track over the paved streets.

The 18 miles of track now electrified, reach every ward in this city, pass the Grand Central and Union

The capital stock of the company has been increased to \$800,000, and the management now consists of E. A. Allen, president, H. F. MacGregor, vice-president and general manager, C. A. McKinney, secretary and treasurer, and Fred Mundes, superintendent.

As to the men who have made the Houston system what it is, it will no doubt be of as great interest to our readers, as it is pleasure to us, to tell of the street railway experience of two of them.

HENRY F. M'GREGOR.

Mr. MacGregor, vice-president and general manager of the Houston City Street Railway Company, was born in Londonderry, N. H., April 25, 1855. His boyhood was spent mostly on a farm, and as opportunity afforded, attending the district school and Pinkerton Academy. At the age of sixteen he completed a commercial course and graduated from the New Hampshire Business Col-

lege. At eighteen he went to Texas, having served two years as a clerk in a store at Haverhill, Mass.

At twenty-five, after seven years of almost continual service with the Houston Direct Navigation Company, in various capacities, he entered the street railway work by being elected secretary of the Galveston Street Railway Company. He continued with that company for three years, and at twenty-eight purchased jointly with Col. Sinclair, the stock of the Houston City Street Railway Company, and became its vice-president and general manager. The company at that time owned five miles of track, eighteen cars and forty mules, all in a dilapidated condition. From then until now the active control has been in his hands.

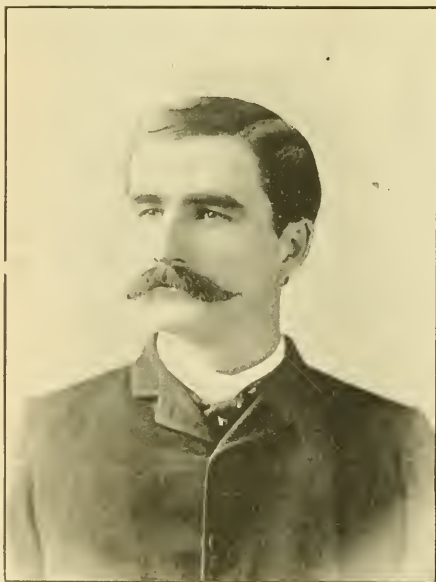
He planned the system and supervised the improvements thus far made, and whatever merit the system has, or success the company has achieved, has been largely due to his devotion to the work entrusted to his hands.

He has been successful at every step of the ladder of life, and has other business connections as well as being director in several corporations. But the street railway is his pride and has received the best part of his time and

in the common schools of his native city, and in Illinois, to which State he removed with his parents at the age of fourteen. His business career may be said to have commenced at the age of seventeen, when he was employed in the paymaster's office of the D. L. & W. Ry., at Scranton, Pa. Returning to Illinois, he was for ten years



C. A. MCKINNEY, SECRETARY AND TREASURER, HOUSTON CITY RAILWAY CO.



H. F. MCGREGOR, VICE PRESIDENT AND GENERAL MANAGER, HOUSTON CITY RAILWAY CO.

energy, and so familiar is he with the details of all departments that whatever the work, executive, clerical, or mechanical, he is at home in all.

C. A. MCKINNEY.

Mr. C. A. McKinney, secretary and treasurer, is of good old New England stock, his father's people having been residents of Massachusetts, and his mother of the well-known Phelps family, of Connecticut. His boyhood days were spent in Brooklyn, N. Y., where he was born on the 19th of April, 1855. His schooling was obtained

assistant secretary of the Illinois Masons' Benevolent Society, one of the first and most successful of the co-operative or assessment insurance companies, in which position he received a good training in all-around office work, and which led to an almost constant service as secretary, or recorder, of the various Masonic and also literary and religious bodies, with which he became connected. In 1885 he went to Nebraska, in which progressive State he was engaged in banking. He was for several years assistant secretary of the American Loan and Trust Company, of Omaha, from which position he went, when the syndicate was formed, in the fall of 1890, to purchase the street railways of Houston, and electrically equip them. Mr. McKinney was selected as secretary and treasurer for the company, and, while street railway business was then new to him, he has not found it difficult to keep the accounts, take in the nickles and pay out the dollars, and is rapidly learning the difference between a mule and a motor.

THERE is now in construction, by George Craddock & Co., of Wakefield, England, a wire cable, 30,000 feet in length, and 30 tons in weight, for the London Tramway Company's new cable line at Brixton. It is expected that the rope will be delivered in a month hence.

NATIONAL ASSOCIATION PLANS.

TO the street railway managers of the country the American Association will do its best to make the exhibit of street railway supplies worth alone the expense and time of inspecting the World's Fair.

To this end the following letter has been sent out to every supply manufacturer in the world, and THE STREET RAILWAY REVIEW urges an early response to the solicitation of the committee.

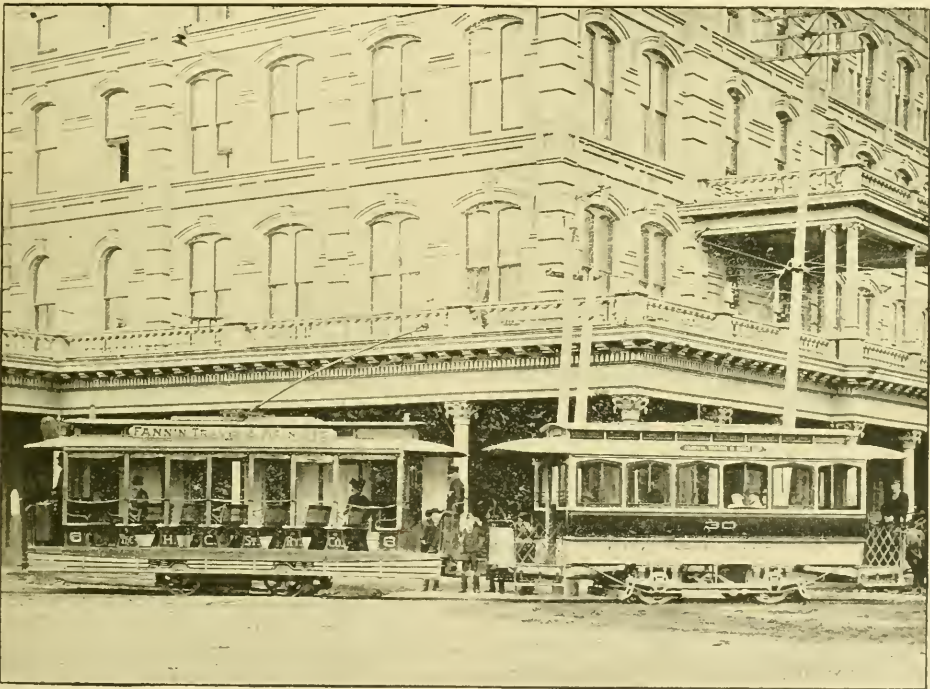
The special committee, appointed by the American Street Railway Association, for the purpose of securing as commendable an exhibit as possible of all that pertains to the street railway business at the forthcoming Colum-

and that devoted to street railways will all be gathered together in one section of the building.

The Exposition will make no charge whatever for space. It will be necessary in estimating the amount of space required, to state just the number of square feet needed for the exhibit, independent of aisle room. A limited amount of power will be supplied without charge.

Exhibits will begin to be received as early as November 1, 1892, and no article will be admitted after April 10, 1893. Complete rules covering the entire subject will be sent on application to Mr. Willard A. Smith, Chief of the Department of Transportation of the World's Columbian Exposition, Chicago, Ill.

Mr. John B. Parsons, vice-president and general man-



THE HOUSTON CITY STREET RAILWAY IN THE BUSINESS DISTRICT.

bian Exposition at Chicago, desires to urge upon you the importance and necessity of making application at once for such space as you will need to make a proper exhibit of your manufactures.

This association has secured fifty thousand square feet, and the allotments of space as to desirability will be made in the order in which applications are received. Unlike any other World's Fair, the management of the Columbian Exposition will arrange the exhibits regardless of nationality, in departments, each comprising all that relates to any particular industry or subject. All, therefore, that relates to transportation will be in one building,

ager of the West Chicago Street Railway Company, has kindly consented to serve the Association as its sub-committee, to advise with Mr. Smith in reference to the exhibit under the auspices of this Association. All applications for space and information in regard to the exhibit should be made to Mr. Willard A. Smith, Chief of the Department of Transportation, for which purpose an envelope, duly addressed, is enclosed.

The committee desires specially, as stated in the outset of this letter, to impress upon you the necessity for immediate action as hereinbefore set forth, should you desire to be represented by exhibits at the Columbian Exposition.

TRAMWAY REGULATIONS IN EUROPE.

LIVERPOOL has the most complicated system of fare and fare-collecting. Every passenger is pressed into service to maintain the honesty of the company's employes. Street car fares range from 2 cents to 14 cents, according to distance. Conductors are required to give each passenger a ticket, in which he punches with a bell-punch one hole for each penny paid. The tickets are printed on a strip of paper rolled and held in a box suspended from the conductor's shoulder. The box contains a separate roll of tickets for each rate charged on the line. The following is printed on the tickets, all of which are alike in the number of punch holes:

"General Notice—This ticket is for two punch holes only. In presence of the passenger the conductor must punch the ticket, one hole for every penny, in accordance with the number of pence demanded for the fare. This ticket is not transferable, and is only available on the trip issued. It must be retained and produced when required, in accordance with the city by-laws."

On the reverse side is the following:

"Tickets for two punch holes only. To be destroyed by passengers after leaving the car. Each punch hole represents a receipt for 1d. only. Passengers are requested to pay no more pennies than for which the conductor punches holes in the ticket, which must be punched in the presence of the passenger."

As a further check on the conductor he must keep a record in plain sight of the number of passengers. This he does by crossing the printed figures on a card fixed to the side of the box tickets or hung at the door; and occasionally along the route this and the number of passengers are inspected by an officer of the company.

Following European custom, the service in Liverpool is to allow only as many passengers as can be comfortably seated. The cars and omnibuses all have seats on top. The carrying capacity is twelve to eighteen inside and sixteen to twenty outside. An act of Parliament requires that each passenger must be allowed at least 17 inches of sitting space, fat or lean.

Drivers and conductors of omnibuses and tram-cars are required to take out a license, for which a fee of 1s. 6d. (36c.) is charged. A metal badge is furnished bearing the number of the license, which is required to be worn while on duty, so as to be plainly visible to the passengers. The fee for a license for a car is 2s. 6d. (60c.). These licenses are required to be renewed annually. No charge is made for renewal.

LILLE, FRANCE.

At Lille, the grant to the company is let for a shorter time than that accorded by the State.

Lyons has granted an extensive right to the General Omnibus & Tramway Company. The consideration is \$16,000 per year in quarterly payments.

The steam trams run on streets at a speed of 5 miles per hour, and less on curves.

The army officials travel at half rates, and where the same company has different lines of cars a transfer ticket is provided for 1 cent extra.

AUSTRALIA.

Our antipodes asseverate that at Melbourne they have the finest line of intramural transportation in the world.

The steam roads in addition to the main lines have spurs running from all suburbs into the center of the city. As there are few grade crossings, and these few well protected by gates, no accidents occur, and a speed of 20 miles an hour is obtainable. The total length of suburban track in the metropolitan area is 94 1-4 miles, with 108 stations, and single trip tickets are sold at 2 cts. per mile, and return tickets at 1-3 to 1-2 additional. Monthly tickets are sold at 60 to 72 cents per mile, and yearly tickets at \$4.80 and \$5.20 per month. During the year ending July 1, 1891, the road carried 35,546,533 people.

Early in the eighties the omnibus lines became inadequate for the growing demand of street traction, and after consideration, the cable was resolved upon as a solution of the problem and the San Francisco system was used as a model.

The cable trams of "greater" Melbourne have been built by the various municipalities into which the suburbs have been erected, under authority conveyed by Parliament, which pledged the credit of the municipalities to the extent of \$8,150,000 in 30 year debentures.

This amount was expended in the construction of the magnificent cable system which was then leased to the Melbourne Omnibus Company, which became in 1883 the Melbourne Tramway & Omnibus Company, and again was augmented by various additional lines.

The "Tramway Act of 1890" consolidated all lines into one directly responsible to the Colonial legislation.

There are at present 41 5-8 miles of double track supplemented by 4 1-4 miles of double track horse-line.

The company has a nominal capital of 2,000,000 shares, valued at \$5.00 per share, with a working capital of \$2,400,000. After complying with all legislative demands the line pays 20 per cent.

To the year ending August '92, the total of passengers carried was 48,043,673, with a gross receipt of \$2,811,260.

The services is in every way satisfactory to people and company.

SOUTH AFRICA.

The only railway service in Africa, although not in the headed scope of our article, deserves mention as illustrating that at some future date the greatest continent will be the field of much interest in all lines of urban and inter-urban traffic.

As yet, Cape Town enjoys the distinction of being the only African tramway center. There is at this place a railway service, local and suburban, as far as Simontown, 22 1/2 miles distant and another steam road is just finished to a populous town on the Atlantic side, 3 1/2 miles distant. The cars are of the English style, lighted by electricity and carry no stoves on account of the climate. Night

and morning, half-hour trips are made and at other times at an hour headway. A station 17 miles out charges for the three classes, 56, 46 and 31 cents. While monthly tickets come at \$10.10, \$8.15 and \$5.47.

There are also two lines of tramways, one operating 5 miles and the other 3 miles, both by horse. The fare is 3 cents per mile and is controlled by distance, as many rates as miles. The municipality make \$125 out of the two franchises and have no voice in the fare question. These lines paid last year, 10 per cent. dividend and 30 per cent. reserved for sinking fund. This 40 per cent. is paid on the capital stock and the bonded indebtedness.

There is no doubt that at no very long time in the future a large field for American brains and capital will be found in the greater Europe.

IN EGYPT.

The "Kicker" ought to be satisfied in this country, as no trolleys, no cable, no horse car disturbs the solemnity of the land of the pyramids. Only the voice of the donkey and his driver are heard in the land and the greatest expense is profanity and 2½ cents to 5 cents per ride.

NEWSPAPER COMMENT.

IN these times of senseless reporters and fire-eating editors, who score the trolley, it is refreshing to find a man who can see the other side, as the Austin, Texas, Daily Statesman seems able to do. Apropos of an unavoidable accident, the Statesman says: "In the majority of cases it has been shown that the motorman was not in the least to blame. In fact, a little observation will show any observing person that the motormen are uniformly careful and watchful, and that they save a hundred accidents every day, where people throw themselves into danger, and take the most unheard of risks. Any one who will take his stand on the avenue for an hour, will see people cross the street directly in front of a car, so near that the motorman has to check his car to keep from running them down; and they do this in spite of the fact that the bell has been clanging its loudest. Ladies in vehicles will lash their horses and drive across the track, when the car is so near that it almost brushes the wheels of the carriage, and the motorman's heart is in his mouth, and he almost ruins his machinery trying to stop the car so suddenly. Newsboys spring on and off the car while it is in rapid motion, risking life and limbs, by every such exploit. Men who are nearing their place of business step off without waiting for the car to slow up, a stone rolling under the foot, or any other trifling accident, may send them under the wheels. As for the children, the little fellows who manage to stray into the streets, it almost seems that some secret evil influence led them straight to the car tracks. A great many people are inclined to look with disfavor upon electric cars because of the accidents. Rather let us bless our lucky stars and the motormen that they are not more numerous; and then let us use a little more common sense in mounting the cars, and crossing the street, and looking after the children."

FOREIGN FACTS.

NEW DEMDAS, Australia, has a tramway well under way.

ENGLISH inventors are trying celluloid grids instead of lead plates for storage battery tramway work.

THE cab drivers and the Amalgamated Omnibus and Tramway Workers' Union threaten an extensive strike which will materially decrease the already small dividends of the companies.

AN electric railway between Naples and Alfredena is projected by O. De Martino and Ludovico Ghirelli, engineers. The overhead system will be used and has received the approval of the provincial technical department.

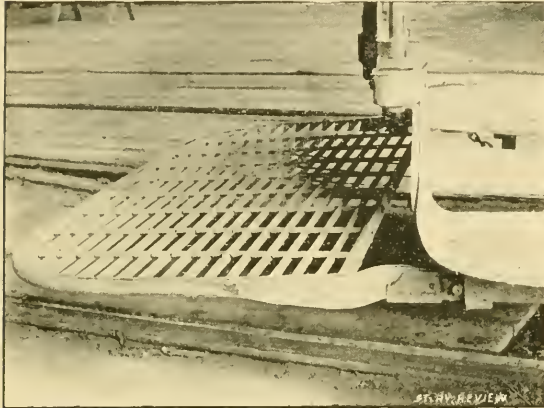
MESSRS. DICK, KERR & Co., London, Glasgow and Kilmarnock, have been entrusted with the reconstruction of the North London Tramways, which were purchased by the North Metropolitan Tramways company. The length of the line is between 7 and 8 miles.

THE Barcelona Tramways Company did not pay dividends for the past year. The increased price of fodder and the serious competition of the Ensanche Company's omnibusses are the assigned causes for the decrease. The omnibus lines used the tracks of the tramway company and justice was so tardy as to be of no practicable benefit.

THE early history of tramways was the subject of discussion at the last meeting of the Tramways Institute of Great Britain. G. P. Bradford, in his paper on the subject said: "The modern tramway was introduced in some metropolitan and provincial thoroughfares by Mr. G. F. Train, who, in 1857, made proposals for laying down tramways on the system originated in Philadelphia. Mr. Train was associated with James Samuel, C. E., but they failed in their object to obtain an Act of Parliament, which was applied for in 1855. In 1880 Mr. Train obtained permission from the Commissioners of Birkenhead to lay down his tramway. He afterwards got consent to put one down between Stockton and Darlington, and lastly was successful in raising a company with the prospect of taking it all through the potteries, a distance of seven miles. Capital was subscribed to the amount of £6,000, and with this a line was made between Hanley and Burslem, 1¼ miles long." The speaker claimed the honor of having invested and laid down, with the assistance and aid of the directors of the street railway of the Potteries, what proved to be the first and only successful groove rail. Eventually the Potteries tramway was sold to the company now in possession. The rail was relaid in 1861, and only here and there was it found necessary to put in new pieces, it was in such fine condition.

THE CLEVELAND LIFE GUARD.

THE device shown here was recently placed upon the market by Thomas L. Johnson, the well-known street railway manager of Cleveland, who is the patentee. It has been given a trial on some of the big eastern roads, and has proven very satisfactory, having been indorsed by the State Railroad Commissioners of Massachusetts, and adopted by one of the Boston rail-



THE CLEVELAND LIFE GUARD.

ways. It is made with a U-shaped frame secured to a cross-bar with a wire screen stretched across the space formed. It is so placed that a person is carried on the guard instead of being pushed along should he be run into or fall between the cars while in motion.

THE NATIONAL FARE BOX.

THE National Fare Box Manufacturing Company, with offices at Room 3, 89 Washington street, Chicago, has put upon the market an improved form of fare box, which merits the close investigation of managers of roads where the receipts do not warrant the employment of conductors.

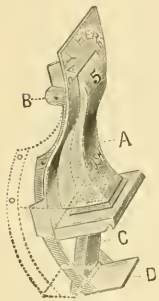


FIG. 1.

The desirable qualities of a fare box are three: strength, security and simplicity, and the National meets these requirements, besides being neat in appearance.

Calling attention to Fig. 1, we see that from the roof of the box hangs an automatic closing door A, on hinge B. When the door is pushed back it discloses the opening of spout C, into which the fare is deposited. At the same time that the swinging door is pushed back, the platform D, which is

attached to the bottom of the swinging door, passes under the lower end of the spout (inside of box), thus disclosing the bottom of the spout at the same moment that the top is uncovered, so that when a coin or ticket is

dropped into the spout it remains there until the swing door is released and falls back into place, by its own weight, over the mouth of the spout; and at the same moment the platform, being attached to the door, swings from under the spout, and the coin or ticket drops to the first dump or hopper.

It is easily seen, therefore, how impossible it is to withdraw the fares, as it is so arranged that either the top or bottom of the spout through which the fare passes into the box, is always closed, thus entirely preventing the use of the "snake," or any other similar instrument.

It also prevents dust from accumulating in the box, an item that will be much appreciated. There are but two drops, simply constructed and easily operated.

The cash drawer at the bottom of the box is supplied with a double bar Yale lock, bolting the drawer on each side. The key cannot be taken out of the

drawer until it is locked, which will guard against leaving it unfastened. By opening this drawer, and removing a screw, the glass and frame in the front part of the box can be taken off, the drops taken out, and the box easily cleaned.

There is a gong on the box, which rings when the swinging door is pushed back to deposit a fare, thus attracting the attention of the driver from the outside of the car, when he wishes to notify the passengers to pay their fares.

The fare box is 6½ inches wide by 22 inches high.

It weighs less and takes up the least amount of room of any box made, and is absolutely waterproof. The front and back are beveled plate glass, and all metal parts are nickel plated, or lacquered to suit purchaser.

Figure 4 shows an interior. Figure 2 the passenger's view, and Figure 3 the device on the top for locking the box when the car is going the opposite way, thus preventing the claim of passengers "paying at the other end."

There are eight prominent car builders and twenty-five roads already using the box, and the best results have attended its use.

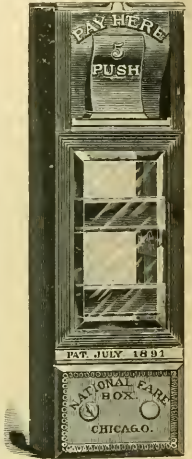


FIG. 2.

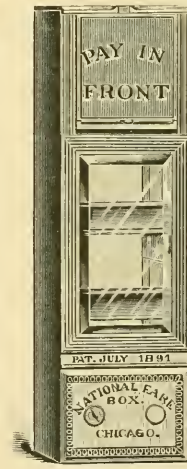


FIG. 3.

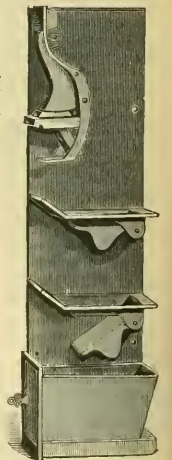


FIG. 4.



Complaint has been made to the Board of Health by an anonymous writer, who said that the Eighth Avenue Railroad Company ran open cars on cold and rainy days, and all night. He said he had got a severe cold from waiting in the street for a closed car at one o'clock in the morning.

Now let some samaritan interdict summer underwear, and straw hats, until June, and prohibit "hanging up" ulsters early in the season, and Dr. Edson will have his hands full.

The rapid transit commission has heard business men, school teachers, preachers, common people, engineers, and everybody express themselves on the tunnel question, and all but the engineers favor surface or elevated transit.

The syndicate controlling the Broadway, Seventh avenue, Sixth and Ninth avenues, and Avenue C surface railroad routes, are branching out in other directions, and propose to cobweb the city with their lines. Already they are getting the consent of property-owners to the extension of the Ninth avenue line, so that a branch may run from Sixty-seventh street, on Columbus avenue, to One Hundred and Tenth street, and then west of Riverside Park, crossing the present tracks of the Ninth avenue line in Amsterdam avenue. Passengers coming down from below One Hundred and Twenty-fifth street, on the Ninth avenue line, will be transferred to the Seventh avenue cars, at Fifty-ninth or Fifty-third streets, over a line to be built for the purpose. Only one fare will be charged, and electricity will probably be used. There may also be built a road through Lenox avenue to the Harlem.

Cable construction on the Third avenue line to Chatham square must be completed by July 15. That is the order that Public Works Commissioner Gilroy has issued to President Albert J. Elias, of the Third Avenue Railroad Company.

A Brooklynite says: Contractor Frederick Lisk has a small army of men hard at work upon Flatbush avenue. They are macadamizing the south and north sides of the street, and laying the middle with Belgian blocks. The City Railroad Company are also hard at work, laying new rails, and the men say that they hope to see the trolley running by the middle of September.

The Brooklyn City Railway Company commenced two

weeks ago the work of building the Richmond Hill extension to the Myrtle avenue line, and it has since pushed the work to completion.

The reports that the Metropolitan Traction Company has made an offer for the purchase of the control of the Manhattan Elevated Railway, have been denied by President Crimmins.

President Crimmins, of the Metropolitan Traction Company, has issued a new rule which requires all conductors to report for duty, after May 29, in a new uniform of navy blue cloth. The suits and caps cost \$17.

The trial trip of the Third avenue line of the Brooklyn City, was made May 20, and opened for business the following Monday.

The new cars are similar to those operated on the Second avenue line, both in color and general make, but they will seat several times as many passengers. They are from the manufactory of the J. G. Brill Company, of Philadelphia, of a dark olive-green color, with ten reversible seats apiece; stained glass panels and polished copper trimmings. Each car will be equipped with two twenty-five horse-power, waterproof motors of the Thompson-Houston make. They are thirty-four feet over all, and will accommodate sixty passengers. The Second avenue electric cars have each two motors of but fifteen horse-power apiece.

In the power house now used are located four engines and sixteen generators. Each of the latter have 400 horse-power. All machinery is arranged in duplicate, so that, in case of a breakdown, no delay will be suffered. The boilers are capable of developing 1,600 horse-power, without trouble, and to each is connected a 500 horse-power battery. Fifty-five new cars are under way in the company's shops.

The new station, which will be a short distance in the rear of the one now in use, will be a substantial structure, 100x104 feet. It will stand on a granite and concrete foundation, with a chimney 200 feet high, and an inside diameter of 12 feet. Beyond will be constructed a bulkhead 100 feet wide and 700 feet long, and a pier privilege, still further ahead, of 400 feet, all of which will be used for landing supplies and loading. In this projected structure, engines capable of developing 800 horse-power will be placed. The entire plant will cost about \$600,000.

Alexandria and Mount Vernon are soon to be connected by the trolley. Contracts for the construction and equipment of an electric road between the two points were let, recently, by a syndicate of Philadelphia capitalists, to Henry Ward Leonard, of New York. The price for the entire work and equipment is \$190,000, and work will begin at once, with the intention of having the line in operation in early fall.

The North Second Street Railroad has been sold at auction, by Taylor & Fox, in pursuance of a foreclosure granted by the Queens County Court, on December 23, 1891, obtained by Henry D. Donnelly and John Englis, as trustees for the bondholders. The road was knocked down to Donnelly and Englis for \$200,000.

The sale included the franchise and the entire property of the road.

To provide rapid transit to New Jersey suburbs, Austin Corbin, Gen. Stone, et al, have a tunnel scheme, and ask grants of the council to that effect.

The project is to construct a four-track tunnel, beginning at the Hackensack Meadows, passing under the Erie Railroad, descending at a grade of 1 per cent., or fifty feet to the mile, running under Castle Point and under the Hudson river at a depth of 125 feet from the surface, to Fourteenth street, New York. here the tunnel will branch, the main tunnel passing under Fourteenth street to Union Square, and the branch, with two tracks, passing southward under Hudson street to Chambers, and continuing in the same line at a depth of about 100 feet to a terminus under Broad street, near Wall. A four-track road is proposed to Union Square, making the distance of this main tunnel three and five-eighths miles. The length of the proposed two-track road is two and one-half miles.

General Stone gives these figures:

An approximate cost of the undertaking estimates \$2,000,000 per mile for the three and five-eighths miles of four-track line, including intermediate stations, or \$7,250,000 for the main tunnel. He estimates that the two-track tunnel, for business down town, will cost \$1,000,000 per mile, for two and one-half miles, or \$2,500,000. The cost of the passenger station at Union Square is put at \$900,000, the baggage station at \$300,000, the terminal yard east of Union Square at \$3,700,000, the land for the western terminus in New Jersey at \$200,000, the station at the western terminus \$150,000, and for engineering and contingencies \$1,500,000, making a total of \$16,500,000. Elevators are included in this estimate, but not electric lighting or power plant. There will need to be elevators at every station, since trains will be 100 feet below the surface.

Electric locomotives are mentioned as the power to be used. The managers of the scheme, as well as General Stone, are enthusiastic.

A VILLAGE IN A NIGHT.

WE often hear of the advent of a steam road causing a phenomenal growth in a new country and acting as the lever to raise a town in a day. The electric road in Oakland, California, however, according to report, has furnished the reason why an adventist's village grew up in a single night at Bushrod Park, erst a houseless wilderness.

The village was composed of tabernacles, where the brethren temporarily sojourn and carry on the necessary business for a village of 2,500 people.

Electric lights were strung and the prophets and prophetesses joined in a meeting the next night.

The electric road furnishes near transportation and the town is supposed to be sufficiently removed from the wiles of the Gentiles, freight, at the unseemly and crowded hours of the rush trips will be carried for the convenience of the traveling public.

A DREAM.

BY LYTTLETON L. BAKER.



Dreamt I was a tramway horse,
Or a street car horse, alas;
I thought as horses think, of course,
And wished I were an ass.
To dream you are a horse, ah, that
A nightmare is, indeed—
A mare that runs through all your
fat
And leaves you like a reed.

Near the big car I daily drew,
Small felt I as a mouse.
Why must a horse, his whole life
through,
Haul after him a house?
I thought that all the folk who got
Into the mighty car
Were friends, who joyed to see
me trot
With them both fast and far.

They seemed to love to break my
back,
Which patiently them bore.
How large the crowd! How long
the track!
And I so sick and sore!
To mock me, oft they decked my
head
With boughs of green, as though
I were a lively Arab steed
In Mr. Barnum's show.

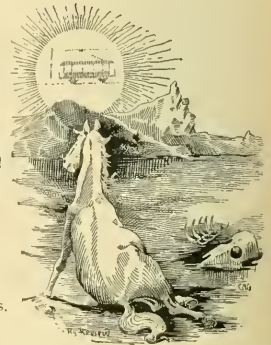


Well, well, I thought, my spirit
soon
Will gallop glad and free
To verdant meadows in the
moon,
Where all dead horses flee.
Upon my back the kind Man in
The Moon will sometimes
jump.
My ribs, now pointed like a pin,
Will then be sleek and
p'ump.



And dreaming of these pastures
rich,
I woke to hear with joy
About the trolley system which
No horses would employ.
O jolly trolley system! O!
Poor beasts with stomachs slack!
'Twill fill ye with delight to know
Ye soon will get the sack!
'Twill be a better sack to ye
Than any sack of corn.
May dying horses live to see
The light of trolley morn!

—New York News.



THE New England Electric Club will open and dedicate its new club house, at 14 Bosworth street, Boston, May 25.



The first car of the Calumet Electric Street Railroad has been run over the line connecting with the cable at Seventy-first street, and South Chicago is now in communication by street railway with the rest of the city. Cars will be run every ten minutes Sundays and every fifteen minutes daily. The route of the line is from Oakwoods Cemetery, Brookline Park, Seventy-first street and Cottage Grove avenue, down Cottage Grove, through Grand Crossing and Dauphin Park to Burnside, at Ninety-third street, and on Ninety-third street, through Stony Island and Calumet Heights to South Chicago, the terminus being the Illinois Steel Company's shops.

It is likely that Maj. McClaughry will resign his position as superintendent of Police, having been offered the superintendency of the proposed Metropolitan Elevated Railway, which is to be operated on the West Side.

It is said the salary offered amounts to \$7,000 for the first year and \$12,000 annually thereafter, when the road is in operation.

The South Chicago Electric Railway is building a line up Yates Avenue, destined to enter the Exposition grounds at the southeast corner which will accommodate a large per cent. of the city visitors from points south and southeast of the grounds.

Work on the Michigan avenue loop is now finished. The new underground yokes weigh 437 pounds each as against 125 pounds each for the old pattern. Rails of the Johnson pattern, having a depth of seven inches and a weight of eighty-five pounds to the yard, are used. The old rails weigh only seventy-eight pounds to the yard.

The Grand Crossing & Windsor Park Street Car Company have now a franchise before the council, which they wish passed, on 75th street from the lake to the Illinois Central Railroad.

Inspectors have at last found the missing register on the City Railway. The number of the lost one was known. Conductor Arbaugh, who was using the register, was arrested, and when the news got out there were several resignations between sundown and sunrise.

May 20 was a great stock day in Chicago. West Chicago Street railway stock sold as high as 148.

North Chicago City Railway sold as high as 196 $\frac{3}{8}$ to 196 $\frac{1}{2}$. The prediction was freely made that West Chicago would reach easily 175 before summer and North Chicago 200. In all lines a great advance was made, Alley "L" going up nearly 2 points, from 106 to 107 $\frac{1}{2}$, at which price 100 shares changed hands. Lake street "L" stock was worth 25 to 26.

PERSONAL.

JOHN SCULLIN, the prominent railroad man of St. Louis, was a Chicago visitor last week.

JOHN PEARCE, Secretary of the Sioux City, Iowa, Cable Railroad Co., visited Chicago last month.

C. A. BENTON, of the Sprague Elevator Company, 15 Wall Street, New York, was a Chicago visitor last week.

W. FORMAN COLLINS, 347 Rookery, Chicago, Western Manager of the Electrical Engineer, left for Europe last week.

PROFESSOR D. C. JACKSON, of the State University of Wisconsin, was in attendance at the electrical association last week.

GEORGE RANK, oberigeieur der k. k. Oster Staatsbahn, Austria, is in the city. The gentleman is a very prominent Austrian engineer.

E. J. WESSELS, of the Short Electric Company, and located in the Mill's building, New York City, called at the REVIEW office during the month.

A. E. HAY, President of the Robinson Machine Company of Altoona, Pa., was a June visitor in Chicago, and incidentally a caller at the REVIEW office.

CHAS. M. BARCLAY, formerly of the Stearns Manufacturing Company, is now with the Railway Equipment Company, and still will make Chicago his home.

ROBT. L. FITZGERALD and others have filed applications for a new electric road in San Francisco, a second application for a Broadway and Third for a Berkeley road.

H. H. WINDSOR, editor of THE STREET RAILWAY REVIEW, accompanied by his wife, is making a two months' trip inspecting the railway systems of the Pacific coast.

LOUIS E. ROBERTS, of the Lewis & Fowler Company, spent a few days recently in Chicago. Mr. Roberts is one of the most genial of the profession, and has well earned his success.

FRANCIS W. CROCKER, professor of electrical engineering at Columbia College, New York, and also of the Crocker-Wheeler Electric Company, was attendant on the June electrical meeting.

F. G. L. HENDERSON, Superintendent of the Newton Street Railway Co., (Newton, Mass.), has been elected secretary and treasurer of the Massachusetts Street Railway Superintendent's Association.

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

JOHN G. HOLMES, PRESIDENT, Pittsburg, Pa.
 THOMAS H. McLEAN, FIRST VICE-PRESIDENT, New York, N. Y.
 JAMES B. SPEED, SECOND VICE-PRESIDENT, Louisville, Ky.
 ALBION E. LANG, THIRD VICE-PRESIDENT, Toledo, O.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE-PRESIDENTS, AND HENRY M. WATSON, Buffalo, N. Y.; LEWIS PEBRINE, JR., Trenton, N. J.; W. WORTH BEAN, St. Joseph, Mich.; MURRY A. VERNER, Pittsburg, Pa., and THOMAS C. PENNINGTON, Chicago, Ill.

Subjects for Discussion and Committees Appointed to Report Thereon.

"Power-House Engines."

T. W. WRENNE, President United Electric Railway, Nashville, Tenn.; L. H. McINTIRE, Engineer, Harlem Bridge, M. & P. Railway, New York; F. S. PEARSON, Chief Engineer, Electrical Department West End Street Railway, Boston,

"Relative Cost of Operation of Horse, Cable and Electric Roads."

WM. Mc C. RAMSEY, Electrical Superintendent Federal St. & P. V. Passenger Railway, Pittsburg, Pa.; F. R. GREENE, Secretary Chicago City Railway Company, Chicago; JOHN L. HEINS, Superintendent Brooklyn City & Newton Railroad, Brooklyn.

Next meeting will be held in Cleveland, O.

Massachusetts Street Railway Association.

President, CHAS. B. PRATT, Salem; Vice-Presidents, H. M. WHITNEY, Boston, AMOS F. BREED, Lynn, FRANK S. STEYENS; Secretary and Treasurer, J. H. EATON, Lawrence.

Meets first Wednesday of each month.

Ohio State Tramway Association

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice President; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus, Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice President, THOS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BALFOUR, Trenton; Executive Committee, OFFICERS and C. B. THURSTON, Jersey City; H. ROMLINE, Paterson; LEWIS PEBRINE, JR., Trenton.

The Street Railway Association of the State of New York.

JOHN N. BECKLEY, PRESIDENT, Rochester, N. Y.
 THOS. H. McLEAN, VICE PRESIDENT, New York, N. Y.
 GEO. LAW, SECOND VICE PRESIDENT, New York, N. Y.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—D. F. LEWIS, Brooklyn, N. Y.; C. DENSMORE WYMAN, New York, N. Y.; CHAS. CLEMINSIAK, Troy, N. Y.
 The next meeting will be held at Saratoga, September, 20th, 1892.

Arkansas.

HOT SPRINGS.—There is talk of extending the Center avenue line to Oak Lawn Park.

Alabama.

MOBILE.—The new electric railway will be in running order by the middle of July. The band stand and other improvements at Monroe place are nearly completed.

Work upon the Marine Street Electric Railway has been commenced, and the line will be extended to the bay shore, where the company will fit up a beautiful park.

Twenty of the car mules of the street car stables have been killed on account of glanders.

The Mobile Electric Street Railway Company have placed the poles along the line, and are now waiting for shipments of iron to arrive.

MONTGOMERY.—The Cloverdale Electric Street Railway Company have nearly completed their lines, and are in hopes that cars will be running by the last of the month.

California.

FRESNO.—Marcus Polasky has been granted a franchise for fifty years, to operate an electric street railway line.

OAKLAND.—The East Oakland Street Railway Company have asked for a franchise on Ninth street.

The City Council have granted the Piedmont Cable Company a franchise to Washington street, from First to Eighth street.

SAN FRANCISCO.—The Henson Steam Motor Company has been incorporated. Capital stock, \$5,000,000.

Canada.

HAMILTON.—The dynamos and engines are placed in the power house, and cars are expected to be running soon.

PETERSBOROUGH.—Negotiations with the Edison Company are still on, and it is thought they will build an electric line.

MONTREAL.—The syndicate that controls the Cleveland, Cincinnati, and Toronto Street Railway have acquired a controlling interest in the Montreal Street Railway.

Colorado.

DENVER.—The Patton motor has been given a trial on the Denver, Lakewood & Golden Railway, and proved very satisfactory. It is reported that several will be ordered and placed on the line.

THE West Denver tracks of the Denver City Cable Railway company will be completed and the line in operation in a few days.

THE Tramway company is building a line from Twentieth street to Seventeenth street.

THE new Elyria electric line of the Tramway company, it is stated, will be completed in thirty days.

A NEW company filed articles with the Secretary of State, for an incorporation, to be known as the South Side Railway Company. The line will run from Denver to Fort Logan.

THE Denver Tramway Company opened out on the first day of the first summer month with a new system of work for its operative. The hours of labor of the employes have been reduced to nine hours per day.

HAYDEN.—It is reported that J. B. Ormon has secured the contract for building the Midland's Cripple Creek branch from Hayden.

Dakota.

GRAND FORKS.—The Grand Forks Electric Street Railway Company has been granted the right to put in an electric system.

Delaware.

WILMINGTON.—The Wilmington City Passenger Railway Company has been granted permission to build a new electric line on Eighth street from Market to Church.

STOCK of the Wilmington City Railway Company has advanced \$5.00 per share within the past ten months. Good business-like management did it.

Georgia.

ROME.—Work has already begun on the new electric street car line. The cars will be running by July 1. The new line will cost over \$100,000 when completed.

Illinois.

AURORA.—The electric street railway company contemplate purchasing the Montgomery farm and making it into a fine park, and extending their line to the entrance.

BLOOMINGTON.—The Citizens' Railway Company have been incorporated; capital stock, \$100,000. Incorporators, John McNulta, U. E. Howell and J. T. Snell. Within ninety days the company will have completed the double track loop, and cars will be in operation over the new tracks.

EAST ST. LOUIS.—The high water did not affect the schedule running time of the East St. Louis Electric Railway in the least.

FREEPORT.—Representatives of Eastern capitalists have an option on the Freeport street car line, and it is thought the bargain will be closed.

HARVEY.—The Harvey North Side Street Car Company have been incorporated; capital stock, \$30,000

MONMOUTH.—The Monmouth Motor Street Railway Company will soon begin work on their new line. The power will probably be electricity.

PEORIA.—The mules have been given a holiday on the Fort Clark Street line, and electric cars are making regular trips.

ROCK ISLAND.—The Davenport and Rock Island Electric Railway Company contemplates building additional track facilities in the vicinity of the ball park.

STERLING.—Howland & Ellis, of Boston, forfeited \$5,000 for non completion of an electric street railway. Work was begun two years ago

SPRINGFIELD.—T. C. Hughes, chief engineer of the proposed St Louis and Chicago Electric Railway, was recently in the city and expressed himself to the effect that work would be commenced on the line at once.

Indiana.

COLUMBUS.—A company headed by Joseph F. Gent, has been organized with a capital of \$50,000, to build an electric railway.

EVANSVILLE.—Work is being pushed on the Evansville Street Railway Company's new electric plant, and it is thought they will have cars running before the first of August.

FORT WAYNE.—Work has been commenced on the belt line and it is hoped to have the electric cars running by August 1st.

INDIANAPOLIS.—The Citizen's Street Railway Company have been given a franchise to the state fair ground. This franchise covers about the same route as the franchise given to the Broad Ripple road. A large force of workmen are now at work on the extension for the Citizens' line.

JEFFERSONVILLE.—At a meeting of the directors of the Jeffersonville City Street Railway Company, Eugene Frazier was elected general manager. N. H. Myers has filed suit against the old company to recover \$750 for services as treasurer.

Iowa.

DUBUQUE.—The United States Court has appointed Horace Poole receiver for the Allen & Swiney Electric Railway of this city.

INDEPENDENCE.—C. W. Williams, the famous horse breeder, has closed the contract for the engines and boilers for the electric line to be delivered June 15th.

IOWA CITY.—The Iowa City Electric Street Railway Company have surrendered to the city their franchise granted a year ago. This leaves the city free to negotiate with other parties for an electric line.

OSKALOOSA.—A company proposes to build an electric line from the town of Beacon to the town of Carbonado, passing through this city, making about 5 miles in all and ask the city to donate \$5,000.

SIoux CITY.—The cable for the extension of the cable line is now in running order.

It is safe to say that \$5,000 will cover all the damage done to the Sioux City Street Railway Company by the flood.

WATERLOO.—Whitney and Sedgwick are making an effort to gain control of the street railway in this city.

Kansas.

LEAVENWORTH.—H. Piper, Samuel Tate, Jr. and M. J. Buckingham have commenced foreclosure proceedings against the Leavenworth Rapid Transit Company to recover \$150,000 on a mortgage which encumbers all the rolling stock, appliances and road bed.

Connecticut.

DANBURY.—The Danbury and Bethel Street Railway has been purchased by Thomas Waller, who represents a syndicate which is buying railway lines throughout the country.

NEW HAVEN.—The two big engines for the West Haven Electric Railroad are being placed and will be ready to start in a few days.

NEW LONDON.—The street railway company are endeavoring to secure power for an electric line.

NORWICH.—Work on the Norwich Street Railway line is being pushed. The Ponemah mill will furnish the power delivered at Taftville.

Maryland.

BALTIMORE.—The new electric railroad, from this city to Pikesville, will be running about July 1.

At a general meeting of the stockholders of the Baltimore Traction Company, the executive committee was empowered to make arrangements for the use of electric power on all the company's lines not cabled, or being cabled.

The Curtis Bay Electric Railway is completed, and now open for business.

The track on the Central line is completed, and cars will be running in a few days.

The Baltimore Traction Company now owns, actually and prospectively, 60 miles of rapid transit lines in this city.

Baltimore Traction Company filed a mortgage recently for \$1,700,000, to the Mercantile Trust and Deposit Company. The money is to be used to equip the Frick lines with electricity.

The Baltimore City Passenger Railway Company are building two new power houses.

Work on the Gilmor street power house is nearly completed. All the heavy machinery on which the cable will run has been placed, and the engines are ready for work.

Massachusetts.

AMESBURY.—The much-talked-of Haverhill and Amesbury Electric line has at last taken form. The track will be laid at once, rails having been ordered.

BARNSTABLE.—The Cottage City Street Railway has been sold to W. A. Boland, the recent purchaser of the Prospect House and Prospect Heights. He will build a road to the New York wharf and extend the line of track to the Prospect House.

BLACKSTONE.—The same people that signed a petition to compel the street railway to water their tracks or take up their rails within thirty days, have now signed another petition to modify the first one. The street car company discontinued the service and allowed walking for two weeks. The order was revoked.

NATICK.—The Natick Electric Street Railway Company has been granted a franchise to extend its lines into South Framington. Work will commence at once.

NEW BEDFORD.—The capital stock for the Hatherly Electric Railway is to be \$60,000 and all has been subscribed.

WAKEFIELD.—The Wakefield and Stoneham Street Railway Company have applied for a charter.

WALTHAM.—The Newton Street Railway will our allow firemen to ride free when they are responding to an alarm.

WORCESTER.—The directors of the Worcester-Leicester and Spencer Street Railway Company have declared a 3 per cent. dividend to the stockholders' bonds on the earnings for 7½ months.

Michigan.

BAY CITY.—It is rumored that the West Bay City Electric Railway Company will endeavor to secure the right for building an electric railway system in this city.

BATTLE CREEK.—The railway track is now laid toward the lake to the city limits, and the cars are running.

BELDING.—The Belding Street Railway & Improvement Company has been incorporated with a capital of \$20,000.

LANSING.—Gordon McDonald, of New York, has been appointed receiver for the Lansing City Railway Company.

DETROIT.—The following officers have been elected by the Detroit & Belle Isle Street Railroad Company: President, James H. Vhay; secretary, N. W. Goodwin; treasurer, E. S. Heineman.

The Fort Wayne & Elmwood Street Railway Company will hereafter be known as the Fort Wayne & Belle Isle Company.

The Washington Trust Company, of New York City, have brought suit against this city. The Washington Trust Company holds the mortgage on the plant of the Citizen's Street Railway Company, and is trustee for the holders of \$3,000,000 of bonds.

KALAMAZOO.—Indications look bright for an electric line to take the place of the old horse car line.

MARQUETTE.—The street railway company's return circuit has been laid, and cars will be running in a few days.

MUSKOGON.—The contract for building the new car barn has been awarded, and work will be pushed at once. The building will be brick, and is 177x87 feet in size.

NEGAUNEE.—The Negaunee & Ishpeming Street Railway & Improvement Company has been incorporated with a capital of \$100,000.

PORT HURON.—The common council has granted a franchise to the City Railway Company to construct and operate a street railway.

PONTIAC.—The common council of this city has granted a franchise for a street railway from Pontiac to Orchard Lake.

ST. JOSEPH.—The much-talked-of sale of the St. Joseph Street Railway plant, to the English syndicate, is declared "off." The St. Joseph company will proceed to complete its line.

Minnesota.

DULUTH.—Work has been commenced to connect Superior and Duluth by a street railway line. A ferry boat will be used to transfer passengers temporarily.

MINNEAPOLIS.—Judge Kelley has decided that the Combination Steel & Iron Company has a lien on the Fourth street and Shelby avenue cable line for \$3,340.57. The lien is for a balance due for material in 1887.

The electric line to St. Louis Park will soon be in operation.

The Minneapolis Street Railway Company have taken out permits for the addition of another story to the supply house, at Blaisdell avenue and Thirty-first street, at a cost of \$3,000, and alterations to the Lake Harriet pavillion, whereby the entire structure will be enclosed in glass, at an expense of \$1,800.

It is rumored that the City & Suburban Railway Company, and the East End Dummy Line Company, will consolidate.

ST. PAUL.—Work is nearly completed on the new St. Paul & White Lake Railway. The power house is complete, and traffic will be opened in a few days.

Maine.

BELFAST.—Work on the Rockland, Camden & Thomaston Electric Railroad is well under way. The line will be about nine and one-half miles long.

New York.

BATH.—The Belfast Electric Street Railway is now a surety, and work will be commenced at once.

BUFFALO.—Engineers have been surveying for an extension of the street railroad on Spring street and work of laying rails is commenced.

BROOKLYN.—The long fight for control of the Brooklyn Elevated Road has ended and new directors have been elected. General Manager Martin has tendered his resignation.

The North Second Street Railway was recently sold at public auction for \$200,000. The sale was made on a judgment of foreclosure. The company will be reorganized immediately.

The conductors on the following lines recently appeared in new uniforms on the same day: The Broadway, Sixth, Seventh and Ninth avenue lines, University place and Spring street, Duane street and Avenue C, and all the Metropolitan cross town lines.

FONDA.—Fonda was apportioned to raise \$5,500 of the capital stock of the Cayadutta Electric Railroad Company. \$10,500 has so far been subscribed.

FORT EDWARD.—The street railway company have petitioned the railroad commissioners asking that the street railway be extended from its present terminus at East street to the Opera House.

JAMESTOWN.—The Jamestown Electric Street Railway Company has expended this spring about \$55,000 in the way of more thorough equipment of the plant. The company has also purchased some land adjoining its present power house on which will be erected a new car barn at a cost of about \$5,000.

HAMBURG.—The proposed electric road from this village to Buffalo will be 8½ miles in length, and cars will be run every thirty minutes.

NIAGARA FALLS.—The Niagara Falls Railroad Company, 6 miles long, with a capital of \$300,000 in a new scheme for the "Falls."

OLEAN.—Work of changing the street railway to an electric line will be completed August 1.

ROCHESTER.—The several street railway lines of Rochester carried 124,734 passengers on Decoration Day. The record was broken by nearly 50,000.

TONAWANDA.—The Board of Trustees of this village have granted a franchise for another electric railway. D. F. Callahan is president of the new company.

New Jersey.

BLOOMFIELD.—There is some talk of electricity for the cross town railway to Orange.

JERSEY CITY.—Plans have been submitted to the President of the Jersey City & Bergen Railway Company, for a new power plant house to be built of brick, 164 feet long by 110 feet.

MANCHESTER.—The Massabecic Horse Railway Company has, with one exception, re-elected its old board of directors, with Gust Foster, president. The building of a road to the lake is talked of.

NEWARK.—The City Council of Newark have passed an ordinance regulating the speed of cars through the city.

Nebraska.

NEBRASKA CITY.—The Street Railway line will soon be operated by electricity.

AKRON.—There is much talk of an electric line to run between Akron and Silver Lake.

CANFIELD.—W. T. Williams has been elected president and general manager of the Mineral Ridge & Niles Electric Railway.

CHILICOTHE.—The new company that recently bought the Chilicothe Street Railway, will put in electric motive power and generally improve the road.

CINCINNATI.—The C. H. & D., Railroad are going to build an electric line to run from the new depot, with baggage and freight transfer.

THE Consolidated Street Railroad Company is building a car barn at Gilbert and Woodburn Avenues to accommodate 100 cars.

THE Mt. Auburn electric line is busy laying a double track from St Bernard to Carthage, having just completed one to the former point. They will have half a dozen more new cars in operation in a few days.

Ohio.

COLUMBUS.—The Columbus Street Railway Company has ordered trucks and motors for twenty new cars, which are to be delivered within sixty days. When the new cars are received there will be only three minutes between cars on High and Long Streets. On the other lines every six minutes instead of nine, as now.

WORK will be commenced within thirty days on the Columbus & Westerville Electric Railroad.

THE Leonard Avenue Street Railway Company have asked for a franchise to build five miles of electric road.

ARTICLES of incorporation of the Columbus & Magnetic Springs Electric Railway were filed with the following named incorporators: E. R. Hotsenpiller, D. C. Kilbury, J. E. Newhouse, W. M. Warren and Solomon Hill.

PAINESVILLE.—The Painesville & Richmond Street Railway Company have been granted a charter for a single track road.

PUT-IN-BAY.—The new electric railway at this place will soon be completed. D. Atwood is superintending the construction of the road.

SPRINGFIELD.—The Citizens' Street Railway Company have petitioned the city council to extend their franchise twenty-five years and to allow them a straight five cent fare. They agree to equip their fifteen miles of track with electricity and make it into a first class line.

YOUNGSTOWN.—An effort is being made to secure the right of way for the extension of the Youngstown Electric Railway to Girard.

F. WAYLAND BROWN, of Cleveland, succeeds Wm. Cornelius as manager and treasurer of the Youngstown Electric Street Railway.

Oregon.

ALBANY.—The Albany Street Railway Company has definitely decided to change its horse cars for rapid transit.

ASTORIA.—The new electric line recently opened in Astoria is three miles long. Two and a half miles of the road is built on a foundation of piles and the cars travel for that distance over the waters of the bay.

PORTLAND.—It is reported that five street railway companies here have consolidated through the Rollins Investment Company. The deal includes the City & Suburban, Metropolitan, Multomah Railway, Portland & Fairview, and the Waverly & Woodstock lines.

A STOCK company with a capital of \$1,000,000, has been incorporated. The object is to operate an electric railway in Vancouver.

Pennsylvania.

ASHLAND.—A charter has been granted for an electric road which will start at Mahoney City and run to Pottsville and connect with the Tam aqua & Pottsville.

THE Tamaqua & Pottsville Electric Railroad has been chartered with a capital stock of \$120,000. The charter is limited to a term of 999 years with a route covering 20 miles. It will run from Tamaqua through several towns into Pottsville.

BLOOMFIELD.—The Bloomfield Street Railway Company, capital \$12,000, have been granted a charter to build an electric road.

CHESTER.—The stockholders of the Chester and Media Electric Railway Company have elected the directors. At directors' meeting officers were elected and given authority to commence work at once.

COLUMBIA.—The Columbia & Marietta Electric Railway Company has been chartered with a capital of \$50,000.

ERIE.—Work has been commenced by the Erie Motor Company upon their new power house. It will cost \$6,000 and have a capacity of fifty cars.

GETTYSBURG.—The Philadelphia & Reading Railroad Company have secured control of the Gettysburg Electric Railroad. As the road touches the "Reading" at Harrisburg and then runs around the battle ground, touching the "Reading" at Gettysburg, it can be made very profitable.

HARRISBURG.—The ordinance passed by the town council, granting the right of-way to the electric railway company, will be accepted.

A CHARTER has been granted to the Harrisburg & Mechanicsburg Electric Railway Company. Capital stock, \$75,000.

LEWISTOWN.—The Lewistown & Bellefonte Electric Railway Company has been incorporated, with a capital of \$100,000. W. P. Stevenson, of McVeytown, is president.

MT. PLEASANT.—The Uniontown Electric Street Railway has renewed operations, after an idleness caused by the burning of the power house.

PITTSBURG.—The Penn Street Railway Company, of Pittsburg, have been granted a charter for an electric road. The capital stock is \$80,000.

AN ordinance has been prepared and presented to the council, asking for a tax of \$50 on the electric and cable cars.

The Second Avenue Traction Company are running cars on the new branch line on Greenfield avenue.

STUBENVILLE.—There is talk of joining this city with Mingo Junction by an electric railway line.

SOUTH BETHLEHEM.—The Catasauqua & Northern Street Railway Company has been incorporated. Capital stock \$30,000.

South Carolina.

WILMINGTON.—The following officers have been elected by the board of directors of the Wilmington Electric Street Railway Company: Chas. A. Lieb, president; John H. Barnard, vice-president and general manager; C. W. Heiskell, superintendent.

Tennessee.

MEMPHIS.—Magnolia Park, on the City & Suburban Line, will have an opera as a summer night attraction, and a number of improvements will be made by the road to improve traffic.

CHATTANOOGA.—The Chattanooga Electric Railway will make improvements which will amount to about \$300,000. It is the purpose of the company to extend the St Elmo branch to Blowing Springs. The Harrison avenue line will be completed, and the citizens of the north-eastern part of the city will be given accommodations to and from the city. The Cowart street line through South Chattanooga will also be completed, as will also the Carter street line.

Texas.

NAXAHACHIE.—The stockholders of the Lake Park Street Railroad have elected directors. This road has been in operation about six months and is making a handsome profit.

Utah.

SALT LAKE CITY.—T. P. Murray has had the Deep Creek franchise amended, allowing him to build the Penitentiary road, running south to Garfield Beach.

CONSENT of the property holders has been obtained and the franchise for the Salt Air Railway Company allowed. They will build along West Boulevard.

J. B. WALDEN has been granted a franchise for a street railway from Twelfth east to city limits.

Virginia.

ROANOKE.—The work of laying the tracks of the Roanoke Street Railway Company is about completed.

Wisconsin.

ASHLAND.—The Ashland Street Railway Company, and the lighting company, will be combined under one management. An electric railway will be put in, and the present railway will be extended seven miles.

FOND DU LAC.—The sale of the Fond du Lac Street railway has been set aside by the Circuit Court, and the road is again in the hands of a receiver.

JANESVILLE.—Though it rained torrents the day the new electric street railway was opened, everybody turned out and made the best of it. Speeches were delivered, and the bands played just the same. The line is five miles long, and cost \$95,000.

MENASHA.—The bargain has been made for the present railway company, and there is a bright outlook towards the building of the Neenah & Menasha Electric Railway.

MILWAUKEE.—The city ordered the Milwaukee Street Company to pave West Water street, between Cedar and Grand avenue, with square granite blocks, to conform to the pavement laid by the city. The company reply that they are under no moral or legal obligations to replace an original pavement between their tracks and returned the original cob blestones that were taken up.

OSHKOSH.—It is rumored that a new company will buy the street car line and change it to electricity.

RACINE.—When the St. Louis parties purchased the Belle City Street Railway, some months ago, they gave bonds that they would take the road, when ready to rebuild, or forfeit the amount of bonds. The old officers and directors have resigned, as the new company is ready to take the road.

PUGET SOUND NOTES.

From Our Own Correspondent.

SEATTLE, Wash., June 19, 1892.

The Rainier Power & Railway Company has a large force of men at work on its extension through the north suburb.

John P. Fay, Herman Chapin and R. Hilton have applied for a franchise for an electric road from Fremont in the north end of Seattle, extending north to the boundary of the city, and thence to Everett, 30 miles above Seattle. The line will be known as the Seattle and Everett

L. H. Griffith, president of the Seattle Consolidated Street Railway Company, said a few days ago to the correspondent of the STREET RAILWAY REVIEW: "I have been examining the reports of electric roads in other cities, and I find that, considering the number of our cars, our operating expenses are just about the same as in Eastern cities. Labor of all kinds is higher in Seattle, and that item is considerably larger, but we make up in fuel. We burn sawdust, which costs practically nothing but the expense of handling."

The Woodland Park Electric line, one of the feeders of the Consolidated system, has one of the handsomest cars ever brought to the Pacific coast. The woodwork and seats are of Spanish cedar, varnished, and the interior of the roof is of bird's-eye maple. The seats are of the same style as those on steam cars, are cushioned and have reversible backs. The windows all slide down into the woodwork, and thus the car can be made practically an open one.

The Seattle city council is trying to get the Consolidated Company to light some of the suburban streets through which it operates lines.

The Front Street Cable, and the Madison Street Cable, although owned by practically the same set of stockholders, are operated separately; but now they have begun to issue transfer checks.

Peder Pederson has secured against the Seattle Consolidated Street Railway a verdict for \$2,000 and hospital and medical expenses. On June 16, 1891, he was thrown out of a car by an accident and injured.

Horace Heliker has sued the Front Street Cable Company for \$10,000 damages for injuries received January 18, 1892. The Seattle Consolidated Company is made joint defendant in the suit. Heliker claims to have been hurt by a collision between the cable car and the electric.

Robert M. Longstaff and his wife, Mary E. Longstaff have brought suit against the Madison Street Cable Railway Company to recover the land upon which the power house of the company stands. The company claims that the title to the strip in dispute passed to it along with the rest of the property on which their building stands, while the plaintiffs allege that the man who deeded it to the company never had title to it,

and included it in his deed without having a legal right to do so. The court is asked to declare the defendant illegally in possession and to grant a writ of restitution to the plaintiffs.

Robert M. Longstaff and his wife have also sued the Madison Street Cable Company for \$5,000 for personal damages which Mrs. Longstaff is alleged to have received by being thrown from one of the company's cars on April 18. She claims that she was about to alight, when the car was started, and she was thrown to the ground.

The Front Street Cable Railroad Company has won in the suit of B. T. Gillespie for damages. The plaintiff claimed \$5,000 for injuries alleged to have been sustained by having been thrown from his wagon while driving over the defendant's road on Front street. The defendant tried to non-suit the plaintiff, but the case got to the jury, which gave the verdict for the company.

Mary Park has brought suit against the Union Trunk Line for \$10,150 for damages alleged to have been received April 21, by a collision between one of the company's cars and a wagon.

For nearly a month negotiations have been going on for the consolidation of all the electric lines of the city. The Northwest Thomson-Houston Company equipped most of these roads, and has considerable money invested in them. The General Electric Company, which has succeeded the Thomson-Houston, has formed the plan of buying out the whole electric system, and uniting all the lines under one management. The companies which would thus be bought out are the Seattle Consolidated, the West Street & North End, the Rainier Power & Railway, the Rainier Avenue, the Union Trunk, the Woodland Park, and the Grant Street Electric. The deal was nearly arranged, but Winthrop Coffin, one of the General Electric Company's financial agents, regarded the price as too high, and so a new valuation will have to be agreed upon.

The Lynden Electric Motor Railway Company has been incorporated with a capital of \$250,000.

Receiver Sprague, of the Tacoma & Puyallup Railway Company, has begun suit for \$10,381 to recover on a contract said to have made by the Tacoma & Fern Hill, Wapato Belt Line, and Point Defiance Tacoma & Edison Railway.

The Tacoma Railway & Motor Company has arranged to sell its bonds and purchase the Tacoma & Steilacoom Railroad, increasing its trackage to forty miles. The old mortgage will be cancelled, and a consolidated mortgage issued upon the whole property.

Twenty new electric cars have been ordered for the Tacoma Railway & Motor Company.

The Tacoma, Edison & Puyallup Railroad Company has filed a suit to set aside the deed of conveyance by which the Point Defiance, Tacoma & Edison Railroad Company secured title to the motor line from Tacoma to Edison. Damages to the amount of \$100,000 are also asked. It is alleged that the property in dispute was deeded to the complainant first and was subsequently deeded to the defendant.

C. Wells, a farmer, narrowly escaped being killed by an electric car in Tacoma. He stepped in front of one which was coming at full speed, and when the motorman yelled to warn him, he saved himself by clutching the dashboard, and hanging on until the car was stopped.

The Lake Whatcom Street Car Company has decided to straighten the curves on the road in order to allow the locomotive of the Blue Canyon road to use the track for hauling logs and freight.

The Edison General Electric Company has brought suit in the United States Court against the Port Townsend Belt Railway Company to recover an alleged debt of \$51,171.18. The plaintiff claims that this amount is due on a contract for constructing an electric railway station with car and line equipment. Only \$4,000 of the cost has been paid and the suit is brought for the balance. The debt was covered by promissory notes, endorsed by Julius S. Potter, C. B. Holman and H. C. Colver, who are made parties defendant. The court is asked to appoint a receiver to look after the affairs of the railway company, and to grant judgment against it and the endorsers of its notes.



A Pleasant Route to Pleasant Places.

Commencing June 1, Tourists' tickets to the various Eastern Summer resorts will be on sale via the Lake Shore Route. Special rates will also be made to New York for the Y. P. S. C. E. meeting and to Saratoga for the N. E. A. meeting in July. Send for full information. F. M. BYRON, City Pass. and Ticket Agt., 66 Clark St.; C. K. Wilber, West. Pass. Agt., Chicago.

COMING DEVELOPMENTS OF ELECTRIC RAILWAYS.

THE American Institute of Electrical Engineers convening in the parlors of the Grand Pacific Hotel, Chicago, on June 6th continued its meetings June 7th and 8th. The newly elected officers, Frank J. Sprague, New York, president, R. W. Pope, secretary, and G. W. Phelps, treasury, with a full representation of the rank and file of the society were present.

Valuable papers were read and discussed by all the ablest electrical engineers in the country.

To the railway field, N. W. Perry's paper on "Series Electric Traction;" "Electric Railway and Motor Tests," by G. D. Shepardson, and the inaugural address of the president were directed.

The well-known literary ability of Frank J. Sprague and his undoubted authority on such questions, coupled with the recent general interest display on this subject has impelled THE STREET RAILWAY REVIEW to publish in unabridged form the remarkable pointed and conservative address, which we doubt not, will receive the wide attention that it deserves. Mr. Sprague delivered his address to a full meeting on Monday, June 6th.

IT is a trite but mistaken saying that electricity is in its infancy. It dropped its swaddling clothes when Morse sent the first telegraphic message. It put aside dresses and pinafore when the dynamo and arc light were invented. The incandescent lamp, the telephone, the art of welding, the transformer, are incidents of buoyant youth. The modern electric motor and electric railway mark a vigorous manhood.

The truly marvelous development of electric applications of every kind, the accomplishment of many things which in ignorance of the very art, or lack of knowledge of what are now well-known facts, and more particularly the great commercial development of the transmission of power, whether for stationary purposes or for electric railways, has led to many a foolish prediction and idle boast.

This is no age of inspiration, nor time for hopes never to attain fruition. It is above all things a practical age, perhaps too practical, but nevertheless one in which commercial enterprises to be successful must promise either a new field of development or economize in older fields.

As the orthodox few have been waiting in sublime faith for many centuries, and will wait for many more, for the fulfillment of ancient prophecies, so too will impracticable electric enthusiasts wait for the millenium when investments are boundless, performances limitless and efficiencies unity.

It would, perhaps, have been proper in making my inaugural address to so representative a body as that of the electrical engineers, that I should touch upon the special discoveries and experiments which have recently attracted attention, but there have been so many enthusiastic and brilliant workers that neither the time at my disposal nor the knowledge I possess would permit me to do justice

to their work; hence, it seems better to take up a subject with which I have been more particularly identified, which to-day commands so much attention, and concerning which there are so many conflicting opinions. While finding encouragement in the past achievements of our profession, I think the time opportune for a word of caution.

Electric street railways are no longer experimental, nor is their success problematical. Their history for the past five years is that of an almost unequalled development. Almost within a decade has occurred the first working of a practical electrical railway. In a third of that period there have been put in operation or are under contract more than 450 roads, equipped with nearly 6,000 cars, over 10,000 motors, and with over 3,000 miles of track. There is made a daily mileage of not less than 700,000 miles, and over a billion passengers are carried annually. At least \$75,000,000 have been invested in this industry alone. Thirty thousand horses in a single year have been relieved from the slavery of street car propulsion; stables are disappearing and streets becoming cleaner; luxurious cars are running on smooth, well-built and rigid roadbeds. Dividends have been increased, expenses reduced, investments enlarged, the unproductive have become productive, the impossible possible. Land values have been increased, habitable limits extended, homes created, and time saved.

We no longer hear seriously of the dangers of the trolley wire, the failure of service. The time has come when legitimate investment is amply warranted. Electric street railway construction has become a matter of engineering, not experiment. Not only have the smaller towns adopted what is the only available means of current supply, but the larger cities are following their example. St. Louis and Baltimore, Minneapolis and St. Paul, Buffalo and Rochester, Boston and Brooklyn have fallen into line, and latterly even Philadelphia seeks an improved street service, and in New York public interest is being aroused.

In the latter city it is of course impossible to tell how successful will be the attempt to introduce electric propulsion. There is there a strong, and in many respects a legitimate, objection to overhead wires. Many unsightly poles and badly strung wires have disappeared, and their places are taken by an underground service.

The general feeling of opposition to poles and wires ought not, however, to act as a barrier to such reasonable and proper introduction of an overhead system of supply, as the conditions now existing in that city very properly warrant. I have frequently pointed out the fact that the greatest good can come of the greatest number, especially in the over-burdened condition of transit which there exists, if certain of the lines were electrically equipped; wherever, in fact, there would be no street obstruction.

In broad streets, where the tracks occupy only a small portion of the street and are near together, a line of poles

of ornate design, with arms projecting on either side, can follow the center of the street, the same poles being used for lighting. Such a street, it seems to me, is Eighth avenue, then, too, where there is a middle division or park, such as exists in many boulevards, and which is now used for telegraph poles, there is opportunity for an electric construction which would be entirely unobjectionable.

On streets occupied with elevated structures, these structures themselves could be used for a practically rigid overhead system.

Among the numerous places in New York where an overhead system could be put in perfect operation are Central Park, West, the boulevard from Fifty-ninth street, up, a part of the First and Second Avenue lines, the Third, Sixth and Ninth Avenue lines, and all the suburban extensions from the annexed district.

I am not sufficiently familiar with the streets of Chicago, which is the last other remaining city which must consider electric street railways.

In these larger cities, however, one condition should be insisted upon, and if this condition is not in the proper spirit, then much of the objection which has been raised against an overhead system must necessarily disappear.

The construction must be of the very best. The only overhead line allowed should be a contact wire with sufficient strength, the main conductors and the feeders should be put underground in proper conduits. There would then be overhead only a wire necessary for the smallest duty and of the requisite strength.

Impressed by the great development of this industry, and brought face to face with the changes it has wrought, the query is continually made, Will the electric motor replace the steam locomotive? It is similar to the older questions: Will the telephone replace the telegraph? Will the electric light annihilate the gas system? and in all soberness a like answer can be made. It will not, but it will, as the electric light, and as the telephone have done, create a field of its own, and will replace a portion of the service now done by steam.

It seems to me that the growth of electric railways will proceed something in this order: First, the street systems in the various towns, then connecting lines between adjacent towns following the lines of highways, then longer connecting lines, even on the tracks of the existing steam lines, or, growing bolder, on exclusive rights of way on the same order. Then will come suburban traffic on a larger scale, and freight transfer systems, and finally the more ambitious projects of trunk line service under limiting conditions, such as I will specify.

It has been very properly said that a man will make the first long rides on electric railways by transferring from one town system to another through connecting links, rather than on individual roads.

This is precisely the process by which great steam systems have been built, although, of course, starting on a larger scale, and it is but natural that this shall be one step in the development of electric railways.

But evidently this natural process of evolution does not

offer scope enough for the more enthusiastic, and we are now and again treated to an ideal electric road to be built on plans boldly defying both geography and the abodes of civilization. An air line route according to rules of surveying allowed only in Russia and on the desert of Sahara; abolition of grades and street crossings; rigid and continuous rails; loaded cars of light weight, each operated by its own motor and making few or no stops, unlimited potentials and undiscovered resistance to insulation; new physiological and engineering laws; indestructible machinery; unheard of powers of braking and new methods of train operation and signalling; around all, a clear atmosphere, above all a perpetually smiling heaven, and behind all an unlimited bank account and the unlimited confidence of the investor.

Such are some of the characteristics of such a road, but perhaps it is but fair to ask, given some of these conditions, what would be the capacity of steam traction?

No one will question the capacity of a motor to do the necessary work required, or to make a speed superior to that of the steam locomotive provided sufficient energy be delivered to its terminals, but we must deal with existing or probable methods of supply. It is true that the speed at which a train is propelled by steam has only increased about 50 per cent. in sixty years, for in 1832 the "Matthew Baldwin" often made a speed of a mile in a minute; but we must not confound speed with power, for while the maximum speed has not been so materially increased, the endurance, the perfection of the mechanism, and the economy of performance have made great strides. The increased speed, which is by no means the maximum possible of a locomotive, per se, has been attained at much higher powers, and the schedule time has been shortened principally by cutting down grades, straightening curves, filling up ravines, abolishing trestle works, replacing wooden bridges by permanent ones of iron or stone; by the use of heavier and stiffer rails, better switches, improved methods of automatic signalling, the interlocking switch and signal system and the abolition of grade crossings; in shops, by improvements in details and managements which permit of higher speeds on more extended sections of road because of greater safety, lower traction co-efficients, and a greater degree of confidence possessed by the engineer.

All these things are necessary for high speed electric railways, and any general improvements that will be of benefit to the latter must necessarily be of service to the former.

Many predictions which are made concerning the future of electric propulsions, either in ignorance or disregard of the possibilities of steam duty, and the limitations necessarily existing in all systems of transportation, deserve and will receive little consideration.

Hence, let us note a few of recent locomotive performances.

Almost everyone is familiar with the remarkable run recently made by a Schenectady locomotive, hauling a special train on the New York Central Railroad, when

the distance of $439\frac{1}{2}$ miles from New York to Buffalo was made at an average speed of nearly 60 miles per hour, and which was the precursor of the Empire State Express, which makes the regular run at an average speed of over 52 miles.

More recently, we have accounts of an interesting record made by a well-known writer on two runs between New York and Albany, on which a large number of indicator cards were taken. The weight of train was about 270 tons. The steam pressure varied from 160 to 170 pounds. From an inspection of about a dozen cards, the indicated horse-power varied from 551 horse-power at 44 miles to 1,120 horse-power at 78.9 miles.

At 60 miles per hour the train resistance is stated to have been 15 pounds per ton, and at 70 miles, 17.10 lbs. per ton.

About 7 pounds of water were evaporated per pound of coal.

A remarkable statement concerning this performance was made by Mr. Sinclair, which, while almost incredible, will, if borne out by an analysis of facts, prove to be something of a surprise to those who make their prophesies of the electric economies by comparative statements.

In the description of these tests in a recent number of *Locomotive Engineering*, it is stated that the whole trip shows an indicated horse-power per hour for an average expenditure of only about $3\frac{1}{8}$ pounds of coal per hour.

This is far better than any stationary engines.

On the New Jersey Central Road, one schedule time is $86\frac{1}{2}$ miles in 89 minutes, which is made when there are a number of necessary slackings. On the 13th of May, the time was taken of this speed of a Baldwin Compound Locomotive for a considerable period of time on one of the regular runs. Ten continuous miles were made in $452\frac{1}{2}$ seconds, and five were made in 222 seconds. The fastest time taken was 44 seconds, and the slowest made was 47.

On the 26th of last February, a similar compound passenger locomotive running on the same road, broke all steam records by running a mile in $39\frac{1}{4}$ seconds, or at the rate of nearly 92 miles per hour.

At this speed the indicator cards showed 930 horse power, and the drivers, which are 78 inches diameter, were making 395 revolutions per minute.

In the very near future, I expect to have the pleasure of riding on a locomotive when going on these high speeds, and I presume my respect for steam locomotion will not be diminished thereby, nor, on the other hand, will my confidence in the possibilities of electric propulsion under the proper conditions.

Experimental runs have been made with an electric locomotive at the rate of a mile in thirty seconds, that is, 120 miles an hour, and I confidently expect some day to go at that rate. But it will be under special conditions and not on the regular trunk lines of this country, and it is the height of folly to suggest that these steam trunk lines are to be abolished.

In making these very high speed runs there is not much attempt at maximum economy of coal consumption,

the necessity being to generate steam as fast as required by the cylinders, but on taking an average of five trips, I find that there was evaporated 7.19 pounds of water per pound of coal used and 9.41 pounds of water evaporated per pound of coal consumed. The total weight of train varied from 213 to 241 tons.

The personal equations of engineer and fireman necessarily enter seriously into steam operations, and this, compounded of course with the peculiarities of each engine and the conditions of service, is shown in railroad reports.

In this connection I recently inspected a number of engine sheets. On one, which gave the duty of 25 engines, the average total cost per engine mile was 10.35 cents, of which 2.66 was for fuel. The total cost varied from 6.8 to 19.24 cents, and the fuel (wood) from 1.96 to 4.77 cents.

On another sheet, giving the performance of 22 engines, the total cost per engine mile was 14.70 cents, of which the fuel cost 4.61. The total cost varied from 8.82 to 27.98 cents, and the fuel cost from 2.04 to 7.43.

In still another, that of the performance of 18 engines, the total cost per engine mile was 14.73 cents, of which the fuel (coal) cost 6.62 cents. The total cost varied from 10.4 to 22.52 cents, and the fuel cost from 3.82 to 13.84.

In discussing the electric system there is often a confusion of statements with reference to economy. Despite the undoubted fact that the electric motor can probably be run at variable high speeds with less variation of economy than can the steam locomotive, we must not forget that in the latter we are considering the economy of the unit on a whole, not merely of the steam cylinders, but also of the boiler and the furnace.

In electric propulsion a similar comparison of economies must take into account the variable duty of the central station and the losses on the line as well as in the motor, and where single units are used, the variation in economy of the whole system would be much greater than in the steam locomotive. There will be only a reasonable fixed efficiency of the central station and the line when the number of units is large enough to make the load on the central stations nearly constant.

Let us now consider another class of duty.

Sometime ago I made a very careful analysis of the work done on the elevated roads in New York city, with a view of determining the coal consumption and the duty performed by the locomotives. At the time this investigation was made, now nearly seven years ago, there were in use on the Third Avenue division, 63 trains at one time, running at very close intervals. The weight of the trains was from 80 to 90 tons; the speed was often as high as 20 to 25 miles an hour; stops were made every third of a mile; in short, the duty demanded of the engines was exceedingly severe.

The maximum indicated horse-power of the locomotives was found to average about 163 horse-power, although on occasions these locomotives have been worked up to 185 horse-power. Work was divided approximately as follows:

Acceleration in starting, 59 per cent.; lifting, 24.3 per

cent.; and traction. 16.7 per cent. The average horse-power exerted was 70.3 horse-power, considerably less than one-half of the maximum.

The work on the line was so distributed that there was an almost constant total duty of about 4,500 horse-power. The locomotives were on duty 20 hours, but used steam only 6 hours, and including all losses when standing still, and the amount of steam used in braking, there was a horse-power developed for about 6.2 pounds of coal per hour.

I believe that these figures are entirely reliable, and they show a remarkable performance, when we consider the class of duty.

An analysis of the coal expenditures showed that, with an efficiency of 60 per cent., and without any of the energy of the train being returned to the line, the relative coal expenditures between steam and electricity would be about in a ratio of 2 to 1; but if the energy of the train was returned to the line, to the extent which I believe it is possible, then the relative expenditures of fuel would be in the proportion of 7 to 2. Since the coal charge on the four divisions was, at the time, about \$550,000, it can easily be seen that, independent of any question of saving, in the care of the structure and any reduction of depreciation of the motor equipment, the fuel saving would be sufficient to pay a good interest on the cost of an electric equipment; and a large interest on the cost of electrical equipment minus this value of the present engines.

I have no reason to doubt the soundness of the conclusions I then made.

You will have here in Chicago, however, a somewhat more advanced condition of affairs. A compound type of locomotives has been adopted for the elevated road service, and I believe it will show an increased economy over that of the operation of the New York roads. Consequently, in discussing the question of economy, it is necessary to get full information concerning the duty which will be done here.

In discussing high speed possibilities and limitations, the testimony of Dr. Dudley, as given in a discussion of a paper before this Institution on the 24th of February, 1891, is interesting.

There are, generally speaking, three distinct elements constituting the resistance to train movement on a level, and they have a most important bearing, when we consider the operation of long or short trains, and at high speeds. One of these elements is the friction of the train in its bearings; with good rolling stock, this is about 3 pounds per ton. For all reasonable speeds it is probably fairly constant, provided the lubrication is good. Another element is that of air resistance, which varies with the shape of the forward end of the train, the condition of the air, the direction of the wind, and the velocity of the movement. The third I may call the train lifting or rail bending effort, which depends upon the weight and stiffness of the rails and solidity of the road-bed.

Dr. Dudley stated that on the New York Central system he found that trains of about 250 tons when running

at a speed of a mile a minute have a resistance of from 10 to 12 pounds per ton; but that on short trains of but two or three cars, the resistance sometimes ran as high as 35 or 40 pounds per ton.

This is probably due not to any change in the friction of the bearings, but to the fact that the air resistance enters as a much higher component of the total.

It at once emphasizes the fact that the operation of short trains must, at high speeds, no matter how good the track, or how favorable the circumstances be, with a train resistance higher than that required by long and well vestibuled trains.

Such a shape can be given to the front of an electric locomotive as will make the air resistance not over one-half that presented by a plain surface or equal cross section, and perpendicular to the line of motion, but even this fact does not alter the other, that the resistance per ton must be higher for small trains than for large ones.

Mr. Dudley further stated, in speaking of the influence of stiff rails, that the difference in power required on the Chicago Limited when running on a 80 and 65-pound rail was from 75 to 100 horse-power per mile, that is, somewhere between 10 to 12 per cent. of the power actually developed, and he estimates that with a 105-pound rail which is nearly twice as stiff as the 80-pound rail, there would probably be saved another 100 horse-power per mile, making a total saving of a quarter by less than doubling the weight of the rail. In this opinion it is perfectly safe to run a steam engine 120 miles an hour on this heavy rail.

Such rail improvements increase speed possibilities with present engines, but we have not related the limit of steam duty.

Almost all the locomotive work of the United States has been done up to the present with simple engines. Their weight and capacity has been increased, their steam pressure raised until the standard is now about 140 pounds within recent years, however, the compound locomotive has come into use, and there is a comparatively large number of them in daily service. The steam pressure has gone up to 180 pounds as a standard, working sometimes as high as 200 pounds, but these are by no means the limits of steam pressure.

On the Paris, Lyons and Mediterranean Railway, the standard for steam pressure for compound locomotives is 250 pounds. The compound locomotive has still its battle to fight, but I think it would be a rash man who will say that the days of still higher steam pressure are not to come, and that the triple expansion locomotive will never exist.

Speed, capacity and coal economy are, however, not the only questions to be considered in railroad operation, and in discussing the general subject it will be found that the signaling and braking questions at high speeds are serious ones. Undoubtedly an electric train with distributed motors, making the weight of the train available for traction, could by using the motors as dynamos to return the energy of the train to the line from the highest to mean speeds and then on a local circuit, be more quickly

and effectually slowed down and stopped than where shoe brakes are used, and both methods of course would be available.

But if using a motor ahead of a train then there will be comparatively little difference in the stopping power.

When riding at 60 or 70 miles an hour, it is a very quick stop to bring a train at rest in less than 2,000 feet. This is often as far as any signal can be made out, especially when the weather is at all thick. Hence we may expect to find on electric railroads, if high speeds are to be attained, and quite possibly also on steam railroads, an extension of automatic signaling so that trains indicate on more than two sets of signals. At present the practice is to divide the line into sections, and when a train passes a certain point it sets a danger and cautionary signal, dropping the danger signal on the section just preceding, and the cautionary signal on the one beyond.

Turning now to the greater powers, we must not confuse the terms "large-powered" and "trunk line" work.

There are two statements which I think will need no corroboration.

If we had a continuous train movement completely occupying a track system, there can be no question but that its operation from a central source by electricity would be more economical than if operated by steam locomotives.

So too, if a large number of units in reasonable proximity are moved, and the stopping and starting so regulated that the total demand upon the central stations is fairly continuous and equal, then there is no question as to the economy of electric propulsion as compared with steam.

On the other hand, the operation of a single or very few units over a long distance would be so uneconomical and afford so small a return on the investment required as to make it prohibitory.

Between these two lines the condition of operation where steam and electricity meet on planes of equality; as the number of trains decreases, steam operation is the more economical; as the number increases electricity must be preferred.

In discussing the use of electricity instead of steam, a well-known steam engineer recently stated that in his judgment it might be conceded that electro-motive force for the propulsion of cars will not be economical, except for suburban traffic, and upon certain sections of important trunk lines like New York Central between New York and Albany, the Pennsylvania System between New York and Philadelphia, and other lines of like character where it is necessary to dispatch a large number of comparatively light trains every day, and at short intervals. The principal field for a power of this kind would be in suburban service long enough to make the ordinary street electric cars unpopular because of the time required, and in such cases as these mentioned above, also for moving freight trains in city; that is, for the performance of transfer service.

This is precisely in line with the arguments which I have advanced from time to time, and which I illustrated in a paper before the National Electric Light Association

and its convention in Kansas City, where I outlined the possible service between New York and Philadelphia, which I believe to be practicable, and to which I will again refer.

I must repeat that it narrows itself then to the one question as to the number of trains operated between two terminal points. Make that number of trains sufficiently large, and the electric motor is the best means of propulsion whether for high or low speed, whether for large or for small cars. Decrease this number and we must rely on steam propulsion, or to put it in another way, the answer to the query, will electricity take the place of steam for railroad purposes is, only in part, and then only when the number of trains operated between the terminal points is so large that the fuel economy would pay a reasonable interest and depreciation of the necessary cost of the central station and the system of conductors.

Of course I do not in this general reply consider those special cases where advantages are to be gained for which there is a return for capital in another direction. Such a case is that of the Baltimore Tunnel, where the investment and cost of operation will be greater than that for steam propulsion; in fact, there will practically be no economy in power, because the steam locomotives are not done away with but simply unused for a period of a little over a mile. There is in this specific case, however, the incidental advantage of doing away with the necessity of a ventilating plan and yet getting rid of the annoyances incidental to tunnel services.

Trunk line transportations being a great problem, we should not attempt the simultaneous solution of all the questions involved, but instead, determine what those questions are, consider their sequence, and the probability of success, and solve them in their order.

Every system has its limitation. The electric is not exempt from this law, and hence it will set forth what are well known limiting laws concerning the transmission of energy. They have been stated time and again, but somehow or another, people often lose sight of them in discussing the question of investments in large electric railways, so that I think it will be well perhaps to re-state and emphasize them.

The weight of copper necessary to transmit a given amount of power with a fixed loss will vary inversely as the square of the electro-motive force used.

The distance to which it can be transmitted with a given weight of conductor will vary directly as the pressure.

The distance to which it can be transmitted over a conductor with a given cross section will vary directly as the pressure.

The weight of copper necessary where the supply station is in the center of a system is only one-quarter that required if the station is at one end.

The weight of copper will vary inversely as the square of the number of supplying stations properly placed.

The electro-motive force required will vary inversely as the number of stations.

Lack of knowledge of these simple and inalterable

laws has lead to much misconception of electrical possibilities, and these have not been confined to the electrical engineers,

In many of the suggestions which have been made, even by practical steam engineers, there has been an unnecessary confusion of impracticable and practicable, and the specific object which should have been borne in mind has been lost sight of.

Committees have drawn impossible specifications for trunk line service, and demanded of electric motors a capacity and performance superior to that of the best compound steam locomotives. I unhesitatingly pronounce any attempt to build some such machines, for the present, certainly unnecessary and impracticable. The service thus suggested, if at all needed, will for many years be better performed by the steam locomotive than the electric.

Leaving out of present consideration trunk line work, there are three problems requiring solution in the application of electricity to propulsion on a large scale under conditions existing, for example, in Chicago, or in any other place where there is a movement of a large number of trains on more or less complicated tracks as will be found at almost all terminal railway stations.

They are:

First: The development of an electric locomotive of ample power, which shall be as readily controlled as the steam locomotive; shall be reliable in operation, and shall show a high economy.

Of course, such a machine must have all the adjuncts which are necessary for train movement.

Second: A system of conductors and methods of supporting the same which can be relied upon for ample supply of current and absolute certainty of continuous contact at all speeds on curves, switches, cross overs and the multitudinous combinations which exist on yard tracks.

Third: A system of automatic block signalling, which while effective for steam traffic will not be thrown out of operation by the use of tracks as conductors of electricity for a general supply. This is a more serious question than is at first considered, for this use will materially interfere with if not absolutely destroy the utility of what is known as the rail circuit system.

This third problem is one which must necessarily follow the development of the other two, as the automatic signaling systems now existing have followed the development of steam practice.

While I am not by any means thoroughly familiar with the various methods of automatic signalling, I believe I am justified in saying that there is none at present existing which will meet all the requirements of railway practice, and which can be operated on track used by both steam and electric locomotive, where the rail is used as a part of the supply circuit. Some of the best known systems of signaling would be rendered entirely inoperative.

As difficult as it may seem to devise such a system, I believe that it certainly can be developed, but only prop-

erly so on a section of track which is more or less experimental, on which, at the time of operation, automatic signaling is unnecessary, but which is actually operated by both classes of service. Such an experimental section would be a combination of single and double tracks, with all the varieties of curves, crossings, switches and ladders; such as would be found in any large yard.

It will probably be found necessary to erect a variety of kinds of conductors. From the most careful consideration which I have been able to give to the subject, I believe there is one way, and only one way, in which the current can properly be supplied in any complicated system, and that is from the overhead conductor, practically rigid in character, following very nearly the center line of all tracks and switches, with no moveable overhead parts, and with return through the rail. The locomotive would then practically be moving between two electric planes, the lower being the guiding one.

I know there has been a great deal of talk about other possible systems of supply. We have heard much of the charged rail using low potential currents, supplied at frequent intervals by motor generators driven from a central station.

Since we have discovered no conductors devoid of resistance, and the art of welding is not particularly applicable for railway service, where moving contacts are a necessity, little credence need be given to any scheme of this character.

We heard again of the central rails, supported on posts, in wells between the tracks. A center rail may be acceptable on a system like that of the elevated roads, but in ordinary railroad work, any ditch intended to drain a track, so as to keep insulators dry and keep snow away from them, would probably so open the track that any moisture and frost would cause upheavals of serious character, and the cost of maintaining the track would be prohibitory. The use of snow machinery for keeping the track clear would be impossible, and anything underneath the car is in the most exposed place for sustaining damage by defective rolling stock, and continually liable to all sorts of mechanical injuries and accidents, with all the evil results of interruption of current, short circuiting and stoppage of traffic.

Another system which has been proposed is that of conductor supported on posts alongside of the track and elevated but three or four feet above it. While not open to so serious objections in the matter of insulation as a centre rail system, its use where there are crossings or switches is manifestly not to be thought of. Even on a straight clear track in a hard climate there would be most serious trouble in the matter of clearing the tracks from snow and with the grade crossings in this country gaps in the conductors would be too great for the contacts on a single locomotive to stand.

Some time ago I was requested on behalf of a well known financial man, whose enthusiasm as to the possibilities of electric traction is well known, but who is withal a most practical railroad man, to inspect various railroad terminal tracks in this city with a view of, first,

the substitution of the switching work now done by a part or all of the 1,800 or more switch engines by electric motors, and eventually the operation of suburban service.

In Chicago, in the space of about two square miles or more, exactly $1\frac{1}{2}$ miles in length by $\frac{3}{4}$ of a mile in breadth, it is no exaggeration to say that there is or will be not less than 75 miles of track, and switches and crossings with their various combinations almost innumerable.

I went over and over some of these tracks with the one thought in my mind, how can the current be delivered to the locomotives and how can the automatic signalling be done? And I was forced to the one conclusion to which it seems every man who makes the investigation must come, and that is that the overhead system of supply is the only one, but that it must be as substantial and thorough in character as that of any other part of the system, and further that in view of the cost, such a system is only permissible where the number of units operated is large and continuous.

These conclusions are not new, but they have been emphasized by the particular problem which is here represented.

Intimately connected with the question of conductors, and one of the most serious ones which has to be met by the electrician, is that of potential. The personal danger limit of continuous or ordinary period alternate currents, is pretty well determined, and it seems generally admitted by constructors that the danger limit for continuous current machine, with its commutator, is about the same as the personal danger limit.

Hence we meet with two dilemmas. If using continuous current motors, we are limited to a difference of potential per machine of 1,000 to 1,200 volts, and we can so far as safety of the machine is concerned, only probably go above this limit by putting the motors in series, precisely as has been proposed for long distance stationary transmissions.

If this is not done then we have the introduction between the transmitting dynamo and the receiving motor of a motor generator system, another net theory which is often suggested, but which I unhesitatingly pronounce as so uneconomical as to be impracticable.

If using an alternate current system, the converters must be used, either distributed along the line and supplying the working circuit or placed upon the locomotive to safeguard the motors.

While the use of a converter under these conditions is not as objectionable as the use of the motor generator, it can not commend itself as a very practicable scheme, and certainly in view of the fact that no single, phase single alternate motor promises, up to the present, serious success.

For the present, and I think for a long time to come, we must confine ourselves to the consideration of railroad problems, where continuous currents are used, and where the traffic between two points is sufficiently large to justify the investment in central stations and conductors which would be required for the operation of such a system.

There are two methods of propelling trains electrically, one by following steam practice, that is, by building a large motor and hooking it to the head of a train, the weight of the motor being such as is required for the necessary power and traction when grades or slippery tracks are encountered.

From all that has been developed up to the present, to get the control that is necessary and to build the machines safely, the electric locomotive will weigh nearly as much per horse-power as the steam locomotive. This weight can be better distributed, but I do not think if steam practice is followed on trunk line service, that there could be any very material reduction of weight of train.

The other plan is to have each car propelled by one or more motors. This would be the ideal system so far as propulsion goes, provided the electric motor was unlike all other mechanical apparatus and that it never failed, and if a number of machines could be as well taken care of, cost no more and show as little depreciation as fewer machines of larger capacity operated as a unit.

Should we ever arrive, as we all hope, to the possession of a single circuit alternate current motor, then, in view of the simplicity of its control, we may fairly hope for the distributed motor system.

But here also the capacity and likewise the weight of the motor being determined by the total duty done, the weight of train limit would not be decreased, but rather increased.

If, on the other hand, single units are used, the query naturally arises, what form would the electric locomotive of the future take? I do not think this is by any means settled; undoubtedly gearless machines will be used, but whether they will be mounted directly upon the axle, or whether they will movably enclose the axle and be flexibly connected to it, while their weight is carried on springs on the truck, or whether the motor will be carried on the truck frame and connected to the drivers by the ordinary coupling rods, are questions which will be determined eventually by the depreciation per car mile upon the motors, trucks and road-bed, as well as by the speed to be attained.

Whatever method of mounting the motor is adopted, for reasonable weights and powers, a 2-axle truck will be used, but where the large powers and weights are necessary, two such trucks will be coupled together, so as to keep the weight upon each wheel within limits, and this will carry a cab containing the regulating and collecting devices, and so shaped as to offer the least resistance to air pressure and high speeds.

I have never advocated the use of a connecting rod in transmitting the motion from an armature to a driving axle, but I think it fair to say, in this respect, that the so-called hammering effect on the rails, said to take place in the ordinary locomotive driver, where the weights are counter-balanced, exists more in imagination than in fact, and that the chief trouble in the use of the connecting-rod is the change of direction of its movement.

Among the roads which are ripe for the electrical engineer, and on which in the near future I hope he will

demonstrate he has a most legitimate claim, are the New York elevated and Chicago elevated; the handling of the trains on the New York Central and Harlem roads below the Harlem river; the long-talked-of rapid transit road of New York; the Metropolitan underground road of London; the proposed tunnel roads of London, Paris and Berlin; and, coming more immediately home, suburban service, such as that of the Illinois Central railroad, a most ideal track for the electrical engineer; and last, and, as it will prove, one of the most important, the operation of terminal and warehouse systems for the interchange of freight on the lines entering a city situated as is Chicago.

Taking this last, we have here a definite problem, now performed in a more or less satisfactory way by steam service. It is a problem large enough of itself. It has little connection with electric trunk line service, and the present impracticability of the latter has little bearing upon the thorough practicability of the former.

Eighteen hundred or more switch engines, many of them on duty twenty-four hours a day, a large portion of the time standing idle, puff their foulness into your overburdened atmosphere, because from 80 to 90 per cent. of all the freight that comes into the depots of this city ought never come inside its limits, and would not were there a practical way provided to distribute it from one railroad to another outside the city limits. It has been suggested, and it seems to me a most feasible plan, that there shall be established a vast system for interchanging freight on the various railroads by a great 6-track crossing belt road which shall form a common zone of transfer either by itself or in combination with freight warehouses or storage yards.

Undoubtedly there are many difficulties in the way, but from an electrical standpoint there is absolutely no question but that such a system of belt line is practicable.

With such unsolved problems, such abundant fields, I deem it unnecessary to attempt to build electric locomotives to pull trains of great weight 100 miles an hour, or to develop a system of conductors for trunk line service which is not possible for yard duty, or to consider a central station or track equipment for a duty not required. This problem is in a measure an experimental one, which being carried to a certain measure of success will clearly point the way for future development and outline its limits.

I may be pardoned perhaps if I take radical views in some matters of railroad practice. I have fortunately or otherwise been thrown into direct touch with all the larger work which is to be done in this country during the coming year, and it gives me pleasure to announce what many of you know from the current news of the day, that there will probably be in operation in the United States within twelve months not less than five locomotives varying from seven to twelve hundred horse power and from 45 to 80 tons in weight. The character of the work done will vary. In that work in which I am most concerned from a personal standpoint, a 700-horse-power electric locomotive will be built for experimental work, and to attempt to solve as far as may be the various

problems which are involved in railroad practice in Chicago. If my judgment is followed, there will be an experimental section of track in the form of a loop about thirteen miles long with eighteen miles of rail, and with every variety of single and double track construction and simple and compound crossings and switches.

On this I hope to see erected such varieties of overhead construction as may be found best to meet the various kinds of service, and where the railroad problems on track jointly operated by steam and electricity can be developed in the most satisfactory manner.

On this track there will be not only this locomotive but also one of equal rated capacity supplied by one of the larger manufacturing companies.

The duty demanded of these machines will be severe. They will be required to haul a train of not less than 450 tons at 30 miles an hour up a grade of 26 feet to a mile.

They will probably be required to develop their full rate of capacity at all speeds between 30 and 60 miles per hour, and if there is sufficient track room they will be driven at speeds of at least 75 and perhaps 100 miles per hour for short distances. The potentials used will be nearly double that at present obtaining in street railway practice.

A still larger problem so far as power goes, although not in the variety of conditions which will have to be met, will be that recently taken for the operation of the belt line tunnel now being constructed in Baltimore to avoid the necessity of boat transfer to Locust Point. The duty of the motor here will be to propel the trains with engines coupled on but not in operation through a tunnel about 6,000 feet long.

The conditions require the motors which will weigh about 60 tons, and have a capacity of about 1,200 horsepower to propel a 1,200-ton freight train up a grade of 42 feet to the mile at a speed of 15 miles. Passenger trains of 450 tons' weight must be regularly started from rest twice in the tunnel on this grade, and in an emergency the motors must start the freight train. The draw bar pull under regular duty, and when not starting, may be as high as 32,000 pounds.

Perhaps the traffic from New York to Philadelphia affords as good an example as any of what may be done on regular passenger service, provided the track is clear enough.

For this I some three years ago outlined a service and again in *The Forum* of September, 1891, an electric express service with a method of supply through a rod carried above the car and a return circuit through the rails and earth.

The current was to be supplied from one or more central stations equipped with high class triple expansion engines driving multipolar dynamos directly coupled. What the electric engineer, and the railroad man as well, needs to know is whether the electro-motive force required on the line and the number of stations necessary would be prohibitory.

No attempt was made at excessive speed, but I confined myself to the average speed of a mile a minute for a

distance of 90 miles, and considered a through service only. I assume a total weight of copper of only about two-thirds that which existed on the long distance telephone line between New York and Boston. The trains were to be two car units leaving every ten minutes.

I found, with these conditions, the stations and potentials would be about as shown in the following table:

| POTENTIALS. | | | |
|-------------|--------------|---------|---------|
| Stations. | Miles apart. | 2-wire. | 3-wire. |
| 1 | | 3600 | 1,800 |
| 2 | 45 | 1,800 | 900 |
| 3 | 30 | 1,200 | 600 |
| 4 | 22 1/2 | 900 | 450 |

If the 3-wire system is used, that is, the rails as a compensating conductor, between two trolley rods, then with only two stations 45 miles apart it is seen that the potential is less than 1,000 volts, and this we undoubtedly can handle.

I am not prepared to say that we may not use even a higher pressure, because I believe whatever is demanded in the interests of economy, all things being considered, will be used, but if we can reduce the potential to perfectly safe and reasonable limits by multiplying the number of stations, then these stations should be increased so long as the increase does not seriously affect the general expense of working. On a service of this character, where I have made the conditions distributed work, and the dispatching of units at brief intervals, which conditions, I repeat, are absolutely necessary, if we are to consider long distance transportation by electricity, such increase of stations as is advisable will not increase the cost of central station operation.

Such is the work before you, a work well meriting your best efforts, yet it is well to temper your enthusiasm with prudence.

Limit your attempts to the solution of those problems which will prove of practical benefit.

Do not chase rainbows. They are beautiful and poetic, but they have small place in the world's economies.

Remember that neither sentiment nor ignorance are winning cards, but lessened cost of operation for equivalent duty and increased returns on invested capital.

All this is said in no spirit of discouragement, for I yield to no man in my confidence in the future of electric traction. No new field is so rich, none more pregnant with great possibilities, but the growth of the work will be more expeditious and healthy if we separate the visionary from the real, the impracticable from the practicable.

WILLARD J. HIELD, of Minneapolis, is no longer superintendent of the Minneapolis lines, but has assumed the duties of general manager of the company, dividing the responsibilities of C. G. Goodrich, who will hereafter act as Mr. Lowry's first lieutenant, with the post of vice-president, thus making his duties less onerous. Mr. Hield, although a young man, is one of the best railway men in the north-west, and we wish him all success in his new position.

ELECTRIC RAILWAY ORDINANCE FAILING TO PROVIDE FOR POLES AND WIRES.

COMPLAINANT constructed a street railway between St. Joseph and Benton Harbor in 1885, and has operated it by horse-power. The City of St. Joseph passed an ordinance October 19, 1891, granting permission and authority to the complainant to construct and operate an electric single or double trolley street railway; no provision concerning wires or poles was made in the ordinance. Complainant accepted the ordinance, and commenced the construction of an electric railway. This action is brought to enjoin the defendants from attempting to remove any of the poles set by complainant, and from interfering with such construction. The defendants question neither the validity of the ordinance nor the right of complainant to construct and operate an electric railway. The decision is on motion to dissolve the preliminary injunction.

Judge O'Hara, in delivering his opinion, said:

It is urged by the complainant that if the Common Council desired to control the location of poles it should have so declared in the ordinance granting authority to construct the road, and that its failure to do so warrants the construction of the railway according to the method had in contemplation by the officers of the railway company when the ordinance was accepted.

In support of this position cases have been cited to the effect that the Common Council can not lawfully make unreasonable regulations or tack on new conditions after the acceptance of an ordinance of such a character.

The question involved in this case, however, is not whether the Common Council can act arbitrarily or impose new conditions, but whether it has lost all control of the location of the poles in question by reason of the silence of the ordinance upon that subject. Poles can not be erected at the arbitrary will of the company's foreman.

Parks, lawns, trees, fountains and monuments in and along public streets and drives, are subjects of just concern to every citizen of the municipality.

The acceptance of such an ordinance does not render the city powerless to protect itself against an invasion of the parts of streets devoted to adornments, nor to legislate concerning encroachments generally.

Any other rule would leave the city with no remedy but that of a proceeding directly aimed at the abatement of a public nuisance, pending the determination of which the public might suffer inconvenience, annoyance, incalculable loss and irreparable injury.

On the other hand, those members of the Common Council who supported the passage of the ordinance knew that an electric railway could not be constructed without side supports for the trolley wire.

It can not be conceived that they were ignorant of the fact that wooden poles are generally employed for that purpose, and that such poles are usually erected on the sides of streets and at uniform distances apart.

The silence of the ordinance respecting the location of poles indicates that the council intended that they should

be erected in the ordinary manner. The railway company, however, was bound to observe reasonable regulations prescribed by the common council. The complainant by force of law accepted the ordinance of October 19, 1891, subject to the provisions of the statutes under which the city was incorporated.

These statutes give control and supervision of all streets to the common council, and empower that body to make street regulations. The statutes in question confer no power to pass ordinances for the benefit of private individuals merely, but the common council has the right thereunder to make such street regulations as shall be reasonably necessary to avoid injury to the general public.

It is beyond the power of the common council to deprive the railway company of rights and privileges conferred by the ordinance under which it is constructing its road.

Requirements and provisions concerning the location of poles, however, if reasonably necessary to protect the interests of the public, and which do not impair the operation, safety or usefulness of the railway, and which neither delay its construction nor materially add to the cost thereof, cannot be said to curtail such rights and privileges.

The common council of St. Joseph, however, has failed to make any ordinance concerning the poles. The council has not lacked the power to supervise the erection of poles, but has failed to properly exercise its power. It has not established any line for the erection of railway poles, and has neglected to ordain where poles should not be placed.

A construction company ought not to be embarrassed in this manner. Common fairness forbids it. The city had the power to establish lines and to make reasonable regulations, but it should have acted seasonably. There must be general ordinances, and some definite system must be prescribed before the municipal authorities can properly interfere with the erection of the poles. (*Grand Rapids vs. Hydraulic Co.*, 66 Mich., 606.)

The city authorities have never indicated where the front street and Catholic church poles might be erected.

Certain it is that the company must have a pole or some contrivance for the support of its trolley wire at the foot of Ship street, and it is agreed by all concerned that a pole in the center of the street would be a nuisance.

As already stated, the city officers object to the present location of this pole, but do not intimate where it or the Catholic church pole may be planted.

The road cannot be operated without poles or other supports at these points, and the company is not compelled to submit to loss of time or money through the inaction of the common council.

(Circuit Ct., Berrien Co., Mich. *St. Joseph & Benton Harbor St. Ry. Co. vs. City of St. Joseph*, et al. Not yet reported.)

THE Belgium government is said to be considering the practicability of adopting electric traction on its steam railways.

THE street railway service in Minneapolis during the convention deserves every encomium that delighted visitors have heaped upon it. The cars were all placarded as to destination and routes, and switches placed to the best advantage regardless of expense. One evening last week, at a public concert, no less than 200 cars were in active service, including trailers. On an average the cars can carry 75 passengers, which gave the company facilities of moving at least 15,000 in half an hour. Vice-President Goodrich and Superintendent Heild were both on the ground and personally superintended the work of starting cars. In less than ten minutes after the concert was over a score of cars had started but the crowd was apparently not diminished. Car after car was started in quick succession until over 100 had carried upwards of 7,000 persons towards their homes.

This was the history of convention week, and the home people, as well as the visitors, suffered no inconvenience.

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days; reported especially for the STREET RAILWAY REVIEW, by Munn & Co., Patent Attorneys, 361 Broadway, New York, N. Y.

ISSUE OF MAY 10, 1892.

| | |
|--|---------|
| Electric Railway, C. H. Baker, Lake Geneva, Wis..... | 474,355 |
| Trolley Wire Support, O. F. Evans, Columbus, Ohio..... | 474,375 |
| Cleaning Brush for Electric Railway, R. M. Hunter, Philadelphia, Pa..... | 474,471 |
| Trolley for Electric Railways, C. E. Friel, Boston, Mass..... | 474,552 |

ISSUE OF MAY 17, 1892.

| | |
|---|---------|
| Cable Railway Grip, J. C. H. Stut, San Francisco, Cal..... | 474,875 |
| Grip-Car Brake, W. Byrnes, Chicago, Ill..... | 474,900 |
| Street Car Curtain, A. D. Cochran, Indianapolis, Ind..... | 474,902 |
| Railway System, H. T. Dunne, New York City, N. Y..... | 474,951 |
| Electric Railway, J. W. Grantland, Philadelphia, Pa..... | 475,107 |
| Cable Car Grip, D. D. Nolley, Wilson, N. C..... | 475,143 |
| Electric Railway Motor, S. H. Short, Cleveland, Ohio..... | 474,160 |
| Device for Bending Electric Trolley Wires, H. D. Winton, Wellesley, Mass..... | 475,261 |

ISSUE OF MAY 24, 1892.

| | |
|---|---------|
| Trolley for Electric Railways, J. W. Newhouse, Indianapolis, Ind..... | 475,467 |
| Signal for Street Cars, C. H. Smith, Lansingburg, N. Y..... | 475,474 |
| Switch for Street Railways, R. H. Snively, Louisville, Ky..... | 475,475 |
| Switch for Overhead Wires, A. O. Hoyt and P. W. Leffler, Minneapolis, Minn..... | 475,504 |
| Electric Motor Car, W. H. Patton, Chicago, Ill..... | 475,702 |

ISSUE OF MAY 31, 1892.

| | |
|---|---------|
| Grip Mechanism for Duplex Cables, A. Bryson, Jr., New York, and J. W. Pendleton and A. R. Benn, Brooklyn, N. Y..... | 475,846 |
| Cable Grip, J. Schirra, Pittsburg, Pa..... | 475,896 |
| Electric Railway Motor, J. F. Shawhan, Detroit, Mich..... | 475,970 |
| Safety Attachment for Railway Trolleys, M. A. Yeakley, Cleveland, Ohio..... | 476,028 |
| Conduit for Electric Railways, W. F. Carr and C. F. Ferrin, Minneapolis, Minn..... | 476,128 |
| Hanger for Electric Railway Wires, C. B. Elliott, Boston, Mass..... | 476,192 |
| Swivel Pull-Off for Overhead Wires, C. B. Elliott, Boston, Mass..... | 476,193 |

ISSUE OF JUNE 7, 1892.

| | |
|--|---------|
| Frictional Gearing for Street Cars, G. B. Brayton, Chicago, Ill..... | 476,243 |
| Conduit for Electric Railways, W. Bradley, Fort Wayne, Ind..... | 476,603 |
| Tramway Switch, J. R. Wiggington, Washington, D. C..... | 476,713 |
| Fare Register, J. K. Greenleaf, New Haven, Conn..... | 476,741 |

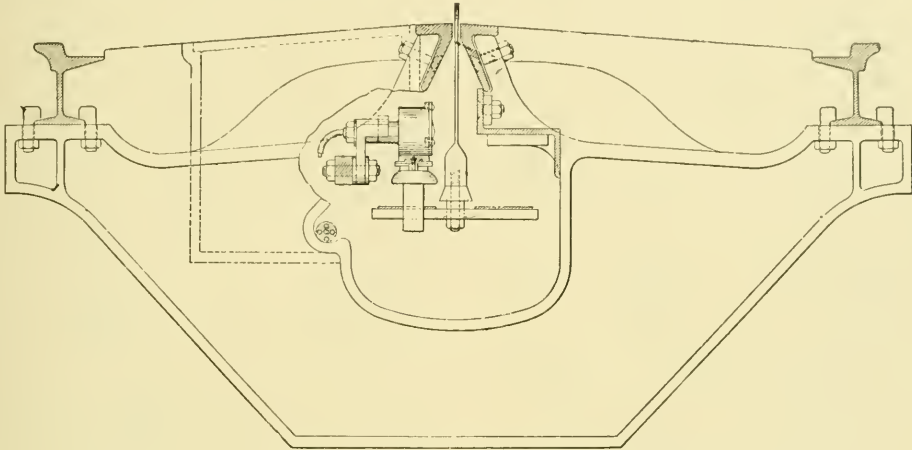
THE COLUMBIAN UNDERGROUND SYSTEM.

THE numerous inventions of the past two or three years, looking toward a commercially and electrically perfect system of underground electric traction, have been supplemented by the inventor, D. J. Murnane, of St. Louis, under patents granted March, 1891.

The promoters of the device have established a working model in Room 73, Exchange Building, Chicago.

with the clip and the current is conveyed to the motor. After the trolley has passed, the brush falls to its vertical position and the next one is tilted.

Thus one brush is always in the circuit and for the greater part of the time as the car passes, two brushes are feeding the current into the motors. The shank of the brush swings on the shaft which holds the clips. As the entire contact switch is enclosed by a cap not shown in the engraving, the device is moisture proof. The



CONDUIT COLUMBIAN UNDERGROUND ELECTRIC RAILWAY.

The general appearance of the model suggests the cable system, and indeed is intended to show the methods of using cable ways for this traction. The method is simple and not altogether unexploited.

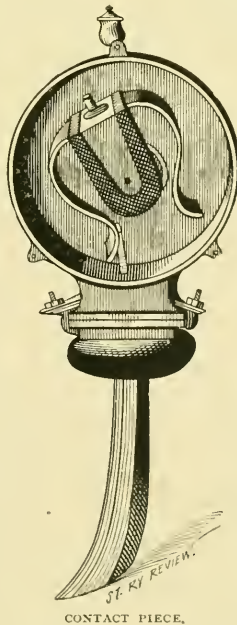
The car may be fitted with one or two motors, as work would require, and a slot built especially for it is of less depth than an ordinary cable way, and as in the case of the trolley, the rails are used for the return. A lead covered cable conveys the current to certain points, at more or less distances apart, according to necessity, where the current is communicated to the trolley board, 16 feet long, running lengthwise way of the car. Our illustration shows roughly the method used. A sliding trolley, as we may call it, is hung from the trucks of the car. This trolley is 16 feet long, and built substantially, with a thin sheet of copper on the upper surface, which collects the current from the contact switches placed at intervals of twelve feet, and conveys it to the motors through wires run in the trolley support. This contact switch is illustrated above. The current is fed from the cable through an insulated tube to the two S shaped lips that are permanently fixed to the center shaft. Being held in position by gravity, no current is flowing through the brush unless a car is passing.

As the car passes, the trolley tilts the brush, as shown in our illustration, when its upper terminal makes contact

inventor intends to fill this cup with oil, in order to obviate flashing and electrolysis. The brush is 5 inches long and made of copper. As the car always stops in contact, perfectly sure starting is secured. When going at high speed, the trolley slides from one brush to another with great rapidity, always, however, maintaining a closed circuit. When going ten miles an hour, the slide passes a switch every second; but the fields of the motor being saturated, and as the momentum of the car assists locomotion, there is less demand for current.

Since the cable carrying the current is highly insulated, the inventor claims that 1,000 to 5,000 volts may be used, thereby greatly reducing the cost of copper and lessening the liability of burn-outs from heavy amperage.

The switches are hung midway between or on the conduit yokes, while the feed cable is in most underground systems strung along the side. Man-holes are arranged at every switch for convenience of inspection or repairs. Each contact is independent and can be cut out from the main circuit by means of a switch arranged near the terminal. The trolley beam can be disconnected from the trucks at any time and removed through hatches in the track. The inventor has followed out his propositions well, and the model works to a degree of perfection that is very gratifying to the promoters. Engineer Clift Wise is the principal of the scheme.



CONTACT PIECE.

ECHOES FROM TRADE.

THE J. G. BRILL COMPANY, of Philadelphia, is pressed to the utmost limits of its capacity with orders.

THE LACLEDE CAR COMPANY of St. Louis, has orders for 10 new cars for the Duluth line.

THE MEAKER MANUFACTURING COMPANY has received several large orders lately, and their works are full.

LEWIS & FOWLER, of Brooklyn, have sold 4 open and 4 closed 18-foot cars to the Springfield, Mass., railroad.

JOHN A. ROEBLING & SON, Trenton, N. J., have the order for wire for the Union Electric Railway, of Chester, Pa.

THE GRIFFIN WHEEL & FOUNDRY CO. report the street railway department of their very large foundry full to its utmost.

THE HEALY MOTOR COMPANY of Detroit has four lines equipped with its motors. The latest is the line from Detroit to Wyandotte.

GUS SUCKOW, of the Richard Vose Car Spring Company, 115 Broadway, New York, was a caller at the REVIEW office last week.

THE M. STEEL COMPANY, of which O. W. Meysenburg & Co. are agents, is furnishing all the castings for the new down-town cable loops in Chicago.

THE DETROIT ELECTRICAL WORKS have opened offices at 23 Fisk Bldg., Boston, and 18 Courtlandt street, New York, the latter being in charge of Mr. T. W. Warfield.

THE WESTINGHOUSE COMPANY has secured the contract for the equipment of the West End line of Pittsburg. The present order is 50 motors and four 150-horse-power generators.

THE Simplex Wire continues to keep its place among street railway men, and the Chicago selling agent, Mr. Geo. Cutter, of The Rookery, states that the demand is constantly growing.

THE ELLIS CAR COMPANY is reaching the southern trade to a considerable extent this season. The trail cars sent to Columbus, Ga., have been particularly pleasing to the local press and people.

THE NEW CASTLE CAR COMPANY, of New Castle, Pa., is a new car-builder. The company has already turned out several orders, among them 10 cars for the Pleasant Valley Traction Company of Pittsburg.

THE ALLEN PAPER CAR WHEEL CO., of New York and Chicago, will admit "that their patent wheel will wear out," but they make great claims for its durability and elasticity, claiming also that it will out wear five old style wheels.

DORNER & DUTTON, Cleveland, Ohio, report business rushing in their various lines. This enterprising house is receiving a great many orders for their motor trucks and at present have orders for over one hundred on their books.

LOUIS BLATZ, of 107 West Monroe street, Chicago, has put his mechanical genius and facilities into the manufacture of a number of allied electrical specialties, such as trolley wheels, electric railway switches, graphite bushings and brass founding in general.

THE BROWNELL CAR COMPANY of St. Louis recently had a fine compliment for their fenders, in the miraculous escape of a baby from death under the wheels of a Broadway, New York car. The child was two years old, and only slightly bruised by the accident.

THE E. P. ALLIS COMPANY of Milwaukee, will make a fine display at the Columbian Exposition. Besides smaller engines showing various types, they will install a 4,000-horse-power quadruple expansion type. This engine will furnish part of the power for the exhibition.

THE CUSHION CAR WHEEL CO., of Indianapolis and Chicago, are meeting with great success with their patent steel tire wheel. Among the latest orders are some for the Chicago City Railway and the West Chicago Street Railway Company, both companies being well pleased from the results obtained.

KOHLER BROTHERS, the enterprising and popular managers of the western interests of the Eddy Electric Manufacturing Company, have removed from the Rookery to an elegant suite of rooms at 1417-1418 the Monadnock Building. This removal will give them room more according to their strength.

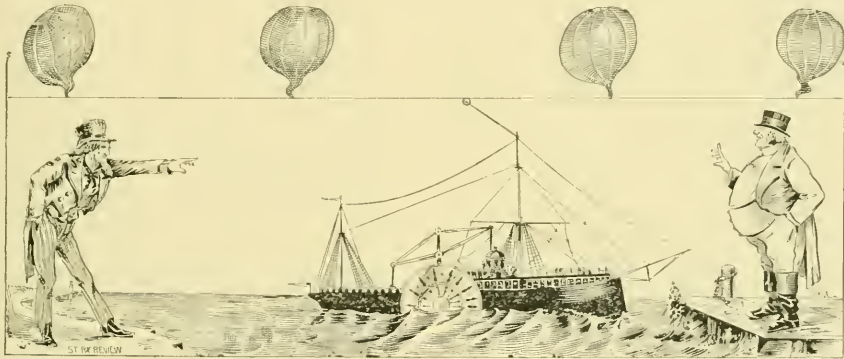
ARBUCKLE, RYAN & CO., of Toledo, Ohio, have been awarded the contract for the entire power plant for the Put-in-Bay Electric Light and Railway Company, 500-horse-power, Russell & Co.'s automatic engines, boilers, etc., including the entire erection. This plant will furnish power for the railway and for lighting Hotel Victory.

THE ELECTRICAL SUPPLY CO., of Chicago, still have a few of those handsome catalogues left and will be glad to send one to any street railway man interested in all kinds of equipment. We have described this in another issue as the most complete work of the kind ever published and well worth a place in any manager's library.

THE DETROIT ELECTRICAL WORKS. Owing to great press of eastern business, this company has found it necessary to open a New York office, which has been located in rooms 11 and 311 Metropolitan Telephone and Telegraph Building, 18 Courtlandt Street. This office will be in charge of Mr. T. W. Warfield as District Manager. They have also opened an office in Boston, in No. 23 Fiske Building.

THE BODIFIELD BELTING COMPANY took an order for a three-ply belt 143 feet long and 60 inches wide, on June 2, at 10:30 a. m. Then they took 2,145 square feet of leather, or 300 steer hides, weighing 2,263 pounds, and made that belt and had it running at 5 a. m., June 6. How is this for time? This belt was for the American Wire Company.

THE DETROIT ELECTRICAL WORKS, at its recent annual meeting, elected the following directors to serve during the ensuing year: Messrs. Hugh McMillan, W. H. Wells, T. H. Newberry, Gilbert N. McMillan, J. H. McWilliam, Strathearn Hendrie, Louis Warfield, all of Detroit; and Messrs. Albert A. Pope and George B. Strong, of Boston. The following officers of this company were elected by the board of directors at a meeting held May 17: Hugh McMillan, president; Louis Warfield, vice-president and general manager; Joseph E. Lockwood, secretary; Thos. Muir, treasurer; H. C. Van Husen, assistant secretary.



A NEW IDEA IN THE TROLLEY LINE.

THE BALL ENGINE COMPANY, of Erie, Pa., list among recent shipments, Maryland Steel Company, Sparrows Point, Md., one 50-horse-power Simple engine; Wilmington Street Railway Company, Wilmington, N. C., two 130-horse-power Simple engines, and complete steam plant; J. C. Rubinger Company, Keokuk, Iowa, one 300-horse-power Cross Compound engine and condenser; Chesapeake Light and Power Company, Hampton, Va., two 150-horse-power Tandem Compound engines and transmitting machinery; Moundsville Electrical Company, Moundsville, W. Va., one 130-horse-power Simple engine; Niagara Falls Street Railway Company, Niagara Falls, N. Y., two 130-horse-power Simple engines and steam plant complete; Edison General Electric Company, State House, Trenton, N. J., one 35-horse-power Simple engine; Schuylkill Electric Railway Company, Pottsville, Pa., one 250-horse-power Simple engine; Freeport Gas and Electric Light Company, Freeport, Ills., one 130-horse-power Simple engine; Warrenton Electric Light Company, Warrenton, Mo., one 50-horse-power Simple engine; Pittsburg Iron and Steel Eng. Company, Newcastle, Pa., one 50-horse-power Simple engine; one 80-horse-power Simple engine.

A. L. IDE & SON, Springfield Ill., are as ever, rushed with work. The output for April aggregated 3,735 horse-power, and included Puget Sound, Gulf and Atlantic points. Shipments were as follows: Westminster & Vancouver Railway Co., Vancouver, B.C., 500-horse-power; Power & Collins, Seattle, Wash., 300; Fort Worth & Arlington Heights, St. Ry. Co., Fort Worth, Tex., 250; National Brewing Co., St. Louis, 50; Mecca Co., Chicago, 200; National Electric Mfg. Co., Eau Claire, Wis., 200; C. H. Bausch & Sons, Holyoke, Mass., 25; Williams & Parish, Dallas, Texas, 50; Edison General Electric Co., Denver, 90; Davenport & Rock Island Ry. Co., (8th order) Rock Island, Ill., 175; Hyde Park Electric Light Co., Hyde Park, Ill., 250; Mattoon Electric Light Co., Mattoon, Ill., 250; Camden Electric Light & Power Co., Camden, Ark., (2nd order) 150; Springfield, Electric Light & Power Co., Springfield, Ill., (7th order) 150; O. C. Irwin & Co., Fowler, Ind., 100; North Chicago St. Ry. Co., 45; Iowa Hospital for Insane, Independence, Ia., 100; C. W. Williams, Independence, Ia., 100; St. Louis

Railroad Co., St. Louis, 150; Duluth & Iron Range R. Co., Duluth, 200; Fort Clark Horse Railway Co., Peoria, Ill., 250; Siegel, Cooper & Co., Chicago, 100, and "The Hub," 150.

McGUIRE MANUFACTURING COMPANY. The mails were not delayed, but in one day recently the McGuire Manufacturing Company, 122-132 North Sangamon street, Chicago, received notices that their trucks had been adopted by the Milwaukee Consolidated Railway, Milwaukee, Wis.; the New Orleans & Carrollton Street Railway Company, New Orleans, La.; Jefferson Avenue Line, Detroit, Mich.; Port Huron Electric Railway Company, Port Huron, Mich., and the Central Railway Company, of Baltimore, Md. In addition to these orders they received the following orders during the month of May: Citizens' Electric Street Railway & Power Company, Mansfield, Ohio; Logansport Street Railway Company, Logansport, Ind.; Binghamton & Port Dickinson Railway Company, Binghamton, N. Y.; Williamsport, Pa.; Lima Electric Railway Company, Lima, Ohio; Montgomery, Clowersdale Electric Railway Company, Montgomery, Ala.; Utica Belt Line Street Railway

Company, Utica, N. Y.; Gate City Electric Railway Company, Keokuk, Iowa; Punxutawney Passenger Street Railway, Punxutawney, Pa.; Terre Haute Electric Railway Company, Terre Haute, Ind.; Union Depot Railroad Company, St. Louis, Mo.; San Francisco & San Mateo Railway Company, San Francisco, Cal.; Jacksonville Street Railway Company, Jacksonville, Ill.; Burlington Electric Street Railway Company, Burlington, Iowa; State Electric Company, Clinton, Iowa; Second Avenue Line, Pittsburg, Pa.; The Douglas County Street Railway Company, West Superior, Wis.

THE GOUBERT MANUFACTURING COMPANY is making extensive alterations and improvements in the plant situated at 32 Cortlandt street, New York city, doubling the amount of floor space and giving a large room over to the display of their manufactures. The company will hereafter occupy the entire second floor of the building in which they are located.

THE DUPLEX STREET RAILWAY TRACKS Co., of 51 Wall street, New York, have recently received a large order from New Orleans, and have several smaller ones from eastern roads. The laying of 6,600 feet of their track upon the Atlantic avenue line, at Brooklyn, is being watched with much interest, as it is considered as a test of this track before deciding upon the kind of rail to be laid upon the whole system.

ALBERT & J. M. ANDERSON, of Boston, have appointed Mr. Robert W. Blackwell, 39 Victoria Street, Westminster, London, as their agent in England. Mr. Blackwell will keep in his office a complete line of samples of the well-known Boston trolley, and all kinds of the Etna insulated trolley line material, and we predict that with the awakening on electrical traction matters in Europe, Albert & J. M. Anderson will have their share of European trade.

THE RAILWAY EQUIPMENT COMPANY, Chicago, reports for the last week, orders for the complete equipment of roads in New Haven, Connecticut; Brooklyn, New York; Baltimore, Maryland; Evansville, Indiana; Chillicothe, Ohio; Pittsburg, Pennsylvania; Hamilton, Canada; Augusta, Georgia; Kokomo, Indiana; and Put-in-Bay, Ohio. They have also made during the same time large sales for extensions of present roads. The business of this Company is constantly increasing.

THE SHORT ELECTRIC RAILWAY people are highly gratified with the performance of their gearless motor at Grand Rapids, Mich., on May 22. The trial trip was made under the espionage of J. R. Chapman, of the Consolidated lines, who is also delighted with his new purchase. The rest of the party included prominent Grand Rapids people and C. R. Cummings, Mr. Odell and Mr. Bradbury, of Chicago. The trips were made by the entire party, and all the most difficult curves and steep grades separately and together were used as tests. The car ascended one $9\frac{1}{2}$ per cent. grade at a speed of 9 miles without the least difficulty. The Short Company

manufactures two types of gearless motors; one wired for high speed on level track, the other for slower speed on grades. The Grand Rapids motors will be of the latter type, owing to the stiff grades on the road, but will make twenty-five miles per hour easily on the level.

THE PAGE BELTING COMPANY, of Concord, N. H., is still considerably in the field, to judge from the following recent sales of the Eureka Dynamo belt: Two to Galveston, Tex.; one to Chattanooga, Tenn.; two to Roanoke, Va.; one to Seymour, Conn.; one to Boston; nine belts to the Brooklyn City Railway Company, Brooklyn, N. Y.; four to the United States Electric Light Company, Washington, D. C.; two to the Staten Island Light, Heat & Power Company, Port Richmond, N. Y.; three to the Prudential Insurance Company, Newark, N. J. Of the company's regular "dynamo double" belting, sales have been made to the Pennsylvania Railroad Company, Camden, N. J.; to the Red Star Line repair shops, Jersey City, N. J., and to the People's Electric Light Company, Trenton, N. J.

THE RAILWAY EQUIPMENT COMPANY, Chicago, reports business as rushing in all departments. They have added largely to the established business of the Electric Merchandise Company, whose business they purchased some few weeks since. The company reports a largely increased business over the last season, but having increased its manufacturing facilities, it is able to guarantee immediate shipments. The managers of the Company having devoted their entire time and attention to "Electric Railway supplies only," for several years, are prepared to furnish reliable and complete information to parties about to equip electric street roads. Such inquiries are given the most careful attention, are answered fully and without charge.

THE STEARNS MANUFACTURING COMPANY, of Erie, Pa., proprietors of the Woodbury Automatic High Speed Engines, are advised that the Franklin Institute of Philadelphia has awarded the "Edward Longstreth" medal of merit to the Woodbury, stating that: "The Sub-Committee after witnessing the operation of several of these engines, were impressed with the fact, that the skill and intelligence displayed in the design and construction of the engine, have resulted in a machine of handsome appearance, capable of close regulation of speed, smooth in its action and well adapted for its purposes. Recognizing the integrity and skill displayed, your committee recommends the award of the Edward Longstreth medal of merit." (Signed by the whole committee).

N. W. HARRIS & Co. is part purchaser of the \$1,500,000 sale of bonds recently completed. They will be issued by the National Street Railway Company of Illinois, a Chicago corporation which controls the principal street railway lines of St. Louis. The bonds will be issued by the Cass Avenue and Fair Grounds Railway Company. This company is a consolidation which has

just been made of the Northern Central, the Union, and the Cass Avenue railway companies. The controlling interest in the capital stock of the three consolidated companies was held by the National Railway Company. D. G. Hamilton is president, Charles L. Hutchinson treasurer, and F. W. Smith secretary. The directors are George T. Smith, Edward G. Foreman, D. G. Hamilton, E. Buckingham, T. J. Lefens, William T. Baker and Charles L. Hutchinson.

The new issue of bonds will be secured by a mortgage on the lines of the Cass Avenue and Fair Grounds Company and will be guaranteed by the National Railway Company.

White Peaks and Dark Canons.

Colorado is a land of sharp contrasts, of brilliant lights, of intense shadows; a land where heights and depths make obvious the meaning of the word antithesis; a land where every mood in mind can find an answering mood in nature. The high, white minarets of the mountains, from whose slender pinnacles float the wind-blown banners of the snow appeal with silent eloquence to the lofty aspirations of the soul; the sombre chasms cleft by Titan forces through granite-hearted hills, within whose depths dark shadows throng and swirling torrents dash, speak to the heart a language that thrills, inspires and awes. It does not follow that these glories of white peaks and these glooms of dark canons preclude the pleasant intervals, the sunny meadows or the secluded nooks wherein the tired mind or wearied body may find peaceful rest and refuge from turmoil and toil. To one making a journey in Colorado, New Mexico or Utah, or taking a transcontinental tour from East to West, or *vice versa*, the Denver and Rio Grande railroad offers accommodations equal in elegance, convenience and luxury to those of any other line, with the added attractions of the unrivalled scenery along the line abounding in a magnificent opulence of white peaks and dark canons. The month of November, 1890, witnessed one of the most important improvements in railroad facilities that has yet been made in Colorado and the West. The completion of the standard gauge of the Denver and Rio Grande Railroad from Denver, Colorado, over the mountains, to Ogden, Utah, which five years ago was deemed an impossibility, is certainly a triumph of daring and engineering skill. The new line is by the way of Leadville, tunneling Tennessee Pass, threading the Canons of the Eagle and Grand Rivers, giving a view of the Mount of the Holy Cross, enroute, taking its trains through Glenwood Springs and down the Grand River to Grand Junction, thence to Salt Lake City, Ogden and San Francisco. By this route one is given an opportunity to behold the magnificence of Eagle River Canon and the marvelous beauty and grandeur of the Canon of the Grand. The overland train is a model in every respect. From the engine to the last first-class coach, everything is bright and new, and of the most elegant style of workmanship and finish.

If any reader desires to know more about these stupendous works of nature, write to S. K. Hooper, General Passenger Agent, Denver, Colorado, and he will send you, free of cost, elegantly illustrated books, giving a full description of the marvels of the "Scenic Line."—Stanley Wood in the "Great Divide."

• WHY NOT BUY

CAR WHEELS

Known to be
good like those made by the

Griffin Wheel and Foundry Co.

THE PROOF? TRY THEM.

OWOSSO'S OPENING.

THE interurban line connecting Corunna and Owosso, Michigan, is now in running order. At the opening of the road held recently the business men of both places gathered at Corunna, and with the moral support of the officials of both towns, and amid the joy of the citizens and the music of bands, the first car was started.

Inventor C. E. Healy, of Detroit, superintended operations, and the two motors ordered performed to the satisfaction of both buyer and seller.

The fare one way is ten cents and fifteen cents for the round trip. The cars carry both motormen and conductors, and the traffic promises well.

THE W. J. JOHNSTON COMPANY, LIMITED, Times Building, New York, has just issued the second edition of the "Dictionary of Electrical Words, Terms and Phrases," by Professor Edward J. Houston.

The book, of which we acknowledge an advance copy, bears little resemblance of the first edition of 1889 and which is no doubt familiar to our electrical traders.

The new edition was rendered necessary by the wonderful progress of electrical science and brings all matters, manners, and methods down to date.

This practically and necessarily, nearly new book has 562, double column, octavo pages, printed on heavy paper. Five hundred and seventy illustrations add to its perspicuity and definitions are given under 5,000 distinct titles and nearly as many more cross titles are entered for convenience in reference.

The dictionary is very complete and should be added to every electrician's working library. Price, \$5.00.

SINCE the fire at the barn of the Second Avenue electric, at Pittsburg, there has been more than a ton of metal stolen, much of it brass, and altogether of considerable value.

In the First Place.

"The Overland Flyer" of the Union Pacific System is to-day as it has been for years, the most popular as well as the fastest Daily Transcontinental Train. The flyer is a solid vestibuled train composed of Pullman Sleepers and Dining Cars and Free Reclining Chair Cars. No change of coach Chicago to Denver, Ogden, San Francisco or Portland. Note our common sense time table:

"THE OVERLAND FLYER."

| Leave Chicago, 10:30 P. M. | Leave Omaha, 2:15 P. M. | Arrive Denver, 7:40 A. M. | Arrive Ogden, 1:00 A. M., Salt Lake, 3:00 A. M. | Arrive Portland, 7:25 A. M., San Francisco, 9:45 A. M. |
|-------------------------------|----------------------------|------------------------------|--|---|
| Sunday. | Monday. | Tuesday. | Wednesday. | Thursday |
| Monday. | Tuesday. | Wednesday. | Thursday. | Friday. |
| Tuesday. | Wednesday. | Thursday. | Friday. | Saturday. |
| Wednesday. | Thursday. | Friday. | Saturday. | Sunday. |
| Thursday. | Friday. | Saturday. | Sunday. | Monday. |
| Friday. | Saturday. | Sunday. | Monday. | Tuesday. |
| Saturday. | Sunday. | Monday. | Tuesday. | Wednesday. |

For tickets or any additional information, call on your nearest Ticket Agent, or address, W. H. KNIGHT, Gen'l Agt., 191 S. Clark St., Chicago, Ill. E. L. LOMAX, G. P. & T. A. U. System, Omaha, Neb.

ADVERTISEMENTS FOR HELP OR POSITIONS WANTED WILL BE PRINTED IN THIS COLUMN FREE.

WANTED. A position as Superintendent or Assistant with an Electric Road, by a young man thoroughly competent in all branches. Address J. E. M. P. O. Box 792 Syracuse, N. Y.

WANTED Draughtsman. To a good man, with experience in car-building, an excellent position with a large manufacturing company is open. Address J, care STREET RAILWAY REVIEW.

FOR SALE. 125 Tons 38 lb. Second Hand Steel Tram Rails in excellent condition. 100 Tons 25 lb. Second Hand Steel T Rails, but little used. D. E. GARRISON & CO., 219 N. 4th St., St. Louis, Mo

FOR SALE. 2 No. 20 500-volt Edison Railway Generators, 65 H. P. complete, with regulating devices, and in perfect working order, for \$1,625 each. 3 No. 10 2200 volt Edison Dynamos, complete with regulating devices, and in perfect order, for \$700 each. 1 Hawkeye 220-volt Dynamo, 20-Ampers, for \$500. 1 Hawkeye 220-volt Dynamo, 150 Ampers, for \$350. 3 Baldwin Steam Dummy Locomotives, from 8 to 11 tons, 2 for \$500 each. One as good as new for \$2,500. All of them were in daily use last summer. Address DAVENPORT & ROCK ISLAND RY. CO., Davenport, Ia

FOR SALE. 1 Baldwin Saddle Tank Engine, weight, 9 tons, cylinders 9 x 12 in., built in 1881. Price \$1,000. 1 Baldwin Steam Motor, weight, 20 tons; cylinders 9 x 12 in.; built in 1884. Price, \$1,500. 1 Baldwin Steam Motor, weight, 11 tons; cylinders, 10 x 14 in., built in 1887. Price, \$2,000. All the above standard gauge, have Eames brake, and are in excellent condition. Also 400 Tons 48 lb. Slot Rail, 2 Walker U Frames with 12 ft. Staggered Arm Sheaves, 1 Set Double Cable Driving machinery, with four Ring Walker Differential Drums. 1 Hazelton Tripod Boiler, 150 H. P. 1 Hazelton Tripod Boiler, 300 H. P. All the above but little used and in excellent condition. CONSOLIDATED STREET RAILWAY CO., Grand Rapids, Mich.

WANTED. Situation as superintendent, or assistant, with an electric street railway company, by a young man thoroughly familiar with electrical work (licensed), and who has had also a practical training with one of the leading electric companies in the United States. Good references. Address "Electrical Engineer," care of THE STREET RAILWAY REVIEW.

WANTED Situation as superintendent or draftsman in either railway or street car shop, by a man 35 years of age, with ten years experience in railway and street car work, thoroughly familiar with all details; references furnished. L. R. SNYDER, 5447 Ridgway Court, Chicago.

WANTED. A position by a man of 25, now with a large manufacturing concern, who has served several years in all branches of light and power, from fireman, engineer and dynamo man to superintendent, also construction work. Will go anywhere on trial and demonstrate to the satisfaction of all that I am what I claim to be; good references. Address "On Trial," Care of STREET RAILWAY REVIEW, Chicago.

FOR SALE.

100 Meaker Stationery Registers. "Latest improved" pattern, but little used; as good as new. R. C. CRAWFORD, Secretary West Chicago Street R. R. Co.

H. R. PARROTT, President, F. W. PARROTT, Treasurer.

The Parrott Varnish Co.

BRIDGEPORT CONN.

MANUFACTURERS OF

The Finest Grades of . . .

RAILWAY VARNISHES.

For Sale. One United States Dynamo 80,000 Watts, 500 Volts good as new. EAST READING RAIL ROAD, Reading Pa.

Wanted. A man to wind T. H. & Co. armatures, 30 to 50 H. P railway car motors. Address JOHN F. GIV'N, Hewitt and Hackberry St. Cincinnati, O

Notice to Managers. A competent Electrician and superintendent desires a change, and will be pleased to receive offers from those desiring his services. Good references. Address, D. 62, care of Street Railway Review.

Second-Hand Engines for Sale.

One 150 H. P. Russell automatic engine with line shaft pulleys.
 One 50 H. P. Russell automatic engine with line shaft pulleys.
 Two 25 H. P. Rice automatic engines.
 One 35 H. P. Westinghouse engine.
 One 25 H. P. Chandler & Taylor engine.
 Taken in exchange for Ideal engines and will be sold at less than half original cost. For further particulars, address A. L. IDE & SON, Springfield, Ills.

WE PURCHASE TOTAL ISSUES OF : : :

STREET RAILWAY BONDS.

: : : CORRESPONDENCE INVITED.

N. W. HARRIS & CO., BANKERS, 163 Dearborn Street, Chicago. 15 Wall Street, New York. 70 State Street, Boston.

**C. E. LOSS & CO.,
 General Railway Contractors.**

Estimates made on all classes of Engineering Work.

—WAUKEGAN, ILL.

**THE LATEST
 —FOR—**

Electric and Cable Cars.

STREET CAR

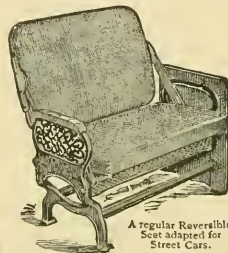
SEATS

Of Every Description.

With or without springs, covered with Carpet, Plush and Rattan.

Hundreds of References.

Thousands in Use.



A regular Reversible Seat adapted for Street Cars.

Catalogues, Estimates and Samples on Application.

THE HALE & KILBURN MANFG. CO., Philadelphia New York, Chicago.



WINDSOR & KENFIELD,

PUBLISHERS AND PROPRIETORS,

334 DEARBORN ST., - - - CHICAGO.

Published on the 15th of each month.

SUBSCRIPTION, - - - ONE DOLLAR.

FOREIGN SUBSCRIPTION, - - - TEN SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW,
Caxton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR,
Editor.

F. L. KENFIELD,
Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW,

334 Dearborn Street, Chicago.

Entered at the Post Office at Chicago as Second Class Matter.

This paper member Chicago Publishers' Association.

VOL. 2. JULY 15, 1892. NO. 7

EXHIBIT SPACE AT CLEVELAND CONVENTION.

Exhibitors who intend making a display of street railway appliances at the 11th annual meeting of the American Street Railway Association, which will be held in Cleveland, October 19th, 20th and 21st, should apply immediately to Henry J. Davies, Secretary Brooklyn Railroad Company, Cleveland, O.

ATTENTION is called to our directory of street railways, published in every issue and carefully corrected monthly. The magnitude of the business naturally renders important changes every month, and while errors will occasionally creep in we are confident our directory list is really the only complete and correct one published. Please examine your road in our list and advise us of changes as they occur.

THE eleventh annual convention of the American Street Railway Association, at Cleveland, will be the largest and most important gathering of street railway men ever convened. No company on the continent can afford not to be represented there, and delegates who contemplate attending owe it to the local committee to so advise them at the earliest possible moment. Write to H. J. Davies, Secretary Local Committee, Cleveland, stating what hotel accommodations you desire, and rooms will be reserved accordingly. The fraternity in Cleveland will do everything possible to promote the comfort and pleasure of visitors, but they cannot do impossible things and it is certainly due them that timely notice be given and enable them to secure the desired quarters in advance.

IN an Ohio city the past week a joint effort has been made by a large number of interested citizens and a street railway company, to purchase private property for the purpose of opening a new street and constructing thereon an electric line. The street is greatly needed as a short cut to a well settled district, and the team traffic and passenger travel would be considerable. The desired property is unimproved and until now has never been considered of unusual value. The condition of the municipal finances will not permit of the city assuming the duty of condemnation. As soon as it appeared that the street railway was willing to assist in the expense of opening and grading the street the public spirited owner advanced his selling price to just double its former figure, which effectually puts a check on the desired improvements.

The case quoted above is but one phase of the everyday occurring efforts of unscrupulous individuals to bleed the railway corporations. In this case the property was practically unsalable until the line was proposed, the construction of which would advance its value many fold. But not satisfied with all this, the road is asked to pay an exorbitant fee for the privilege of serving the public. And meanwhile the public sit apathetically by and wait. It does seem as though a public sentiment should be engendered and a pressure brought to bear in such cases as would give companies the leverage necessary to carry out improvements so greatly needed. The general rule seems to be, however, to place as many obstacles in the path of progress as possible, while the dear people set by with folded hands and cry "bravo" every time the corporation is worsted in a bout.

THE subject of compressed air as a street railway motive power, is the subject of an interesting article in this issue from the pen of General Herman Haupt. The writer stands high among the engineers of this country and Europe, and will be remembered as one of the leading contracting engineers in the construction of the Hoosac tunnel, and as the author of several standard engineering works. While compressed air has been for some years the only motive power on a number of European roads, it has never succeeded in securing that foothold in America which would lead to its adoption as the exclusive motor power of any road here. The friends of the system, however, are still sanguine of an ultimate place among the railway powers.

The accepted theory among street railway men of to-day is, however, that the operating car should be at all times in continuously direct connection with the source of power, from the moment it leaves the car house in the morning until it returns at the close of the day's run; and at present this is only possible in the case of the trolley wire electric, cable and dummy systems.

No sensible man in these days of mighty accomplishments, but concedes that other than the three methods just named may some day supercede them; but as we have stated in the past, the street railway men of to-day are wide-awake, progressive and practical men, who above

all others are most anxious for the best motive power at the least operating cost, which is the claim made by the compressed air system, and yet among them all no one has been found who was willing to cut loose from the accepted systems and adopt that of compressed air.

THE STREET RAILWAY REVIEW believes in giving a hearing to all systems which may promise improvement in any branch of the service, and while inviting a full discussion, promises an impartial treatment of the case.

THAT the railway manager in his honest endeavors to do that which he knows is best for the public and his company, labors under exasperating difficulties in his relations to city official mandate, is better known to himself than can be expressed in words. What the tax payer would suffer were street railways ever to pass within the hands of municipal management, is illustrated in a small way in a recent instance which occurred in San Jose, Cal.

One of the companies had occasion to relay a considerable amount of double track, part of which extended through the main business street, and which was paved. The company submitted the plans of its proposed reconstruction, and which was according to the latest and best methods in use in cities. For some unaccountable reason certain city officials condemned the system, and refused to grant the necessary permit. The matter went into city council for settlement, which body energetically upheld the decision. The company offered abundant evidence in favor of the desired construction, but these expert purveyors of local law could not see any advantage and stubbornly refused to change their ultimatum. As the mooted section was absolutely necessary to the connection of the tracks extending on either side of the city, there was no alternative, and finally under protest the company submitted. The track was laid, the paving replaced, and in a few months the track was in such wretched condition, a great howl went up on all sides,

The road was then graciously allowed and ordered to tear the work all out and re-lay according to original plan.

This little experiment on the part of the city, cost the railway nearly eighteen thousand dollars, besides the loss of revenue from interrupted traffic, and the road seems to have no redress. Just how much money will be required to educate the city fathers, no man knows; but it is such things that cause a manager's hair to fall out without even having time to get gray, and his life made a burden, while the alleged charms of railwaying droop and fade away.

THERE is an unmistakable evidence of late, on the part of city officials, and many of the daily papers, to urge the placing of a per cent on the gross receipts tax on all renewals of old franchises and grants of new. It cannot be denied that in many instances, this apparent desire to benefit the city treasury, is but another form of blackmailing and bleeding corporations, who are expected to secure immunity by some process of converting these belligerents from the error of their ways. In some cases, the situation is reduced to the choice of throwing overboard the cargo, or sinking the ship.

With the largely augmented facilities which have been introduced in the last three years, and in the furnishing of which to the public, companies have expended large sums, and the growing feature of a transfer system enabling patrons to travel farther, and reach a very greatly increased number of points without the expenditure of an additional fare, formerly required, it would seem as if the companies had justly earned immunity from burdens, rather than become deserving of the extra burdens which press and people compete in imposing.

As a practical illustration of this, may be cited the case of the Newark, New Jersey, lines, which not long ago adopted a general transfer system. During June 600,000 transfers were issued, and the estimate for the year is placed at nearly 8,000,000. Assuming that each transfer represented a fare, the revenue which would otherwise have been collected, will be seen to amount to \$400,000. While the company would not have received as much as this, as many thousands ride under transfer privileges who otherwise would have remained at home, still the service rendered the public is represented by the full amount, and the company is entitled to the credit of having given the citizens of that city the magnificent sum stated. The same conditions in greater or less degree, could be cited in the case of a large number of other cities throughout the country.

It is an unmistakable fact, which in traveling across the country from ocean to ocean forcibly impresses itself upon every observing mind, that the American people do not justly appreciate what the railway companies have done toward advancing the material, service and social conditions in our cities and towns. When a line is proposed, it excites interest; while building, curiosity; when completed, a grand hurrah! In a few weeks or months, it becomes a matter of history; the struggles and sacrifices of the promoters are forgotten, the money which has been made for them be the advance in property, is all ignored, and the company becomes the target of the entire community. If it happens to carry a few big loads the cry goes up "the road is making too much money," and jealousy and obstruction vie with one another to make Jordan a hard road to travel. Little misfortunes and delays are magnified, while improvements in the service or freedom from delays, fail to call out a word of commendation.

AS a sample of the genuineness of a large number of damage claims which are constantly brought against street railway corporations, may be cited a recent case in New York, where one Thomas, owning property abutting on one of the stations of the Manhattan Elevated road. The jury of course found for the plaintiff, and required the company to pay heavy damages or move its station, the claim being that the latter obstructed the light and depreciated the value of the saloon on the ground floor. The company decided to move its station, and now the tenant is suing his landlord for \$10,000 damages caused by loss of business as a result of the removal of the station.

MILWAUKEE'S GIGANTIC POWER PLANT.

History of Rapid Transit in Milwaukee. The Men and the Means, Methods and Measures.

AWAY back in the good old times, when Chicago was a village, Sara Bernhardt a baby, the trolley unborn, when the STREET RAILWAY REVIEW was just beginning to be needed, and Milwaukee boasted only 30,060 souls and no breweries, there was a street car line of the mule type in the Cream City. This was in 1859, and about this time, as Herodotus would say,



WALNUT STREET.

the River & Lake Shore Railway was built. The prophetic eye of John Lockwood saw that Milwaukee was destined to become a big place, but the prophecy has been overshadowed by the reality and that little two miles of flat iron track has grown and spread out and flourished like Jonah's gourd, into the present dimensions of heavy T rail, and 4 little bobtails have brooded upon and brought forth the 500 modern cars that to-day traverse avenues that were then cow-paths and hunters' trails.

It was not until 1859 that the street railway scheme assumed practical proportions. In this year the common council passed an ordinance authorizing the River & Lake Shore Railway Company to build track and operate cars on various streets in the first, seventh and eighth wards. A capital stock of \$50,000 was subscribed to further the undertaking, and Alexander Easton, a Cincinnati contractor, became the builder of Milwaukee's first street railway. May 20, 1860, was a great day for Milwaukeeans, and such expressions as "wunderschoen" and "herrlich" were heard from the lips of the inhabitants thereof as the first little bobtail ran over the single track on East Water street, or Walker's Point Bridge, as it was then called, to Division street, now Juneau avenue. The same spring the East Water street line was extended on Juneau avenue to Prospect avenue.

George H. Walker, Dr. L. W. Weeks, W. J. Johnson and F. S. Blodgett were the first promoters of the street railway enterprise and Mr. Walker was Milwaukee's first railway manager.

It was in 1863 that the common council passed an ordinance authorizing the extension of the road on the

south side from Walker's Point bridge to Ferry street, on Ferry to Lake, on Lake to Clinton, on Clinton to Florida, on Florida to Hanover, on Hanover to Elizabeth, on Elizabeth to Sixth, on Sixth to Mitchell, on Mitchell to Forest Home, on Forest Home to the cemetery. This line, however, was not built until some time later.

The River & Lake Shore road was succeeded by the Milwaukee City road which was organized, promoted and incorporated by John Plankinton, Frederick Layton, Samuel Marshall, Chas. F. Ilsley and Walter S. Johnson. The capital stock was fixed at \$100,000, and the company reserved the right to issue bonds from time to time as necessity might require. W. S. Johnson became general manager and the routes were variously modified to suit the increasing population of Milwaukee, which was, in 1860, 45,000.

In 1869 Isaac Ellsworth became owner of the Milwaukee City. Between 1875 and 1881 the Reed street and National avenue lines were double tracked and the track removed from Ferry, South Water, Florida and Greenbush streets, besides various extensions and improvements were made in this time.

In the fall of 1881 Peter McGeogh took hold of the Milwaukee City as owner and manager. Mr. McGeogh proceeded at once to make the road mainly what it is



GRAND AVENUE—LOOKING WEST.

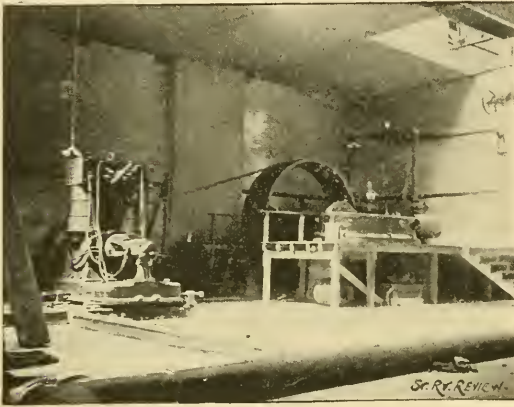
now. He extended the National avenue line to National Park, the Walnut street line to the city limits, and the Third and Eighth street lines to the north limits. Besides these, several lines were built outright. Mr. McGeogh remained in possession until December 1, 1888, when he sold out to New York capitalists for \$1,500,000, and then again in August, 1890, it changed into the hands of its present owners.

THE CREAM CITY LINE

was incorporated in June, 1874, by F. B. Van Valkenburg, James B. Turck, James B. Hoes, Ed. C. Wall and H. S. Mark.

This company took up the streets on the east and south sides abandoned by the Milwaukee City Railway Company. The Farewell Avenue, Ogden, Jackson and Mason Street lines, from North avenue to East Water street was in operation in 1875. Soon after the company built the line on East Water street, from Juneau avenue across the East Water street bridge to Clinton street, down to Kinnickinnic. The Forest Home line was built in 1877. Ten years later nearly all the other lines were completed.

James B. Turck was the first manager of the road, while F. B. Van Valkenburg was first president. In 1877



THE FIRST ENGINE.

the Forest Home road was built, but soon after consolidated with the Milwaukee. Winfield Smith, the prominent lawyer, was president of the consolidation. Mr. Smith remained president until January, 1890, when he was succeeded by Henry C. Payne.

In April, 1890, the road was sold to a Pittsburgh syndicate for \$777,000, and August 1st of the same year the Villard people paid \$850,000 to get possession.

Horses were successors to steam dummies which were forbidden on account of accidents, and when the Villard syndicate took hold, all the horse barns became useless and the beautiful electric system inaugurated.

THE WEST SIDE ROAD

organized in June, 1874, by John Tesch, John Plankinton, S. W. Greene, S. S. Merrill and S. S. Harrison, with Mr. Tesch president, was given franchises on several West Side streets. Ordinances dated 1876, 1879 and 1880 give rights to extend and double track various lines. In 1890 the entire road was overhauled, put in condition, and equipped with electricity. Washington Becker was at the head of the line from 1875.

THE HINSEY LINE.

John A. Hinsey was the man to pave the way for electricity in Milwaukee. In 1888, after an exciting contest, Hinsey and Hinckley were authorized by an ordinance of the city council, to cable the entire city. The Rasmussen system was suggested as the proper method for

the occasion, but upon the failure of the system in New Jersey, the idea was abandoned, as the traffic would not warrant the trial of any other design in the cable.

It was during a trip east that Mr. Hinsey was first interested in the electric method of power transmission. This was in 1889, and in 1890 the ordinance was amended to allow the use of electricity. In the spring of 1890 an electric road was equipped and put in operation.

The equipment was incomplete and the road almost a failure because the monied man in the firm refused to bring any more pecuniary assistance to the operation of the road.

Mr. Hinsey owned 40 per cent of the stock and Mr. Hinckley the remainder, and to save litigation and settle differences the two closed out to Chas. F. Pfister for a \$120,000 loan. The Milwaukee & White Fish Bay Company was at this time given the streets allotted the Hinsey Company, but not occupied by the latter company. The M. & W. F. Bay was built in 1886 and was under the control of W. H. Bradley, but came into Mr. Pfister's hands in 1890 and was consolidated with the Hinsey line. Since this time litigation has been the prominent feature until the White Fish Bay road came under the Villard wing in June, 1890.

The Milwaukee Consolidated Street Railway Company, when finally settled, found itself in possession of the Cream City, Milwaukee City and the two dummy lines, one to Whitefish Bay and one to Wauwautosa. These have been added to until including the Becker line, still in the courts, there are 100 miles of track comprehended under the Villard system.



HURRY-UP WAGON.

The gauge of the track is 4 feet 8½ inches and with a large number of grades of from 6 per cent to 9 per cent.

The track is mainly laid with girder rail of the Johnson pattern or Illinois Steel Company's girder. The Illinois rail is in the majority. The streets are mainly cedar block, but several long stretches of Macadam are to be found, and the streets are mainly in fine condition.

The curves are for the most part 40-foot radius and the cars swing around them without a jar. The roadbed of the Whitefish Bay line is very winding and will be straightened next year, when electricity will probably

supercede the three steam dummies. The pleasure resort at the Bay is owned by the Pabst Brewing Company, free admission and the best of order. All suspicious and undesirable characters are immediately ejected.

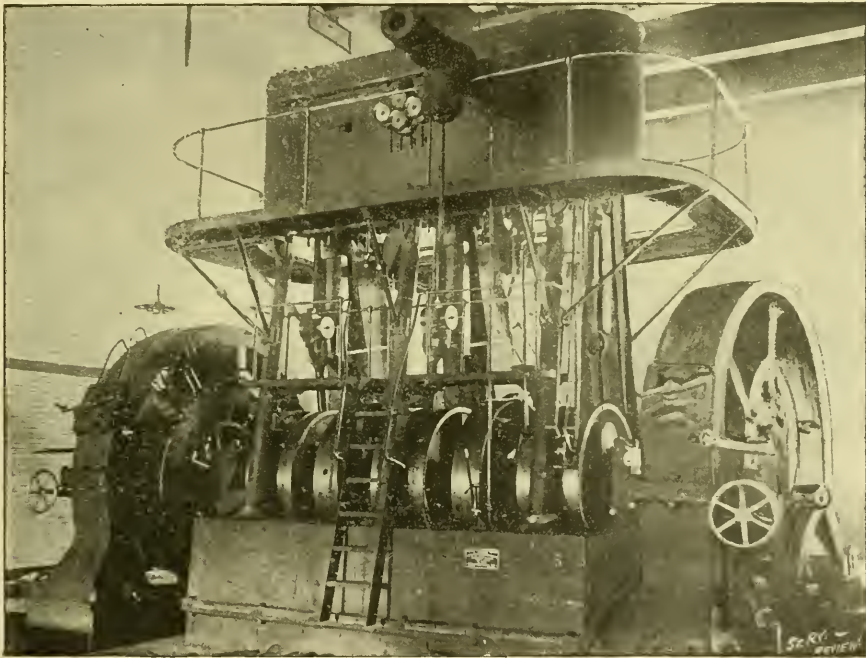
THE ROLLING STOCK

is probably more varied than any other in the world. Cars of all makes, sizes, conditions and trucks make the city a mine of interest to street railway men. The cars come from the La Clede, American, St. Louis, Brownell, Gilbert, Brill, Jones, Northern, Stevenson, Ellis and Lamokin works, mounted on McGuire, Randall, Brill and other trucks, with wheels made principally by the Northwestern Wheel and Foundry Company. All cars are doing the best of service and are easy riding. Some of the cars are old gray-beards on their last legs, excuse us,

New York concern, and built by the J. Morton Poole Company, of Wilmington, Delaware. The cylinders are $16\frac{1}{2}$ inches bore, diameter, $23\frac{7}{8}$ and $38\frac{1}{2}$ inches, by 30-inch stroke at 160 lbs. steam pressure. They are vertical triple expansion machines of 120 revolutions and stand 21 feet high. Five smaller engines of 300 horse-power, 250 electrical, of the same make and type are set to run the electric light plant. These latter are $11\frac{7}{8}$ bore, $17\frac{1}{2}$ and $28\frac{1}{4}$ inch cylinders by 21-inch stroke, with the same steam pressure as the larger. Further on there will be 6 smaller engines of the same dimensions as the light requires on the second floor for railway use.

THE ELECTRICAL EQUIPMENT

consists of 5 Number 60 standard Edison dynamos at



NEW STYLE VERTICAL 600-HORSE-POWER ENGINE.

wheels, and one the STREET RAILWAY REVIEW man rode on had seen 25 years of service, still a good serviceable car and made by John Stevenson for the River & Lake Shore road in the '60s. There are 500 cars, all told.

THE POWER HOUSE,

situated on River street and convenient to fuel transfer, is a mammoth affair, two stories in height, with dimensions 100 by 103 by 95 feet high.

On the ground floor, which is solidly built in concrete and brick, are bedded the five large 60-horse-power or 500 electrical engines, which are destined to furnish the power for the railway system. These engines deserve a more detailed mention. They were designed by J. C. Henderson, engineer-in-chief of the Edison Company's

present operating the railway work which will be superceded by 12 multipolar dynamos, 200-kilowatt capacity each. These will be coupled direct to the end of the shaft, doing away with all intermediate transmission, saving about 15 per cent of the power. The multi polar machines are of the Siemens or German type, having 8 poles with a gramme ring armature 84 inches in diameter. The edge of the armature is used as a commutator, being wound with bars instead of wire. The machines are coupled to the railway switch board for convenience in switching any machine onto any of the numerous feeders running to this board, so that in case of accident to one machine another can be placed immediately in use. All switches and apparatus used on the board are of the Edison standard make and mounted on Italian marble, doing away with all fire risk.

THE FEEDER

system is complete and interesting. These feeders run from the switchboard to such points of the city where the power is in greatest demand, with an appreciation of the equalization of the current to the standard of electro-motive force. The line is all cut in as one main, being fused at numerous points to avoid accident to the machinery and station.

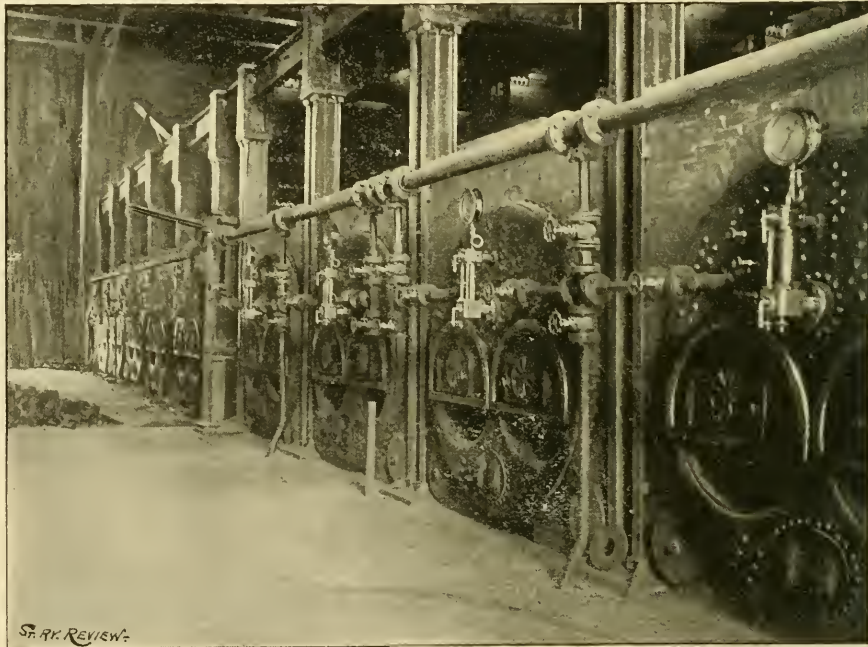
The switchboard is 42 feet in length. There are 66 pieces of apparatus here fixed, besides 5 steam and water gauges from the boilers.

There is one main ammeter that will tell at a glance the amount of current in use on the line.

the lighting work. The output of the lighting plant is 25,000 lights 16 c. p. incandescent.

THE STEAM PLANT

consists of at present 9 Galaway boilers made by the Edgemoor people of Delaware. To these will be added 8 more, placed above these at present set, making two fire room floors, which will have coal conveyers supplying each with coal from the coal storage. These boilers feed into 2 main headers placed against the wall of the engine room. These headers are 60 feet long and of 16-inch diameter. From these main headers the auxiliary headers are fed, which run along the ceiling of the engine room and from these with copper pipes are tapped the



BATTERY OF NINE GALAWAY BOILERS—MILWAUKEE RAILWAY

THE LIGHT WORK

is done by one 2-50-Kilowatt machine, one 2-100 and a temporary plant of 2 number 20, and 4 number 60 Edison Standard machines, which will in the near future be replaced by 2 more 2-100 machines. These machines are of a similar type to those used in the railway slant.

The wiring of dynamo connections to the switchboard are laid in interior tubing concreted under the floor, terminating near the end of the building where the switchboard gallery is, where they run in across tubes to their respective connections on the board. This board is on a gallery about 10 feet from the dynamo floor and is constructed similar to the railway board but much larger and adapted for illuminating work. This board will have all the latest improvements and conveniences for furnishing equal pressure in all parts of the city. The standard Edison three-wire system is used throughout in

steam pipes for the engines. The auxiliary header is a 12-inch pipe and the steam pipes are 5 inches in diameter. The entire plant is run condensing being built along the Milwaukee river, which gives plenty of water for the purpose. The condensing plant consists of 5 Wheelock-Wheeler Condensers, 4 Blake air pumps 8X12X12 stroke and 4 circulating pumps of the same make. The condensed water is discharged into the hot well, a tank 5 feet in diameter by 15 long, from which the four feed pumps supply the engines. This plant is for railway work only, being under the main engine room floor. The condensers and pumps for the illuminating plant are under the sidewalk, and consists of 1 condensers of 1,000-horse-power, two air pumps and 2 circulating pumps.

The horse-power of the boilers is 200 each, all internally fired and 160 lbs. pressure. The boilers make an imposing appearance as our engraving shows.

A Wass grease extractor removes all impurities from the water, being placed between the boiler and the feed pump. The DeRyke grease extractor and separator is attached to the exhaust and steam pipe of each engine.

THE MANAGEMENT.

The present management of the Villard system, with the accustomed executive ability of this great organizer is divided into two parts. One comprehends the territory known as the West Side, bounded by the Milwaukee river, 5 miles out, and under the direct management of Geo. W. Hummell, with his office on West Water Street. All the accounts however, are audited and all the receipts handled at the main offices on the corner of Mason and Milwaukee Streets, in the second floor of the Coalby and Abbott building. Here Vice-President Payne, Manager Lynn, Auditor W. L. Mason and Assistant Secretary and Treasurer Geo. O. Wheatcroft, with nine assistants are busy about seven days in the week finding out how money matters and construction affairs are going. Here also, the allied interests of the electric light plant is handled, and here is the lair of Chief Engineer Stickman and his assistants. While upon the subject the name of Electrician O. M. Rau may be mentioned. Mr. Rau, although a very young man, is an accomplished electrician and mechanic and a most pleasant gentleman to meet, and to him in a great measure the street railway is indebted for its smooth running electrical equipment.

THE BARNS AND SHOPS

of the Company are at present scattered over the city at convenient points.

The old horse barn at the corner of Farewell and North avenues where the two electric lines of that name meet has been reconstructed into a car barn and repair shop. The building is 180x250 feet and will contain space for 150 cars.

In this building the finely made curves and track work are made and the managers' handsome car is stored. This managerial chariot is a beauty. Designed by Mr. Lynn it could not but be of the best. Every bit of metal is nickel-plate. The windows are plate glass, the electric lights are incased in frosted globes. Its dimensions from end to end are 24 ft. 10 in. by 7 ft. 6 in., the length of the car from door to door being 16 ft. The vestibules are finely fitted and even the Calorific stove poker is nickel plate. The woodwork is all finely polished birch with mahogany trimmings, the ceiling being of quartered oak. The seats are of the best Wilton brussels of a deep red, to harmonize with the woodwork. The floor is covered with a heavy rope matting, on top of which is a strip of carpeting similar to that used on the seats. Shades take the place of blinds and are of the genuine parlor car pattern. Not content with the small mirrors usually found on cars, four large French plate glass mirrors have been placed in the front and end of the car, taking the place of the windows. These have been duplicated on the same scale on the exterior front and end of the car, making a total of eight mirrors about 40 by

25 inches each. To top off the general interior effect. Cathedral glass has been used in the small windows in the top of the car. The car is number 200 and is fitted with a brake of A. W. Lynn's inventive genius.

The new machine shops, at the corner of Kinnicinic avenue and Mitchell street, will employ about 100 men. The building is 300x300 feet in dimension and will contain machinery for woodworking, ironworking and general repairs.

The South side barn is a two-story, reformed horse-barn, and by means of elevators 200 cars can be placed here. The basement gives space for 400 horses and mules with their complement of 35 valets.

Opposite the barn there will be erected shortly, a paint shop 125 feet deep by 325 feet front, or just one block long. About fifty men will be given employment here. Here are stored the managerial rigs and sleighs, nine in all. The line patrol wagon is a little beauty, light and elegant.

The transfer facilities are handled by four men especially detailed for the purpose, who stand at the junction of the lines and pass around the tickets shown in the engraving. This system of transfers admits of criticism, in that outsiders may sneak transfers off of the official in charge unless he be very watchful. The register-sheets at the end of the route are taken in charge by specially empowered officers, thus preventing a juggling of fare sheets.

ALEXANDER W. LYNN,

The judicious and hard-working manager of the Consolidated lines has had a good many things happen to him since he arrived in the United States at Saratoga, New York, 55 years ago. Saratoga may have received its first impulse as a watering place from the fact that our friend was born there in 1847.

Mr. Lynn removed from Saratoga in 1849 principally because his parents went West about that time, and Alexander felt constrained to accompany them.

As becomes a good Westerner, Mr. Lynn devoted his entire energy immediately to growing and has succeeded admirably in this as in other things. As he was the youngest of 17 children he was not spoiled in his youth, and to this his friends attribute his unflinching good nature under all circumstances. His father's death left the children to make ways and means for themselves and young Alexander was made a committee of one to look out for his own sustenance.

His first money was gathered in exchange for services supplementary transportation department in the office of a beer factory, in Sparta, in the capacity of office boy. To this he attributes his earliest interest in saving wind and limb in the street railway service.

After learning telegraphy he became an expert penman and taught this branch of learning several years. His after enterprises include a United States mail route in Wisconsin, the livery business and spinal fever. On account of the latter he went to Denver to recuperate his health. He farmed in Iowa, ran a livery stable and

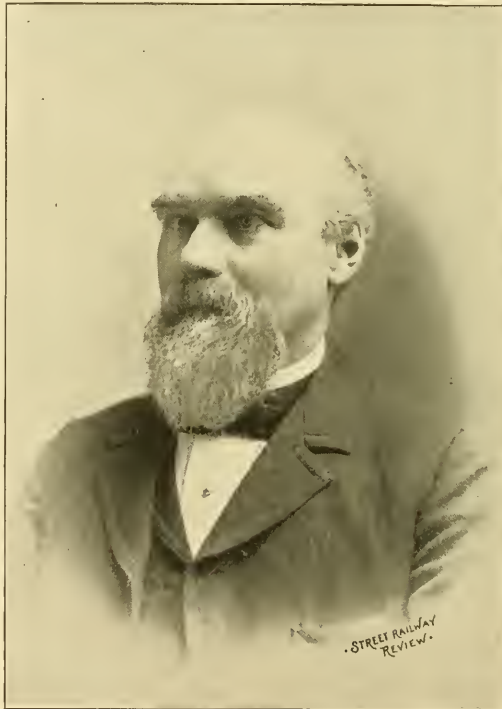
operated a telegraph all at the same time, 'broke' on a railroad, became a conductor, and finally after all this tutelage became a railway contractor and manager.

Charles Hathaway, of Cleveland, became a friend to the young man in a very substantial way, by giving him a chance on the Racine railway lines, about 1882. Mr. Lynn accepted the offer and by way of learning "from the ground up" cleaned horses for several months. He did this with the same vigor that he has done all things and was soon made superintendent of the Hathaway lines. Mr. Lynn directed the change of the Cleveland line from the bob-tail to the best and finally rebuilt the whole system. In recognition of his services the company gave him \$500, paid his expenses and let him spend six weeks seeing other lines.

At the end of this time he was ordered to Milwaukee, where he has been since. He found the Cream City line with 18 miles of track and 21 cars and 300 mules. To day this line, now in the Villard system, has 40 miles of iron, 80 cars, 50 of them motors, and 500 horses. So much for five years besides superintending three sales of the line. To his present more extended duties Mr. Lynn addresses himself with the same energy, and every man on the line knows that what he says he means and that he has a personal interest in each man from barn-boss to stable hand.

Mr. Lynn at 45 is robust, contented and of independent means, owing principally to his great ability, his unflinching faithfulness and hard work.

His only fads are fast horse flesh and the Consolidated system of Milwaukee.



A. W. LYNN.

CONSTRUCTION BIDS.

THE East and West Side Railroad Company propose to build and equip about eight miles of road at once; using the overhead trolley system. They are in the market for all kinds of equipment. Communications should be addressed to H. H. Hallock, general manager, Binghampton, New York.

F. A. M. BURRELL, junior member of the belting house of Chas. A. Schieren & Co., spent two days in Chicago last month visiting his brother, who has the management of their Western business.

UNJUST DISCRIMINATION.

A BILL has been prepared for the legislature of Louisiana, aimed at the lines in New Orleans, requiring all street car companies to use a conductor on each operating car. The constitution of Louisiana does not permit the legislature to discriminate for or against any portion of the state, and hence the proposed act is a manifestly unjust one. In large cities and on lines where travel warrants it, companies find it a matter of policy and economy to use conductors, but on new lines and in smaller towns such a law would simply prohibit, in some cases, a car service at all. Conductors should be employed wherever the business will warrant it, but cars can be

safely and properly operated by one man. We rode recently on an electric line in Spokane Falls, which runs from the business center out to a new suburb, which has just been opened, on which one man performs the double duty of conductor and motor-man. Under this arrangement it is possible to operate the cars at just one-half the headway which the business would warrant were two men required on each car.

If New Orleans is really suffering for relief of the nature suggested in the bill, the proper course would seem to be a city ordinance providing for conductors on every car, rather than a general statute sweeping the entire state without exception or condition. The fool legislator seems to be quite as much at home in the South as in many other afflicted portions of our country, and gets his work in at all hours and seasons.

DECIDE at once to attend the October Convention and then write the local secretary for desired hotel accommodation.

CHAS. SCHIEREN & Co., New York and Chicago, are filling a great many orders of electric street railways. The new electric lines are causing a great belt demand.

THE South Chicago Electric Railway has contracted the following equipment: Fifty 20-horse-power motors, Westinghouse Company; twenty-five cars with McGuire trucks, St. Louis Car Company; three Allis Corliss engines, 300-horse-power each; Stirling water tube boilers. E. J. S. Esterbrook is Chief Engineer.

TWO-HORSE-POWER MOTORS.

AN English engineer has advanced the idea that a properly-managed 2-horse-power motor is sufficient for tractive purposes. W. G. Carey, of the Roundhay Electric Tramway makes the following convincing reply through the London Electrical Engineer:

An ordinary 16-ft. car, when loaded, weighs, exclusive of motors, about 10,000 lbs. At the rate of eight miles an hour it moves horizontally 704 ft. per minute. Assuming that a pull of 25 lbs. per ton of weight is necessary to overcome friction (with a grooved rail it will probably be somewhat greater) the horse-power required to drive

on a level road will be $\frac{4.5 \times 25 \times 704}{33,000} = 2.4$ h. p. If the same speed is to be maintained on a 5 per cent gradient, the car must be lifted 35.2 ft. in each minute, which will require, in addition, $\frac{10,000 \times 35.2}{33,000} = 10.66$ h. p. It will

therefore be necessary to exert 13 h. p. to drive such a car at the rate of eight miles an hour, on a gradient of 1 in 20—a feat which is accomplished daily on scores of roads in the States. But when, in addition to the above weight, that of the motors is considered, the power required will be even greater. These figures are only for the power required to maintain the speed when once it has been attained. In starting, while the armature speed is yet very low, an enormous torque is required, and the motors must be designed to stand a current far in excess of that which will be taken when running at normal speeds.

DUBUQUE'S DEAL.

THE Eighth Street line at Dubuque, was recently sold for \$25,000 under foreclosure of mortgage.

J. R. Doane, of Cincinnati, holder of a majority of the bonds was the buyer. Mr. Doane said in an interview that the future of the road depended very materially on the support and encouragement given it by the people of Dubuque. The road has been of immense advantage to residents on the hill, and has brought about a general increase in real estate values. Without going into details Mr. Doane thinks that in the event of the formation of a new stock company there should be liberal subscriptions to the capital stock by Dubuque people. He wanted to see it practically a Dubuque company and under the management of Dubuque men. If local capitalists show an inclination to invest in the company, Mr. Doane is willing to let them in on the ground floor, and he has no doubt the other bond holders would be willing to do the same. The line cost originally \$80,000 and was sold at sheriff's sale for \$25,000. A consolidation of the line with the Rhomberg system would, in Mr. Doane's opinion, be a good move for both interests, but nevertheless he is confident that with extensions and an improved equipment the road can be placed on a dividend-earning basis. Dubuque is a good railway town and the deal ought to go through.

ON LOWRY'S LAND.

THE directors of the Northern Car Works, recently burned at Robbinsdale, held an important meeting recently, at which the question of a site for rebuilding was discussed and partially settled. If certain property owners in Northeast Minneapolis do the proper thing, it is certain that the works will be rebuilt on the Lowry tract at the city limits. The terms under which this is to be done, it is understood, include the gift of 10 acres of land to the works for a site and the taking of \$20,000 worth of stock in the company by Mr. Lowry and his friends. If the deal goes through, as now seems probable, no time will be lost in getting to work at the buildings. The plant will be a very large one.

The insurance adjusters have allowed the Northern Car Works \$60,000 for the loss it sustained when its plant was burned. The contents was \$86,000, leaving a loss of \$26,000. The total insurance on the plant was \$80,000, but there was a salvage of \$20,000.

RAILWAY MEN IN POLITICS.

THE railway man is always proud of his interest with this great factor of civilization and is found in every good work besides. They run Sunday schools, horse races and politics. Just now, while politics seems the prevailing topic, a casual glance at the situation reveals more than one good railway man in the political field.

Col. Dan Lamont, a strong believer in Cleveland, is president of a New York road and interested in the Metropolitan. John D. Crimmins, of New York syndicate fame, is a strong figure in Tammany's camp.

Just opposite these men, but on common grounds in the Street Railway fraternity, is the Hon. Wm. McKinley of Ohio, president of the lively little road at Defiance.

Ex-Congressman Conger of Ohio, is president of the Canton road.

Col. H. C. Payne, vice-president and general manager of the Consolidated at Milwaukee, is also a good republican, and took a leading part at Minneapolis.

Daniel F. Lewis is a leading democrat, and was urged to accept the nomination for mayor of Brooklyn.

C. L. Magee, of the Duquesne Traction Company, is a pillar of republicanism in the Keystone state.

Thomas Lowry, of course, as you were just saying, has a large say in local and state republican circles as well as a voice at larger matters.

A short mention brings to mind Governor Bowie of Maryland; Hon. Stephen Elkins, Ex-Secretary of the Navy Whitney, and the Hon. G. Hilton Scribner of New York, who is a prominent factor in the young republican campaign policy and president of the Young Mens' Republican Club.

Although this list is far from complete, and almost every rapid transit man is perforce a politician in the best sense of the word, our list shows enough to prove the statement.

STREET RAILWAY LAW.

EDITED BY MR. FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Elevated Portion of Electric Railway.

A statutory prohibition against an elevated railroad in a city street, except under special charter of the legislature, applies to a portion of an electric railroad elevated twenty feet above the surface of the street, although the elevation is only for the purpose of overcoming engineering difficulties and is necessary to permit an extension of the road to the center of the City.

The question to be considered is whether the elevated structure which the ordinance authorizes the defendant to build between Chase and Lexington streets, is an elevated road within the meaning of section 186, which provides that "nothing in this article shall apply to or authorize the construction of any elevated railroad, or of any other railroad except a surface road; and no elevated railroad shall be constructed in or through the city of Baltimore, or in or through any of the counties of the State, except under a special charter of the General Assembly."

The proof shows that this structure is to be built with vertical pillars or columns, upon which are to rest longitudinal girders, with transverse girders or cross-beams, all to be built of iron or steel. It is to be elevated twenty feet above the surface of the street, and to extend from a point between Chase and Eager streets to a point between Saratoga and Lexington streets, to the very center of the city. It is to be built upon the same plan as the elevated roads in New York. Such a structure can not certainly be said to be a surface road, but must to all intents and purposes be considered an elevated road, within the meaning of the statute. But then, it is said, it is elevated above the surface of the street only for the purpose of overcoming certain engineering difficulties, and that the elevation begins only when certain obstructions on the surface of the street necessarily require it, and that the descent to the surface is made as soon as these obstructions are overcome. To overcome these obstructions it is necessary to build an elevated road twenty feet high, a distance of three-quarters of a mile. Now, if the defendant's contention be sound, and these obstructions extended from North avenue to the City Hall, then the city authorities could authorize it to build an elevated road all the way; and if so, what becomes of the statutory prohibition which says that no elevated road shall be built in or through the city, except under a special charter granted by the General Assembly? Such a construction would be, it seems to us, against both the letter and the spirit of the statute.

Then again, it is said that this elevated structure is but a fractional part of the defendant's road. This may be true, but the question is one to be determined by the nature and character of the structure itself. However necessary this elevated structure may be to the downtown extension of defendant's road, and whatever advantages are thereby to accrue to the public, as affording a more convenient and rapid transit from one part of the

city to the other, these are matters for the consideration of the Legislature, which alone has the power to authorize the construction of an elevated road in or through the city. The invalidity of the ordinance in this respect, however, does not invalidate the entire ordinance. Other sections deal with matters in no manner connected with the construction of this elevated road. The first section grants to the defendant the right to lay tracks of its own on North avenue, and this right is in no manner impaired by the invalidity of the fifth section, purporting to authorize the construction of the elevated road.

(Md. Ct. Appeals, Koch vs. North Ave. Co. 15 L. R. A. 357.)

Power of Railroad to Cross Streets—Regulations by Municipality—Interference with Corporate Franchise—Unreasonable Ordinance.

The grant to a railroad company by its charter of power to lay out and construct a railroad between designated termini carries with it, as an incident of the grant, power to cross streets and highways within the location of its road, without any special grant to that effect.

A municipal corporation within the limits of which a railroad company has located its road under legislative authority, may, under the power to regulate the use of streets, pass ordinances regulating the use of streets by railroad companies constructing and operating railroads within the city under legislative franchises, provided such regulations do not unreasonably interfere with the exercise of franchises conferred by the Legislature.

A city ordinance which prohibits digging up the surface of any street except by permission of the board of aldermen first had and obtained, as applied to a railroad company laying its track across a street within its located right of way, is not a reasonable regulation of the company's exercise of its corporate franchises. Such an ordinance in effect declares that a right conferred by the Legislature shall not be exercised except by consent of the city government, and in that respect the ordinance is illegal and void.

(Sup. Ct. N. J., Allen vs. Mayor, etc., of Jersey City. 49 Am. & Eng. R. Cas. 289.)

Street Railways—Transfer Checks—Unlawful Ejection of Passenger from Car—Punitive Damages.

By the ordinances of the city of St. Paul granting certain franchises to the defendant, a passenger who has paid one fare on any line operated by the company in the city is entitled to a transfer check or ticket entitling him to a continuous passage over any connection or crossing line. Where such passenger applies for and accepts a transfer check for one of several continuous or crossing lines, plainly marked and designated, he will be limited to the line so selected; but where the route desig-

nated is not so limited, but is equally applicable to several lines, he will be entitled to be transported over either.

Where a passenger is ejected by a conductor acting in good faith in pursuance of the rules of the company, and upon due notice to him, and with the exercise of no more force than is reasonably necessary, the damages to be allowed, if a recovery is had, are compensatory only.

(Sup. Ct. Minn., *Pine vs. St. Paul City Ry. Co.* Not yet reported.)

Pennsylvania Statute Authorizing Appointment of Railroad Police—Street Railroad.

The Act of February 27, 1865, vests large and important powers in the Executive in authorizing him to appoint and commission an unlimited number of persons who, when appointed, shall have the powers of policemen of the city of Philadelphia, in all of the counties of the State through which the lines of the corporations appointing them may run, who shall be paid by private corporations, and shall be under their control and direction.

I am of the opinion that an Act of this character should be strictly and not liberally construed. At the time of its enactment, street and passenger railways were in operation only in cities and other municipalities, wherein the local police were adequate for the protection of property and the preservation of order; and the reasons which then existed for the Act under consideration, certainly did not apply to such corporations. If since then, the application of electricity to a motive power, and the organization of companies to use it for longer distances, and in more sparsely settled regions, have created a necessity for an extension of the provisions of this Act, I am of the opinion that such extension should be made by legislative amendment to the Act, and not by executive construction.

(Opinion of Attorney-General of Pennsylvania. *Petition of Allentown & Bethlehem Rapid Transit Co.*, 49 Leg. Intel. 349.)

Personal Injury—Sudden Starting of Car while Passenger is Alighting—Reasonable Time to Alight—Contributory Negligence.

Passengers on a street car have the right to assume that the car will not be started after it has stopped to let off passengers, without the driver's first using reasonable care and diligence to ascertain whether any passenger is in the act of alighting, and also that the car will not be started in a sudden and violent manner.

A street railway company is not excused from liability to a passenger for injuries from the sudden starting of the car while he was alighting therefrom, by the fact that it was the ordinary and usual way of the driver's conducting his business, to start his horses suddenly and violently with a whip.

A passenger on a street car is not guilty of negligence contributing to injuries from the sudden starting of the car while getting off, in failing to alight at once upon the car stopping, or in waiting to give precedence to a lady or others more infirm than himself.

(Sup. Ct. Mich. *Britton vs. Grand Rapids St. R. Co.*, 51 N. W. Rep. 276.)

Street Railways—Ordinance Granting Franchises—Reservation by City of Right to Permit Another Company to Use Tracks of First Company—Use of Electricity—Crossing Public Bridge.

An unqualified power reserved to the city in an ordinance naming the streets upon which a horse railway may lay its tracks, under its charter making its rights subject to the determination of the City Council, to grant the right to another company to use the former company's tracks, authorizes it to grant the privilege of using electricity for a motive power, with such reasonable powers and incidents as are necessary to make it effectual, although the necessary changes may cause some inconvenience and loss to the horse car company, where ample provision is made for compensation.

A provision in a city ordinance granting a street railway company the privilege of laying its tracks on a public city bridge, that it shall not be construed as granting the company the right to lay any additional tracks on the bridge, is for the benefit of the public, and secures to such company no monopoly of the right of way; and it can not enjoin the use by another company, under a license from the city, of that bridge, either before or after the re-construction, or of a temporary bridge erected for public use during such re-construction.

Md. North Baltimore Pass. R. Co. vs. Baltimore, 23 Atl. Rep. 470.

[NOTE.—In the case of *St. Louis R. Co. vs. Southern R. Co.* (Sup. Ct. Mo.), 1 STREET RAILWAY REVIEW 319, after plaintiff had established its road, the Legislature granted the City a new Charter, which provided that any street railroad company should have the right to run its cars over the tracks of any other street railroad company upon payment or just compensation. Plaintiff accepted from the city additional franchises, and agreed to conform to present or future ordinances enforcing the Charter. It was held that plaintiff thereby conceded the right of other companies to use its tracks, and became subject to any ordinance subsequently passed providing the mode of ascertaining the compensation.—ED.]

Land Occupied by Railroad—County Authorities Declaring to be Highway—Conditions not Fulfilled—Electric Street Railway.

Where the County Court declares a road to be open as soon as certain fences are set and other conditions complied with, and the proposed road is left with railroad tracks, fences and embankments crossing it for eleven years thereafter, and there is no proof that any of the said conditions were ever fulfilled, the County authorities have no right to grant a street railway company permission to lay its tracks along said road without the consent of the railroad company, and the laying of such track may be enjoined at suit of the railroad company.

U. S. Cir. Ct. E. D. Tenn. *Cincinnati South R. Co. v. Chattanooga Electric St. Ry. Co.*, 44 Fed. Rep. 470.

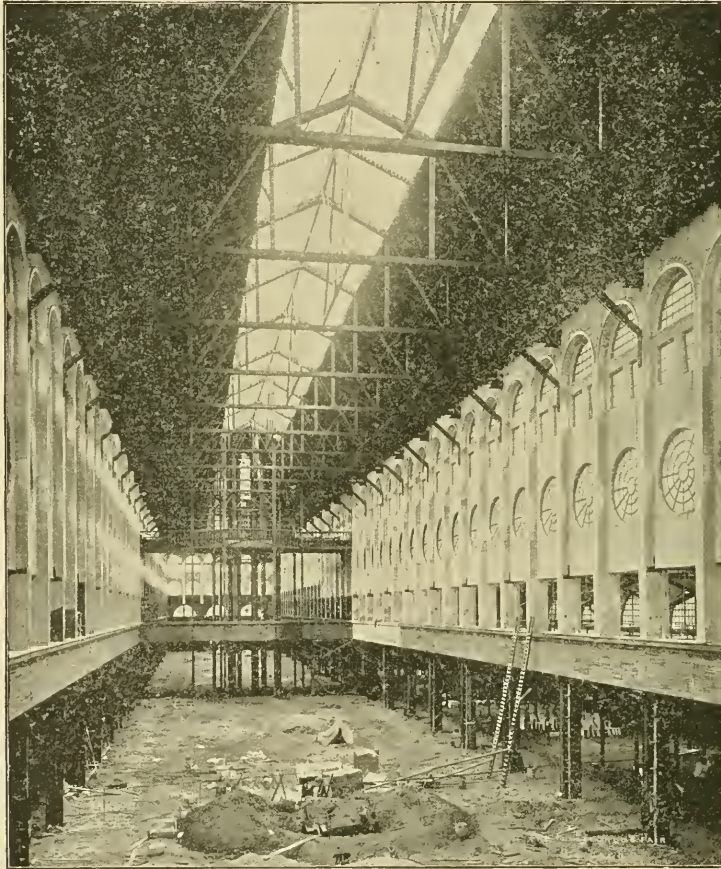
Street Railway—Collision—Patrol Wagon on Track—Negligence of Car Driver.

In an action for personal injury sustained in a collision between plaintiff's wagon and defendant's street car, it

appeared that plaintiff was a police officer in charge of a patrol wagon carrying an injured man on a stretcher, and while on the defendant's track, his wagon was struck by a car coming from the opposite direction. Plaintiff's driver gave evidence, which was corroborated, that he saw the car and tried to pull off of the track, doing so slowly on account of the injured man; that when about sixty feet from the car, he hallooed as loud as he could to stop the car; that the driver was looking behind his car and did not attempt to slacken the speed before the collision. *Held*, that defendant's motion for a non-suit was

A BIG MAN.

ONE of the curiosities of the Greenbush horse cars, New York, is a car which carries a driver whose weight is 342 pounds and height 6 feet 4½ inches. This driver is obliged to wear a very low crown cap to avoid contact between his head and the roof of the car. He is also obliged to have his wearing apparel, from the crown of his head to the soles of his feet, made to order. In common with very large men generally, this driver is as full of fun as a kitten.



COURT OF TRANSPORTATION BUILDING—LOOKING NORTH.

properly denied, as driving a wagon on a street car track is not negligence *per se*, and the evidence was sufficient to show the car driver negligent in not looking ahead to observe whether the track was clear.

Sup. Ct. Cal. *Swain v. Fourteenth St. Ry. Co.*, 28 Pac. Rep. 829.

It is reported that the Town Council of Chemnitz has authorized the Berlin General Electric Company to lay out a new tramway line, and arrange that the existing one shall be worked by electricity.

TRANSPORTATION BUILDING.

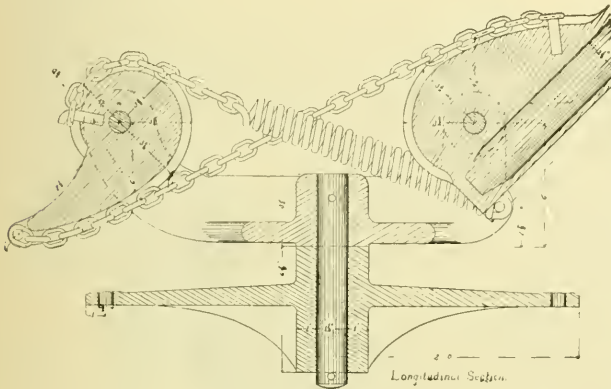
WE present on this page a view of the interior of the transportation building in the grand court, looking north. The magnificent extent of the building is well shown and the exterior is wonderfully representative of the world's progress in a series of bas-reliefs. The very fine engraving that we are enabled to present is the same that appeared in the last issue of the *Illustrated World's Fair* and is one of the series showing the gradual progress of all departments.

HEATH'S TROLLEY BASE.

A RECENT device in trolley bases is the invention of Frank Heath, of Minneapolis, which makes a number of claims to superiority.

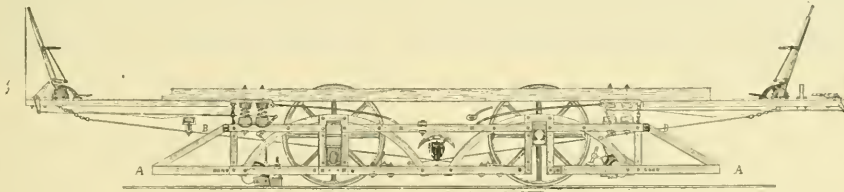
The base is considerably lighter than some other designs and the idea carried out is in the matter of tension, making it equal at all points, or weaker when it is drawn and stronger when it is up, and an easy manner of adjusting.

The engraving shows clearly the principle involved. When the pole is lowered and the springs tightened there is a change of leverage.



HEATH'S TROLLEY BASE.

The chain on the pole cam rolls down near the pivot and on the opposite cam farther away, thus offsetting the extra power exerted by the spring stretching and at the same time giving the chain attached to the pole more travel than those attached to the springs. This plan prevents the springs from becoming "tired" when passing under bridges or while standing in the barn. As the strain is light when the pole is drawn there is less liability of bending the pole.



THE CRIST MOTOR TRUCK.

The adjustment is very easy, merely taking up or letting out a link in the chain, which is attached to a pin or hook in the pole or the cam.

The pole sets in a socket and is held by a clamp which can be removed by loosening one nut.

The whole base is cast in one piece with the exception of the hooks to which the chains are attached and the clamps which hold the pole. The whole base weighs about 100 pounds.

The inventor is a practical railway man connected with one of the largest roads in the country.

THE CRIST MOTOR TRUCK.

THIS device, illustrated below, is the invention of John J. Crist, a mechanic of Wichita, Kansas. The following description gives the method of construction and points of vantage claimed:

The truck is composed of the following parts, viz.:

Two rectangular wrought iron or steel frames, arranged one above the other at suitable distance, and the two connected at each side by corner uprights, and by means of uprights forming housing for the truck oil boxes. These are provided with arch bars connecting them at the housings. The upper of these frames is approximately square across each end, and the lower one is made with its end portions inclined each way from a center line, thus presenting a pointed projection at each end. The two are connected together centrally at each end by means of a bridge bar. A central cross-bridging of the lower frame, for supporting the truck as shown in the engraving.

Two pairs of track cleaners, a pair at each end of the truck, one over each rail, and each pair connected together by a cross-bar, and jointed to the truck frame. Each cleaner consisting of a beam, a scraper, arranged to fit and at an angle to the truck, and of a brush carried in rear of the scraper.

Spring caps made in pairs, a pair arranged upright on each corner portion of the truck frame, and an inverted pair attached to the under side of the car sill over the former pairs. Coil-cushion springs, eight in number, arranged seated in the cups, for supporting the car frame and car thereon. Side and end anchor bars arranged connecting the car frame with the truck frame, as shown in the drawings.

THE syndicate of Philadelphia capitalists has bought the Findlay, (O.) road on Blanchard Avenue for \$60,000. Wm. R. Carnahan is vice-president and general manager.

OLD DAN.

AN accident happening to switchman Dan Collins at the corner of Fifth and Broadway, Cincinnati, has brought to light the fact that Old Dan, as he is familiarly called, is the oldest employe of the Consolidated. The accident laid him off an hour or two for the first time in a long while. Dan has been with the Consolidated since 1859. The old man is of venerable appearance with long hair and beard. He will soon be retired on pension.

SCENES ON THE SAN FRANCISCO AND SAN MATEO ELECTRIC RAILWAY.

THE construction of the first electric railway in the City of the Golden Gate was fraught with difficulties. Had anyone proposed three years ago to build and operate an electric line on an eleven per cent. grade in a large city, he would have been the object of sympathy; but this has been successfully accomplished, and while several engineering difficulties presented themselves in the path of progress, the greatest obstacles to overcome arose from a prejudice and opposition on the part of the good people of the city. Now that the line has been completed and is in regular service, the volume of business is large and the present equipment is taxed to

the ultimate intention is to extend on south to San Jose, which will make the road 50 miles in length. California is thoroughly at the mercy of the Southern Pacific railroad, which has a gigantic monopoly, including every avenue of access by rail to San Francisco, and the local roads which diverge from this great business center are all owned by this one company. The public are very bitter against the corporation, and hence any prospect of relief is welcomed, and as the proposed electric line to San Jose will parallel the Southern Pacific and offer lower rates of fare, the undertaking is naturally receiving assistance and encouragement.



CLIMBING THE ELEVEN PER CENT GRADE.

its utmost on pleasant days, and additions have already been ordered and its arrival is impatiently awaited.

At present writing 12 miles have been built, starting at the corner of Market and Steuart streets, only one block from the Ferries, that great center of distribution in Frisco, and is operated to Baden, in San Mateo county, which is the recently selected site for the Stock Yards, in which enterprise the names of several of the great Chicago packers are the moving spirits. Considerable activity is seen in real estate at this point, and houses are rapidly going up for the accommodation of workmen and others. For a distance of 5 miles the line is a double track, then for two miles a single track with convenient turnouts. Franchises have already been secured to Redwood City, a distance from starting point of 30 miles, and

A complete history of the organization of the San Francisco and San Mateo road appeared in these columns recently, on the occasion of its completion, which occurred in the latter part of April of this year, and hence this article growing out of a visit to the road by a representative of this paper is timely, to complete the story of its operation and plans for the future.

The route already occupied includes numerous curves and grades. The former involved few new difficulties, as the radius in nearly every instance is ample and mostly made on levels. The grades, however, are something to mention, both in point of number and severity. Fully one half the present line is built on grade ranging from 14 per cent, the heaviest, down to 10, 9, 8 and 7 per cent., which latter figures are most numerous. The

heaviest grade ascended is on Harrison street, within three-quarters of a mile from the Ferry, and is $11\frac{2}{3}$ per cent, and while the speed at this point does not exceed that named in the city regulations, it is remarkable when one considers the loads which are lifted. As high as 175 passengers have been repeatedly carried up this grade on a 26-foot car, and the writer was one of a load which filled every available foot of standing room, hung from the hand rails and occupied choice positions on the draw-heads, until it seemed as if the roof was the only part of



TRESTLE ON THE SAN MATEO LINE.

the car where more could ride. It has been incorrectly stated that cars mount the 14 per cent grade on Harrison street, and which is just over the summit from the hill above mentioned. This, however, is not so. At a point about midway on the $11\frac{2}{3}$ per cent grade one track diverges and by a longer route makes a detour of the hill, joining to make the double track about a half mile distant and at the foot of the 14 per cent grade. This latter is laid only with single track and to insure absolute safety in descending with such heavy loads, a cable is attached to the rear draw bar, and the car let down by a counterbalancing weight which rides on a small carriage in a conduit beneath the track, being drawn up as the car goes down, and returning to its place again by its own gravity. The cable is a one-half inch steel rope, passing several times around a drum located in a pit beneath the track at the summit; the drum being equipped with powerful band brakes operated with levers, by means of which it is easily possible to control the speed of the car to a nicety, or stop its progress within a few feet at any point. The distance thus protected is about 600 feet, and no accidents have yet occurred in its operation. The cars, as on nearly all the lines in Frisco, are supplied with track brakes in addition to the usual wheel brakes.

In the business district the track is laid with girder rail changing to tee on reaching the residence and outlying territory. Although Frisco is not, in proportion to its size, a residence city, still the line traverses several pretty streets, lined with comfortable homes and furnishing good local travel. An interesting construction feature are the trestles, of which the company have built two, one, the Croton street trestle, being 400 feet long and 40 feet in height.

The rolling stock at present includes 15 single truck cars of 23 feet length, and 5 double truck cars 26 feet length, all built by O'Brien Brothers, of San Francisco. The single truck cars have each two 15 horse power motors and the double two of 25 horse power.

What might be called the half-and-half type of car—one one part a closed car and the balance at both ends open—seems to be very popular in this city. For the greater part of the year the outside seats are in best demand during the day, while at night and on rainy days the patrons seek the shelter of the inclosed portion.

The power station is one of the best on the coast and would be a credit to any road in the country. As this line was the first to be built in San Francisco no pains were spared to make the station complete and to take advantage of the latest and best in electric railway practice. Two magnificent engines of 500 horse-power each, of triple expansion condensing Corliss type, were built and installed by the Risdon Iron Works, of San Francisco. This concern is one of the largest in the country and are celebrated for the variety of work designed and built for railway service. Their engines and driving machinery are to be found in nearly every cable plant in that city, and much of the new electric driving machinery on the coast bears their imprint.

Their extensive facilities are supplemented by a progressive policy which keeps them informed of the latest in railroad theory and practice.



THE COOLING POND.

One of the illustrations shows the cooling pond, where the water used in condensing is sprayed from fountains and the entire circle of the pool, into the air. The pond is 30 feet in diameter and is a unique method of cooling. The usual method throughout the coast country is to carry the water to a height of 10 or 20 feet and allow it to return to the cistern by flowing through several hundred feet of shallow wooden troughs, open at the top, which answers the purpose. The advantages of the fountains are quite apparent.

The boiler room is one of the most attractive sights of the plant. This room is large and airy, being provided with a ventilating roof, and giving plenty of room for the five Sterling boilers, manufactured by the Sterling Company of Chicago. These boilers are of 250-horse-power each, and are placed in a row making a frontage of 72

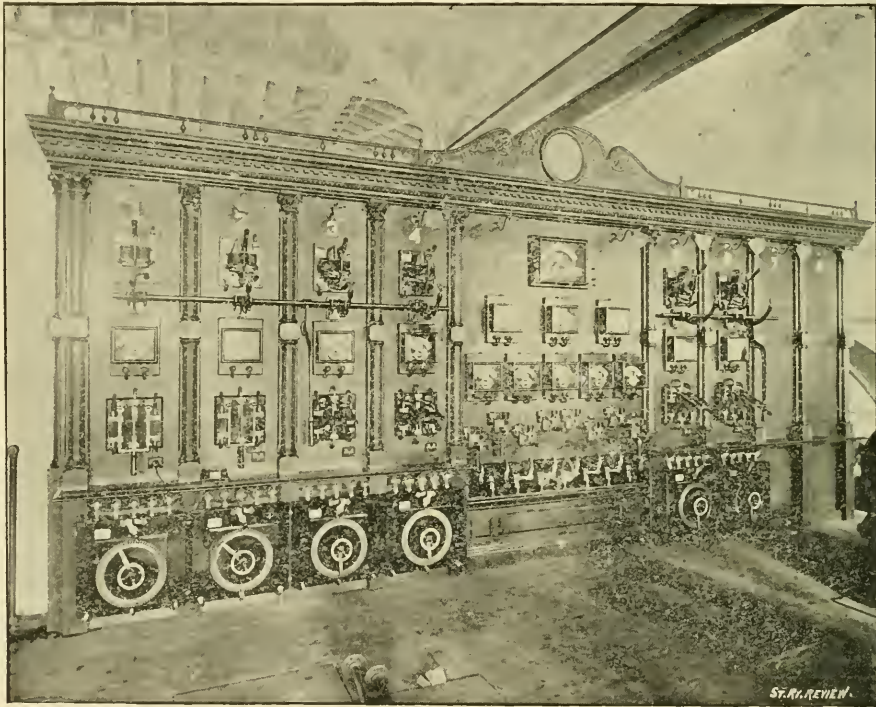
feet by 18 feet in height, with a depth of 14 feet. They are placed on a solid concrete foundation and bricked up the whole height on all sides.

The electrical work, both in the station and on the line, was all installed by the Thompson-Houston Company, under the direction of Engineer F. F. Barbour, upon whom fell the duty of making the designs, the company's own equipment being used throughout. Six 80 kilowatt generators are already placed and two additional generators of similar type will be added next month. The switchboard is justly Mr. Barbour's particular delight, being built of selected Spanish cedar, with a special slate panel for fuses, to which fuse terminals are fastened direct, absolutely preventing any possibility of danger from

and is growing in popularity every day. The present operated route passes the Holy Cross Cemetery and a branch is also being built to Golden Gate Park, and which will do a large business from pleasure seekers. Bernard Joost is president, and J. W. Hartzell secretary and general manager.

LOOK OUT FOR THE OLD MAN.

A CONDUCTOR of a Washington street car has divulged the system of signals by which the boys "passed the old man around" which being interpreted, means notified the drivers and conductors on the line that the superintendent was inspecting the road and to be on the look out. The scheme worked thusly:



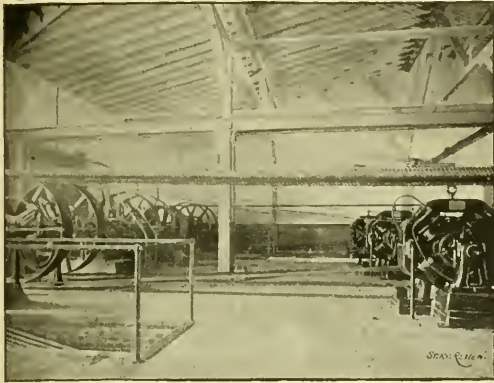
THOMSON-HOUSTON SWITCH-BOARD, SAN FRANCISCO AND SAN MATEO ELECTRIC POWER STATION.

fire. Each feeder has its own ampere meter, lightning arrestor, switch fuse, etc., the board being altogether the most handsome and perfect on the Pacific coast. A separate incandescent plant lights the car houses after midnight when the main lines shut down. The pit arrangements for examining and repairing trucks and motors are excellent. The machine shop for repairs is conveniently placed at one end of the car house, supplied with gear cutters, lathes, planer, wheel press and other needful appliances, all operated when in use by a stationary electric motor driven from the power station. THE REVIEW is under obligations to Mr. Barbour for favors when its representative was inspecting the road and plant. The operation of the line has been successful from the start,

When the superintendent started out the driver in whose car he happened to be or who saw him first would signal the next approaching driver by drawing his hand across his throat or putting his fingers to his lips. The driver would immediately ring the bell and call the conductor forward. If the front platform was clear of passengers he would tell the conductor; if not, two kicks against the door as the conductor approached were sufficient to let him know what was up. In this manner it was not long before every driver on the road knew it and you can imagine that there was nothing against the men turned in on the occasion of that inspection. The boys have a new code now, which is warranted to hold water and is eye-proof.

THE RAILWAY DEPARTMENT of the Electrical Supply Co. is doing a phenomenal business at present, having, during the last two weeks, sold almost all material required for the overhead and track circuits of over three

hundred miles of road. A large and well assorted stock, prompt attention and quick shipments, fair prices and strictly honorable treatment are rapidly gaining the railway department the same standing with electric roads that the lighting department enjoys with electric lighting



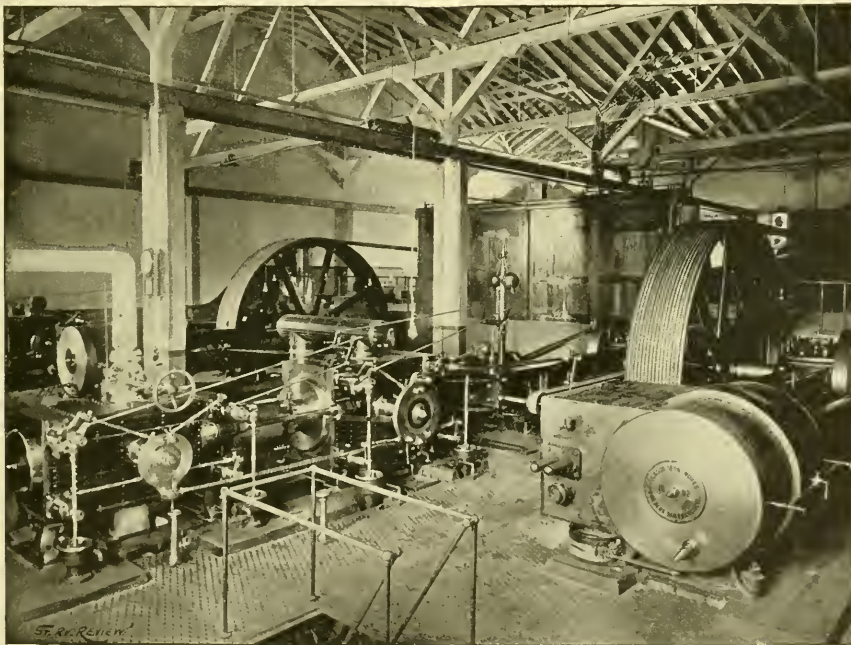
GENERATORS—SAN MATEO ROAD.



SAN MATEO POWER STATION.

20 for Omaha, and are now finishing the balance of orders for the West Chicago Street Railway Company for 225 cars and 180 for the Washington & Georgetown Road, at Washington, D. C., besides smaller orders from a number of points.

companies. Boston trolleys are still popular as ever and the large stock of trolleys and parts carried in Chicago by The Electrical Supply Co. is a decided convenience to Western roads.



INTERIOR SAN FRANCISCO—SAN MATEO POWER STATION.

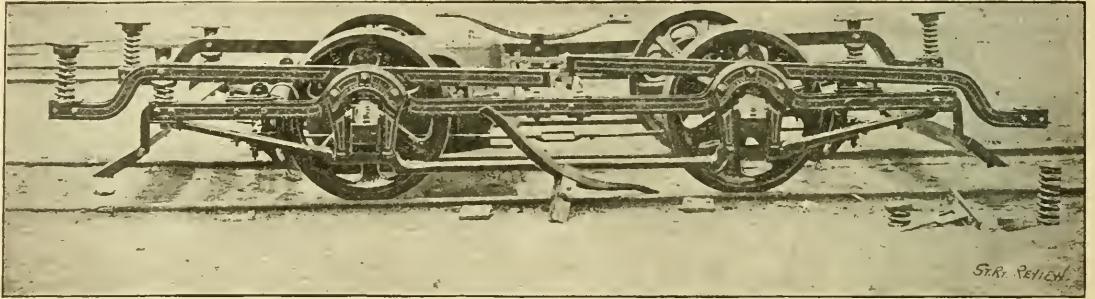
LAFAYETTE COLE, formerly of this city, has opened an office in San Francisco, where he will represent the Railway Equipment Company, of Chicago, and Holmes, Booth & Hayden.

THE NEW GILBERT TRUCK.

THE illustrations below are in themselves a good description to the practical manager of the merits of the new Gilbert truck; to better demonstrate, one cut shows the truck "knocked down." Special attention may however be called to its strong construction, which has been designed with a view to durability under hardest service. It is absolutely non-oscillating by reason of the half elliptical springs resting on the jointed

WAGES AT COLUMBUS.

AT a director's meeting of the Columbus, Ohio, railway last week, the schedule of wages revised and placed on the following basis: For the first three months all conductors, motormen, trolley-men and shed-men will receive 15 cents an hour or \$1.80 per day of 12 hours. For the next nine months they will receive 15½ cents an hour or \$1.86 a day, and thereafter 16 cents an hour, or \$1.92 a day. All extra time worked



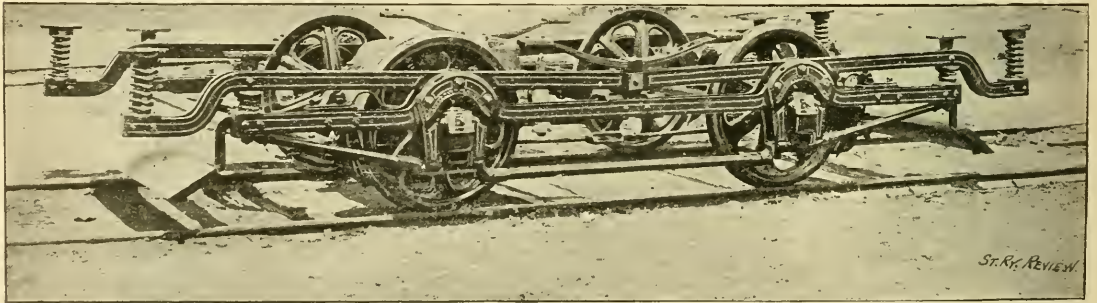
GILBERT TRUCK—SHOWING CONSTRUCTION.

side-bars. This truck supports the car for 15 feet, and touches it in 12 different places. Smooth riding and increased life to the car body are thus secured, to the delight of patrons and profit of the company. As already stated, the Gilbert truck lays special claim to long life and easy motion.

A special feature is the ease with which the motor can be reached for repairs, and which is accomplished by the removal of the lower pipe truss rod, making the motor accessible from one or both sides, also underneath the

will be paid for in the same ratio. Under the old schedule the conductors and motormen averaged about \$1.75 a day. Manager Stewart says nearly nine-tenths of the men have been in the service of the company for a year and they will consequently get an advance to 17 cents an hour. The increase in wages will cost the company \$18,000 the present year.

CHATTANOOGA's electric railway directors are negotiating the sale of their system.



THE NEW GILBERT TRUCK COMPLETE.

journal boxes is a removable cap, which will allow the axles to drop out. This is a new feature and will be found specially desirable in the case of gearless motors, or on any occasion where it is necessary to raise or remove the car body. The truck is no experiment, having been thoroughly tested in Albany, N. Y. and Patterson, N. J., from which latter place a third order has been received. Aside from the good qualities which an examination of the truck insures, the reputation of the Gilbert Car Company is alone sufficient guarantee of what, as in this case, they recommend.

THE many friends, and they are very many in all parts of the country, will learn with interest of the change which J. A. Hanna has made, in resigning his position with the J. G. Brill Car Company to accept that of general traveling salesman for the McGuire Manufacturing Company. Mr. Hanna has met with splendid success among railway managers and won their esteem and respect for his gentlemanly manners and thorough business methods. In his new position, though not new work, we wish Mr. Hanna deserved success, and congratulate the McGuire Company.

WORLD'S FAIR INTRAMURAL TRANSIT.

IT is with no little pleasure that the STREET RAILWAY REVIEW presents to its readers the first account of the construction and the first illustrations of the methods to be pursued by the transportation company, that some months ago secured the contract for moving the thousands and thousands of people who will require some cheap, expeditious and safe method of traversing the many acres included in the tour of the Columbian Exposition buildings at Jackson Park.

Without doubt the matter of transportation upon the grounds is the most difficult question to be solved by the

A number of plans were submitted to the committee of the Exposition management and the most applicable and practicable were soon gathered out of the chaff. Of those left from the winnowing process, one under the name of the Western Dummy Railway Company was selected.

This company, supported by the General Electric Company, and coming from the Thomson-Houston side of the house, suggests through its official organization an elevated electric railway of the following details:

The posts upon which the structure rests are fourteen feet high, but the varying contour of the ground will make the distance from the ground to the track vary slightly. On two solid beds of concrete 7x7 feet, 12

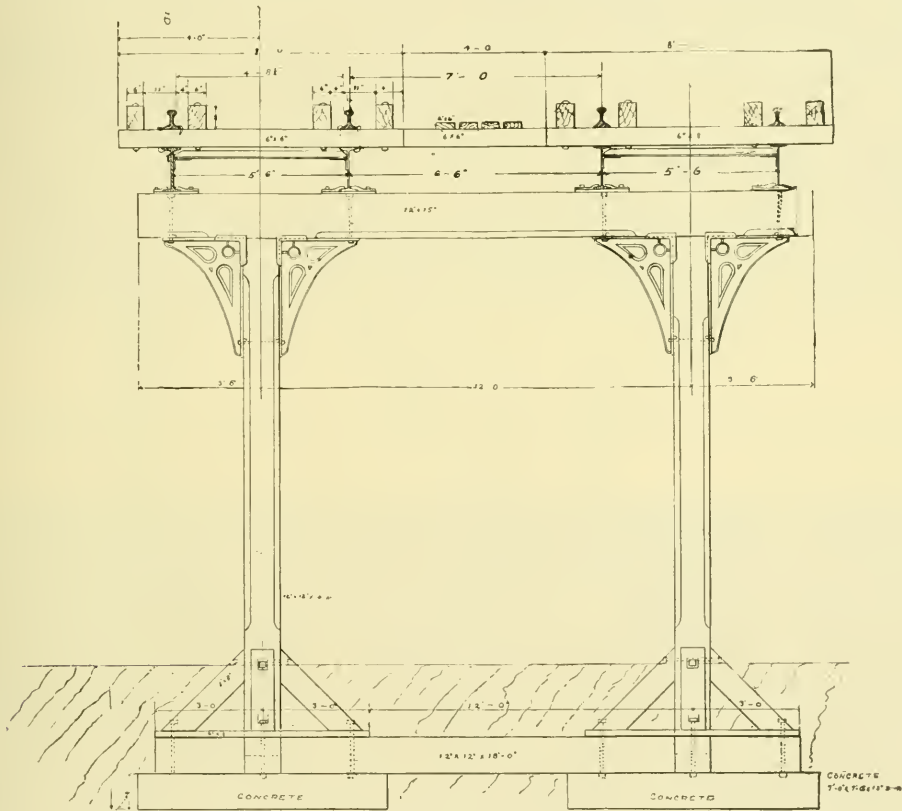


FIG. 1—CROSS SECTION CONSTRUCTION OF ELECTRIC ELEVATED RAILWAY FOR WORLD'S FAIR GROUNDS

authorities in charge. The reasons are as follows: In the first place, whatever company should undertake the task must depend upon the public direct for its dividends and expenses, while the lighting, feeding, watering and outside transportation are all matters of necessity and the cost and probable income could be fairly well known beforehand.

With these following difficulties to face, viz: a cheap construction, facilities for handling an immense number, or few, as the day or the case might require, a safe and convenient method of avoiding the surface crowd, and a cheap enough rate to enable all who may wish to take advantage of other than shanks' horses.

inches deep and set in a 4-foot excavation, rests a cross beam which is of yellow pine and 12x12 inches by 18 feet long, into which the uprights, which are 12x12 inches by 14 feet, of yellow pine, are mortised. These uprights are further braced on either side, and the braces bolted to the tie beam. A reference to the engraving shows clearly the method. From center to center of the columns the distance is 12 feet.

A cap beam of yellow pine, 12x15 inches by 19 feet, surmounts the columns running crosswise of the track. This is braced and in part supported by iron brackets weighing 200 pounds each, which latter are securely bolted to both column and cap beam.

Above this cap, and running length-wise with the track under each rail, are set heavy I beams, running 60 pounds to the foot. These I beams are fastened by steel plates and clips with a lag screw. The beams are 15 inches high. Above and resting upon the I beams are the ties 6x8 inches by 18 feet long, and set 20 $\frac{7}{8}$ inches from center to center. Upon these ties is laid the rail, Pennsylvania standard T pattern, weighing 60 pounds to the yard, and bolted through the ties to the I beam. On each side of the rail are wooden guard rails 6x8 inches and set 4 inches from the inside and 11 inches from the outside of the rail. The structure runs in 25-foot spans and has a safe strain of 15 tons in the center of the spans.

The power equipment will be separated from the other power houses and will be equipped with Babcock-Wilcox boilers, the engines are not yet settled upon. The cars will be moved by electric traction, on the trolley system, with the wire between the rails.

BROWNELL'S TRUSSED TROLLEY BRIDGE.

RADICAL improvements, and great advances, often create weak points which previously had no existence, or existing, were insignificant. One of these cases accompanied the introduction of the trolley system, especially where horse cars were transferred into motors, and at first even in specially built cars. The weight and strain of the trolley pole and base worked havoc with many a car and caused an unsightly sag in the deck, and attendant strain on the entire super structure. To withstand this the ribs and roof supports have been made heavier, increasing the car weight. Even then the strain is great, fast increasing as the car ages.

The illustrations forcibly describe themselves. In the first is seen the Brownell Trussed Bridge and the old style unsupported wooden bridge, which latter sags heavily with its own weight. A weighted cord stretched

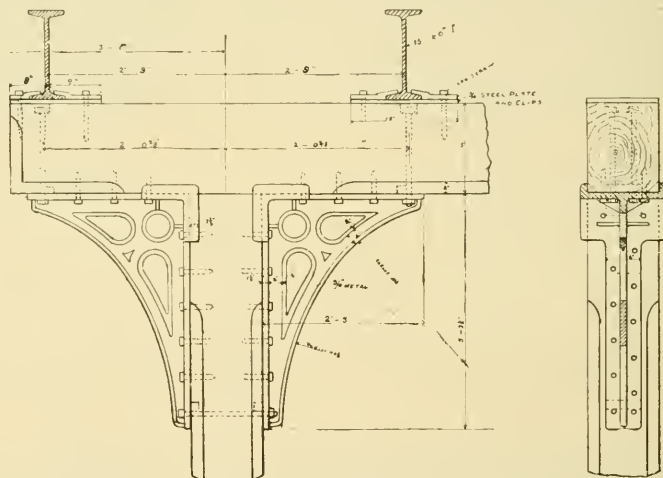


FIG. 11.—ELECTRIC ELEVATED RAILROAD FOR WORLD'S FAIR.

MT. VERNON CONTRACTS LET.

THE Washington, Alexandria and Mount Vernon Railway Company, has awarded contracts for the construction of the Mount Vernon road to the following parties: Cars, J. G. Brill & Co., Philadelphia; motors, generators and line material, General Electric Company, New York; poles, Loud & Sons, Detroit, Mich.; rails, Henry Levis & Co., Pennsylvania; girder rails, William Wharton & Co., jr. Philadelphia; engines, Providence Engine Company, Providence, R. I.; overhead wires and work, grading and track laying to Woodbridge & Turner, of New York and bridge across Hunting Creek to Rogers & Son, of Alexandria. The contracts for the power has not yet been awarded. Work will be commenced as soon as the material can be gotten on the ground and contractors are under heavy bonds to have the line completed by September 1st, next, and in operation two weeks later.

from horse to horse shows the plane line and the respective self-supporting power of the two bridges.

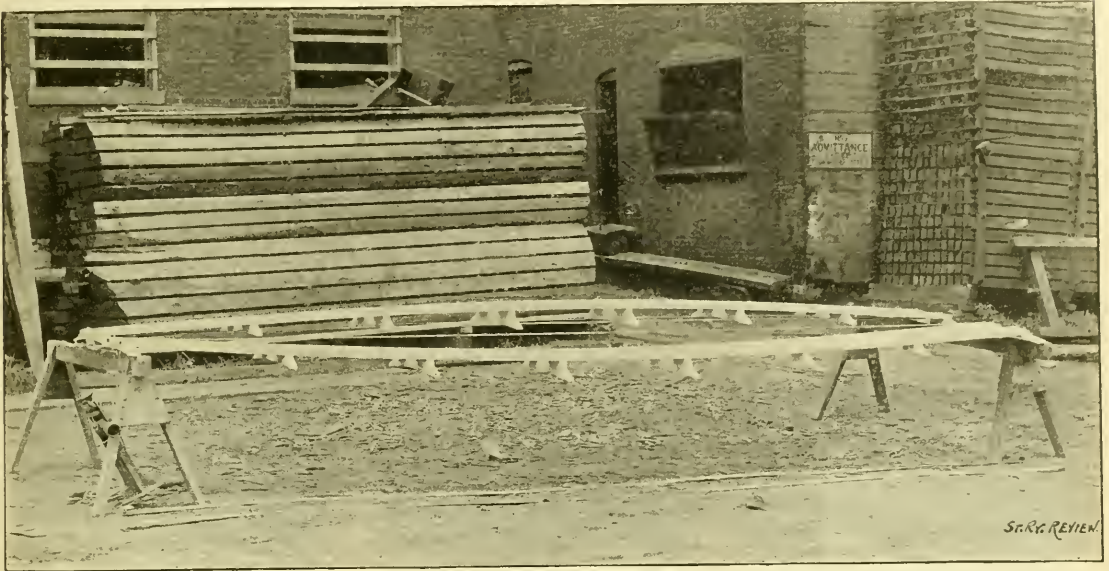
In the second cut the illustration is intensified; the old style bridge deflecting twelve inches with only the weight of a young lady, while the trussed bridge supporting three men at its weakest point shows no perceptible deflection; both photographs being taken from the same standpoint.

In the foreground are shown the two truss rods hooked at the end, the use of which throws the entire weight and consequent strain on the ends of the car body, where it properly belongs. This application of the truss to the trolley bridge is one of the best and most practical improvements that has been offered in a long time.

PRESIDENT FOWLER, of the Lewis & Fowler Manufacturing Company, recently had the misfortune of breaking his leg while out driving. It will be several weeks before Mr. Fowler will be able to meet his hundreds of friends again, who, meanwhile, tender him their sympathy.

JOHN H. GRAHAM & COMPANY of New York, agents for the New Departure Bell Company of Bristol, Conn., writes us that they are meeting with good success in the

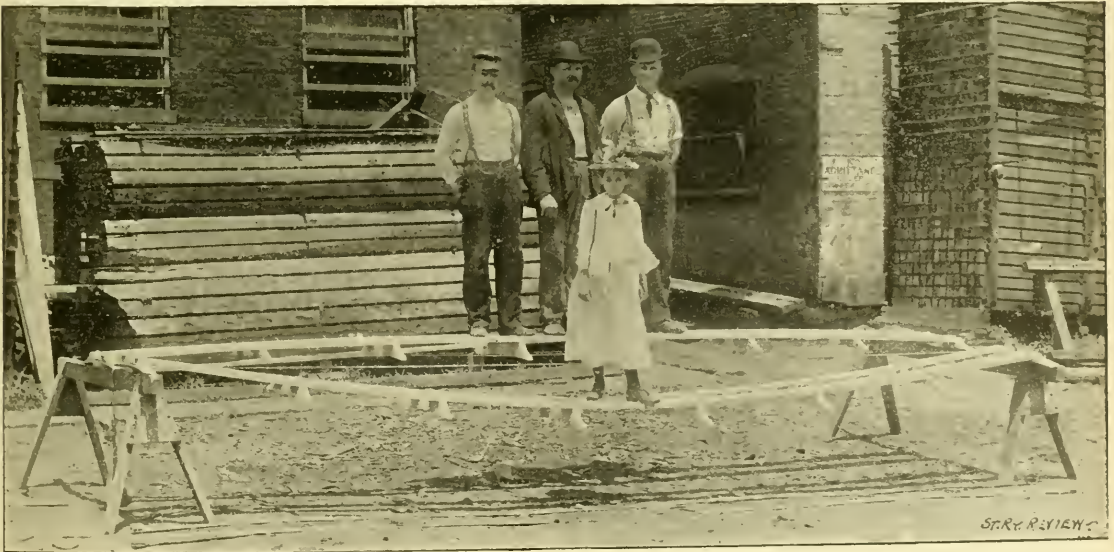
THE ELLIS CAR COMPANY, Amesbury, Mass., are getting out among other orders, ten large open 10-bench cars, for Salem, Mass., and additional shipments to Port



COMPARATIVE DEFLECTION OF BROWNELL'S NEW BRIDGE AND OLD STYLE—WITHOUT LOAD.

sale of their rotary bell. Among the orders recently filled are the following roads; Omaha Street Railway Company, Omaha, Neb. The Wilkesbarre and West

Huron, Mich., Vincennes, Ind., Lawrence, Mass., and a number of special constructions for the storage battery cars for the Bradbury Storage Battery Company, at



COMPARATIVE DEFLECTION OF BROWNELL'S NEW BRIDGE AND OLD STYLE—WITH LOAD.

Side Street Railway Company, Wilkesbarre, Pa. The Consolidated Street Railway Company of Columbus, O., and the Patterson Railway Company of Patterson, N. J.

Lowell, Mass. Other work is constantly coming through the shops and the Ellis Car Company, as usual, are kept busy.

TRAMWAYS' INSTITUTE OF GREAT BRITAIN.

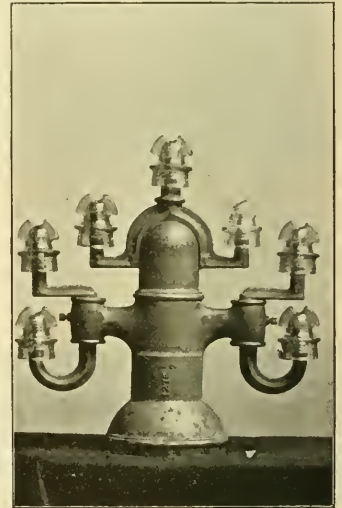
THE annual convention of the Tramways' Institute of Great Britain and Ireland, composed of the leading street railway men of those countries, convened on June 28th, in London. The attendance was large, some eighty members being present, and the papers and discussions which followed showed the rapidly increasing interest which is being felt in railway progress abroad.

W. Carruthers Wain was unanimously re-elected president, and delivered a most interesting address to the convention, reviewing the progress of the year. A paper was read by F. Arnall, assistant surveyor of Birmingham, on the "Permanent Way Construction, Especially as regards Wear and Tear and Depreciation." The next paper was by G. Annesley Grindle, C. E., on "Elec-

banquet occurred. The next day inspection was made of the city and South London Railway, including the electrical plant and generating station, also some experiments with the Connelly motor.

The importance and usefulness of this association is rapidly making itself felt in tramway circles in the United Kingdom, and bids fair to prosper and increase under the very able direction of president Carruthers Wain.

THE R. D. NUTTALL COMPANY, of Alleghany, Pa., have recently made a contract with the Brush Electric Co. for the gear plant of the latter company, and will hereafter supply all the gears used by the Brush company during the next year. The demand has been so great from all parts of the country for the supplies manufactured by the R. D. Nuttall company that they have been obliged to work both a day and night force.



NEW POLE TOP.

The illustrations sufficiently describe a new combination pole top which admits of as many additional branches as a Mormon family. It is one of the latest specialties of the Railway Equipment Company, Chicago.

tric Traction: The City and South London Electric Railway," which was a resume of the operations of this company during the past year, and which contained much interesting information, showing that operating expenses had been greatly reduced over the early operation, while the increase in traffic and mileage had been largely augmented.

The next paper was by L. Epstein on "Electric Traction for Tramcars." and treated principally of the application of the storage battery for railway service. The last paper was by A. J. Jarman on "Electric Tramcar Traction." Mr. Jarman expressed the opinion that storage batteries in tramway service suffered greater depreciation from standing than from actual operation.

In the evening the members visited the Electric Exhibition at the Crystal Palace, at which place the annual

NEW YORK STATE RAILWAY ASSOCIATION.

THE tenth annual meeting of the Street Railway Association of New York State, will be held at the United States Hotel, Saratoga Springs, on Tuesday, September 20th, at 10 o'clock a. m. Two papers will be read. "Recent Improvements in Cable Traction," by George W. McNulty, Engineer, Broadway and Seventh Ave. railroad of New York, and "Recent Improvements in Electric Traction," by L. H. McIntire, engineer Harlem Bridge, Morrisania and Fordham railway, New York. There is promise of a large attendance and an interesting and instructive meeting.

THE Homestead strike has not delayed work on the Alley L. or the Lake street L., as currently reported.

PERSONALS.

W. S. BURLING, secretary of the American Car Seat Company, is in the east on a business trip.

J. D. CONNELLY, president of the Connelly Motor Company, of New York, was a caller at this office.

GEORGE B. KERPER has been elected director of the Cincinnati Edison Electric Illuminating Company.

PAYSON ANDREWS, western salesman for the J. G. Brill Company, has gone east to enjoy a well earned vacation.

GEORGE CUTTER has just returned from a ten days trip to Boston and New York, in the interest of some of his specialties.

A. L. SCOTT, who has been general manager of the St. Paul lines, has resigned, and intends to engage in business for himself.

ELMER P. MORRIS, manager of the Railway Supply Department of the General Electric Company, Boston, made us a call recently.

JOHN BRILL, of the J. G. Brill Car Company, Philadelphia, spent several days in Chicago recently, and was warmly welcomed by his many friends here.

DR. HARRISON, and Samuel Byfield, of Ashland, Wisconsin, were in the city a few days ago placing orders for material and equipment for their new line.

ROBERT R. ZELL, formerly vice-president and general manager of the Campbell & Zell Company, Baltimore, has withdrawn from the active management of that company.

WILLIAM ELSOM, the retiring superintendent of the Cedar Rapids-Marion line, was the recipient of several elegant remembrances from the employes of the company.

GEORGE WESTINGHOUSE, while traveling with his family in his private car over the Pennsylvania Railroad had a narrow escape from death or disability in a collision.

COL. J. S. METZOR, of the Northwest Thomson-Houston Company, Minneapolis, was married at Washington, to Miss Edith Mullan, one of the belles of the capital city society.

J. GRAHAM GRIBBLE, a frequent contributor to the columns of this publication and editor of the department of Civil Engineering in the Engineering Magazine, was a caller at this office.

R. D. NUTTALL, president of the Nuttall Company, Allegheny, Pa., passed through Chicago on his way to St. Louis the last of the month, stopping off long enough to make The Review office a call.

THOS. C. NASH, the well-known cable expert, and inventor of the Nash splice for cable ropes, so generally in use, has accepted the position of superintendent of cables for the West Chicago Street Railroad.

W. D. LOVE, secretary of the Pond Engineering Company, St. Louis, has come to Chicago to take the management of the extensive interests of his company here. Mr. Love has everywhere made an enviable record for his company, and its interests here could not be in better hands.

R. B. PIERPONT has resigned his position as general western manager for the Johns Company, to accept a better one in Boston, with the Gould & Watson Company. Mr. Pierpont has a very long list of warm friends in Chicago and the West, who will hope that business may frequently call him this way.

E. E. HIGGINS, general manager of the Short Electric Railway Company, Cleveland, sailed from New York on the 14th inst., and will make a combined pleasure trip in Europe. Mr. Higgins, although a young man, has thoroughly established his ability as an executive officer, and has made friends wherever he has made acquaintances.

J. H. WOODWARD is making a trip through this country in the interest of the Electric Construction Corporation, Ltd., Wolverhampton, Eng., who contemplate making a very complete exhibit at the World's Fair. Mr. Woodward was much pleased with what he saw at the "Fair grounds," and considers Chicago the most metropolitan city he has visited.

J. HOLT GATES, formerly of the Westinghouse Electric Company, and for seven years engaged in electric work, has accepted the position of general sales agent for the United States, of the American branch of the Siemens-Halske Company of Berlin, and whose general offices are in the Monadnock Building, this city. Mr. Gates will make his headquarters here and bring to his new duties a large acquaintance and thorough knowledge of his work.

JAMES LEFFEL & Co., whose water wheels are found in all parts of the world, have celebrated the thirtieth year of continuous business in this line of manufacture. They have greatly improved the wheels within the past two years, and recently made a large addition to their works. One wheel recently shipped weighed with its iron casing 45 tons.

The North Hudson County Railroad Co., Hoboken, N. J., in March purchased a 300-horse-power latest improved Ball engine from the Ball Engine Co., Erie, Pa. They have been so well satisfied with the performance of the engine that they have ordered an additional engine of the same power from the same company. The Englewood Electric Light Co., Englewood, Ills., have ordered a 500-horse power, latest improved, Ball Cross compound engine, through the Chicago office of the Ball Engine Co., Erie, Pa. The Port Huron Electric Railway Co., Port Huron, Mich., have awarded order for one of their latest improved engines to the Ball Engine Co., Erie, Pa. The engine is a 400-horse-power Cross compound of the latest style.

COL. WILLIAM H. SINCLAIR.

THE subject of this sketch, Col. William H. Sinclair, president of the Galveston City Railroad Company, was born at Akron, Ohio, on the 31st day of October, 1839, and is therefore 53 years of age. He was educated in the public schools of Michigan, his parents residing at Jonesville, of that state; and on the 30th day of May, 1861, at the age of 21, he entered the federal army, enlisting as a private in company C, 7th Michigan Infantry. He was appointed corporal in the same company in July, 1861; appointed sergeant major of his regiment August 12th, 1861; appointed second lieutenant and assigned to 3d Michigan battery of artillery, September 9th, 1861; appointed aide de camp on the staff of Brigadier General Stanley, (now major general commanding department of Texas), in May, 1862; appointed first lieutenant of 3d Michigan artillery, July 15th, 1862; appointed captain and assistant adjutant general of volunteers September 5th, 1862; appointed major and assistant adjutant general of volunteers to date from May 8th, and commissioned colonel by brevet to date from March 13th, 1865. He was engaged in the following sieges, skirmishes and battles of the Rebellion; viz.:

- Island No. 10, March and April, 1862.
- Corinth, May, 1862.
- Iuka, September 19th, 1862.
- Corinth, October 3rd and 4th, 1862.
- Stone River (At Murfreesboro, Tenn.), December 1862 and January 1863.
- Farmington, Miss., May 28th, 1862.
- Franklin, Tenn., December 12th, 1862.
- Manchester Pike, (near Murfreesboro), January 6, 1863.

During two of these latter he enjoyed the sensation of having his horse shot from under him. He marched with Sherman to the sea. His bravery and ability won for him numerous recommendations from the leading generals of the army, for gallant and meritorious service while an officer.

At the close of the war he was ordered with his army corps to Texas, and there filled positions of honor and influence up to the date of his muster-out, which was in 1867. So well pleased was he with that state that he decided to make Galveston his future home, which intention has been fully carried out.

His ability as a leader was soon felt in his district and he was elected as a member of the Twelfth Legislature of Texas, where his executive ability was so clearly demonstrated that he became the champion of his party, and was elected Speaker of the House. He was a warm personal friend and confidant of Governor Davis, the great Republican Texas Governor, and at the conclusion of his term was appointed Collector of Internal Revenues, which position he held from May 1st, 1873, up to the date of Cleveland's inauguration.

His first interest in street railroads was at Galveston, in 1876, he becoming a stockholder in the present com-

pany, which at that time controlled four miles of track and employed forty men. His confidence in the progress of the city and the development of this interest made him a prime mover in methods looking to improved service, and a better return than he and his associates were receiving, and he was elected a director, and on January 8th, 1879, was elected president of the company, a position which he has held continuously up to the present time. Success crowned his efforts from the date of his assuming the management, and today the records of that company show that when he assumed management the annual receipts were \$52,000; they were for the last year, 1891, \$180,000 and are rapidly increasing.

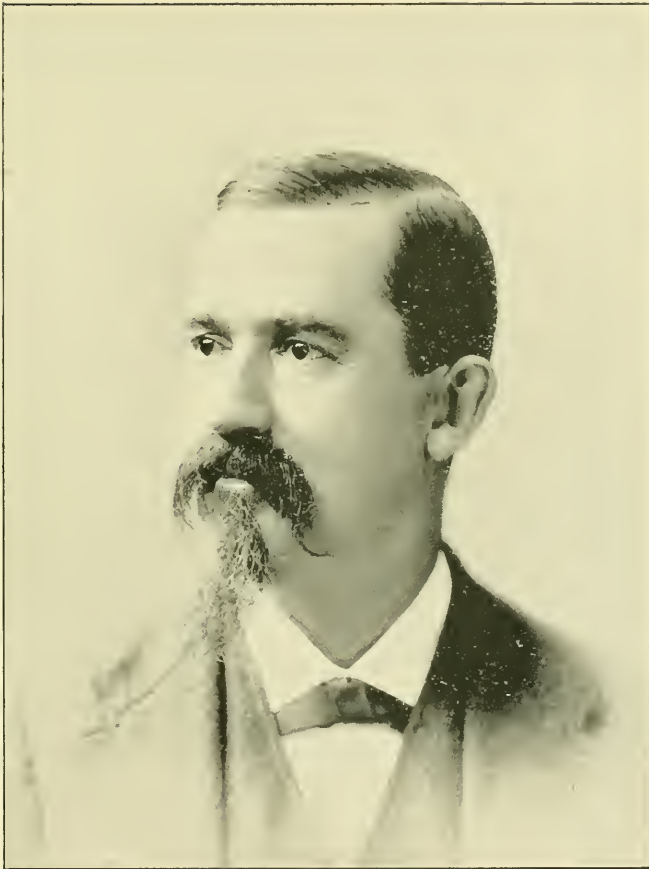
His company is at present operating 42 electric motors. It has three lines still operated by mules, which will give way to electric rapid transit during the present year. It has now 40 miles of track laid with 40-lb. steel rails, and gives employment to upwards of 200 men.

Although required to travel farther than any other regular attendant upon the meetings of the American Street Railway Association, he is always present, takes an active part, and has served as second vice-president; he is also a member of the Loyal Legion of the United States, the Army of the Cumberland, the Grand Army of the Republic; also an honorary member of the Busch Zouaves, of St. Louis, and is a leading mason.

To attempt to enumerate the sterling qualities of Col. Sinclair from a personal point of view would be no easy task. He is generous to a fault, and above all, supremely just, universally kind, and always true, and in the highest degree possesses the esteem and honor of all who know him.

ADDITIONAL SHOPS FOR THE BALL ENGINE COMPANY.

THE continued and largely increased demand for the Ball engines is well illustrated in the rapidly growing capacity of their works. Less than a year ago, owing to the great expansion in their business, the Ball Engine Company, Erie, Pa., were forced to erect a large and complete machine shop which was filled with the latest and most modern improved tools. No idea was entertained at the time that any further increase would be necessary for several years to come, but the demand for the latest improved Ball engines, built by this company, has been so great, especially for electric railway work, that already the makers of the engine have been again compelled to make a further extension of the same building. This extension which is now under way will be built on the gallery plan the same as the balance of the building. It will contain, among other valuable features, the most complete testing blocks and apparatus in the country, and will be capable of testing engines of very large capacity. Every engine that leaves the works of the Ball Engine Company is thoroughly tested and guaranteed to give satisfaction under the most unfavorable circumstances.



COL. WM. H. SINCLAIR,

President Galveston City Railway Company, Galveston, Texas.

THE EDISON CONTROLLING TABLE.

THE matter of facility and rapidity of control of electric power generators is not one of the least points in electric railway practice.

Until recently the large switchboard has been employed, necessitating extreme agility on the part of the electrician in charge to bring the output of his generators to the desired point, and this plan has been found not only cumbersome, but expensive. Improvements were therefore looked for.

In order to secure a thorough, effective and rapid control of the generators in an electric railway station, a new device has been gotten up known as the Railway Controlling Table. On this are mounted all the regulating and indicating apparatus, in the most compact and con-

venient space possible. The ampere meters are of the standard Edison type, the solenoid of bar copper, highly polished, being mounted directly onto the marble. The covers are of polished brass with moulded edges in which are set the beveled glass fronts.

The galvanometer shows when the voltage of the current of one of the generators about to be switched into circuit is the same as that from the other machines already supplying the circuit. It consists of two coils arranged one on either side of a pivoted indicating needle of soft iron. This needle is polarized, it being pivoted within a piece of steel previously magnetized. If the voltage of the current from the generator ready to switch into the circuit is too high or too low, the deflection of the needle indicates the fact, so that the field regulator can be adjusted until the voltage is correct, when the needle pre-



EDISON CONTROLLING TABLE.

venient space possible. The framework is of strong bar iron. The lower part of the front of the table, and the two ends are of sheet iron ornamented with a moulding in relief. The table top, upper part of the front and the upright back piece are, in the table illustrated, of polished Tennessee marble, but this is an exceptionally fine piece of work. The more frequent custom is to have pieces made of polished or plain slate. In front are the dynamo field regulators, operated by wheel handles and duly numbered in reference to the machines they control. On the table are mounted the cross bar snap switches,—new style switches recently designed—the dynamo fuse blocks and the equalizing bar switches, one for each dynamo; a volt meter of the Weston type and a volt meter switch of the regulation pattern.

On the upright back piece are the ampere meters and galvanometer. These instruments merit particular men-

sents no deflection. This instrument is mounted directly onto the marble, its cover being similar in style to those of the ampere meters just mentioned.

With the controlling table in the station, the electrician has no difficulty in swiftly regulating his output of current to meet the varying conditions under which the road may be working. With one hand on the snap switch handle and the other on the wheel of the field regulator an almost simultaneous movement is possible, and control is thus immediate.

The table shown was designed for four generators and was invented and constructed by the Edison General Electric Company.

THE Supreme Court of Ohio has decided that the East Cleveland franchise on Central avenue is all in good order and legal.

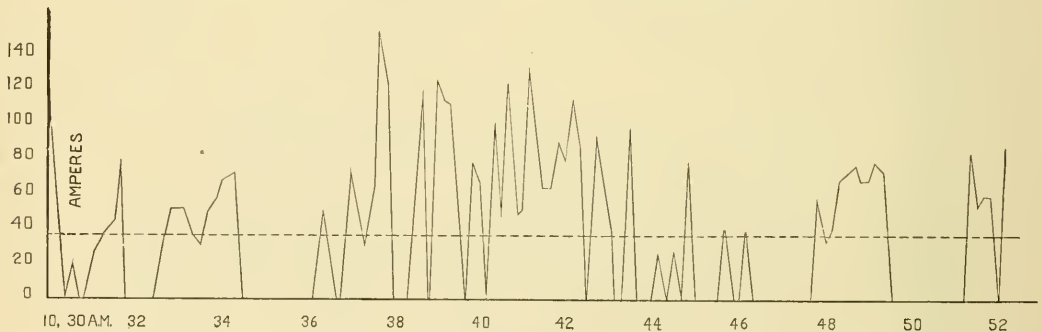
POINTS ON POWER STATIONS.

BY WM. LEE CHURCH.

BEAR in mind that the engine in an electric railway power station is normally an under-loaded engine, not an over-loaded engine. That the above statement is not in larger type is wholly the fault of the printer, and not of the emphasis which the writer desires to give it. Strange to say, a belief precisely the opposite of this seems to be floating vaguely in the minds of most railway men. It would seem somehow, that the abruptness of the load, and the momentary excess which is found every few minutes, had been confused in the mind so as to take the place of the working facts which exist. It is true that an electric railway engine gets frequent and heavy over-loads for an instant, but no more than ought to be comfortably taken care of by the fly-wheel and a proper steam distribution, provided the engine is intelligently adapted for the work. But this over-load has little direct bearing on the economy of the engine; in part, because the over-load lasts but a moment, and in still greater part, because a heavy load is, as a general statement, an economical load, within limits depending somewhat upon the type of engine. With

diagram is necessarily confined to a section of but few minutes run, but the same action was continuous throughout the day. Now the average horse power for this run would reduce the power represented by the dotted line equivalent to 30 horse-power; but this average of 30 horse-power resulted from a continuous fluctuation from 0 horse-power to 125 horse-power, and out of this arise some pertinent questions.

Assume that you are about to equip a small power station, and that you are aware of the probable fluctuation of load. Sufficient experience is now available to make this assumption a reasonably safe one. For present purposes we will go to the extreme though not uncommon case, represented by the diagram, and assume that your maximum load will be 125 horse-power. It is manifest that you are compelled to select an engine of a rating of certainly not less than 100 horse-power at the determined steam pressure, in order that it may pull over the high spots without sensible diminution of speed. Being limited by this rigid necessity, you next propose to estimate beforehand what your probable coal account will be, since the



reference, however, to the fuel duty of the engine, it is not the over-load which is to be principally considered, but the variations of load; and of these variations the minimum load plays by far the greater part in the final economy.

To put the matter in another light we would say, that the maximum load determines the size of the engine, and the minimum load determines its duty. At this point the investigator is likely to jump to the false conclusion that the average load for the day represents the true performance of the engine, upon which he can base his estimate of fuel consumption. This certainly seems reasonable, but nothing can be further from the truth. To make the point clear, we will have recourse to another ampere diagram taken from a small station operating a country line over numerous grades. In this diagram it will be observed that for fully 20 per cent of the time, there is no load whatever on the engine, other than its own friction and that of the generator. At such times the cars are all for the moment on the down-grade, the circuits open, and the amperemeter at zero. This particular

final statement of the operating account will contain this as a large item. Shall we reckon the fuel duty on the basis of the rating of the engine, say, 100 horse-power? Manifestly not; because the engine gets no chance to work at its rated horse-power except at brief and infrequent intervals. Shall we reckon the duty of the engine on the basis of the average of its power throughout the day, as per the dotted lines? Assuredly not; and let us see why. If you jump to conclusions again, you would figure something as follows: "My engine is a 100 horse-power engine, but it will average only 25 horse-power throughout the day. Now if it were running at its rated horse-power it would consume, say, 25 lbs. of water per horse-power per hour. (It is assumed to be a compound non-condensing engine of the ordinary type not capable of meeting a fluctuating load.) But since it is operating at an average load of about 25 per cent of its rating, I will allow that it will use as high as 30 lbs. of water per horse-power per hour; or a total of 13,500 lbs. of water, or, say, 1,350 lbs. of coal, or with banking fires about 1,500 lbs. coal for an 18-hour run, equal, with \$3

coal, to \$2.25 per day; and this is what I will figure on in estimating my expense account." And in figuring this way, you would figure exactly wrong, and forever thereafter, you would wonder why you were burning so much coal. Moreover you would gently curse the engine under your breath. Now as a matter of fact, your power averages itself, but your fuel duty does not, and this is what you never thought of.

Suppose we examine this point. A fuel duty under a continuous rated load, if your engine is a non-compound non-condensing engine of the slow speed variety, would be perhaps 28 lbs. of water, or as low as 25 lbs. with the ordinary compound engine; but even if the engine ran continuously at the average load of 25 horsepower, its performance would be not better than 45 lbs. which will be fully demonstrated in another paper. Unfortunately, even this condition, bad as it is, almost never exists for more than a moment, but in fact the engine is alternately anywhere from 25 per cent over-load down to no load at all, that is, no effective load. Under the rated load or thereabouts, you would be getting 25 to 28 lbs.; under a continuous, average load, if you had it, you might even get 40 lbs. But under the actual conditions of fluctuating load, out of which your average load is only computed, not created, you are getting anywhere from 30 to 75 lbs. and varying every moment. If you will now average the fluctuating duties due to the fluctuating loads, instead of averaging the load first, and then assuming a duty based on that, you will find that instead of 30 lbs. you will consume at least 50 lbs. of water per hour for every electrical horse power delivered. This means coal and dollars, and if you never knew it before, you will know it when you come to divide your coal bills by the car mileage. Perhaps I ought not to have taken so extreme a case, though an actual and common one, but all small stations suffer under these conditions, and the larger stations only modify them.

This condition of things, already bad enough, is further aggravated by the power required to drive a more or less extended line of counter-shafting, which power is a constant, and becomes a proportionately greater factor as the effective load becomes lighter. This subject, however, will be treated more fully in another article. The conditions outlined above, as has been said, are found in greatest intensity in the smaller class of stations, and on hilly roads, and to a certain extent become modified as the station becomes larger, the extremes of fluctuation being toned down by overlapping of a greater number of cars. The fluctuation is by no means reduced as much as is popularly supposed, and it is at present a question in the writer's mind whether 1,000 h. p. is not the smallest unit on the single-engine plan, which can with safety be considered in the hope of economical results. It is those small and moderate sized stations which the writer has most heavily on his mind; the big stations get the best attention and treatment, although, I humbly submit, not necessarily the best judgment. The smaller stations are apt to be tinkered up by home talent to save (?) money, or laid out in a general hap-hazard style by some

one more interested in the contract than in the engineering results. The fact of the matter is that the small station has the heaviest odds against it in respect to earning capacity any way, as is the general law with all small enterprises, from which it follows that it should, per contra, receive the most painstaking engineering in order to off-set this disadvantage and raise its intrinsic operative efficiency to the highest point. In short, give me the small stations and I care not who builds the big ones.

We therefore return to our original proposition and once more repeat that the engine in the power station of an electric railway is essentially an under-loaded engine, and not an over-loaded engine, and must be so treated. Having established this premise, the next and reasonable thing would be to examine the essentials of an engine capable of giving a high duty under light loads; or, more properly speaking, a uniformly high duty under all and wide variations of load. It has been well settled that no ordinary type of engine, compound or otherwise, can accomplish this desired result, even approximately, and since it has fallen in the writer's way to be connected with the development of certain improvements in precisely this direction, it will be the proper object for the next article to make the nature of these improvements somewhat plain.

AN ELECTRIC ROAD IN THE YOSEMITE.

THE tourists and pleasure seekers who contemplate their next visit to the wonderfully beautiful region known as the Yosemite valley, or the thousands who hope at some future time to feast their eyes upon the grand sights, will be overjoyed to learn that the tedious and expensive stage journey will probably be superseded by a business like and convenient electric railway. At present the traveler is confronted with two days of hard staging. The first day's ride, about forty-five miles, brings him to the foothills of the great Sierra Nevada range. The second day's ride brings him to the timber land where the big trees are and the great sugar pines, seven or eight thousand feet above the sea, and then there is a descent of four thousand feet in half a dozen miles into the wonderful valley.

The difficulties of obtaining fuel and water have debarred the narrow gauge steam railroad scheme and this has set Professor T. S. C. Lowe, of Pasadena, to thinking of the electric method. Professor Lowe is the commissioner for the management of the Yosemite under appointment of Governor Markham and withal a practical and, as is shown by his actions—a progressive reader.

The power station will be located on the Merced River, and the power which is now running to waste amounts to a fall of 3,500 feet in the first 20 miles out of the valley. A narrow-gauge road with cheap water power to produce the electricity will bring tens of thousands of tourists to the Yosemite and the Big Tree Grove easily, and cheaply, instead of, as now, being compelled to make two days of hard staging each way and at a heavy expense.

RICE MACHINERY COMPANY'S CONTRACT.

THERE has just been placed in the hands of the Rice Machinery Company, 63-65 South Canal street, Chicago, an order for the entire outfit of shafting, floor stands, friction clutch pulleys and other equipment, by the Oshkosh Electric Light & Power Company.

The Rice Machinery Company are general western agents for the Dodge Manufacturing Co., of Mishawaka, Indiana, and the appliances are to be of the latter company's manufacture. The Dodge patent split disc clutches and wood split pulleys will be used throughout. The main shafting is 6 inches in diameter and to be supported on the Dodge improved adjustable floor stands and bearings to be of the late improved chain oil-

SIMPLE CAR RECORD FOR CAR HOUSE.

THAT a record should be kept of when a car has been in the shop or received inspection or care other than that of the usual every day washing or sweeping, is conceded, but how to accomplish this without the annoyance of a red tape system of accounts is a question which the careful manager has often asked himself. A book record is an excellent thing from which to make up a yearly report, but where it is desired to use cheap labor for much of the work some plan is desirable which shall be at once complete and simple, and even where the work involves the use of skilled labor, any method which simplifies accounts is greatly to be desired. It insures better care of rolling stock and the discovery of needed repairs when first required.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 1 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 2 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 3 | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 4 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 5 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 6 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 7 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 8 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 9 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 10 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | | | | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | | | | | | | | | |

PEG BOARD FOR CAR RECORD.

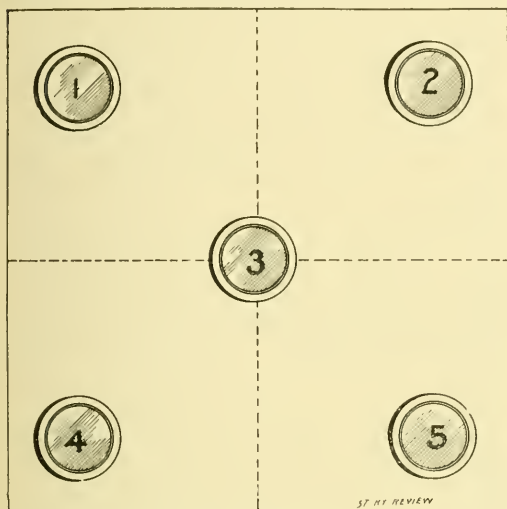
ing pattern. The main receiving pulleys from the engines are the Dodge Manufacturing Co.'s wood split pulleys and of sufficient capacity to transmit 500 horse power each. It is our purpose, at an early date, to illustrate the Dodge split disc clutch, as many advantages are therein embodied, which the power user will appreciate. From the fact that it is peculiarly adapted to electrical generating work, it will interest our readers to no slight degree. The Rice Machinery Company, the contractors of the above plant, are making special efforts in the electrical field, and have installed some important plants, among them the Bessemer Electric Co., of Bessemer, Ala., 400 horse-power plant, and the plant of the Grant Locomotive Works, near Chicago, furnishing the motive power for their 80-ton electric cranes.

A. M. Hinckley, the progressive superintendent of the Salt Lake Rapid Transit Company, at Salt Lake City, has devised and had in use for several months one of the simplest and most effective systems we have seen, and the diagrams given herewith will readily illustrate its plan and use.

A frame is made of dressed pine with a black background and figures painted in white. The horizontal line at the top indicates the car numbers and may be extended to include any desired number. In this case there are 20 cars running out of the barn. The vertical row of numbers at the left are from 1 to 31 inclusive, and indicate the day of the month.

Once a month a record of the board can be transferred to a book if desired, either by the barn foreman or some

clerk from the general office. For other shop repairs or more or less ample records the record can be kept by increasing or decreasing the number of peg holes. The frame is protected by a glass door which slides upward being supported by counterbalancing weights. The whole device occupies little room, being placed upon a wall and is always "open for inspection."



KEY TO THE BOARD.

In practice the pegs are not numbered and are all of one color, although as many colors may be used as record holes; but to better illustrate we have numbered the five as in use at Salt Lake:

No. 1.—Thorough cleaning, including blinds, etc.

No. 2.—Oiled trucks and boxes.

No. 3.—Ready to go out.

No. 4.—Thorough inspection.

No. 5.—Hold.

In this way the barn foreman or man in charge can peg a car to have it held in the house at any day within the following month, and the record shows at a glance just what attention has been given each car. In the large diagram the pegs show that car No. 2 received a "Thorough cleaning" on the 2nd inst. and was "Ready to go out" on the 3rd. Car No. 2 was "Thoroughly inspected" on the 2nd inst., while car No. 4 was pegged to "Hold" on the 5th. It is unnecessary to illustrate further as the scheme explains itself.

NEW ENGLAND ELECTRIC CLUB.

THE reception of the New England Club, which was held on May 25, was a thoroughly enjoyable occasion. C. S. Knowles was elected president, vice Mr. Wyman, resigned. The ground floor of the building is given up to reception and dining rooms. The second floor has the billiard rooms, private dining rooms, kitchen and wine room. The third floor is for sleeping rooms and the fourth is used by the help.

CHICAGO'S ACCIDENTS.

JUST while our friends of the daily press are indulging the degraded public taste for full details of the awful and morbid in the matter of accidents, a tabulated digest of accidents and deaths from all causes wherein the coroner's services are required may be given from the coroner's office in this city.

Murder claimed 43 victims during the last six months, railroad accidents 164, asphyxiation 31, elevator accidents 20 and street cars 20. Suicides by hanging alone give a total of 24, while poison removed twice the number of human beings that the "juggernaut" disposed of. Starvation had two cases, just one-tenth of the (deadly street car.) Of the street car accidents only four were women. In fact, the helpless petticoated brethren, who run twice the chance of being hurt, are really one-fifth less liable, entirely from the fact that caution and sobriety are conducive to protracted existence. The grand total of accidents was 790 and 770 of these were not from street cars, which handles perhaps 100 times more people than any other interest mentioned not excepting railroads.

The mathematical fiend will be gratified to know that the ratio of fatal accidents to street railway passengers amounted to .000022 of 1 per cent.

THE WESTINGHOUSE FACTORY.

THE old factory of the Westinghouse Air Brake Company will be transformed into an addition to the general electric work. This addition will add 50 per cent to the producing capacity of the company, and will enable it to employ nearly 2,500 hands. The foundry of the leased building will be of especial value, as much of the work in this line is now done by outside parties.

The recovery in the Westinghouse stocks from their low figures of last year is most marked and noticeable in all of the companies operating under the different Westinghouse patents. This is largely due to the material increase in the value of the properties and the reduction of the debt of several of the companies.

TORE UP THE TRACK.

THE good cottagers, summer residents, at Morris Cove, Conn., have a rather unconventional manner of dealing with affairs which they consider detrimental to their interests.

One fine Sunday the railway people put a big gang of men at work and built 2,300 feet of track, nearly half being between the cottages and the water.

This made the cottagers angry and as a result the section which so aroused their ire was taken up one evening, in an hour and a half, by seven expert railroad workmen brought down from Hartford.

The men did their work without any damage to the rails, ties and poles, which they removed, and they returned to Hartford without interference by the authorities.

THE PNEUMATIC MOTOR FOR SURFACE ROADS vs. HORSES, CABLES AND TROLLEYS.

Written for the Street Railway Review.

IN view of the serious objection to the trolley electrical system for propulsion of cars on surface roads in cities, the annoyance from tearing up streets and the cost of plant and maintenance of the cable lines, the expense of horse power, with the sanitary evils resulting from the location of stables in populous cities, the fact that pneumatic motors after a successful demonstration of their superiority, have been overlooked, seems inexplicable.

These motors are not only entirely free from the objectionable features of the other systems, but they furnish a mode of propulsion which is more safe and also more economical than any other, with equal velocity of travel.

These assertions are made advisedly and are based on actual demonstration. In 1878 and 1879, five pneumatic motors were constructed upon the plans and under the supervision of James T. Hardie, mechanical engineer, and were run for several months on the Second Avenue railroad in New York, with perfect success.

In 1879, the writer was called upon in the interest of proposed investors to investigate and report upon the practicability and expediency of using pneumatic power for street railroads. The comparative results were overwhelmingly in favor of motors of that class, but attempts to secure their general introduction at that time proved failures. The position taken by presidents and other officers of horse railroad companies, both in New York and Philadelphia, was that any car running along city streets without horses in front would frighten horses, cause runaways, accidents, and subject companies to suits for damages.

This objection of course applies with much greater force to the cable and trolley systems, which are accompanied by a loud humming noise, while the pneumatic motor can have a noiseless exhaust, but no argument or explanation availed in the face of this senseless and ridiculous objection. One railroad president declared that if the motor were adopted by his company it would be necessary to kill some of his old horses, stuff the skins, and mount a pair of them on a low truck in front of each car.

The attempt to introduce pneumatic motors was thus found to be premature in 1879. The company could make no progress and finally abandoned all efforts, losing the capital expended in plant and demonstrations, and no attempt to revive the motor has since been made. The engineer and inventor, Robert Hardie, is now in the service of the mechanical department of the Columbian Exposition at Chicago, and retains unshaken confidence in the superiority of the pneumatic motor.

Existing conditions now seem favorable for the introduction of a motor which, free from the objections to all other systems, with no new defects of its own, may be considered as perfect. No fears are now entertained that a car running without horses in front will make a

stampede of all equine animals on the streets traveled, and this in 1879 was the only reason urged in opposition to the introduction of the pneumatic motor. It is possible therefore that a few extracts from the report made in 1879 may be of interest at the present time.

The compressor plant was located at Harlem, on the line of the Second Avenue Railroad. It developed 66 horse power and charged the cylinders under a car with compressed air in seven minutes. With a proportionately larger plant not more than one minute would be required.

The report of Mr. Hardie stated the capacity of the cylinders under the seats at 17,000,000 foot pounds of work, capable of running a car 16 miles on a level.

The effect of the compressed air was greatly increased by passing the air through a tank of hot water at the temperature due to 80 pounds pressure. The tank had a capacity of 5 cubic feet and was placed on the side of the platform.

The writer has not at hand a copy of his full detailed report, but only an extract of some of the results, which will be here given.

A duty of nearly 50 per cent of the horse power used in compressing air can be secured from the expansion and utilization of dry air when compressed; and by using stationary, compound or condensing engines, four times the power can be obtained with a given cost of fuel, as compared with ordinary steam motors which more than counterbalances the loss in compression.

By the addition of a heater and passing the air through hot water, an increase of nearly 100 per cent of power can be secured at a merely nominal cost.

On a straight and level road, with 160 cubic feet of air in the reservoirs, under an initial pressure of 350 pounds, the motor would run 7 miles with a reserve of one-third left in the reservoirs on its return. This result assumes that the amount of air expended at each stroke is equal to a full cylinder of air expanded to atmospheric tension, but actual work has demonstrated an ability to run 10 miles with a single charge, proving that less than this quantity is sufficient. The back pressure which would result from working against a vacuum is relieved by suction valves in the exhaust passages.

In descending grades, the motor cylinders not only act as brakes, but also as air pumps, and have power to pump back into the reservoirs, against a pressure of 200 pounds, sufficient air to raise the gauge pressure 7 pounds in running 2100 feet, and restore sufficient air, when heated, to run the motor half that distance upon a level.

By this remarkable contrivance power can be stored on descending grades. The down-hill portions not only use no power, but give back a portion of that which was expended in ascending.

The compressed air can be used expansively to any extent, and cut off at any part of the stroke. It can act as a brake, or the motion can be instantly reversed, and the braking apparatus is exceptionally complete and satisfactory.

The power of an eight-ton motor is sufficient to propel three cars on a straight and level road. With full power in the motor cylinders, and full adhesion on the rails, the motor can overcome grades of 300 feet to the mile.

Although, during a run, the pressure in the reservoirs is constantly diminishing, yet, by means of a reducing valve, the working pressure in the motor cylinders is maintained at a constant limit.

Each motor, allowing for increased speed, would take the place of ten or fifteen horses, the cost of which would about equal the cost of the motor, \$1,500.

The system would be particularly adapted to suburban localities and would afford better facilities for rapid transit than are afforded by elevated roads, for while the speed would be equal to twenty miles or more per hour, the stops would not be limited to stations, but could be made at any point.

With the small class of motors, three cars, or two in addition to the motor can ascend grades as steep as any usually found on horse rail roads. This is a point of the greatest value for public accommodation. It will enable a company to utilize all their old cars and supply additional cars at the hours when the rush of travel requires them without additional expense for power or conductors.

The Delamater iron works offers to supply a compressor plant of sufficient capacity to charge one car per minute for \$20,000.

Compressed air can be transmitted to any distance without loss except for friction in pipes. If pipes are large and velocity low, the loss will be inconsiderable. Several lines could therefore be operated from a large central plant and in many localities natural water power could be utilized to compress air, and the compressed air transmitted by pipes to large motors, generate electric currents, or drive machinery by direct application to cylinders.

To charge motors at a central station a nozzle between the tracks and a short piece of pressure hose to screw onto the air reservoir is all that would be required to connect with reservoirs located in a building. It need not be necessary to run the cars into a house to renew the air supplies.

The running expenses are less than one-half, in fact, the estimate shows less than one-third, the cost of horse power.

The motors run without noise, ashes or smoke, are perfectly under control, and would furnish the best possible power to operate elevated railroads.

Skilled engineers are not required, an ordinary car driver can be taught to run an engine in a single trip.

No fuses are burnt, or boilers exploded through carelessness, and as air reservoirs last indefinitely, explo-

sions in transit from causes which render steam dangerous, are impossible.

Even if an explosion should occur by a rupture, it would be while charging the reservoir at the time of maximum pressure and not in transit, and the air would simply escape with a hissing noise. Cold, not heat, would result from the expansion.

The car acts as its own governor and as no more air can be used than is necessary to overcome the resistance, there can be no waste.

There are no horses in front to obstruct a clear view of the track.

At a speed of 12 miles per hour, the motor can be stopped on a level within its length, and the braking apparatus cannot get out of order so long as the motor can move at all.

The pneumatic motor would be peculiarly adapted to underground roads, as the escape of pure air would assist in the ventilation. But it is the best possible for all urban or suburban roads, whether elevated, surface or in tunnels.

In this paper, results only have been given, the full report made in 1879 gives the facts upon which the conclusions have been based.

A detailed estimate was made from data furnished by the operations of the Second Avenue Railroad and a comparison of costs of operation by horse power and by pneumatic motor. In this estimate it was assumed that a compressor plant was located at each end of the route, requiring double the expenditure for plant and double the expense of operation over a single plant located in the middle of the run which would answer just as well.

The estimate for pneumatic power was designedly made in excess, so that errors would be on the safe side and the cost of horse power was from actual results on the Second Avenue Railway.

On the basis of sixteen millions of passengers carried on this road in 1878, the year prior to the report, the actual results of operation by horse power were:

| | |
|--|------|
| Running expenses per passenger in cents | 2.88 |
| Estimate by pneumatic motor | .89 |
| Cost per passenger by horse power including general expenses and a six per cent dividend | 4.55 |
| Estimate by use of pneumatic motor | 2.57 |
| The dividend was \$72,000, or .45 of a cent per passenger. | |

The conclusion from the data furnished was that a very small increase in the number of passengers would permit the company to sell ten tickets for 25 cents and still pay fair dividends upon the capital invested, besides furnishing a rapid transit, the speed of which would be limited only by considerations of safety.

But all these demonstrations and representations backed by the very strongest inducements of the daily press in New York and by the actual running of five motors daily for a period of several months availed nothing against the senseless cry "It will scare horses." "The motor cannot be run unless we put stuffed horses in front

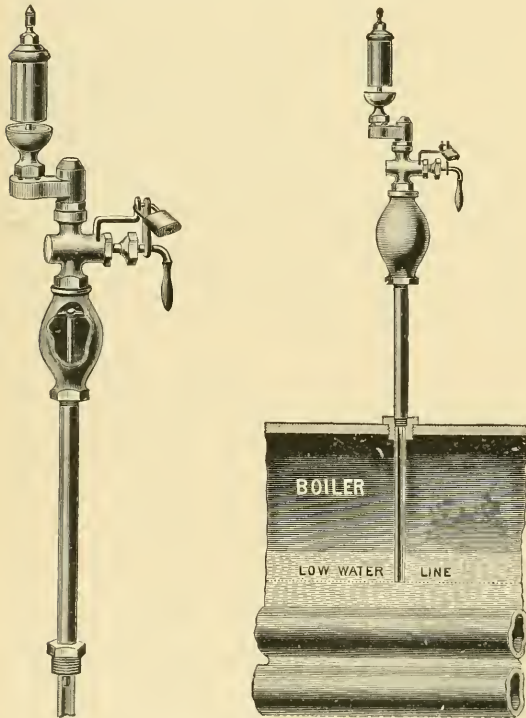
of each car." It is true that horses on the opposite track did at first prick up their ears, look at the motor and shy a little, but they never gave any trouble and soon became accustomed to it, and no case of a runaway accident with street vehicles was heard of. But prejudice, which proved all powerful to exclude the pneumatic motor at that time, did not prevent the introduction of the far more objectionable trolley and cable systems very soon afterwards.

HERMAN HAUPT,
Consulting Engineer.

Saint Paul, Minn.

FUSIBLE PLUG AND LOW WATER ALARM.

A NEW low water alarm has just been put on the market by James B. Clow & Son, Chicago, which avoids the possibility of the fusible metal becoming coated with scale as in the old styles. The importance of this fact will be more readily understood when the fact is known that scale $\frac{1}{8}$ of an inch thick over a $\frac{1}{2}$ -inch hole is sufficient to hold a pressure of 70 pounds.



CLOW'S LOW WATER ALARM.

The left hand cut shows the construction of the indicator. The center brass pipe runs from point where indicator is inserted in boiler to the top of the air chamber, and by its use an immediate circulation of live steam is secured when water goes below the safety line.

The stop cock is of an improved pattern, and will not set or expand, and can always be opened or closed easily. The lock is brass and furnished with two keys. The

fusible metal is held in brass plug connecting the offset and stop cock. When the metal fuses it is forced by the pressure of escaping steam into upper part of the offset, and the steam, free of the metal, operates the whistle, thus securing an absolutely sure and safe low water alarm.

To connect it, tap hole in boiler, size of $\frac{3}{4}$ -inch gas pipe, connect piece of $\frac{1}{2}$ -inch gas pipe in bushing and allow it to extend down in boiler so that it will be two or three inches above the flues; screw bushing tightly into boiler and the alarm is ready to give immediate notice when the water reaches the bottom of the pipe.

The stop cock is always locked open, so if the engineer allows the water to go below the pipe the whistle immediately gives the alarm, and it cannot be shut off until the lock is opened, when it can be quickly closed; while with the old style it was necessary to draw the fires before the plug could be changed, and with this device you can absolutely prevent the burning of the tubes.

WHERE ANGELS FEAR TO TREAD.

THE steam engineer editor of the Safety Valve has an undisguised contempt for the scheme of Dr. Wellington Adams, to put in a trunk line between St. Louis and Chicago to be run electrically. Ye editor saith: "One mile in 36 seconds. Bah! Where is an electric road that is making the half of this speed, to wit, a mile a minute? or 50 miles an hour? or 40 miles an hour? or anything like it!"

"Let this electrical genius who claims to be equal to the astonishing feat of producing 200 horse-power with a weight of 6,000 pounds in a motor going at 500 revolutions, build an electric motor that will make 50 miles an hour in actual every-day practice. When he has accomplished this, and we are sure that it can be done, though not at all sure that he should do it, he will be warranted in talking about still more speed. But for a man like this Adams, who has never accomplished anything original in motor practice, to talk seriously of perfecting a railway on which motors are to speed 250 miles in $2\frac{1}{2}$ hours on the overhead trolley system, it makes one search the horizon with something like anxiety to see if the fool-killer is not in sight."

F. J. Sprague's caution as outlined in last month's REVIEW, is the conservative statement, while the more enthusiastic say "Wait."

We wait.

WANT A ROAD.

ONE of several gentlemen who recently secured a franchise for an electric railway in a good-sized town in Missouri has written us he will be glad to correspond with any person desirous of taking up the deal with them and constructing a road. The promoters claim the road will pay and that the opening for outside capital is a good one. We will forward the address to any requesting the same.

ELECTRIC RAILWAYS IN THE SOUTH—SAN ANTONIO DE BEXAR.

WAY across the rolling prairies of Illinois, cold and bleak in their winter rest or covered with swirling, shifting robes of snow, across Missouri deep in the mud of an approaching spring, through the wooded wilds of Arkansas and then the traveller finds himself upon the spreading plains of Texas. On through the flowery wilderness of summer tide, past hamlet, cattle ranches, herds, towns and trackless wastes, the traveller finds himself on the southern slope of the Lone Star state, where years ago the intrepid LaSalle planted the lilies of France, where the Spanish grandee put his mailed foot, where the wandering tribes of Arrapahoes and Apaches foddered their horses and the dirty half-breed Mexican and freedom loving American have battled for supremacy.

Eighty miles southwest of Austin, on the San Antonio river, lies the city of San Antonio, with its population of 38,700 souls. Here in the midst of a land teeming with life, here in the midst of a land of history, here where the poet might well say:

"A foot fall there
Suffices to upturn the warm air
Half germinating spices; here decay
Produces richer life, and day by day
New pollen on the lily petal grows
And still more labyrinthine buds the rose,

The march of progress of man's supremacy and the marks of the more practical, but perhaps less aesthetic abound."

In 1860 San Antonio had a population of 8,235, when the great plains and valleys where Sioux City and Leaven-



POWER HOUSE SAN ANTONIO ELECTRIC RAILWAY.

Southern Texas is as much an historic treasure house for the archeologist as any spot in Yankeedom, and here grew up, flourished and decayed, more kingdoms and rulers than has been the fortune of any other ground in the sisterhood.

Kentucky, etymologists disregarded, is proverbially "the dark and bloody ground," but there can be found man for man more unnamed graves than any other feet the sodden ground of the late war can show.

History on the southern Texas slope has been written in blood-red characters of war, in the peaceful hieroglyphics of agriculture and the uneven but unmistakable chirography of progress.

worth stand were blank places. In 1880, the crowd swelled by the advent of railroads numbered 20,550 and 18,000 increase in the last decade testifies to its increasing importance.

At San Antonio, pronounced by the natives, we might say now, Santone, there is a meeting of the three trunk lines of railroad, the International & Great Southern, the San Antonio & Aransas Pass, and the Northern Pacific. The county seat of Bexar county it has also the county court house, a fine building, an United States arsenal, a Roman Catholic college and seminary, 11 Protestant churches, a Catholic cathedral, 3 daily and twice that number of weekly papers, breweries and the great cattle,

corn, cotton, wool and hide market of this prolific section of the Lone Star State.

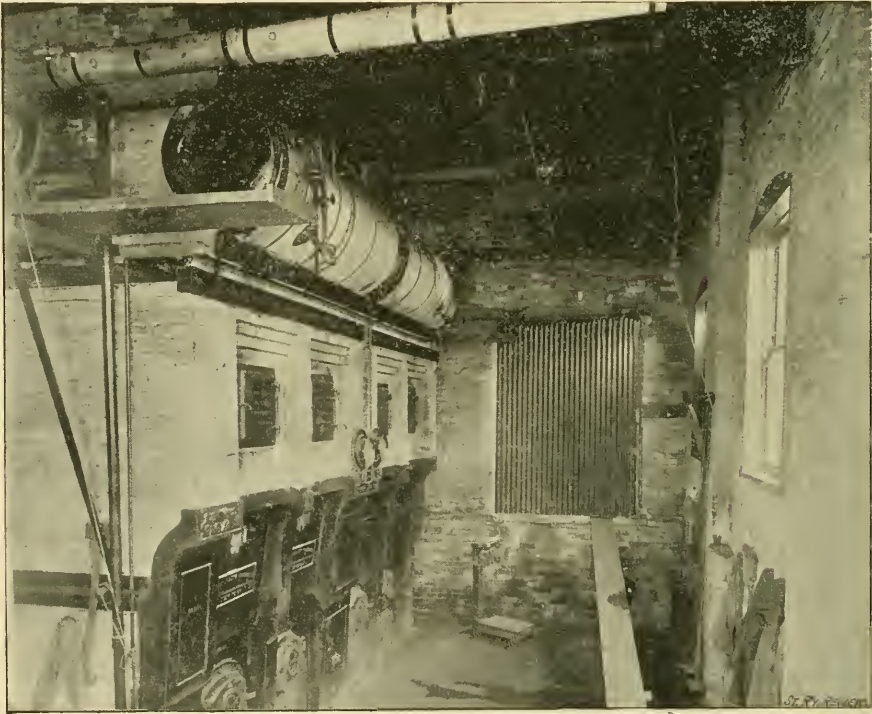
The San Antonio river, with its clear waters and its uncertain temper, sometimes as quiet as a sleeping child and again raising in its wrath out of its bed and snatching everything into its turbulent current, winds in and around the beautiful city, past the jacal of the greaser, through the gardens of the wealthy, and past the ruins for which the town is famous.

The greatest natural power in the vicinity are the Falls of the San Antonio, where the water descends 60 feet, furnishing the means of manufacture to scores of thrifty men.

The narrow streets of old San Antonio present a curi-

Sometimes a "Norther" fills the air with dust and snow, but ordinarily there is no more lovely climate in all our country and the weak lungs that can not stand northern winters or western elevation thrive and grow strong in the salubrious air of the Texas Summerland.

Historically it may not be generally known that San Antonio is one of the oldest settled spots in the area of what is now the United States. Away back before 1698 there was a mission conducted by the Spanish Roman Catholics and called San Fernandez. In 1698, however, the mission of San Antonio de Valero was removed thither and this was changed to San Antonio de Bexar. The different missions which flourished there, alternately forts and churches, sometimes both and some-



STIRLING BOILERS—SAN ANTONIO STREET RAILWAY.

ous sight any day, with the gayly attired higher class Mexican vaqueros, the dirty greasers, the black, brown, yellow, cream colored and white negroes, the burly beggars riding about complacently asking alms from the elevation of his burro and feeling no whit richer from his less tiresome means of travel. Here the priest who rules his flock and gives advice, spiritual, temporal or physical; here is a southern gentleman, old style, smooth shaven and affable, here is a northerner with his quicker step and his restless eye, here a cowboy coming in for a carouse in town after months of loneliness on the great plains; an Indian may perhaps be seen or a blue blooded Spaniard proud of his lineage and his record; adobe houses with dull exteriors and dim, cool interiors.

times neither, are now heaps of dust and wrecks of stone and adobe. The last of the missions was the Alamo; once peaceful but successively a defence against the French under La Harpe and St. Denis, against the Commanche, against the Tahuacanos and against the Apache. Now Salcedo and Herrera surrender to the Americans. Here the brave Milam fell.

The most awful event of the Mexican war was here enacted. W. Barrett Travis with 144 men held the Alamo. Santa Anna's troops were making rapid progress toward the citadel. Col. Bonham is sent out to warn Houston that unless he comes speedily the Alamo is doomed. Houston cannot be found and Bonham like Regulus returns to the Alamo to die. Fifteen hundred

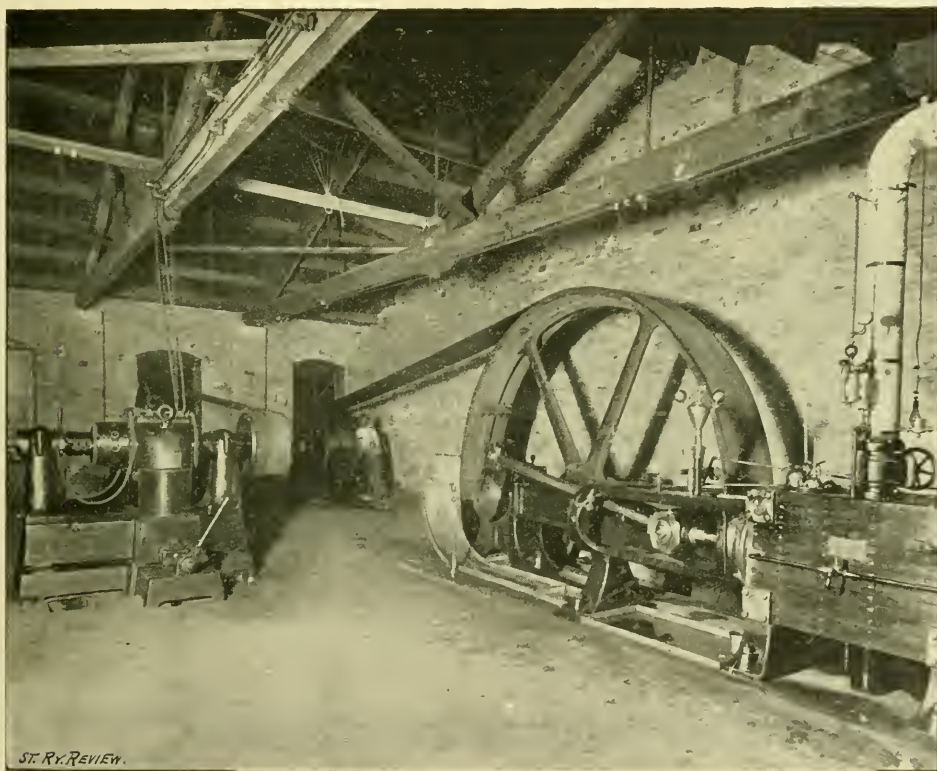
strong the picked men of Santa Ana's battalions bear down on the little band, 2,500 more of the flower of Mexican chivalry come to reinforce. Day after day the plucky band holds out. Finally one midnight the alarm is sounded. Santa Anna will storm the stronghold. Over the walls of the old Mission swarm the Mexicans, and one by one the little band falls to the bloody pavement of the slaughter house. When the next day the Alcalde of San Antonio was called before the conqueror, he saw Travis dead in a corner with a bullet in his head, Bowie butchered in the bed where he lay sick, Evans shot through the back as he stooped to light the powder magazine and Crocket prone on the ground with a ring of dead Mexicans around him.

broad and beautiful streets and on these the wheels of progress roll continually.

THE SAN ANTONIO RAPID TRANSIT STREET RAILROAD COMPANY

was organized December 29, 1888, and began immediately to plan their present system. The men to whom honor is due are W. J. B. Patterson, president; G. Stuart Simons, secretary, and Chas. W. Ogden, treasurer, while the details of the work and worry devolve upon General Manager Simons and Superintendent R. R. Salter.

The track is $4\frac{1}{2}$ miles long, of 4-foot $8\frac{1}{2}$ -inch gauge and laid with 35-pound T rail, made by the Scranton,



BULLOCK ENGINE—SAN ANTONIO STREET RAILWAY.

There is something Homeric, something grand in these rough times, and no wonder the shaft that commemorates these dead says:

"Thermopylae had its messenger of defeat,
The Alamo had none."

Then later, Houston with his half crazed troops bore down upon the Napoleon of Mexico at San Jacinto, and with a cry, "Remember the Alamo," the Americans rushed upon the Mexicans and in eight minutes not a Mexican was in sight.

Let us turn now from these exciting scenes and take a look at the San Antonio of to-day. The newer city has

Pa., rolling mills. The grades encountered are all easy, the steepest being 3 per cent.

THE ROLLING STOCK

Consists of 3 motor and 4 trail cars, all 26 feet in length. Two 15-horse-power motors to each car are made by the Thomson-Houston Company. Brill's number 13 trucks are under the cars.

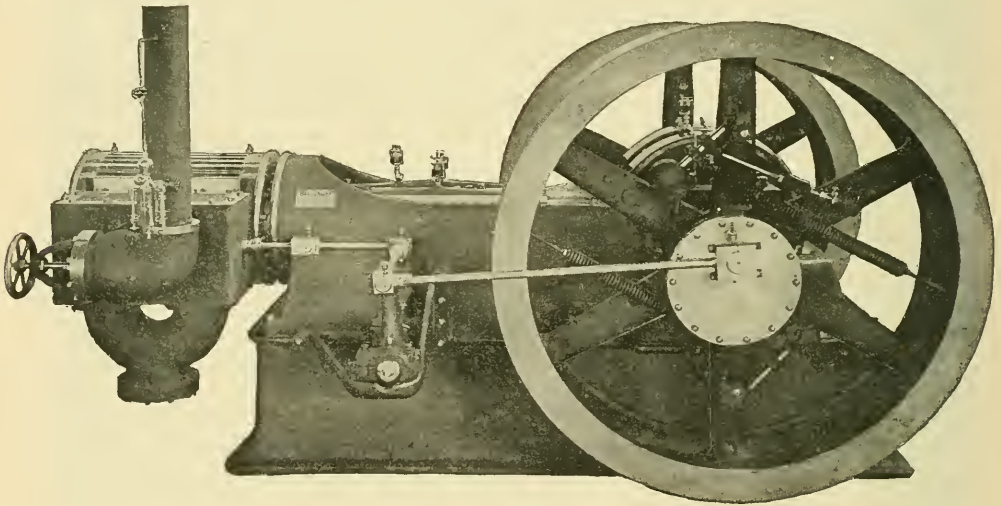
The power station, shown in our engraving, is 70 by 84 feet, including car house and boiler room.

The engine here inclosed is of the well known Bullock Manufacturing Company, of Chicago, and is of 120-horse-

power. The engine is well shown in the engraving on the preceding page and gives the best of satisfaction.

The engine is a 16x36, with an ultimate output of 150-horse-power. The one Thomson-Houston 80-horse-power generator is driven by a jack shaft fitted with Lane friction clutches, made by the M. C. Bullock Manufacturing Company. The installation of the entire power plant was completed by the Bullock company and finished in advance of the time allotted them in their contract, something unusual in this line of work. That this portion of the equipment is well built is evidenced by the fact that there has been no delay or shut down from the first starting of the engine.

The two Stirling boilers, made by the Stirling Company, of Chicago, are first class examples of their skill. The boilers are rated at 100-horse-power each, with 125 pounds pressure. The boilers as shown in the engraving are 18 feet long, 12 feet high and 16 feet deep, bricked up.



BALL HIGH DUTY ENGINE FOR RAILWAY SERVICE.

The route of the road covers the prominent business streets and the pleasure resorts of the Head Spring of the San Antonio river, the San Pedro Park, a beautiful place, and the historic Alamo heights.

San Antonio is a place of beauty, historical interest, and a health resort of note and we wonder that so many traverse the old world when the new is so full of interest.

THEO. P. BAILEY, manager of the railway department of the General Electric Company's Chicago office, has recently closed contracts with the Fort Wayne & Belle Isle Railway, of Detroit, for 29 car equipments of two 25-horse-power water-proof motors each, four multipolar 268-horse-power generators and 31 miles of overhead construction. Two 300 and one 600-horse-power Reynolds'-Corliss compound condensing engines will be used and a fine brick power-house, 140 by 150 feet is to be built.

HEAVY DUTY FOR RAILWAY SERVICE.

THE engine of an electric railway power station has duties that are imposed upon no other class of machines. The extremely varying load which they are so frequently called upon to carry requires the fulfillment of special conditions, prominently, great strength and prompt action of the governing mechanism. Through the lack of one or both of these points some of the earliest installed engines have shown themselves inadequate for their tasks.

In the accompanying illustration is shown an engine recently brought out by the Ball Engine Co., of Erie, Pa., especially for electric railway service. It will be seen that this engine is, for its cylinder capacity, of great strength and weight, the makers claiming that the engines they build are, for the horse-power, the heaviest engines made. The connecting rod and crank shaft are of forged steel. The crank shaft is 8 inches diameter in

the crank pin and in the journals. The crank pin boxes are lined with strictly genuine babbitt; the crosshead boxes of pure copper and tin. The crosshead pin is of tool steel. The system of oiling the running parts is very simple and thorough. The valve, which has been used by this company with great success in the past in their electric light engines, is continued in the heavy-duty engines. This engine has shown in practice, perfect regulation under conditions where the variation in load on the generator, from zero to the full capacity, has occurred in less than five seconds of time. The makers of this engine, working on the theory that the electric railway interests demand a strictly first-class engine, are using the very best possible material and workmanship throughout, and claim to give perfect satisfaction.

THE Electric Street Car Workers' Union is a labor organization at Toledo.

DITCHING BY ELECTRICITY.

WHEN in Spokane, Washington, recently, we witnessed the excavation of a very deep sewer being constructed by the city. The truck was close beside one track of the Spokane Street Railway Company, and to facilitate the work a vertical conveyor had been built, and by means of buckets on an endless belt like a grain elevator, the excavated earth was elevated many times faster than could possibly have been accomplished by manual labor. Power was obtained by an electric motor built into the conveyor and receiving its current from the electric railway wires. As fast as the work progressed the machine was moved forward. The suggestion is a good one for managers to consider, and when they have occasion to do track work of a heavy nature it will readily be seen that a no small saving can often be made both in time and expense.

CHANGED THE COMBINATION.

SOME bright conductor on the Cincinnati Consolidated some seven years ago discovered the combination of the bell punches. With this knowledge for his capital stock he formed a close corporation and made known his secret to his brethren at \$100 per head, and since then the stealings of the 30 men have amounted to \$100 per day or about \$36,000 per year.

Some time ago an old trusted employe of the company was approached by one of the conspirators, and, after careful sounding, was let into the secret. He consented to become a member, paid the initiation fee, and also secured him a pledge of assistance if he got into trouble on account of the conspiracy and support for a certain time if he got out of employment.

As soon as this man learned the details of the conspiracy he went to Supt. Harris and laid before him the facts of the case. He gave the names of the men interested in the conspiracy, and showed foundation for his story by opening one of the punches in the presence of the superintendent. The company could not change the combination and sent East for an expert. The scheme was worked by opening the box that received the bits punched from the slips, taking out as many as desired, and moving the hands on the register far enough back to balance the pieces taken out.

Both the combination and the men are now changed.

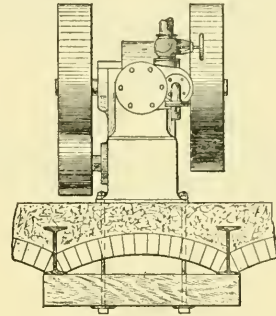
GALESBURG GETS ELECTRICITY.

THE little bob-tail cars and the intensely patient and docile mules which have constituted the rapid transit of Galesburg, Illinois, ever since the road was built, will now fade into history. The College City Street Railway Company has been sold to a new organization, the Galesburg Electric Motor and Power Company who have also secured new franchises and will equip eight miles this season.

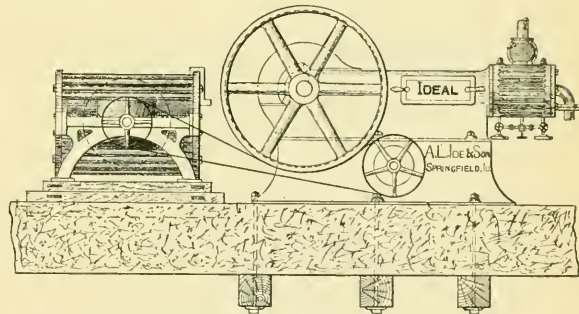
It has not yet been decided whose motors will be adopted.

IDE'S IDEA.

THE illustrations show a new method introduced by A. L. Ide & Son, the extensive engine builders of Springfield, Illinois, for transmitting power from engines and dynamos. The apparatus is extremely simple, consisting of a pulley supported by a stud, which is secured to the base of the engine and which requires no foundation or fixtures.



On account of the small space required, it is especially adapted where space is limited. Two dynamos may be driven from one engine by placing a pulley on each side of the base, and either dynamo may be stopped or started without interfering with the operation of the other machine, by sliding the dynamo on the base so as to bring the belt in contact with the lower surface of the engine pulley.



They have recently installed one of their 8x10, 35 horse-power "Ideal" engines with this transmitting device driving a Thomson-Houston 250-light incandescent dynamo for lighting the Keeley Brewing Company's plant, Chicago.

The engine and dynamo are placed on the floor, which is composed of I-beams and brick arches, as shown by the cut, having no foundation for support. The engine runs at 360 revolutions per minute, but is so perfectly balanced that there is no perceptible vibration of the floor or building.

PROFESSOR SHORT of Cleveland is figuring on a system of electric traction for the New York elevated roads. At present he refuses to give particulars, but all may be assured what Professor Short undertakes goes through.

HYGIENE AND VETERINARY

Edited by F. T. McMahon, Veterinary Surgeon, Chicago City Railway Co., World's Columbian Exposition, and Chicago Police and Fire Department.

DISEASES OF THE NERVOUS SYSTEM.

WE shall commence a consideration of the individual diseases of this class by some general observations on the origin of affections of the nervous system generally. In the horse, the nervous mass is greatly superior to the cerebral; and we find that affections of the spinal cord are in this generous animal more numerous. An apoplectic termination to human life is by no means uncommon. In the horse it is little known; but the frequency with which spinal affections occur, bear little proportion between the two; and taking all the circumstances into consideration, are more than equal to the nervous affections of mankind. Dissections of morbid subjects have also shown that the causes are various, but are usually referable either to pressure on the spinal cord, or otherwise are attributed to a morbid alteration of structure in the cord itself.

Pressure on the spinal marrow may be the consequence of either wounds or over exertion; or it may originate in the existence of parasites within the canal. Lesions, occasioning wounds, are very common from fractures of some of the vertebrae, or from dislocation of the same bones; an aneurism of the aorta has produced it; exostosis and poll-evil have also done the same; the one by ulceration through the articular membranes, and the other by an osseous deposit within the canal. Debility, resulting from over exertion, causes either sanguineous congestion, or otherwise it is accompanied with an increased effusion of interstitial fluid within the spinal sheath. It is said that the sanguineous congestion of the membranes often precedes inflammation of the spinal cord itself, in which cases a rapid paralysis follows. We are led to believe the membranes can inflame independently, and the same with regard to the spinal cord; also that each may be productive of a series of symptoms of greater or less intensity. When the substance both superiorly and inferiorly is inflamed, then it is usually found that both sensation and voluntary motion are destroyed; but when the inflammation is limited to the superior portion, the sensation is principally impaired; and when, on the contrary, the inferior half of the chord is affected, then motion is prevented. A morbid alteration in structure also takes place in the spinal cord, this change has been found in most domestic animals, as in rabies in dogs, stomach staggers in horses, etc.

The spinal cord in these cases becomes soft, and converted into a grayish pulpy mass, losing its original fibrous structure, where paralysis has been present. But we must not be misled by this observation to attribute all the affections of this class to the spinal marrow; we attribute many of the most important to morbid states of the cranial brain, as apoplexy, when it is attended with complete paralysis. Nor must we lose sight of the retrograde march on some nervous irritations, which spring

from neither the cranium or spinal marrow; but originate in the extremities of the nerves, and are transmitted to one or other, or to both the sources; which then becomes secondarily affected, as in the cases of lock-jaw, produced by wounds, &c.

TETANUS OR LOCK-JAW.

Tetanic spasm differ from all the affections we have lately noticed, inasmuch as the muscular contractions are not alternated with periods of relaxation; on the contrary, here they remain permanent, or with very little, and never entire, remission. Lock-jaw, so called from the rigid closure of the mouth, may be considered as a morbid irritation of the whole or a part of the nervous system.

Tetanus is divided into traumatic or symptomatic and idiopathic or non-symptonic.

Traumatic tetanus is the consequence of some external injury, and it follows all kinds of lesions. Castration, nicking, docking, punctures, particularly of the feet; lacerations, and even contusions, will bring it on. The size of the wound is of no consequence; it may ensue from the smallest abrasion; and it may not follow the largest possible lesion. It is by many considered as most apt to follow wounds of tendinous and ligamentous structures, but a wound on any part may start it up.

Idiopathic cases are extremely uncommon; so much so, indeed, that a careful post-mortem examination has frequently proved those few that have been esteemed such during life to be referable to such disturbance of digestive functions, or internal lesions, as may fairly be considered as constituting the symptomatic form. As an instance of how slight a cause may produce the traumatic form of tetanus, provided of course the predisposition exists, I treated one case the result of the tail being tied up too tight,

SYMPTOMS.

If a physiologist were told that tetanus was a spasmodic contraction of all the voluntary muscles, he would describe the following symptoms without having seen the disease, so exactly are they characteristic of such a state. It commences usually by a certain stiffness about the head, and a peculiar mode of standing. Upon raising the head the haws of both eyes are pushed out, giving to the countenance of the animal a strange expression. By the tetanic action the haw is drawn partly over the globe, at the same time the tension of other muscles gives the eyes a vivid appearance, which ill accords with the more placid effect of a protruded haw. The jaws are not invariably fixed, though from their being generally closed springs the popular name of the disorder. As the disease extends over the voluntary muscles of the trunk and extremities, the appearances are distressing in the extreme. The head is raised, the ears pointed forwards, the nos-

trils dilated, the nose is protruded. The legs straddle wide, the tail is elevated, and quivers and the abdominal muscles are drawn tight over the belly, giving to the horse an appearance of having just completed severe exertion. Profuse sweats mark the distress of continued convulsions. The circulation is, in most cases, at first not much affected; but as the disease increases, the pulse quickens, and becomes tremulous and irregular. The respiration also gradually becomes hurried and intermittent; costiveness is usually present, and the urine scanty. In this state the suffering animal may remain from six to twelve days, when worn-out by irritation, he expires in convulsions. At others, either remedially or spontaneously, the contractions give way slightly; feeble attempts are made to eat, the limbs become more supple, and a very slow recovery ensues.

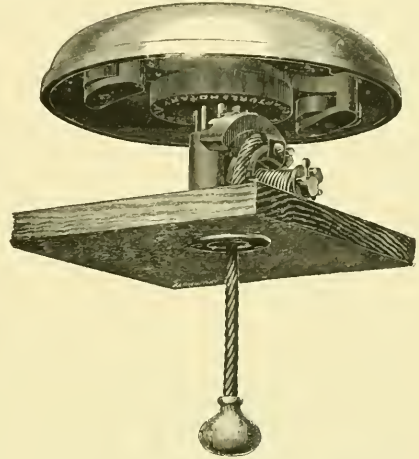
TREATMENT.

Although the greater number of cases prove fatal, yet still a sufficient number recover to warrant our utmost endeavors. The very different means which may have been successfully tried might stagger the skeptic, and make him attribute the recoveries under these discordant medical agencies to the constitutional strength of the animal. This however, is not the only instance wherein very opposite means are beneficially employed for the cure of the same disease, every practitioner is aware of the benefit derived from cold applications in some inflammatory cases; and every one is equally aware how salutary hot fomentations prove, apparently, in similar inflammations. A curative end is equally produced by both; the modus operandi to us is not evident. This circumstance should make the veterinary practitioner not absolutely wed himself to any one plan of treatment. When one has been pursued without any appearance of success, let another be adopted. If a lacerated wound be the cause of the disease, it may be prudent to exercise the part, removing not only the injured surface, but a portion of the flesh beyond, and making sure of taking a piece of the irritated nerve, which is the cause of the disorder. In the case of a punctured wound, particularly in the foot, if there be a confined sinus, have the horn thinned and slit it up with a knife.

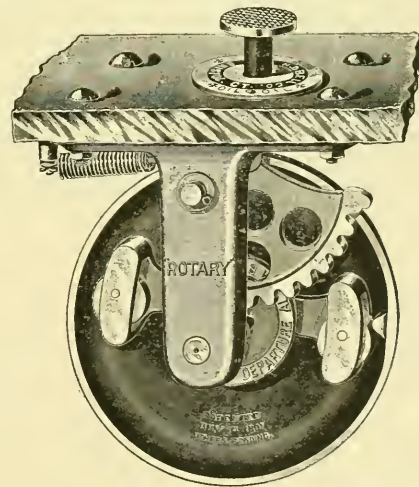
THE ST. LOUIS CAR COMPANY, of St. Louis, write us they have orders on their books for over 450 cars. The company has just completed a new paint shop, with a capacity of 100 cars. Among some of the orders they are filling are 21 grip cars for the Mt. Auburn Cable Railway, Cincinnati, O., 10 motor cars for the South Chicago and Calumet line, 11 for the Southern Railway Company, of St. Louis, 30 for Evansville, Ind., 50 for the Atlantic Avenue Railway of Brooklyn, N. Y., 60 for the Union Railway of New York, 30 for the St. Louis and Suburban Railway Company, St. Louis, 50 for New Orleans, 25 for Louisville, Ky., 30 for Trenton, N. J., 30 for Wilkesbarre, Pa., 20 for Savannah, Ga., 20 for Galveston, Texas, 20 for the City of Mexico, besides a number of small orders.

NEW DEPARTURE BELL.

WE have had frequent occasion to mention the merits of the new departure bell, of which John H. Graham & Co., 113 Chambers street, New York, are general agents. It has made a splendid record and its



notes actually are heard in all parts of the land. The first style offered was intended to be placed beneath the car platform and was operated by the foot. The gong was hung horizontally, which position was recently changed to a vertical as shown in the first illustration herewith,



But many managers expressed a preference for an exposed ball, to be placed above the hood or car roof, and to meet this desire a new type is now being manufactured and is shown in the second illustration. The gong fully protects the works, while the sound is in no degree counteracted by noise of the wheels and the confined position below the car.

The New Departure specialty is winning new laurels every day and constantly salutes the ear in all our cities.

PUGET SOUND NOTES.

From Our Own Correspondent.

SEATTLE, Wash., July 9th, 1892.

The Consolidated Street Railway Company intends to sink an artesian well at its power house, and the Union Electric Company may join in the enterprise. L. H. Griffith, general manager of the consolidated company, says he expects to strike a sufficient flow of water at a depth of 200 feet to supply both power-houses and thereby save the consolidated company \$150 a month.

The Consolidated Street Railway Company is negotiating for the improvement of Woodland Park, a tract bordering Green Lake, in the north end of the city. The company proposes to make a pleasure resort of the park. The Yesler Avenue Cable Railway, the Madison Street Cable Railway, and the Union Trunk line have each fitted up pleasure resorts at the ends of their lines, and the Sunday travel is in consequence very large. The Consolidated Electric Railway Company carried 12,000 passengers on Sunday. It is estimated that the total business of all the street railways on that day was about 35,000 passengers.

The city council is considering the question of compelling the Seattle Consolidated Street Railway to light, according to the terms of its franchise, certain streets, through which it operates lines. The company has petitioned to the council, stating that it is impossible to light the streets from the trolley wires, as is provided in the franchise, and so in order to comply with the franchise in every detail, the company would have to put in a complete electric light plant. The expense of this addition would be greater than the earnings of the company would warrant. The matter is as yet undecided.

John Miller, a conductor of the Consolidated company, was leaning from his platform to signal another car, when his head struck against a pole, and he was seriously injured.

The Consolidated company has secured a non-suit in a case brought against it for \$5,000, damages by Mrs. Hugh H. Hughes. Her husband fell through a bridge of the company and was drowned in Lake Union, in May, 1891. She alleged that the company received its franchise on condition that it should keep the bridge planked; but the court held that the facts set forth in the complaint were not a sufficient cause for action.

The conductors and other employes of the Union Trunk line have decided to organize a brass band, and in a short time will begin practicing under a competent leader.

The power-house of the Grant street electric line is completed, but some delay has been caused by the non-arrival of boilers. These are on the way now and are expected here within a week. In from thirty to forty days the power house will be in active operation.

J. P. Thompson has brought suit against the West Street & North End Electric Railway Company to recover \$24,660, which he claims is due him for services rendered as engineer in the construction of the road.

The Ranier Power & Railway Company will soon have the north end of its line completed.

Henry Harbauer has sued both the Seattle and the Front Street Cable Railway companies for \$7,000 damages for the breaking of his ankle. Last March he stepped from the car into a deep hole, on a dark night. The hole had been left by the city workmen. Harbauer also complains because the conductor of the car gave him no warning of the danger.

The theory which some perhaps hold, that employment by a street railway company is sure to inculcate in a man principles of virtue and honor, has been refuted by A. W. Mudgett, a conductor of the Seattle Consolidated Street Railway Company. When he moved here several years ago, he became acquainted with Mrs. Emma Debble, a widow, whom he wooed and won. The wedding was to have taken place last month. A few months since he fell in with Miss Mary Groves, a pretty and lively young woman of about twenty. He made love to her at an astounding rate, and an engagement soon followed. The two women lived in opposite ends of the city, and he found it possible for a time to pay court to both without getting himself into trouble. On May 10 he induced Miss Groves to accompany him to Victoria, and get married without her mother's knowledge. About ten days after the wedding Mudgett began to treat the bride with such chilling indifference that she became suspicious of him and shadowed him one evening when he went to call on Mrs. Debble. On discovering Mudgett's perfidy, the girl told

her mother, who further discovered that the ceremony at Victoria was a mock one. Mrs. Groves then forced the gay conductor to marry her daughter, and the notice of the marriage caught the eye of Mrs. Debble. She at once hunted up Miss Groves, now Mrs. Mudgett, and the two women mingled their grief and anger. They took their revenge by going together and riding on Conductor Mudgett's car. When they got on in the afternoon, Mudgett started, turned pale, and was so nervous that he could hardly stand up. They swept past him, and took seats together. They remained in the car, trip after trip, till the unhappy Mudgett's hours of work had expired.

L. H. Griffith, manager of the Seattle Consolidated Street Railway Company, has been elected director and manager of the Tacoma City Railway Company. While managing the Tacoma system, Mr. Griffith will retain the management of the Consolidated company's lines in this city, as he has them so well organized that they do not need his entire attention. He will re-equip the Tacoma road with ten new cars of high speed, and with the latest improved single reduction motors. The cars will be built in Tacoma and every effort will be made to have them done early in the fall. The 900 horse-power engine now in use will be duplicated.

The Tacoma & Point Defiance road is now equipped with electricity. The Thomson-Houston Company did the track work, and the Edison Company furnished the cars with single reduction motors. There are seven cars now ready, and five new ones are expected daily.

The consolidation of the Steilacoom road and the Tacoma Railway & Motor Company has been effected. There was some difficulty over the transfer last month, and Winthrop Coffin, of Boston, representing the Thomson-Houston interest, was sent to Tacoma to look over the ground. He reported unfavorably as to the price, but this was finally agreed to, and the transfer was consummated in New York and confirmed later at a meeting of the directors held at St. Paul. It is understood among the improvements contemplated by the Tacoma Railway & Motor Company, in relation to the Steilacoom line, is the placing of two 25-horse-power Thomson-Houston W. P. motors in the cars. Electricity will be used on the road as far as the Tacoma city limits, and steam motors on the Steilacoom end.

A petition is before the Tacoma superior court for permission to foreclose a mortgage held by Allen C. Mason on the Tacoma & Puyallup motor line. In case the foreclosure is allowed it will result in the road passing under the control of the Tacoma, Point Defiance & Edison Company, which will forthwith proceed to equip the line with electricity, a consummation devoutly wished by the patrons of the road.

For being thrown from a bridge, thirty feet to the ground, by alleged careless manipulation of an electric motor car, Patrick O'Rourke has sued the Tacoma Railway & Motor Company for \$10,567 damages.

Chief engineer Knox, of the Tacoma Railway & Motor Company, had a singular and painful experience a few nights ago. He was working in the recess back of the large switchboard in the power house, when he came into contact with the person of his assistant. The latter was standing in such a way as to complete the circuit through Mr. Knox's hand, which was firmly clasping a copper rod carrying a 500-volt current. Mr. Knox was thrown violently against the wall, and the flesh was burned and torn away from his hand. On the rod the lump of flesh and sinew torn off was exactly duplicated in copper, forming an odd excrescence. The engineer has had that portion of the rod removed, and will preserve it as a curio.

The Water Front Street Railway of Whatcom, which occupies the principal business streets of the place has been sold by John H. Stenger, J. W. Morgan and F. C. Pettibone to Edmund Cosgrove and Hugh Eldridge. Cosgrove and Hugh Eldridge are large stockholders in the Fairhaven & Whatcom road, which takes the back streets in Whatcom and runs to the lake. This means eventual consolidation of the two lines. There are over 200,000 shares of stock, and 112,000 were sold. The road is three miles long and cost \$65,000. The Water Front company has elected Hugh Eldridge president, P. B. Cornwall vice president, Victor Roeder treasurer, and E. B. Leaming secretary.

Morris McCarthy succeeds A. E. Rice as general superintendent of the Fairhaven & New Whatcom Electric Street Railway Company.

A project is on foot for building an electric road from Spokane to Fort Sherman and Coeur d'Alene lake in Idaho. The distance is only thirty miles and the falls at Spokane and at Post Falls supply plenty of power for generating electricity. The run can be made in an hour, and Coeur d'Alene lake can thus be brought near enough Spokane to be one of that city's pleasure resorts.

A LAMOKIN OPEN CAR.

THE car illustrated on this page is one made by the Lamokin Car Company and displayed in Milwaukee recently, at the congress of cars held there.

The car is 24 feet over all, with high monitor deck, stationary deck glass of ruby muranese pattern. The ceiling is of quartered oak, and the ends of the car are closed, having two large drop windows and blinds. The seats are all of strips with open-work backs. The trimmings are all solid bronze, Lamokin pattern, and the end seat panels of malleable iron, Cochran pattern, with ribs on the inside and tips on the bottom.

The construction gives to the hard service demanded, the highest theoretical mechanics and the very best practical work. Each part helps strengthen the others and no "grand stand" work is allowed to detract from the whole service.



LAMOKIN OPEN CAR BUILT FOR MILWAUKEE.

The car has five reversible and four stationary seats with independent side curtains.

The colors are well selected and harmonious. The seat end panels are light ochre, all other panels white. The panel letterings are silver, edged with black. The dash, inside and out, is in gold with silver number. The side center panel has a number also. Cochran's patent sign is placed on each side of the roof.

The car is mounted on a Robinson motor truck of the Robinson Machine Co., Altoona, Pa., on 33 inch wheels with a 6 foot 6 inch base.

THE street railway at Lansing, Michigan, had occasion, a few days ago, to entirely relay a considerable portion of track. An entire mile was taken up, graded and relaid with new ties and rails in four days and quarter. A very creditable piece of work, and illustrates the progressive manner in which our Lansing friends do things,

THE CONNELLY MOTOR.

AT different times during the past two or three years the Connelly gas motor has been noticed in the streets of Chicago, at first upon the West Side and more recently on the North Side and in the business section. It has been subjected to a number of tests by Mr. Yerkes' companies, and has finally been adopted by them for extensive use on their horse lines, and also as auxiliary to their cable lines. That it has passed beyond the stage of experiment is evidenced by the fact that not only have the North and West Side companies purchased a controlling interest in the Connelly Motor Company, of Illinois, which controls the motor for this state, but in addition, a plant is being established by them in this city for their manufacture, where the motors will be turned out as rapidly as possible.

They are to be constructed of 10-horse-power for use for

horse and feeder lines intended to draw one trailer, and of 20-horse-power using two trailers; although the 10-horse-power motor demonstrated its ability to draw two trailers at cable speed on the Clark street and Wells street cable roads, it is deemed best to increase the power for this service to secure a large margin of reserve power for emergencies.

The Connelly motor has been often described, and is not unknown to the street railway world. It can be briefly described as an independent motor, generating its power by means of a gas engine, and utilizing as fuel either crude or manufactured gas carried in sufficient quantities upon the car to operate the motor from two to fourteen hours.

The power is transmitted from the engine to the axle in a most ingenious manner, in fact it is this feature which distinguishes the Connelly motor and enables it to work, which all others of the same weight and power

have signally failed to perform. The real problem in securing a satisfactory motor for street service is not generally known, and we will explain that the ordinary locomotive and the usual type of street motor, such as the Belgium steam motor recently tested in this city, are capable of exerting their maximum power only when at their highest speed, and are weakest when starting. A street motor to be satisfactory needs to exert its maximum power when starting, and the ability to do this enables the Connelly motor of 10-horse-power to do work which would require motors of 40-horse-power of the usual type of construction.

The low cost of fuel from which power is generated enables the Connelly system to claim not only independence and simplicity, but cheap operation, a most important factor.

On Thursday of last week, Mr. John M. Roach, vice president and superintendent of the North Chicago

A DUBUQUE SCENE.

SINCE the Dubuque line changed from storage to the overhead system, it has been possible to operate several cars in one train, drawn by a single motor. The illustration is of a train of one motor and two trail cars, containing 22 passengers on the motor and 37 and 33 respectively, on the two trailers. The motors with which the road is equipped are the Detroit Electrical works, under whose system only one motor is required on motor car, the other wheels becoming drivers by a link belt connection between motor axles. The motor in the illustration is a 30 horse-power, being one of nine, 30 horse-power. There are also six 40 horse-power motors in service here, and they are all giving splendid satisfaction. The motor cars were built by the J. G. Brill Company and the opens by the St. Louis Car Company.



A DUBUQUE SCENE.

Street Railroad, was elected to the presidency of the Connelly Motor Company of Illinois, thus assuming control for Mr. Yerkes' companies.

RACINE WRINKLES.

THE Belle City Street Railway Company has let the contract for a 300-horse-power engine to M. C. Bullock, of Chicago, while S. Freeman & Son, of Racine, will build the 3 boilers, 16 feet by 66 inches each. Work has begun on their new buildings and track laying which will probably be finished before the summer is over. Superintendent Schuman is the happiest man in Racine over the change.

The St. Louis Car Company will build 15 cars and the Detroit Electrical Works will furnish the entire electrical and overhead equipment,

As we go to press we learn that the order for 70 trucks for the new cars at Milwaukee has been taken by the J. G. Brill Company. The experimental use of the Brill truck was so entirely satisfactory to the company that the entire order was given the Brill Company, who have good reason to feel proud of the substantial recognition of their work.

In the recent letting of cars at Milwaukee, the J. M. Jones Sons' Company, of Troy, carried off an order for 20 closed cars, to be built after the style and workmanship of their sample car submitted. This is a well earned victory for the Jones Company, secured in the face of the most active competition. Their high grade work is too well known to need comment, being recognized everywhere as standard in all respects.

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

JOHN G. HOLMES, PRESIDENT, Pittsburg, Pa.
 THOMAS H. McLEAN, FIRST VICE-PRESIDENT, New York, N. Y.
 JAMES B. SPEED, SECOND VICE-PRESIDENT, Louisville, Ky.
 ALBION E. LANG, THIRD VICE-PRESIDENT, Toledo, O.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE-PRESIDENTS, and HENRY M. WATSON, Buffalo, N. Y.; LEWIS PEBBINE, JR., Trenton, N. J.; W. WORTH BEAN, St. Joseph, Mich.; MURRY A. VERNER, Pittsburg, Pa., and THOMAS C. PENNINGTON, Chicago, Ill.

Subjects for Discussion and Committees Appointed to Report Thereon.

"Power-House Engines."

T. W. WRENNE, President United Electric Railway, Nashville, Tenn.; L. H. McINTIRE, Engineer, Harlem Bridge, M. & F. Railway, New York; F. S. PEARSON, Chief Engineer, Electrical Department West End Street Railway, Boston,

"Relative Cost of Operation of Horse, Cable and Electric Roads."

WM. MC C. RAMSEY, Electrical Superintendent Federal St. & P. V. Passenger Railway, Pittsburg, Pa.; F. R. GREENE, Secretary Chicago City Railway Company, Chicago; JOHN L. HEINS, Superintendent Brooklyn City & Newton Railroad, Brooklyn.

"Standards for Electric Railways."

O. T. CROSBY, Utica, N. Y.; H. I. BETTIS, General Manager Atlanta Consolidated Railway, Atlanta, Ga.; E. E. HIGGINS, General Manager Short Electric Railway Company, Cleveland; CHAS. W. WASON, Vice-President East Cleveland Railroad Company, Cleveland; J. E. RUGG, Superintendent Citizens' Traction Company, Pittsburg.

"Form for Street Railway Electrical Statistics."

TROS. H. McLEAN, Secretary Twenty-third Street Railway, New York; HENRY W. WATSON, President Buffalo City Railway Company, Buffalo; CHAS. E. WARREN, New York.

"A Model Electric Street Railway Roadbed and Underground Wiring."

GEO. W. BAUMHOFF, Superintendent Lindell Railway Company, St. Louis.

"A Perfect Overhead Construction."

CHAS. H. SMITH, General Superintendent Troy & Lansingburg Railway, Troy, N. Y.

"Economy of Machine Shops for Electric Street Railways."

J. H. BICKFORD, Salem, Mass.

Next meeting, Cleveland, O., October 19th, 20th and 21st.

Massachusetts Street Railway Association.

President, CHAS. B. PRATT, Salem; Vice-Presidents, H. M. WHITNEY, Boston and AMOS F. BREED, Lynn, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON, Lawrence.

Meets first Wednesday of each month.

Ohio State Tramway Association

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice President; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus, Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice President, TROS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee, OFFICERS and C. B. THURSTON, Jersey City; H. ROMAINE, Patterson; LEWIS PERBINE, JR., Trenton.

The Street Railway Association of the State of New York.

JOHN N. BECKLEY, PRESIDENT, Rochester, N. Y.
 THOS. H. McLEAN, VICE PRESIDENT, New York, N. Y.
 GEO. LAW, SECOND VICE PRESIDENT, New York, N. Y.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—D. F. LEWIS, Brooklyn, N. Y.; C. DENSMORE WYMAN, New York, N. Y., CHAS. CLEMENSHAW, Troy, N. Y.
 The next meeting will be held at Saratoga, September, 30th, 1892.

Subjects for Discussion.

"Recent Improvements in Cable Traction."—GEO. W. McNULTY, Engineer Broadway & Seventh Avenue Railway, New York.

"Recent Improvements in Electric Traction."—L. H. McINTIRE, Harlem Bridge, Morrisania & Fordham Railway, New York.

Arkansas.

HOT SPRINGS.—The Fountain & Suburban Street Railway Company have filed articles of incorporation to build an electric railway. R. Shurray, J. Fraser and W. D. Bell are among the incorporators.

Alabama.

MONTGOMERY.—It is reported that the Terminal Street Railway Company are soon to equip their line with electricity. They have asked the council for the right to locate poles.

MOBILE.—The United States court has authorized Receiver Outlaw to expend \$2,000 for mules for the use of the City Railway Company. All danger from glanders has disappeared, and the receiver will soon have a good supply of stock to accommodate the public.

California.

BERKLEY.—There is talk of a street railway from this city to Oakland Robert Fitzgerald is one of the promoters.

OAKLAND.—The East Oakland Street Railway Company have given a mortgage and trust deed to the California Safe Deposit & Trust Company to secure the payment of 250 bonds of the value of \$1,000 each, bearing 6 per cent interest. This is an aggregate of \$250,000.

J. L. DAVIS and R. M. and E. L. Fitzgerald filed recently with the city clerk an application for a franchise for an electric railway along several streets.

SAN FRANCISCO.—There is great talk of a cable line on Mission street in the place of the old horse line.

THE work of changing the gauge and rebuilding the road-bed of the Geary street cable railroad is progressing finely. In another week it is likely that the new track will be laid the entire length and there will then be direct communication from Kearney street to Fifth avenue and D street, fronting Golden Gate Park. It is expected that when matters are in full working order the Geary street cars will branch onto the main line on Market street, continuing down to the ferry landing.

SAN JOSE.—Geo. K. Edwards, the well known and popular superintendent of the San Jose & Santa Clara Electric railroad having resigned to accept a position as assistant superintendent of the Oakland, San Leandro & Hayward electric road, his fellow workmen presented him with a handsome gold badge inscribed: "Presented to George K. Edwards of the San Jose and Santa Clara R. R. Co."

Colorado.

CREEDE.—A movement is on foot to build an electric railway between Creede and Wason.

DENVER.—The Platte Valley Electric Railway Company has been organized to build an electric railway between Denver and Brighton, John A. Thompson and Edward A. Reser are among the incorporators.

Some very heavy work is being done at the City Cable Company's power house, which is the necessary cause of the stoppage on the company's lines. The work is slow and uncertain, but as announced in Col. Randolph's card to the public, they expect to be again in running order very soon.

It had become a necessity for the safety of the employes, the public, and to prevent possible great damage that a change should be made in the old cog gear, consisting of a pinion and a spur wheel.

The old pinion wheels have a number of broken teeth and the gear wheel has recently shown a cracked face, causing the company considerable alarm.

The work of removing these wheels is enormous, as they have to be raised their own height by tackle, and before this can be done they must be split by a series of drill holes across their diameter. Then the new wheels, which weigh together 100,000 pounds, must be placed; but this will be easier, because the new gear wheel comes in halves, to be bolted together when placed.

TRINIDAD.—Chicago parties are after the Trinidad street railway with prospects of soon closing the deal. It is said that Patton motors will be used.

Connecticut.

HARTFORD.—The electric railroad is doing a splendid service for itself and for the thousands of its patrons who enjoy its advantages. Every train is on time and it is not an uncommon thing to see three cars packed to overflowing. The horse scare epidemic is pretty much over and everybody is delighted with the road and its splendid equipments.

District of Columbia.

WASHINGTON.—The ties for the Alexandria-Mt. Vernon Electric Railway will be furnished by J. A. Marshall. Breen & Freley are the contractors. The road is to be completed by Sept. 15.

Georgia.

ATLANTA.—The construction of the electric line running to Stone Mountain is completed and cars are making regular trips.

MACON.—The Macon Consolidated Street Railway Company contemplate changing their line to electricity.

Illinois.

ALTON.—The secretary of state has incorporated the Alton & Suburban Electric Railway Company, Alton; capital stock, \$50,000; incorporators: Manning Mayfield, Henry C. Swift and E. G. Webster.

AURORA.—The street railway company had charge of the Fourth of July celebration at Aurora. The exercises were held at the Driving Park and were attended by about 5,000 people.

BLOOMINGTON.—The Bloomington & Normal Street Railway Company have ordered material for equipment of their road, to run between Bloomington and Normal.

ELGIN.—The board of directors of the Elgin, Aurora & Fox River Electric Railway Company have elected officers and opened their books for subscription. Right of way will be secured at once.

PEORIA.—Work has been commenced on the line of the Peoria Rapid Transit Railway Company and cars will be running in sixty days.

ROCKFORD.—The West End Street Railway Company in laying their track across the track of the Chicago & Northwestern Railway were prevented by the running engines and cars back and forth at the point where the crossing was to be laid. The city police with a patrol wagon filled the jail with railroad men and they gave up the job and the crossing was laid.

WAUKEGAN.—The council have granted a franchise to the Waukegan & North Shore Rapid Transit Company to build an electric railway.

Indiana.

INDIANAPOLIS.—The street railway company give a free concert at Fairview Park every Wednesday night. The Progress military band furnishes the talent and the company the transportation.

MARION.—Attorney Wallace, on behalf of Russell Harrison, with a man of the Delafield construction company, are here to complete the Queen City road, from the York Inn on the west side to the National Soldiers' Home on the south. Mr. Harrison and George L. Mason are the principal stockholders.

MUNCIE.—In referring to the matter of an electric railroad between Boyce-ton and Westside, two suburbs, Mr. Williams, of the Delaware County Land Improvement Company said: We are not anxious to hold stock in an electric railroad but we must have transportation between Westside and the city proper. If, in the course of time some one else wants to build an electric road, we will sell our line to them, as we are operating a land company not an electric railway company. Let the council act favorably on this proposition.

TERRE HAUTE.—The Vigo Real Estate Company, which are backing the proposed City and Suburban Street Railway Company, have entered into an agreement with the Terre Haute Electric Street Railway Company to construct and operate the line for a certain per cent per annum of the cost of the construction for two years.

Iowa.

DAVENPORT.—The picnic car people are making the Black Hawk Watch Tower the scenic grounds of the three cities. They have erected a beautiful pavilion and run cars at all times of the day and night.

DUBUQUE.—On circus day the Dubuque company carried 22,894 passengers. Memorial day 16,254 people were carried.

The board of public works has requested a conference with the management of the street railway in the matter of changing the method of laying tracks on paved streets.

DES MOINES.—The Des Moines Street Railroad Company has put in a number of switches and generally improved their track.

KEOKUK.—The Fourteenth street extension is finished and running in first class shape. The new management are furnishing good service.

The Central Trust Company, of New York, has filed with the recorder a trust deed executed by the Gate City Electric Street Railway Company to secure bonds in the sum of \$85,000.

OSKALOOSA.—Contracts have been let for materials for the new street railway and work will be commenced at once.

OTTUMWA.—Dr. W. B. Smith's proposition to the council asks for a franchise for an electric street railway line through the principal streets. Dr. Smith agrees to enter into a written contract to build, equip and operate a first-class street railway and to commence operation immediately upon securing the franchise. He also offers to pay the city \$1,000 to apply on the cost of the bridge timbers to be used on the bridge and approach.

SIoux CITY.—The contract for the new Sioux City and Leeds electric line has been let and work will be commenced at once.

At a recent meeting of the street car employes on the electric lines they decided to ask for an advance from 15 to 17½ cents per hour. A committee has been appointed to wait on the management.

Kansas.

ATCHISON.—This city is about to make a new start, several factories will locate and at a recent Board of Trade meeting Mr. Donald reported that a responsible Chicago man had made an offer of \$30,000 for the street railway franchise. A general discussion of street railway matters followed and a committee consisting of Messrs. Jackson, Elliston, Grove, Donald and Gerow was instructed to report as to the rights of the city under the present franchise and what steps are necessary to further the project of an electric street railway.

Kentucky.

COVINGTON.—There is talk of building an electric line from Covington to Independence.

LOUISVILLE.—There is a strong probability that Louisville and New Albany will soon be connected by an electric railway.

Maryland.

BALTIMORE.—S. M. Jarvis, president of the Lake Roland road has returned from Kansas City to let the contract for the road. The west tracks of the Passenger railway are cabled and ready for business.

Massachusetts.

BEVERLY.—There is talk of the Naumkeag Street Railway Company buying the Beverly and Danvers Street Railway. The road was started to be operated by the storage battery system, but the system failed to work satisfactorily and for the past six months the road has not been running.

CAMBRIDGE.—The Storage Battery Railway Company has been chartered to build three miles of road.

FITCHBURG.—The electric railway line is now in good running order between Fitchburg and Leominster.

Haverhill—The City Council have granted a franchise to the Haverhill and Amesburg Railway Company to build an electric line.

Stoneham—An electric street railway is about to be built between Stoneham and Wakefield. The franchise is granted in Stoneham on Central street.

West Bedford—The annual meeting of the Union Street Railroad Employes' Relief Association resulted in the election of the following officers for the ensuing year: President, Benjamin F. King; vice-president, Albert H. Peters; secretary, Wallace C. Tilden; treasurer, W. H. Allen; trustees, William S. Kelly, John C. Jenny, Orin Ricketson, Mortimer McCarthy, Charles B. Sayles.

Michigan.

Battle Creek—An accounting is demanded in a Circuit Court bill filed by William Forbush, assignee of the Continental Electric Construction Company, against D. B. Dewey, W. T. Rickords, and General John L. Beveridge, Frederick J. Wilson and the Battle Creek Electric Railway Company. The Continental Electric Construction Company had a contract to construct a line of electric street railway in Battle Creek, Mich., for the Battle Creek Electric Railway Company. Being unable to carry out the contract it was assigned to Wilson, who was to give up one-half of his profits in the deal. Wilson associated with the other defendants, completed the contract, and it is charged that they cleared \$20,000, besides securing the entire stock of the Battle Creek Electric Company, worth \$75,000. The assignee now claims he is entitled to one-eighth of the entire sum, under the contract with Wilson.

Detroit—The Woodward avenue line will put down 77 pound rails, Johnson girder.

The new officers of the street car employes' association are: R. W. Chase, president; J. H. McCormick vice-president; J. C. Manuel, secretary; W. J. Law, traveling delegate; John Garrity, treasurer; W. Skerrett, marshal; A. H. McKay, sergeant-at-arms, and E. Eby, deputy.

The Detroit Citizens' Street Railway Company have asked for more streets to provide for loops for the electric lines.

A service from Dearborn to Detroit is an assured thing. The Messrs. Hendrie are at the fore front of the enterprise.

The poles for the overhead trolley system of rapid transit on Jefferson avenue have nearly all been planted and the work of stringing wires will be proceeded with at once.

The Fort Wayne and Belle Isle Street Railway Company, having completed their track within the city to the western limits, regular trips are now made to and from Woodmere.

Flint—Prominent Ohio capitalists, in the interests of an eastern syndicate, indicate a willingness to take hold of the Flint street railway project.

Grand Rapids—The Michigan Trust Company, as trustee for Robert L. Belknap, of New York, has commenced suit against the Lake Electric Railway Company to foreclose a mortgage of \$50,000, given on its way and equipment. The bonds were secured by the mortgage with a provision that if at any time the company failed to pay the interest when due, the mortgage was subject to a foreclosure at once. The railroad company has become insolvent.

The Consolidated Street Railway Company are extending their line on Lyon street.

C. N. Tufts has purchased of the Consolidated, a large strip of land which was formerly occupied by the stables and station of the company.

Menominee—It is reported that the Menominee electric street railway is so rushed with business that it will be necessary to purchase more cars.

Sault Ste Marie—The Detroit Electrical Works have petitioned the court for an order restraining the officers of the Sault Ste. Marie Street Railway Company from disposing of any of its corporate bonds. The Detroit company claim they have never received their pay for equipping the road.

Port Huron—Work is just being completed by the City Electric Railway and cars will soon be running.

Minnesota.

Duluth—The Lakeside Railway, capitalized at \$50,000, have filed articles of incorporation for the purpose of building a street railway between Lakeside and Duluth.

Work has been commenced on the new car barn and machine shop of the Duluth Street Railway. The building will be 150x225 feet, one story in height with truss roof. It will cost \$50,000.

The Lakeside Railway company has been organized. Chas. H. Graves, of Duluth, and Geo. F. Chester, of Lakeside, are among the incorporators. Capital \$100,000.

Sauk Rapids—C. Duffy, representing the Electric Railway Company, recently made the citizens a proposition by which they can have an electric line by giving a small donation.

St. Paul—The St. Paul & White Bear Electric Railway Company has increased its capital stock to \$350,000, and is contemplating the extension of the line to Stillwater.

The final step towards the absorption of the St. Paul City Railway by the Minneapolis system and the resulting operation of both roads from the headquarters at Minneapolis has been taken, and within a few days the street railways of both cities will be known as the Twin City Rapid Transit Company.

St. Cloud—The St. Cloud Electric Railway Company have opened their new line for business. Everything worked as slick as could be wished.

Stillwater—In the district court recently the application of W. M. Hewitt, receiver of the Street Railway Company, to purchase electrical supplies and machinery was granted.

Minneapolis—Material has been distributed for the connection of the Hamline electric line, connecting with the interurban line via Snelling avenue.

Cars are now running to Bryn Mawr. The suburban town is about a mile out of the city limits and is reached by an extension of the University and Hawthorn avenue line.

Missouri.

Clayton—The Delmer Avenue and Clayton Railway Company has filed articles and applied for a certificate. Their capital is \$5,000, one-half paid. The incorporators each holding ten shares are Messrs. Baron S. Barnes, M. B. Greensfelder, Emil L. Dosenbach, Chas. R. Ramsey and Chas. C. Nicholls. The company now have a bill pending in the St. Louis Council asking for a franchise from Delmar and De Balveire avenues out Delmar avenue to the city limits.

Kansas City—The work of changing the L road to electricity is almost completed. The Thomson-Houston company have the contract. The steam engines which are now being used on the road will likely be sold to a company on the Pacific coast. Some California men who are interested in a small railroad were in the city recently inspecting the engines with a view of purchasing them. The deal has not yet been made, but it was stated on good authority that it would be consummated in a few days.

Joplin—The route for the Joplin, Webb City and Carterville Electric Railway Company has been surveyed and a profile drawn showing a grade of less than two per cent.

Nebraska.

Beatrice—The City Council have granted the Rapid Transit Company permission to construct an electric railway over several of the most prominent streets and work has already been commenced.

Lincoln—A company has been organized to construct a street railway line to pleasure resort in the vicinity. Storage batteries will be used.

For some time the Electric Street Railway Company has been endeavoring to get control of Logan County Central park, which has been under the management of the Teutonia Maennerchor. They have at last secured control and will endeavor to give concerts at the park once every week.

South Omaha—The Metropolitan has begun operations. Horses will be used until the line is completed to Omaha.

New Jersey.

NEWARK.—Work on the electric railway between Newark and Jersey City is progressing rapidly, and it is thought all will be completed by August 15th.

ARTICLES of incorporation of the Passaic and Newark Electric Railway Company, with a capital of \$100,000 have been filed. It needs a line of only five or six miles connecting with the Belleville & Newark Horse Railroad, and there will be a continuous series of roads extending from Haledone, about two miles north of Patterson to Elizabeth.

PATERSON.—The Peoples Park Railway Company have petitioned for permission to build a street railway through Peoples Park and part of South Paterson. William Strange is president of the company.

New York.

ALBANY.—The Watervliet Turnpike & Railway Company has been leased by the Albany Railway Company for 99 years. Ten Gilbert cars on Taylor trucks have just been added to the equipment. New 72-pound girder rail will be used to relay with and a T. 11. generator has been ordered.

BROOKLYN.—The Sea Beach & Brighton Railroad Company, which was purchased by Henry W. Slocum and others, has been incorporated into The Brighton & Bensonhurst Electric Railroad Company. Capital stock, \$250,000.

SCHENECTADY.—The United States Wire & Cable Company, with a capital of \$1,000,000, has been incorporated. The business of the organization is to manufacture and sell wire, wire rope cables, conductors of every kind for the transmission of electricity, and all wires used in connection with and for the use of electrical machinery, apparatus, and the building, installation, and use of electric plants; to make and sell machinery, and insulation and covering of wires, cables, and conductors for electricity. The locality of the company's business is Schenectady, and the directors are Benjamin F. Sunny, Chicago; Silas A. Barton Boston; Samuel Insull and Dana Green, New York; John Kreuss, Schenectady.

SYRACUSE.—There is much talk of an electric road between Syracuse and Liverpool. Louis T. Hawley and Duncan W. Peck, of Liverpool are heading the scheme.

KINGSTON.—The Kingston City Electric Railway Company have petitioned for a franchise to build an electric railway.

TROY.—The new electric suburban line from Troy to Albion has been opened for traffic. Cars run up the hill without any trouble.

Ohio.

CHILlicothe.—As soon as the new franchise is granted, the Woolston New York syndicate will extend the Chillicothe Street Railway and equip with electricity.

CINCINNATI.—An effort is being made by Cincinnati parties to induce A. L. Johnson, S. H. Short and L. A. Russel, of Cleveland, to take up the Seventh street franchise, which will expire within two years. A part of the enterprise is to construct a belt line around Price Hill. They have applied since for the above.

The Cincinnati Railway Company issues transfers if so demanded when the fare is paid.

ACCORDING to the report of the conductors on the Cincinnati Inclined Plane Railroad, (Main Street Electric Railroad), over 45,000 passengers passed over the route to the Zoo, Carthage, Elmwood and St. Bernard, on the Fourth of July.

CLEELAND.—The Cleveland Cable Company have petitioned the city council for a permit to equip St. Clair street with electricity.

WORK has been commenced on the new power-house of the Woodland Avenue and West Side Street Railway Company.

COLUMBUS.—The new Leonard Avenue road has secured most of the right-of-way wanted. That portion of the street running past the U. S. Barracks was procured by a petition to Congress.

The Consolidated Street Railway Company has been succeeded by the Columbus Street Railway Company, with E. K. Stewart, president and Robert Sheldon, general manager.

ANOTHER suburban electric railway is among the possibilities of the near future. The proposition of the Columbus & Harrisburg Turnpike Company to sell its bridges and culverts to the County Commissioners has been heretofore mentioned.

THE Consolidated propose to build a line along Mulberry Street and run only motors thereon. A line will be built along Livingston avenue and the right has already been secured.

CUYAHOGA FALLS.—The Cuyahoga Falls and Akron Railway and Power Company has been incorporated to build an electric line from Cuyahoga Falls to Akron.

DELAWARE.—J. K. Newcomer, V. T. Hills, J. D. Van Denan and B. W. Brown, have organized a company to build and equip an electric railway.

FINDLAY.—The Blanchard Avenue Street Car line which runs from the Carnahan addition to the Swing addition, was sold last week. For several days Messrs. Hunter and Huston, of Philadelphia, have been negotiating to purchase the line for Philadelphia capitalists. The deal was closed Friday and the price paid was \$60,000 the new purchasers will take charge and will retain W. R. Carnahan as Superintendent. It is understood that the road will be much improved and may be transformed into an electric road in the near future.

LIMA.—Work is being pushed to complete the changing of the old horse car line to electricity. Part of the line is now in service and it is hoped to have all branches running in a few days.

MANSFIELD.—The Citizens Electric Railway, Light and power Company have been granted a franchise to build an electric railway on certain streets.

MT. VERNON.—Columbus and Cleveland capitalists have made a very liberal proposition to the city council for an electric railway franchise.

NILES.—The Thomson-Houston Co. have been awarded the contract of building the electric railway from Mineral Ridge to Niles, for \$46,455.

NORWALK.—Norwalk is agitating the street railway question and have brought it to popular vote.

SALEM.—Very soon Salem will have two electric lines, since the arrangements for the electrifying of the horse car line are moving along so nicely. Work is to commence on it in two weeks and the contract will be pushed to completion. On the "old" electric line the force is engaged in surfacing the cemetery extension in the vicinity of the new bridge. Another gang was busy in putting the ties and rails in place along the State street extension.

SPRINGFIELD.—The City Council recently granted a franchise to the Frey road for an extension and the Citizens road were given an ordinance so that they will not be obliged to pave between the tracks on the streets that are double tracked.

TIFFIN.—The Electric Railway and Power Company has been incorporated. Capital stock \$50,000.

TOLEDO.—The injunction against the Consolidated Street Railway Company has been dissolved, which permits the immediate construction of new tracks on Summit street and portions of Adams and Monroe streets. The Consolidated Company is already pushing the work, as it has long been prepared to do, and soon there will be a good car service on the principal street in the city.

URBANA.—The Youngs'own Street Railway Company is trying to secure the right of way out Albert Street to McGuffey, from their present terminus of the line on Fruit street. A petition has been passed among the property owners on Albert street and has been freely signed.

WARREN.—The stockholders of the Trumbull Electric Street Railway met in Warren recently, and elected directors. The directors then elected the following officers: F. Muhlhauser, pres., H. Cristy, vice pres., Dr. F. W. Dankin, treas., and Jay L. Athey, sec. It is the intention of the company to proceed at once with the work of building the road.

YOUNGSTOWN.—Capitalists are now arranging to connect Youngstown with Girard by an electric railway.

Oregon.

PORTLAND—A new power house on the City & Suburban is nearing completion and will be in operation by the first of August at the latest. The new engine has a rated horse-power of 500, with 24-inch cylinder by 48-inch stroke. A 400-horse-power dynamo has been housed and a big pump put in position by the river for boiler supply or fire exigencies.

The cable railway company seems to have been precipitated into a world of trouble. It has been sued by many firms and a receiver has been appointed. The friendly creditors of the road have scored a triumph in having the manager of the road appointed receiver, before the people who built the road could bring an action to the same effect.

The Union Iron Works, of Portland, brings suit to foreclose a lien of \$28,000.46, and for an interpleader for the other creditors.

Honeyman, DeHart & Co. have filed a suit for \$101.53 and garnished the Ainsworth National bank.

Leonard & Ellis have filed an attachment suit against the Portland Cable Railway for \$860.55. A garnishment was served by the sheriff on the Ainsworth National bank.

J. P. Marshall, cashier of the Ainsworth National bank, has secured the appointment of a receiver and an order for an interpleader. His complaint recited that on May 27, 1802, the cable road gave him a note for \$20,000, secured by a mortgage on its entire property, including the power-house and new extensions. The property, he says, is worth some \$475,000, but is already encumbered with prior claims to about that amount. He therefore asks for a sale of the property and the appointment of a receiver. On the preliminary hearing Judge Stearns appointed F. L. Fuller receiver of the road. Mr. Fuller is at present manager. Fuller was directed by the court to pay his daily receipts into the Ainsworth National bank.

The electric railway between Portland and Sellwood was recently opened for traffic by a grand celebration.

PORTLAND—Work is progressing rapidly on the Barnes Heights & Cornell Mountain Electric Railway. The graders are working both ways from the center of the line, and timber has been hauled on the ground for the second bridge on Mr. Ladd's place, and the construction of the first bridge across Johnson's gulch is well advanced. This line possesses one feature which does not obtain with other motor lines here. The company will conduct a freight as well as passenger service, as the line will be extended into a rich agricultural district. There will be a great amount of wood to be hauled in over the line, besides fruit and farm products, and supplies will be carried from Portland out to the settlers along the line. O. Pike & Co. have been awarded the contract.

Pennsylvania.

CHESTER—The Chester & Darby Electric Railway Company has been chartered. Capital \$50,000. Edward Mellor, of Philadelphia, Edward A. Colby, of Newark, N. J. and Henry C. Davis, of New York, are among the incorporators.

DIXON CITY—The Blakely and Dixon Traction Railway Company has been chartered to build a railway from Scranton to the division line between the boroughs of Blakely and Cerehival. Capital stock \$36,000. Thomas Grear, president of company.

NEW KINGSTON—The New Kingston Street Railway Company is incorporated. The road will be built from New Kingston to Pamassno. Capital \$15,000. James P. Anderson, is one of the directors.

PITTSBURG—The bonded indebtedness of the Pittsburg and West End Railway is to be increased from \$75,000 to \$500,000 to enable them to change the line to electricity.

PHILADELPHIA—A charter has been given to the Fair Hill Railroad Company, of Philadelphia, to run from a point on the Connecting Railway between Filmore street and Hart's lane, in the Thirty-third ward, Philadelphia, thence southwardly to Camden street, one mile, capital, \$100,000. J. W. Dubarry is president, and the directors are James Crawford, William J. Latta, William R. Patton, N. Parker Shortridge, John B. Stauffer, Henry D. Welsh.

The Fair Hill Railway Company, capital \$100,000, were recently chartered. J. W. Dubarry, is president.

SCRANTON—The Blakely and Dickson Traction Street Railway Company has been incorporated to build a street railway line to connect Scranton, Blakely and Dickson City.

SHICKSHINNY—A charter has been granted the Shickshinny and Huntington Valley Electric Railway Company to construct an electric line from Shickshinny to the Patterson Grove camp grounds.

SHARON—Eighty thousand dollars will be spent on building an electric railway from Sharon to Sharpville.

SOUTH BETHLEHEM—Work on the railway has begun. About 2 miles of road will be constructed.

WILLIAMSPORT—The Citizens' Passenger Railway Company, recently chartered, propose to build a line to Wildwood cemetery. J. Henry Cochrane is president of the company.

The East End Passenger Railway Company, with a capital of \$12,000, has been granted a charter. John M. Young is president of the company.

WILKESBARRE—The Traction Company will soon begin to lay track over Main street. The line may be extended to Avondale.

Tennessee.

CHATTANOOGA—The people are to be congratulated on the success of the Electric Street Railway Company in securing the necessary means to improve and extend the system. They have, for a good while, been giving the public an excellent service, the efficiency and comforts of which have been signally increased. The lines are served with admirable regularity; the rolling stock and tracks have been much bettered; and now that this is all to be enlarged and made still better, the people ought to be both pleased and proud.

NASHVILLE—The United Electric Railway Company has about finished four open cars.

Texas.

AUSTIN—J. Leyes Hanlenbeck has been granted a franchise to build an electric street railway.

EL PASO—The City Council have been petitioned by J. N. Carnes of Charleston, West Virginia, for a franchise to build an electric railway through the principal streets of the city.

ROCKPORT—The street railway will soon be extended to Fulton and the Shell hotel.

Wisconsin.

ASHLAND—The common council at Ashland has granted a franchise to the Ashland Lighting & Street Railway Company, a new corporation, composed of members of the old street car and lighting companies at that place. The company agrees to extend the line fully a mile at each end, and all work to be done within eighteen months. Electricity will be used as a motive power.

JANESVILLE—P. M. Krahmer has been elected assistant superintendent of the Janesville Street Railway.

GREEN BAY—The city council of Green Bay has granted a franchise for an electric railway at that place to Jackson I. Case and Charles H. Holmes, of Racine. Work will be commenced on the road about September 1 and be completed by January 1, 1893.

LA CROSSE—Providing the money can be raised the street railway work will be commenced at once. The directors have ninety days to accept the new ordinance and two years to complete the line.

MADISON—The electric work will be built out to the Yahara river to improve the Monona sub-division. Property has risen in value in consequence.

MILWAUKEE—Henry Villard the great railway magnate, was recently in Milwaukee and expressed himself well pleased with the street railway line. The company which Mr. Villard represents has expended over \$1,200,000 in the street railway line and are to spend \$1,000,000 this year.

THE East Side company's electric railway, which reached Sellwood a short time since, is being rapidly extended to Milwaukee. There is one deep cut and one heavy fill on the extension, which are well along toward completion, and it is expected that the line will be completed to Milwaukee in about ten days. It is generally supposed that the ultimate destination of the road is Oregon City, but for the present it will end at Oak Grove, two miles south of Milwaukee.

MARINETTE.—The Marinette Street Railway Company has purchased a large tract of land on the bay shore, about two miles distant from Menekaunee, and will at once proceed to convert it into a fine park.

RACINE.—The Belle City road has given the State street bridge cable contract to Sargent & Lundy, of Chicago.

ARCHITECT J. G. CHANDLER has finished the plans and specifications for the buildings of the Belle City Street Railway Company, and they are nice looking structures. There are two plans. The building to be put up on Main street will be 60x113, of brick, and two stories high. It will be used as a car house and for offices. The one to be built on Lake avenue will be 60x113, and will be for the engine room and dynamos. A force of men are engaged tearing down the old Koch buildings on the site.

THE mayor, finance committee, city attorney and others met at the city hall, with Messrs. Shewman and Holmes, of the Belle City Street Railway Company, recently, and held a consultation in regard to the setting of the poles for the proposed electric street railway. It was necessary that the company have the curb lines and the city engineer is so busy that he asked for additional help to do the work. Ald. Colbert favored making the street railway people pay for the extra work, but the city attorney allowed that if the city controlled the placing of the poles it was their duty to see that they were properly placed.

EAST SUPERIOR.—The Douglas County Street Railway Company will make some important changes in their system during the summer. They are to make the system after the belt line manner as far as possible.

A CORRECTION.

An engraver's error in the REVIEW for April has occasioned so much misconception that we take this our earliest available opportunity for correction.

The error referred to was in numbering the ordinates in the curve, page 194, Fig. 9, giving the horizontal effort and speed. As this curve appeared in the printed article the ordinates were numbered 500, 1000, 1,500 etc. As it appeared on the blue prints distributed by Professor Short when reading his paper, they were numbered with an extra "0" but the final "0" was crossed out. It is not surprising that the curve, as it appeared in print, occasioned comment, as according to it a 20-horse-power gearless motor would have handled with ease a fair sized freight train.

NEW PUBLICATIONS.

THE ANNUAL REPORT of the Secretary of Internal Affairs of Pennsylvania, for the year ending June 30, 1891, contains from page 588 to 785, inclusive, a full statement of the reports of railways of the state. Pages 940 to 973, inclusive, give valuable tabulated statements.

THE TRAMWAY RAIL COMPANY, of Pittsburg, has issued its Catalogue No. 2, in a very pretty flexible binding. The catalogue states their object, their past good record and their present prosperity. Their styles of rail, joint, specialties of track work and chairs for which the Tramway Rail Company is justly celebrated.

THE FIBRE PIPE CO., 45 Broadway, New York, manufacturers of Medbery's Patent Indurated Fibre Pipe and Multiple Duct Conduits for underground wires, put forth in a new catalogue the advantage and styles of their particular product, together with some high testimonials of the same.

THE official verbatim report of the tenth annual meeting of the American Street Railway Association, held at Pittsburg, October 21st and 22nd, has been mailed to members of the association by Secretary W. J. Richardson. It comprises 230 pages, and is a most complete resume of the transactions of the society. It is interesting to compare

the current report with the earlier volumes, as illustrating to what an unexpected extent then existing and supposedly unsurmountable difficulties have been met and overcome, and as showing to what magnitude the street railway business has developed.

A handsome steel portrait of President Watson faces the title page.

EXPERIMENTS WITH ALTERNATE CURRENTS OF HIGH POTENTIAL AND HIGH FREQUENCY. is the latest publication of the W. J. Johnston Company, Ltd., of New York. The book is a record of the researches of the brilliant electrician, Nikola Tesla, and was delivered as a lecture before the Institution of Electrical Engineers, London. The 146 pages, sufficiently illustrated, gives the full corrected text of this very remarkable article, which attracted so wide spread enthusiasm. No electrician should fail to read this monograph and although its very technical nature makes it difficult to master, the time and energy spent will return a dividend. The discourse admits of no criticism from an electrical standpoint, but an index would have been a desirable addendum.

We note with pleasure a sketch of Telsa's life and work. Price \$1.00.

The latest sensation in street railway circles in Spokane is the holding up of one of the cars there. Two masked men held up an electric car there and shot the only passenger through the hand while he was trying to escape. The car was about three miles from the center of the city when it was boarded by two masked men, one of whom presented his pistol at the head of the motorman and told him to stop the car. The only passenger was Miller Davis, a carpenter in the employ of the Great Northern, who had \$600 on his person. As soon as Davis saw the situation he jumped from the car and ran. One of the robber started in pursuit, firing two shots at Davis, who stopped and drew his knife. A scuffle then followed and Davis escaped with his money and a wound in the hand.

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days; reported especially for the STREET RAILWAY REVIEW, by Munn & Co, Patent Attorneys, 361 Broadway, New York, N. Y.

ISSUE OF JUNE 14, 1892.

| | |
|--|---------|
| Electric Railway, R. W. Barkley, Brooklyn, N. Y..... | 476,776 |
| Rail Cleaning Attachment for Cars, P. Wardman, E. Saginaw, Mich..... | 476,909 |
| Electric Railway, C. P. Tatro, Spokane, Wash..... | 476,935 |
| Elevated Railway, A. Davis, London, England..... | 476,982 |
| Trolley for Electric Railways, T. A. Edison, Llewellyn Pk., N. J..... | 476,985 |
| Means for Propelling Electric Cars, T. A. Edison, Llewellyn Pk., N. J..... | 476,986 |
| Electric Locomotive, T. A. Edison, Llewellyn, Pk., N. J..... | 476,987 |
| Conductor for Electric Railways, T. A. Edison, Llewellyn Pk., N. J..... | 476,989 |
| Street Railway Switch, M. A. Cutter, Allegheny, Pa..... | 477,046 |

ISSUE OF JUNE 21, 1892.

| | |
|--|---------|
| Tender for Street Cars, B. Sullivan, Boston, Mass..... | 477,467 |
|--|---------|

ISSUE OF JUNE 28, 1892.

| | |
|---|---------|
| Electric Railway, J. W. Bates, Minneapolis, Minn..... | 477,734 |
| Cable Railway Conduit, M. H. Bronsdon, Providence, R. I..... | 477,884 |
| Carrier-Pulley for Cable Roads, M. H. Bronsdon, Providence, R. I..... | 477,885 |
| Street Locomotive, E. Dederick, Milwaukee, Wis..... | 477,889 |
| Mechanism for Cable Traction, W. A. Butler, New York, N. Y..... | 478,046 |

ISSUE OF JULY 5, 1892.

| | |
|---|---------|
| Trolley Wire Splice, E. A. Sperry, Chicago, Ill..... | 478,140 |
| Fare Register, J. W. Meaker, Chicago, Ill..... | 478,167 |
| Electric Railway Conduit, M. Shoemaker, Sioux Falls, Iowa..... | 478,175 |
| Electric Locomotive, S. H. Short, Cleveland, Ohio..... | 478,242 |
| Electric Railway, F. Mansfield, New York, N. Y..... | 478,346 |
| Support for Street Railways or Tramways, J. M. Price, Philadelphia, Pa..... | 478,362 |
| Trolley, J. W. Davis, Lynn, Mass..... | 478,410 |
| Electric Locomotive, S. H. Short, Cleveland, Ohio..... | 478,477 |

NEW DYNAMO OF THE DETROIT ELECTRICAL WORKS, DETRIOT, MICH.

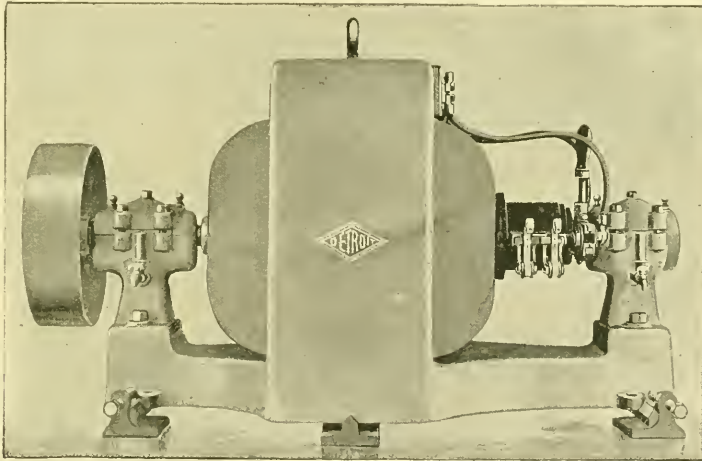
THE illustrations accompanying this article will give our readers a good idea of this dynamo, as they include plan, side elevation, pulley end elevation, commutator end elevation and perspective view.

The type illustrated is that which has been adopted by the Detroit Electrical Works for all sizes up to and including 30 kilowatt, being, as will be seen by the illustrations, a two pole machine, in which the frame and bed plate consist of one solid casting. Above the 30 kilowatt type will be similar to that illustrated except that the machine will be multipolar. The journal boxes are provided with self-centering and self-oiling sleeves, which insure perfect alignment and lubrication.

Each bearing is provided with a guage glass which shows the height of oil in the oil chamber, and with a cock by means of which the oil can be drawn off whenever desired. The lubrication of each of these bearings

by the use of a spring coiled in the form of an involute, the outer end of which is continued straight from the side of the coil—which is below the brush holder—up to and a little above the outer ends of the carbon brushes. The idea being to have the tension due to coil when straight end is in a perpendicular position just sufficient to insure the proper contact. Then as the coil of the spring is mounted upon an adjustable axis, which can be moved in or out at will, as the commutator brushes wear, the spring can be moved inward, always maintaining the straight end of same in a perpendicular position, thus insuring at all times the same tension of brush upon commutator without changing the adjustment of the spring itself in any way. This adjustment can be made at any time very easily by a single movement. As the carbon brushes feed radially they consequently wear squarely across their entire thickness and never require trimming.

The two features of the lightest tension possible of the



SIDE VIEW.

is accomplished by the use of two rings which revolve and carry oil to the top of shaft, from which point it is distributed by means of oil grooves in the self-centering sleeve. Directly over each of these rings, in the outer shell of bearing, is a brass plug, which can be lifted out when it is desired to ascertain if the rings are working properly, or to put in new oil.

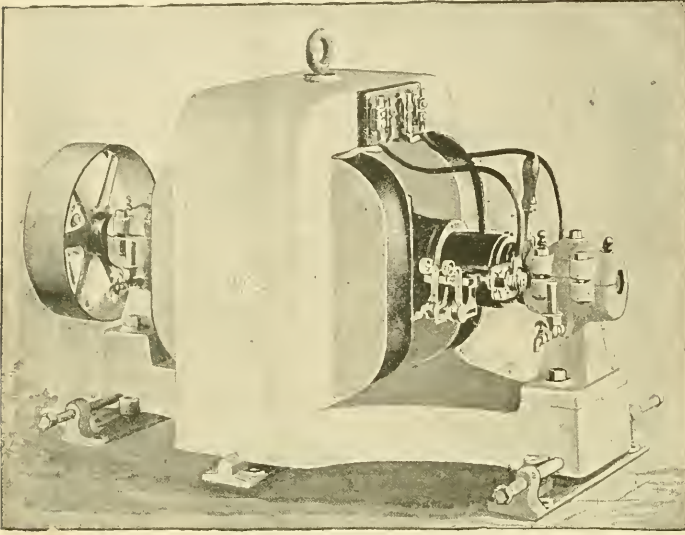
The rocker arm which supports the brush holders is mounted directly on the self-centering sleeve, thus insuring the brush holders being kept central with regard to the commutator.

Carbon brushes are used on all sizes of machines, both for motors and generators. The brush holders are of a new type, covered by patents held by the Detroit Works, which provide just the tension requisite to make good contact of brushes with commutator without more tension than is required, consequently avoiding heating of commutator by unnecessary friction. This tension is obtained

commutator brushes on commutator, and the use of carbon brushes will serve to greatly lengthen the life of commutator, and not only by reducing the wear, but also by reducing the possibility of damage to either brushes or commutator by sparks if the machine is overloaded, such as would naturally result from the use of copper brushes. This means a great saving in the matter of repairs as the commutator is a very expensive part of the dynamo. The expense of brushes is also very much reduced, as carbon brushes not only cost much less than copper, but wear many times longer.

In this connection we desire to call attention to the record made by machines furnished by the Detroit Electrical Works to Posseius Bros. Furniture Company, of Detroit, which machine, although one of the oldest type, was fitted with their improved brush holders and carbon commutator brushes. After 16 months use, every working day of which time the machine was running

for a number of hours each evening, the original set of brushes furnished with the machine were still in use and not one-third worn out, while the commutator itself, although glazed by long use, showed no actual signs of wear when straight edge was applied to same.



PERSPECTIVE VIEW.

The armatures of all machines up to and including 30 kilowatt are of the drum type, but a special winding is used, covered by patents held by the Detroit Works, which not only economizes space at the end of the armature core and holds the wire at ends in position firmly, so they cannot chafe, but also has as its most important feature, the advantage of having no two wires adjacent to each other that have between them any great difference of potential, thus doing away almost entirely with the possibility of burnouts. This winding also gives the largest opportunity for ventilation, and makes the danger of crosses at ends of armature as small as possible. The method of insulating the armature cores and wires is the very best known, consequently these armatures are not liable to burn out under any circumstances.

The commutators are of a new design, and considered the finest commutators that have been manufactured; mica is the sole insulating material used throughout them.

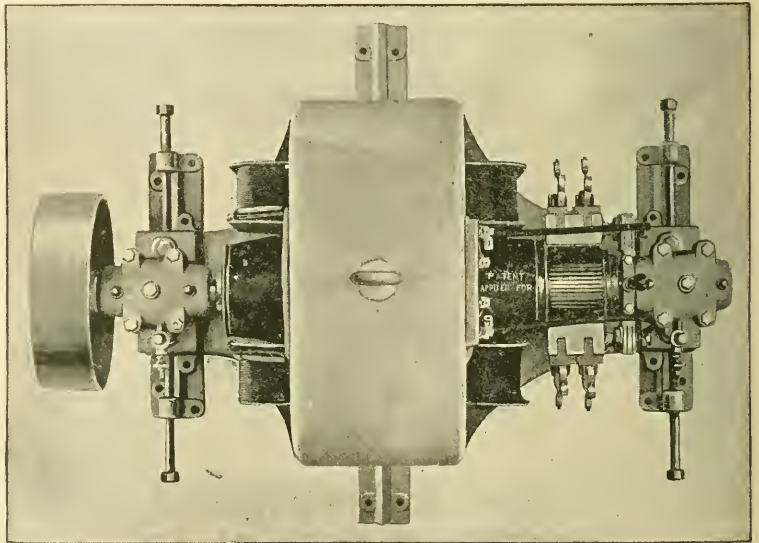
The field coils are wound on metal spools and then slipped into place on the pole pieces, where they are almost entirely covered and protected by the iron frame of the machine. If, however, it is desired to replace any

coil with a new one it is a matter of only a few minutes' work to accomplish this. The insulation of the machine as a whole is carried to the highest possible degree. Consequently these machines can be relied upon to last for an indefinite period without any possibility of repair.

The general design is such that the armature is protected on all sides by the frame of the machine, and the metal flanges of the field spools, while its compactness necessarily requires smaller floor space and less head room than any other machine of equal capacity. All generators are compound wound to give any desired increase in voltage up to 15 per cent at full load.

The under side of the bed of each machine has grooves planed in same so that the machine can be mounted on slides for taking up slack in belt; or if it is desired to hold the dynamo in a fixed position the lugs which are cast on sides of bed plate, near the grooves, can be used for bolting the machine down to foundation; the dynamo shown has a motor headboard on same, which simply provides the necessary terminals for connections. On the headboard of generator there is also provided in addition to these connections

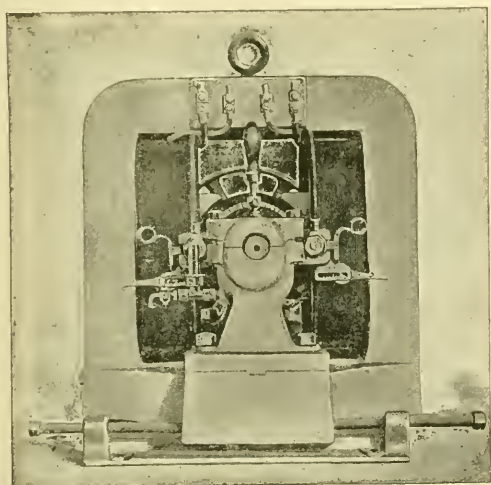
a double pole quick breaking head-board switch so that when desired, and entirely independent of the switch-board appliances, the machine can be entirely disconnected from the mains.



PLAN VIEW.

These dynamos have a fixed point of commutation, which renders possible the reversing of the machine and changing of load from no load to full load without any sparking whatever being noticeable at commutator.

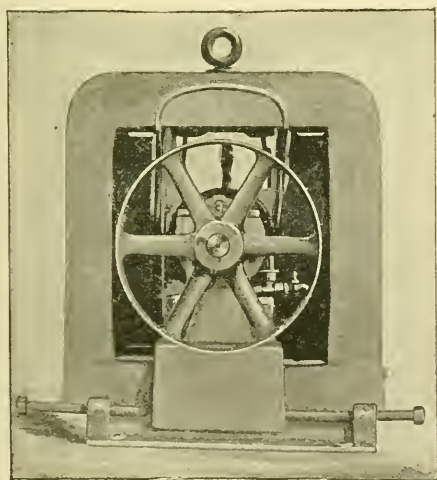
In designing this machine the advantages of slow speed have been kept in view, also the matter of efficiency. As a result the machines of this type average a slower speed than other machines of equal capacity, while their efficiency compares favorably with any.



COMMUTATOR END.

The standard sizes of these machine now being made are as follows, ratings being made in kilowatts: $\frac{1}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3, 5, $7\frac{1}{2}$, 9, 15, 20, 30, 40, 60 and 100. Larger machines of the multipolar type will soon be brought out.

The Detroit Electrical Works have already received orders for these machines as follows:



PULLEY END.

Times Building, Chattanooga, Tenn., two 30 K. W. generators, one 9 and one 15 K. W. motor.s

Bagley Estate, Detroit, one 40 K. W. generator and five 9 K. W. motors. This contract also includes five freight elevators and controlling devices for motors, so

that each elevator is operated by one 9 K. W. motor, which is controlled, started and stopped by means of the starting rope of the elevator, the motor only running when the elevator is in use.

Detroit Dry Dock Company, Detroit, two 250 light generators for lighting machine shop, boiler shop, dry dock, engine rooms and offices. One 40 K. W. generator to furnish current for electric cranes.

Also Detroit Dry Dock Company, for boats which they are building, one 125, one 120 and one 250 light plant, complete.

Detroit Foundry Equipment Company, Detroit, one 9 and one 15 K. W. motors, complete, with controlling devices, etc., for electric cranes.

A CONSOLIDATED ECONOMY.

THE Minneapolis line has made perfect a plan that will reduce by a good per centage the operating expenses. The method was by transferring the Fourth avenue equipment and employes to the Thirty-first street station. In fine, the plan gives instead of 12 barns scattered over the city, each with its crew of men and big expense bill as heretofore, there are now only six. At the Nineteenth avenue N station are the Emerson, Plymouth, Camden and Twentieth avenue N lines; at the East Side station are the University, Western, Lyndale, Sixth street, Kenwood and Lake Harriet lines; at the First avenue station are the First and Fourth avenue lines and the Washburn Park line; at the Minnehaha station are the Riverside and Minnehaha lines; at the Bloomington station, the Bloomington and Cedar lies, and at the Midway station interurban line.

This plan renders six valuable "horse barn plants" useless to the company. The buildings and property on which they stand will be put on the real estate market soon.

PITTSBURG ELECTRIC CLUB.

THIS progressive organization is growing rapidly in numbers, strength and influence. A fine program has been prepared including lectures and musical entertainments to run during the coming year. Election of officers resulted in the selection of M. W. Mead, president; Eugene Ingold, vice-president; J. E. Hall, secretary and treasurer; E. H. Aeinrichs, librarian and historian; D. W. Dunn, F. H. Ketchum, F. P. Mann, E. F. Austin, and G. W. Hubley, house committee, and Joseph Hunter and E. H. Heinrich, entertainment committee.

ST. LOUIS PARK SEASON.

AN appropriation of \$6,000 has been made to arrange an elaborate programme of music at the Lindell Street Railway pavilion in Forest Park during the coming season. Part of the funds have been furnished by the city in the interest of Forest Park, and part by the Lindell Railway Company.

ECHOES FROM THE TRADE.

THE AMERICAN CAR SEAT COMPANY, Chicago, report business fine. They inform us are now at work on several large orders.

THE ST. LOUIS CAR COMPANY among a large number of small orders recently shipped five new cars to the Superior, Wis., railway.

J. G. BRILL & Co., of Philadelphia, recently sent out among their small orders four new open cars for the Robinson Company, at Toledo.

THE LAMOKIN CAR COMPANY are in receipt of a flattering testimonial letter for their elegant open and closed cars sent the Milwaukee Street Railway.

THE ALLEN PAPER CAR WHEEL COMPANY, Chicago, report business very brisk. Seven large roads that have given their wheels a trial, are placing their second orders.

THE FALLS RIVET AND MACHINE COMPANY of Cuyahoga Falls, Ohio, have opened a new office at 18 Cortlandt street, New York. J. H. Long represents the firm in the East.

THE SHULTZ BELTING COMPANY, St. Louis and Chicago, report business excellent. Few managers can be found that are not acquainted the "Shultz Patent Full Leather Belting."

THE OKONITE COMPANY have remembered their many friends with a very neat nickle-plated match box, the combination of which furnished an interesting study to each recipient.

ARTHUR S. PARTRIDGE, of St. Louis, represents some of the leading manufacturers of street railway supplies and is prepared to fill all orders for everything in the the street railway line.

THE E. P. ALLIS COMPANY, of Milwaukee, will place two more engines in the power house of the East Liverpool & Wellsville (O.) Railway. The company are now using two of the same make.

INGLAR & ATKINSON, Oakland, California, are building five cars for the Consolidated Piedmont Cable Company. Bodies will be 22 feet long with double ends, and handsomely painted and decorated.

THE POND ENGINEERING COMPANY, of St. Louis and Chicago, report business good. They are in the market to furnish complete plants. Send for their new book, "Steam boilers practically considered."

THE RAILWAY EQUIPMENT COMPANY, Chicago, are now nicely settled in their elegant new quarters on the ground floor of the Pullman Building, on the Michigan avenue side. Their office fittings are among the finest in the city, and the greatly increased room is already filled with material.

THE ADAMS & WESTLAKE COMPANY are among the largest manufacturers in their line in the country and you will find it to your advantage to write them if in need of car trimmings, head lights, lanterns, etc.

SARGENT & LUNDY, 1421 Monadnock Block, Chicago, are busy on the contract for the overhead wire work and tracklaying on the Bell City Railway, at Racine, Wis. This enterprising firm are in the market for all kinds of street railway work.

C. F. ORR & Co., Chicago, the most extensive street railroad uniform manufacturers in the West, are turning out an immense amount of garments. Their work is giving the best satisfaction and their uniforms long outwear an ordinary ready-made suit.

CHAS. SCHIEREN & Co., New York and Chicago, are filling a great many orders of electric street railways. The new electric lines are causing a great demand for a superior quality of leather belting and their enterprising house is one of the leaders for that class of goods.

THE ELECTRIC SUPPLY COMPANY, Chicago, celebrated the Fourth by sending its friends a bunch of fire-crackers, the apparently dangerous internal arrangement of which, however, proved only to be a most ingenious advertisement of their fuse wires and sunbeam lamps.

THE LEWIS & FOWLER MANUFACTURING COMPANY write us that they have been able to fill all orders on time, but their various departments have been kept very busy. In ordering anything in the street railway line of this house customers can always look for prompt delivery.

THE EDDY ELECTRIC MANUFACTURING COMPANY, Windsor, Conn., have again been forced to enlarge their works, this time by the addition of a 50x154 structure which will be three stories high, of brick. A Ball & Wood engine will be installed and oil will be used as fuel.

THE Q. & C. COMPANY, of Chicago, report business way beyond their expectations. Their saws are so cheap that the leading companies find they can save money by having a rail cut in two in a few minutes and not have several men standing around while two men cut it in the old way.

THE LEWIS & FOWLER GIRDER RAIL COMPANY are rushed with orders, but by the addition of new machinery now being placed, they will be in shape to fill all shipments on time. They have a large number of orders on their books from companies about to adopt their rail for the first time.

THE STEARNS MANUFACTURING COMPANY, of Erie, Pa., and Chicago, write us that they are well pleased with the orders recently received in the street railway line. They are placing a 900-horse-power Tandem engine and boilers of 1,000-horse-power, on the World's Fair grounds.

STREET RAILWAY TICKETS and engraved letter heads, bearing a representation of one of your own cars, are offered by Stromberg, Allen & Co., Chicago. They are among the oldest railroad ticket printers in the country and companies ordering will be fully protected in doing so, and secure the best possible work.

THE MCGUIRE MANUFACTURING COMPANY, Chicago, are maintaining their record in sale of the McGuire truck. Orders taken within the last few days were from the South Chicago City Railway, Kankakee Electric Railway, Pueblo, Colo., and a nice order taken by Mr. Dean from the Consolidated at Toledo.

PRESIDENT JAMES CAMPBELL, president of the Benton-Belle Fontaine road, St. Louis, was a visitor in Chicago during July. He reports that 30 of his cars are equipped with Thomson-Houston water-proof motors and that the "type J" controller, of the same make, shows a remarkable degree of economy in current consumption.

THE MASSACHUSETTS ELECTRICAL ENGINEERING COMPANY, of Boston, who have made a large number of expert examinations for eastern syndicates, have opened an office at 201 First National Bank Building, this city, which is in charge of Mr. Philip Harvey, a pleasant gentleman to meet, and who has a large acquaintance in the west.

WILLIAM H. BRYAN, M. E., late superintendent of the Pond Engineering Company, will devote his entire time to the practice of his profession of mechanical and electrical engineering. His office is 56 Turner Building, St. Louis, where he will be pleased to greet his friends or receive correspondence. He will do no selling or contracting.

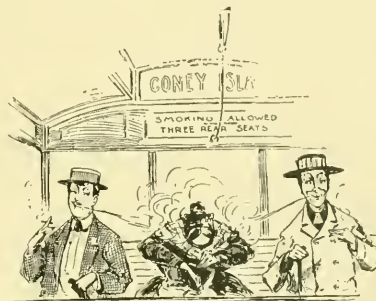
ABENDROTH & ROOT MANUFACTURING COMPANY, 28 Cliff street, New York, have furnished two water-tube safety steam boilers of 266 horse-power each, to the Shattock & Babcock paper mill, at De Pere, Wis. This mill is one of the largest and best appointed in the country and their selection is a high testimonial to the character of the boilers.

GILBERT M. SMITH, who was for eleven years connected with the Ansonia Brass & Copper Company, has opened an office in the Unity Building, this city, where he will act as manufacturer's agent for the sale of brass and copper, and bare and insulated wire. He will mail a new catalogue in a few days. Send in your address and get a copy.

BONDS AND STOCK ENGRAVING.—The superior facilities of the Western Bank Note Company, Chicago, since the occupation of their own 8-story building, has attracted a large amount of this work which was formerly possible to secure only in the East. Their work has always been of the highest quality and now their plant is the second largest in the country. Steel engraving, all kinds of lithograph and artistic work is executed quickly and in the highest perfection of the art.



When Hoffy and Algy went last week to Coney,
They thought for a joke they'd smoke out Mrs. Roney.



She stood it a while, without making a moan,
Then she brought out a dusky dudheen of her own.



She filled it with 'baccy—'t was none of the best—
Got some fire "off of" Hoffy, and—



You know the rest!—Puck.

REFERRING to the great amount of trouble experienced this season on electric roads, from lightning, the Railway Equipment Company, Chicago, state that they are about to place on the market a lightning arrestor of unusual merit, for station, car and line use. Parties who have had trouble during this season from any cause should write them for full information, which will be cheerfully given on application.

THE STEARNS MANUFACTURING COMPANY, of Erie, Pa., proprietors of the Woodbury automatic high speed engine, have been advised that the Franklin Institute has awarded to the Woodbury the Edward Longstreet medal of merit, stating that the sub-committee after witnessing the operation of several of these engines, were impressed with the fact that the skill and intelligence displayed in their design and construction had resulted in a machine of handsome appearance, capable of close regulation, smooth in its action, and well adapted for its purposes.

A SPLENDID ENDORSEMENT.—The New Process Rawhide Company naturally are pleased in the recognition of their goods, as evidenced in the following letter, dated July 1st, from F. O. Rusling, general manager of the West Bay City (Mich.) Railway Company:

"Your letter of June 29th received. We purchased of you in September, 1891, a number of your Rawhide pinions for the armature and intermediate shafts. These pinions have been running up to this date continuously since then, and we have within the past ten days discarded the first worn out armature pinion; the intermediate pinions we have yet to take the first one off.

Our cars run 16 and 17 hours per day, making an average of 8 miles per hour. We send you this day via express an armature pinion taken off June 29, 1892. This pinion has run 26,000 car miles on a Sprague No. 6 motor.

Since adopting your Rawhide pinions we have not lost one gear wheel from breaking teeth. We get more wear out of rawhide than we formerly got from steel, bronze or gun metal. The percentage of gains for rawhide over metal pinions on the wearing of gear wheels is very large. The reduction of noise and the life of rawhide pinions recommends them to all managers of street railways.

We shall soon give you another order, being satisfied we cannot get another make of pinion that will give us the service we have been able to get out of your goods."

THE BROWNELL CAR COMPANY, St. Louis, are mailing copies of testimonial letters recently received regarding the merits of the Accelerator. They speak in terms of strongest endorsement, after having given the car a severe test. T. H. McLean, general manager of the Twenty-third Street road, New York, says, "Since my connection with street railroads, fifteen years ago, I have never seen or used a car that had so many good points as this one and while it would be a very profitable car for a company using cable or electric power, it is exceedingly popular with the passengers." Geo. W. Hommell, manager Milwaukee City Division of the Milwaukee Street Railway, writes, "Of all the new cars put on our road I would rather have your Accelerator." The West End, Boston, have ordered two Accelerators and the Brownell Company have just delivered 30 to the North Chicago Street Railroad. An Accelerator has also been shipped to the Royal Electric Company, of Montreal.

ANOTHER IDEA IN TROLLEYS.



THE FIRST PURCHASER.—I tell you, my dear; it's a howling success.—Puck.

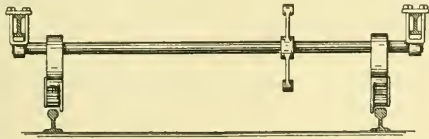
N. W. HARRIS & COMPANY, of Chicago, recently purchased the greater part of the \$1,800,000 issue of bonds, issued by the National Street Railway Company of Illinois, for railway improvements in St. Louis, and report finding a very ready sale for them. They are in the market to buy all kinds of street Railway bonds and from reports of sales made their prices must be among the highest.

This is a fast age we are living in, especially since the introduction of electric street cars. The invention and introduction of Dermaglutine pinions, made only by A. Groetzinger & Sons, Allegheny City, Pa., is fast being adopted by leading railways all over the land and their use is as rapidly reducing the noise and consequent wear which prevails where steel pinions are used. The success of the Dermaglutine pinion is in keeping with the history of the manufacturers and deserved, as a great improvement and advance over pinions first used.

THE LAMOKIN CAR WORKS of Philadelphia, are very busy, the many duplicate orders speaking highly of their new and improved construction. Recent orders are, Williamsport, Pa., Passenger Railway, two open motor cars, on Mcguire trucks, and two 16 foot palace vestibule bodies, mahogany finish; York, Pa., four 16 foot car bodies; Citizens Passenger Railway, Steelton, four 18 foot palace vestibule with Robinson trucks; Rome, Ga., one 16 foot closed, one 8 seat open car body; Bristol, Tenn., Belt Line, two 16 foot closed, with Robinson trucks; Belle City Railway, Racine, four 16 foot palace, closed car bodies, to be finished similar to the sample car sent Milwaukee. Recent deliveries are, 5 cars to Akron, Ohio; 4 to Zanesville; 5 to East Harrisburg and 1 to the Suburban of Pittsburg.

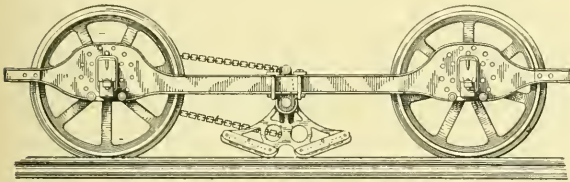
ALLEN'S DOUBLE ACTING TRACK BRAKE.

WHEN W. W. Allen, of Red Wing, Minn., brought out his new track brake recently, it was very successfully tested on a number of roads having heavy grades, giving good satisfaction. Mr. Allen, however, was not wholly satisfied and has been improving his device and now feels he has fully perfected it.



END VIEW OF TRUCK—BRAKE APPLIED.

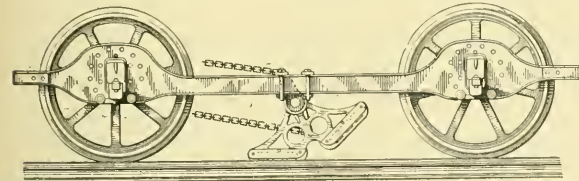
Reference to the cuts will show the brake is double acting and practically automatic. A minimum of power exerted by the operator is sufficient to throw it into action, when the momentum and weight of the car overcomes its own inertia. It is also as easily released. When not in action the shoe does not touch the rail, but when thrown into action, owing to the eccentric form, raises one end of the car sufficient to take one-half its



SIDE VIEW—BRAKE RELEASED.

weight. As soon as released it readily adjusts itself to a level position as seen in Fig. 1.

Ordinarily the brake will prove sufficiently effective without the rubber shoe, but for use on heavy grades the addition of the rubber makes assurance doubly sure. The action of the brake is very quick and positive, it is neither expensive or difficult to attach and can be used on any truck. One grade accident would pay for this brake



SIDE VIEW—BRAKE APPLIED.

equipment for the entire line, and as the demand for rapid transit increases the necessity for quick acting and positive brakes becomes much more a necessity. The increasing construction, also, of lines on grades which a few months since were considered impracticable, has added to the risks to be guarded against and extra precaution called for in such places.

THE charter of the Janesville, Wis., road has been amended to permit of a \$20,000 increase in stock.

BALM STILL LEFT IN GILEAD.

THE manager after perusing the stereotyped kicks in the morning papers generally enters on his duties of the day encouraged and stimulated to strive and do for his appreciated patrons. The public "Pro Bona," and all the rest of his numerous relatives, whose knowledge of how to run a street railway is generally the least of their possessions would do well, to vary the monotony of complaint by mixing a little common sense with their contributions, if there is no remedy but to air themselves in this way. Down in Jersey, at a place called Newark, there is a little custom of a 5 per cent tax on the company's gross receipts, which naturally cripples the service. A good brother who calls himself "Tears" replies to old "Bono" regarding sundry kicks, as follows:

"The question is not what the companies want, or do not want. It is much broader than that. There is no danger of our getting too much out of these companies: but is this special tax the kind of a burden that it is wise for the people to impose on the companies? What the people want is *service*, good tracks, good cars, and plenty of them, and the burdens imposed on the companies should be in this direction. The aggregate amount of money received from this special tax is comparatively small. It is small consolation to a man who has been standing on a street corner for ten or fifteen minutes waiting for a car, to know that five per cent of his fare goes into the city treasury. If he could have got a car five minutes sooner, or have got a seat when the car came along, he would have been much better pleased. The transfer system is a service regulation. How insignificant this special tax seems in comparison with the benefits conferred by the transfer system. But the journalist will say, we will have service, transfers, special and all. No, you won't.

Every dollar the companies pay into the city treasury costs the people of this city two, by way of decreased service. Street railway managers, like all business men, are human, and they won't give something for nothing. I sincerely hope the distinguished editor of the bright and newsy journal referred to, will wipe the tears from his eyes and endeavor to look at this question as he usually does at others, through his common-sense glasses, and no longer pose in his Niobe act.

TEARS.

NO STORAGE FOR VILLARD.

THE head of the great Milwaukee street car syndicate, Henry Villard, in discussing the future plans of his lines in that city, took occasion to remark: "We have already spent a million and a quarter dollars here which will be increased about one million more in completing the work of lines now contemplated. When finished, the system will be something of which the citizens may be proud. As to storage batteries for railway motor use, I have no hope of seeing street cars equipped with a storage battery system. I have been for a good while looking for a storage battery system, but there is none."

BOODLER BEGGS BAGGED.

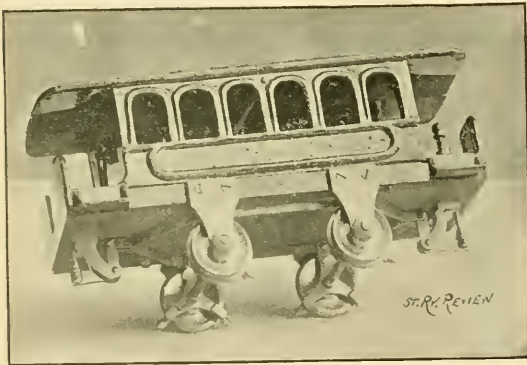


HE secretary of the Oakland Consolidated recently drew \$10,000, ostensibly to pay off the men, but shortly afterwards Beggs and boodle were found to be missing. After a short but energetic search Mr. Beggs was bagged, brought back and confronted by his accomplice Gallagher, who let 'er go and told everything. The books of the company were reported to be in bad shape but an investigation disproved the statement.

DEVICE FOR TURNING SWITCH WHILE CAR IS IN MOTION.

AN automatic device for throwing switch tongues without the use of switch rods and with a view to save time and insure the throwing of the switch, has been invented by Christopher Geiner, of Toledo, Ohio.

The cut is from a photograph of a model placed on a somewhat crudely constructed model, but illustrates the



idea. Switch arms rest on the axles and a triangular shaped switch lever is secured to a horizontal bar below the car, operated by bell crank levers at each end. A spring post on the platform, when depressed by the driver's foot, causes one of the angles of the lever or arm to turn the point. The switch point is intended to keep its centre at all times so that the switch shoes can enter on either side as desired. The inventor is further improving his device, which is simple and not expensive. Managers however, dislike to increase the machinery of their rolling stock, which is already, in some cases, too numerous.

THE FIELD ENGINEERING COMPANY of New York, write us that they are doing the largest business this year they have ever done. An addition to their force has been made by the election of J. R. Craven as secretary. They make a specialty of Compound and triple expansion engines, manufactured by the Lake Erie Engineering Works of Buffalo, N. Y.

THE PFISTER-HINCKLEY CASE AGAIN.

THE much litigated Milwaukee Electric Railway has received another turn in the courts, the conditions of affairs through excessive litigation having reached a pass where even the proverbial Philadelphia lawyer can scarcely keep tab on things. The latest is the first decision in the famous litigation of Chas. F. Pfister and August Vogel against the Milwaukee Electric Railroad Company, Francis E. Hinckley and others, was given by Judge Johnson, and resulted in a black eye for the plaintiffs. The decision came on a motion for judgment of foreclosure on the pleadings. It seems that the company, through its agents, hypothecated \$250,000 in bonds to the plaintiffs to secure a loan of \$125,000. The statutes of the state provide that stock shall not be sold for less than par nor bonds for less than 75 cents on the dollar. The plaintiffs argued that the hypothecation did not amount to a sale but on this point Judge Johnson took exception, and decided that the bonds, if not issued by the company had no valid existence; and if sold contrary to the law they were invalid. In giving his decision the judge referred to a decision of the supreme court in which it was held that the bonds were not only invalid, but that the money paid for them could not be recovered. This was done to show that the court had even gone beyond the letter to sustain the spirit of the statute. The motion for judgment on the pleadings was denied, and carried with it the motion of Manschott to intervene as a party defendant to protect his rights as a bondholder, under the decision, his rights having no standing in the proceedings thus far developed.

The case is a novel one, and stands alone in some of its bearing in legal jurisprudence.

MEXICAN LINES.

THE City of Mexico has a well appointed street railway line in charge of Americans and using American equipment.

The company owns 211 kilometers (131 miles) of lines in the Federal District. Of these, 171 kilometers (106 miles) are standard gauge and 40 kilometers (25 miles) are narrow gauge. Within the city limits the company has 93 kilometers (58 miles) of tracks.

The rolling stock of the company is composed of 5 locomotives and 452 cars—the latter including first-class and second-class coaches, flat cars, box cars for freight, funeral cars, etc.

The company possesses 2,600 mules and horses.

The number of passengers carried during the year 1891 was 15,586,917, of which 8,169,971, were on the lines running to suburban towns, and 7,416,946 on the lines within the city.

| | | | | |
|--------------------------|---|---|---|----------------|
| Receipts during the year | - | - | - | \$1,208,826.04 |
| Expenditures: | - | - | - | 890,606.96 |
| Balance, | - | - | - | 318,219.08 |

Of this balance, \$318,009 was distributed as a dividend among the stockholders, and \$219.08 was carried over as a balance on hand to this year's account.

W. R. MASON.

IT was all on account of being born at Bridgeport, Conn., about thirty five years ago that W. R. Mason is alive today, very much alive, so his competitors and customers say. To the fact that he was born he owes the principal events of his career.

His residence in Connecticut was not very protracted, as he removed from Bridgeport to Jersey City when six months old, accompanied, it might be said, by his parents.

In Jersey City the excellent schools were taken advantage of by young Mason, and when sixteen he made his debut into business life as one of the working force of the banking firm of Fisk & Hatch, on Wall street, New York City. Here Mr. Mason remained five years learning the ins and outs of the circulating medium and gathering experiences that have since been of the greatest value.

Next the subject of this sketch joined that great army of the grip and sold woollens on the road for about ten years, when he acquired the good fellowship that has made him so popular with his acquaintances in business. When in New York Mr. Mason married Miss Emma Van Voorhies of that city, who has since proved, according to the best authority on the subject, the "best wife in the world." Mr. Mason's family now consists, in addition, of two of "the best boys in the world" the same authoritative source.

About four years ago, on the formation of the Electric Merchandise Company, Mr. Mason went into railway equipment "exclusively," bringing all his talents and wide experience to bear upon that branch. He was made president and general manager of the business and remained with it until the organization of the present equipment company, still handling railway supplies "exclusively."

HALE & KILBURN, Philadelphia, are operating their factory at full capacity and shipping large orders of car seats for use in winter cars now being built for fall delivery.

THE report of the coroner of Cook County, which is practically Chicago, shows that out of 790 violent deaths the past six months, 20 were directly or indirectly traceable to the operation of street cars, and of these a large majority were cases in which no blame could possibly be attached to the company. The loss of only one passenger in each 5,000,000 transported, under the conditions which intoxicated, ignorant and criminally reckless persons impose on the street railway carrier; and against whom there is no protection for the company or themselves, is a surprisingly small record. The wonder is how in our large cities accidents are so few rather than that they are numerous as the records show.



W. R. MASON.

ONE form of created travel which may well receive the careful consideration of the progressive manager, desirous of developing every possible avenue of revenue, is to popularize "street car parties." Almost every line, whether operated by mechanical or animal power, has one or more points of natural scenic interest, reached by a pleasant ride over the company's tracks, which constitutes an enjoyable evening diversion. If attractions or refreshment stands are available all the better; if not, the refreshments can be had on the return trip at any of the cafes down town.

One or more cars may be chartered at a good price for the trip, for the exclusive use of the party. It is suggested that it would be no difficult matter to suggest the idea to some one or more of the enterprising society young men as just "the thing" and thus get the ball rolling. Then follow it up with a mention in the local papers, of the event, with a list of those participating, and in short, work the scheme very like the winter theatre parties.

THE AMERICAN CAR CO. report an order for 20 closed coaches 40 feet over all, to be run between Minneapolis and St. Paul. They are to be vestibuled pattern and will embrace many new and original points. The delivery to be made as early as possible.

HISTORY OF A PROGRESSIVE COMPANY.

From its Organization a Success—Always at the Front—Often in Advance of the Times.

THE Railway Equipment Company, Chicago, may with perfect propriety be styled a pioneer company. In the early days of electric railway undertakings it engaged in the business of manufacturing supplies and doing construction work for the Sprague system. Thus occupied, it acquired a thorough knowledge of the needs and an experience in meeting the demands of electric railways, which since has been of inestimable value to its patrons.

Two years ago last June, in the face of frequently expressed opinion, questioning the advisability of venturing upon such an enterprise, this company, under the name of the Electric Merchandise Company, and with W. R.



HOME OF THE RAILWAY EQUIPMENT COMPANY.

Mason as General Manager, began its exclusive, and now long since acknowledged useful occupation of manufacturing electric railway supplies. Previously, the parent companies and a few general supply houses, which almost unconsciously had taken up that new line of business, had furnished what material was used.

These two classes of houses had seemed not to realize the importance of the fixture department of electric railway work, for the former, which naturally and properly were interested and engaged in the perfection of types of generators and motors for railway work, had allowed the necessary line appliances to remain in a decidedly primitive state, while the latter, without practical experience, could not appreciate the needs of electric roads and felt no incentive to the production of a superior quality of such material, or of facilities for manufacturing the same in large quantities.

Recognizing the existing condition of things, the new company resolved upon its conservative policy; namely, to confine its attention to manufacturing and furnishing all supplies needed for building electric railways, or for repairs on the line, or on the cars, or in the station. Its force was well chosen from men who had acquired valuable experience in electric railway work, and who were otherwise well informed in general electrical matters. For want of better available quarters, the company began business at 11 Adams street, where, although seriously handicapped for want of room, it had certain advantages in being in the immediate neighborhood of the Pullman Building, the Chicago offices of the Thomson-Houston Electric Company, and the Westinghouse Electric Manufacturing Company, and within a few blocks of other leading electric companies. A few weeks since, it became absolutely necessary for the company to have larger and more convenient quarters, and a lease was taken of the very elegant offices and store rooms on the ground floor of the Pullman Building, on the Michigan avenue side.

The offices front on Michigan avenue and are on the ground floor. To the immediate left of the entrance is what might be called the visitor's parlor, a space enclosed by a neat railing and containing table and chairs for the comfort and convenience of callers. This office, fronting on Michigan avenue, makes a pleasant waiting room for visitors.

The general manager's office is also in front and just back of the visitor's parlor, and is well ventilated by one of the large avenue windows.

To the rear of the general manager's office is that of the secretary and treasurer, agreeably accessible to customers. Next in order upon the right is the book-keeping department, with the necessary desks and files. Enclosed by the book-keeping department is a neat space for the use of the stenographers. The purchasing agent occupies the rear of the main office on the left, where he is conveniently near the store rooms and shipping department. A youthful usher at the desk to the right of the doorway, is at your service upon your entrance. The same side of the offices furnishes enclosed deskroom for the salesmen, and also space for a large show board, where is exhibited all the various pieces used in electric railway construction. If one desires to see quantity rather than examine the quality of the company's wares, a door at the further end of the offices admits him to a store room, where bins and shelves filled with the many devices handled by the house, line the walls. Much of the more bulky material is kept in the spacious store rooms in the basement.

The rooms are all well lighted by electricity throughout, and will make a delightful home for the new company. Moving into such commodious and pleasant quar-



WINDSOR & KENFIELD,

PUBLISHERS AND PROPRIETORS,

334 DEARBORN ST., - - - CHICAGO.

Published on the 15th of each month.

SUBSCRIPTION, - - - ONE DOLLAR.

FOREIGN SUBSCRIPTION, - - - TEN SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW,
 Caxton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR,
 Editor.

F. L. KENFIELD,
 Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW,

334 Dearborn Street, Chicago.

Entered at the Post Office at Chicago as Second Class Matter.

This paper member Chicago Publishers' Association.

VOL. 2.

AUGUST 15, 1892.

NO. 8

EXHIBIT SPACE AT CLEVELAND CONVENTION

Exhibitors who intend making a display of street railway appliances at the 11th annual meeting of the American Street Railway Association, which will be held in Cleveland, October 19th, 20th and 21st, should apply immediately to Henry J. Davies, Secretary Brooklyn Railroad Company, Cleveland, O.

WE have it on the best authority that the objection to the trolley system in New York is all traceable to one Anthony Comstock, who has been informed that if the line was built the exposed wires would be naked.

THAT the cable system, though being older, is less talked about in these days than electricity, has a recognized place as a great traction motive power, is emphasized by the opening of the magnificent system in Washington, and which cost \$3,000,000. That the company should spend this amount in enlarging its former cable system is irrefutable proof of their confidence in its future and satisfaction with its past record on their lines. While the first construction may seem large to those not familiar with its operating expenses, its economy over horse power is so great that interest on construction is easily paid from this saving and sufficient left to insure good dividends. It is folly to build a cable road where there are no people to ride, but given the traffic to carry and their history has been highly satisfactory. For a heavy volume of traffic, on lines where cable construction is practicable, the cable system unquestionably has a field distinctly its own.

THERE is every appearance that editor Stone, of the New York Journal, has ceased to roll along with the march of progress and is gathering moss at a rate which will make him an away-back number. His rant about palsy as a sequence to riding on electric cars has even less sense to commend it than his reported excuse for withdrawing from the Brooklyn club, because it had introduced electric lights. Such men, though long-winded, cannot keep up with the procession.

THE English daily papers during the past month have given much space to commenting on the annual and semi-annual meetings of the stockholders of the various "tram" companies and the statements published of their business. Special mention is made, because in nearly every instance operating expenses are shown to have increased in greater proportion than the earnings. In a few cases an increase in wages accounts for disappointed shareholders, but the general excuse is the increased cost of provender. As the public dislike is rapidly increasing to their system of steam dummies, the British manager is forced to look to cable and electricity for relief. Motive power in England is on the eve of a tremendous revolution, and when the change does come it will be rapid.

IT is most unfortunate that two events of so much importance, to western railway men especially, should conflict as to dates. Both the annual convention of the American Street Railway Association and the Dedication Ceremonies of the World's Columbian Exposition, occur on October 19th, 20th and 21st. It will be impossible for any Chicago officials to leave the city at that time and there are many others, both east and west, who will attend the celebration here, which in extent and magnificence will be without parallel in modern times. Railroad accommodations on any of those days will be so taxed on all roads, within a radius of several hundred miles of Chicago, that delegates to the Cleveland convention cannot expect anything like the accommodations in travel they would otherwise enjoy.

We have been urged by numerous western railway men to earnestly recommend that the date of the convention be changed to earlier in October, say the 5th, 6th and 7th, which will not conflict with the great Naval Display in New York, a week later. At several conventions, delegates will recall to what an extent the pleasure of the customary excursion has been marred by cold weather, as was the case last year, and an earlier date seems to include all the advantages, without many of the unpleasant features, of later October.

Fifteen members, which could easily be convened in the Secretary's office, in Brooklyn, can vote to make the change, and we believe, aside from any courtesy to western managers, the change will be found an agreeable one to all interested. Few cities, however attractive, are as beautiful at the customary convention date as they are two weeks earlier, and now, that to so large a number of managers the convention is their only outing of the year, it should be made as pleasant and delightful as possible.

THE intensely hot weather throughout the country during the latter part of July was extremely severe on street car horse flesh, and stock lost condition rapidly in spite of the utmost care and attention. In New York city 200 fatalities to stock were reported, and to a less extent elsewhere. The depreciation during three days' exertion under such conditions often equal several months ordinary wear, and force the conclusion on owners and managers that mechanical power is alone equal to the exigencies and demands of city traffic. Many an animal which will be found in the hospital next winter can account for his presence there then by over-exertion in the July heated term.

HALF the amount spent in worthless circular advertising, would be more than sufficient to give the advertiser a large space in his leading trade paper, where it is sure, not only to reach his man, but be seen and read by him. One of our friends, manager of a successful electric road, sends us a printed postal card, soliciting trade, from a firm he had never heard of before. The street number was given as "311 Twenty-sixth street," but of all the Twenty-sixth streets, which city or town this hailed from, nobody knows. The postmark even, is that of some postal car, so the returns from the investment will not run very high to the acre.

Had the firm ever advertised in the STREET RAILWAY REVIEW, their names would have been familiar to every buyer throughout the length and breadth of the land, and even the limited address of "311 Twenty-sixth street" would then have been unnecessary. Jay Gould may be said to be fairly well known by reputation, but unfortunately, having nothing to advertise in the REVIEW, his name is not found there, and the result is, mighty few people know his office address. Do you? We recommend only the best of anything, and recommend advertising in this paper because we know it is good.

WE regret to see so careful and usually reliable a paper as the New York Journal of Commerce depart from the straight and narrow path of truthfulness, and aver that rapid transit has resulted in an increased death rate from accidents entirely out of proportion to the increase in speed of cable and electric over the slower-going horse cars of the vintage of 1833. It apparently clinches matters with the statement that "in Boston, several hundred are killed or seriously injured every year." The facts are that for the fiscal year ending September 30th, 1891, the whole number of accidents on all the lines of the West End Street Railroad, Boston, was only 204, of which but 14 were fatal. Of the fatalities, 4 occurred on electric lines, and 10, on the good old horse car lines. Of the remaining 190 accidents, the electrics claimed 82, and the horse lines 112. While the ratio of deaths, electric cars to horse cars was as 1 to 2.5, the ratio of miles run was as 1 to 2.8. While the mileage is slightly in favor of the horse lines, the comparison is really in favor of the electric, as the latter travel in many cases at twice the speed of horse cars, and in all cases

carry more passengers per car. The fact that the electrics operate in greater proportion in the business district, while the majority of horse cars are on less frequented thoroughfares, is also in favor of the electrics. The conclusion then, can only be that, notwithstanding the larger loads and faster speed of the mechanically propelled cars, accidents are no more numerous than where animal power is employed; while the conditions are such that the electric cars could even score a higher death rate, and yet fairly claim equal safety. No practical street car man in the country but knows that cable and electric cars at 10 to 15 miles an hour, are incomparably safer than horse cars at that speed, were it possible to draw them so fast by animal power. Another fact which is not appreciated by the general public is, that the great majority of all accidents and fatalities are the direct result of inexcusable carelessness, and caused by acts of criminal negligence on the part of the injured person, over which it is utterly impossible for the company or its agents to exercise any control. The history of the operation of cable cars has been the same, and also contrary to general belief, shows a much lower accident and death rate per given number of passengers transported, than the horse lines of the same city.

AT Meriden, Conn., the company not only suffered by their men going on a strike, but signally failed to secure police protection in its effort to operate cars with other men, who were not only willing but anxious to work. Repeated acts of violence reached such a pass that the company at last drew in its cars and announced it would make no further attempts to maintain the service for some time to come. We know nothing as to which party is in right or wrong. Both may have been in fault perhaps. But grant, even, that the company were unreasonable in their regulations, this is a free country and if but one man desires to enter such a service, he should be protected in his right to do so. The most unfavorable elements of the work must certainly be made public at such times, and the new employe accepts them with a full knowledge of what he assumes. We do not uphold any individual or combination of individuals in unjust treatment of others, but this rule must be applied both ways, with equal force to employer and employe. As a matter of fact we do not know of a street railway company which does not treat its men honorably. The work in some cases is hard; in others, the hours of labor long; in some the pay is small; possibly, in some, all three prevail. But we have yet to learn of an instance where the employe, when he hired himself to the road, did not know exactly what the existing requirements were, and voluntarily accepted work under stipulated conditions and agreed pay, hence he has no right singly, or by combination with others, and the use of violence, to attempt to force his employer to his own ideas of how the road should be run. What a howl would raise if the company undertook to make a draft on men, and endeavor to force them to enter its employ on its own terms. Yet this is exactly

the position in which the Meriden strikers proclaim themselves. Having left the company's employ, they seek by force and other means to name the wages to be paid, and who shall and who shall not work for it, even to the extent of prohibiting all work. There is the same justice in attempting to force a company to accept your service on your own terms, that there would be should the company try to force an outsider to work for it on its terms, when he has no inclination to do so. Employes to merit the sympathy and support of the public must not forget that others than themselves have rights, possessing equal guarantee to theirs, under the constitution whose protection they claim, and that they must be consistent in what they do. The Meriden employes must not expect to win while pursuing their present policy.

IT is doubtful if many of the managers of street railway interests, and still fewer of directors and stockholders, realize or appreciate to how great an extent they are indebted to the enterprise and progressive business qualities of those who sell or manufacture their supplies. They are content to rest on the fact, that when they suddenly are in need, a telegram speedily brings the necessary repairs, and the wheels of commerce turn again.

As a matter of fact, the supply-man is the manager's best friend, and while always ready to make sacrifices and prodigious efforts to help an unfortunate brother out of difficulty, not unfrequently finds his good nature sadly imposed upon and his confidence abused.

One of the most flagrant violations of business courtesy, amounting, before its termination, to a positive insult, was the recent experience of a prominent supplyman in this city. A letter was recently received from a party, who wrote to request his immediate presence, in a town in a neighboring state, stating the writer had secured his franchise and capital and was specially anxious to get construction under way and the road finished before winter. As special engagements made it well nigh impossible for the gentleman to leave at once, he telegraphed to request that the appointment be made a week later, promising that the delay should result in no ultimate loss of time. The answer, which was a lengthy one, came promptly, with the charges collect, and insisted on immediate attention and also increased the draft by asking that an engineer come also, to make the survey and participate in the pole raising, and other demonstrations. The case was so clearly one which could not be deferred, the engineer was telegraphed to report here at once, and, taking the last train at night, the two set forth. Arriving the next noon, at the place from which the telegrams had emanated, the chief mogul was sought out, when it transpired he was not in the city, but had been on the scene of future rapid transit for some two weeks; and that all the numerous dispatches were edited by his clerk, who, however, instructed them to report at another town, sixty miles away, and, that owing to a railroad accident, the Mecca was only to be reached by a river steambot. Time will not permit a recital of the experiences of our two friends,

nor the discomforts of the trip, while sitting up all night, nor the disgust and wretched fare with which they filled themselves. Suffice is to say that the destination was finally reached, and the self-elected, would-be-president found. He had no difficulty in establishing his profound ignorance of any and everything pertaining to street railway appliances and practice, and was a seeker after knowledge and several other things. He desired a careful survey of proposed lines; estimates of everything, from making cuts and fills for the track, to excavations and foundations for power house and stack; he wanted plans and specifications for cars, car house and station; and detailed figures as to cost of everything, from rail spike to headlights. To accomplish this would have taken a competent engineer and architect, weeks, and cost hundreds of dollars, but all this the modest seeker desired at no expense to himself. But it remained as a last request to polish off the brass. It seems the efforts to raise capital had all been fruitless, but in order to secure a franchise it was necessary to convince the city fathers that several barrels of money were in stock, with which to build and equip the road. As no reply had been received from the east, our visitor was urged to remain in town a few days, until the council met, when he was to address that august body, representing himself as the financial agent of any one of several New York banking firms, a list of which was thoughtfully prepared, and assure the city fathers that there was no longer any dearth of ducats, but on the contrary, had money to loan the Bank of England, or anybody else. A few texts had been jotted down for guidance in this important lecture on finance, including a highly colored exordium, setting forth the sterling qualities of his "yours truly."

* * * * *

The English language has not yet reached that degree of development necessary to express the inmost sentiments of a trustful, earnest soul. Nor can art portray some of the deepest emotions of the mind. It is to be presumed neither ever will.

THE Engineering Magazine for August, undertakes to comment on the development of electric railways, and after misquoting a contemporary to the effect that "out of the 400 street railways now in operation in this country more than half have definitely adopted electricity as their motive power," conveys the historical information that "there is probably no instance in the history of transportation in which a change of such a radical and extensive—not to say expensive—character has been effected in so short a time." The writer exhibits a sad ignorance of one of the most important industries in the country, for there are now nearly 1,000 street railway companies in the United States, of which fully 400 are electrically operated in whole or in part. In the same August issue, with commendable enterprise, the editor copyrights the article on "Compressed Air for Street Cars," which appeared in the July number of the STREET RAILWAY REVIEW.

THE VALUE OF THE UNIFORM.

ALTHOUGH "the tailor make the man" is an old saw it is very far from being worn out and it shines as brightly and cuts as near the mark as ever. Imagine the appearance of an army dressed according to the whim of every soldier, though perhaps it is impossible to think of the genuine soldier who would want other than his regimentals when on duty. The difference between a band marching in uniform and one attired in citizens clothes affords a good comparison. Police department receives a no small reinforcement of strength in the blue coat, helmet and brass buttons. There is a certain amount of authority which accompanies the uniform which cannot be ignored, and has, also a good moral effect on that special class who are to be found in large numbers on street cars, and to whom the chiefest argument is muscular force.



LOUISVILLE, KY.

As a rule where a road has never had a uniform and the order is given adopting one, the men protest and imagine the expense will be greater than citizens' garments and that the wearing of the uniform will be a

burden. In no case to our knowledge where a uniform has ever once been tried would the men willingly consent to go back to the old style.

The same spirit is evinced by new men, who while serving as students, in a day or two become anxious for their suit as the wearing of it conceals largely the fact that they are new men, and to this extent protects them in measure against the deception the dear public so love to practice on a conductor in the way of working off on him bad money. Of this every conductor has distinct and none too pleasant recollections. The insignia of office also invests him with authority which carries weight with commands which may become necessary to make.

While the uniformed men are not massed in bodies as a company of militia and hence little differences in uniform are less noticeable, yet there should be few if any exceptions made in the prescribed garment. If the rule is known to be varied from in one case it will be attempted in others less permissible and in a short time, the standard is entirely lost sight of. It is a well nigh impossible matter



MARKET STREET, SAN FRANCISCO.

to select a cloth and so cut and trim it as to meet the ideas of every man who is to wear it. Some want single, some want double breasted coats, some velvet collars, others fur or cloth, and the only possible plan is to make as careful a selection as to style as possible and then live up to it.



SALT LAKE CITY.

From the standpoint of expense to wearers, an almost universal misconception exists in the minds of those not using the uniform system. Many are prone to believe that the saving in the wearing of citizens' garments while on duty is greatly over that of the uniform. This however is far from true. The men must be decently clothed. They are most largely the representatives of the company, and pass inspection as to neatness and appearance before many hundreds daily. The public demands that the men be neatly though not expensively dressed.

In no other occupation requiring presentable apparel, is the wear on garments greater than in street car work. Hence it reasonably follows that the

manufacturers of uniform cloths and suits making a special study of the requirements, and having experience in this line, can produce an article far superior for its use, and at less cost than the general dealer in ready made garments; or even the tailor making an occasional uniform suit. Even did the uniform cost more than ready made garments to be selected by the employe from a store-full, he would not be as well off in being left to select what his fancy might suggest, and would in nine cases out of ten, get a suit which, while it might give good wear in other work would soon go to pieces or look shabby on a car. So that were even the cost equal the uniform suitings, are much the cheaper for him. But as to cost, it is very doubtful, if taking the country from New York to San Francisco, the same suit could be purchased for within several dollars of the price secured by the men. In some cities garments are made in quantities and the men measured and fitted while they wait, in others, as in Chicago, every suit is made to



METROPOLITAN, NEW YORK.

order, from patterns cut from actual measurement, and as good a fit secured as if the buyer paid a fancy price and ordered high priced cloth. In fact, in this city, the general public could not have a suit made up from the same cloth for anything like as low a figure as charged the railway men. This is because the companies secure a very low figure by sending all the work to one establishment, where facilities are ample and the volume of this business admits of a system of manufacture, which the retail dealer or custom tailor does not possess, and the uniform manufacturer can turn out a much better garment at less cost than can be made elsewhere.



OAKLAND, CAL.

Blue seems the prevailing color, although gray is fast growing in favor. The latter has of late been made a much more attractive color than formerly, special experiments in this direction having been made by Sawyer, Manning & Co., of New York. The gray shows dirt and grease much less and even when made of the same wool as a blue, will wear longer,

owing to the unavoidable action of the blue dyes on the fibre. In the gray there is just enough coloring to yield a slightly shade and the original strength is preserved. The gray cloth in question is not the "letter carrier gray," but a much better color and made especially for street railway wear. This cloth has been designed by C. L. Bowler, who is in charge of the manufacture of the Sawyer-Manning uniform cloths, and who is one of the best experts on uniform cloth in the country, having been extensively engaged in that kind of work in all its branches, for many years, and is considered one of the authorities on the subject. The gray has already supplanted the blue on several roads in the large cities, and has met with great favor for its lasting good appearance and wearing qualities, and is much preferred by the men to the old color. But,

however carefully made the suit may be, much must depend on the wearer as to its neat appearance. Frequent brushings, the polishing of the brass buttons, and hanging up when not in use, cut a large figure. Many



BROOKLYN ELEVATED.

roads are now furnishing lockers at the barns, where the men may keep blacking, brushes, towels and the like, and which largely promote tidiness. Some men do not need any encouragement as to this, but others do, and the manager, who makes it one of the rules and follows up by enforcement, that the men shall keep as neat as circumstances will permit, will do much to command respect for the men, from both the public and themselves.

The North and West side roads in Chicago; Rochester, N. Y., and several others, give prizes for neat appearance, and consider the plan a very successful one.

A neat head wear must not be overlooked, as it is absolutely necessary to complete the uniform.

The Denver Tramways uniform their men in gray suits, made by Knight & Atmore, of that city, who buy their goods of the Sawyer-Manning Company, New York. These goods give the best of satisfaction and the management requires this make, thinking it the best.

All conductors and grip-men of the Cleveland City Cable, are uniformed in blue. Louis Leon and J. L. Hudson, both of Cleveland, furnish the habilaments. The uniforms cost from \$14 to \$18 and the overcoats from \$14 to \$14.50.

The Metropolitan Road, of Kansas City, Mo., require all conductors and motor-men on their lines, as well as the drivers on the horse lines, to be uniformed. In case the men are unable to furnish their own, the company gives them an order and deducts the amount from their pay. The Toronto lines have just lately uniformed the men, as the result of the careful management of H. A. Everett.

All the Washington & Georgetown employees wear uniforms while on duty. W. Wagner, 325 Arch street, Philadelphia, supplies them, while D. Higgins, Baltimore, makes the bagges.

The Atlantic Avenue Railroad, of Brooklyn, attire their conductors in uniforms made by Baldwin, the clothier, corner of Fulton and Smith streets.

The Lindell Railway, of St. Louis, have hitherto uniformed their motor men and conductors in indigo blue flannel, made by Browning, King & Co., of St. Louis, but an order to change to gray was introduced last March.

The Minneapolis men wear gray suits, with brass buttons, and a more courteous and intelligent lot of men can be found nowhere.

Benedict & Turner, Lick House block, San Francisco,



ATLANTIC AVENUE BROOKLYN.

clothe the boys of the Market street, Geary street, California street, Sutter street, the Omnibus, Presidio's & Ferries, Ferries & Cliff House, San Francisco & San Mateo, North Beach & Mission Central and the Metropolitan lines, all of San Francisco; the Piedmont, the Oakland and the Oakland Electric, in Oakland, and the Santa Cruz Electric Railway, of Santa Cruz, in a heavy blue pilot cloth, double-breasted, indigo suit, warranted not to fade. The firm also gives with each suit, a set of uniform buttons, as used by the different roads, each road having a different design, also furnish set of black ivory buttons with each suit. The suits are made with eyelet holes and buttons go on with rings, so that the brass buttons can be taken off and black put on, and vice versa, at any time, by the wearer. The coat is lined with a heavy wool lining, and the vest is lined with red flannel. The price of suit, including two sets of buttons, is \$22.50.

The Louisville railway conductors are arrayed in neat assabet flannel, 14-ounce, well made and lined with farmer's satin, and sold to the company for \$10. The goods are made by Crutcher & Starks, of Louisville, and, as will be seen, the uniform, though cheap, is durable and well appearing.

The conductor on the Market Street Cable Railway, of San Francisco, is in his right mind and clothed in heavy blue beaver, 30-ounce weight. The coats are double breasted, lined with heavy blue flannel and have six pockets on the outside. The manufacturers, Jos. Figel & Son, situated at 211 Montgomery street, have contracts for the Market street cable, including the Valencia, Hayes, Haight, Castro, McAllister and Fifth street lines; the Omnibus Cable System, the Sutter Street Company, the City Railway, Patrero & Bay View, Central, California Street Cable, Ferries and Cliff House, Geary Street Park and Ocean Company, Powell Street Railway, Presidio and Ferries, the Oakland Railroad, of Oakland, and the Central Street Electric, of Sacramento. The price of the suit is \$21.50, including two sets of buttons.

The Cream City's uniforms are made of police blue cloth. The coat has three inside and five outside pockets, lined with leather, the buttons being all fastened with rings and leather washers. Gottschalk Bros., of Milwaukee, are the architects of these garments, and the wearer of the uniform, herewith illustrated, at the tender age of 21, is 6 feet, 9 1/2 inches tall, weighs 250 pounds, and has taken the prize at the state fair as the tallest man in the state. He is known on the line as Little Henry, and he is as good natured as a kitten.

The Cincinnati Street Railway Company requires its motor men and conductors to wear a uniform, while horse car drivers wear the regulation cap. The motor men and gripmen wear double breasted blue coats. The men of the West end are unusually fine looking fellows, and intelligent withal.

The Freeland-Lewis Company, of Boston, furnishes the West End with gray suits for drivers and blue for the conductors.

The great Metropolitan, of New York, has decided to adopt 13-ounce blue flannel for summer, and 24-ounce cloth for winter. The Burlington Woolen Mills goods have been adopted as the standard. Browning, King & Co. are the architects, and, considering the number of lines it was necessary to outfit, it is but just to say that the order is a fine compliment to the company, the cloth and the New York branch of Browning, King & Company, which is under the direct management of J. W. Lingard.

The Salt Lake City Railroad Company have adopted for their men a fine single reduction, double-trucked, non-condensing suit, of navy blue yacht cloth, made by the firm of Goldsmith & Co., of Salt Lake. The suits are carefully made, of fine appearance and good wearing qualities. The buttons are brass, with the initials "S. L. C. R. R.," in raised letters on each one, and the cap is mounted with the same initials as the buttons, and the word "Conductor," or "Motorman," underneath, as the case may be.

C. F. Orr & Co., Chicago, are among the largest uniform makers in the United States. They supply all the lines in this city, and the police and fire departments. Street railway uniforms are single breasted for conductors; double breasted for drivers. Suits, \$18.00; over coats, \$20.00 and \$22.00. Blue for conductors and grip drivers; gray for horse car drivers (coats only).

Although our article is necessarily incomplete, we feel assured that any manager has only to look at the "Before and After Taking" pictures, to resolve in his own mind at least that the uniform has very largely to do with good discipline, and confidence from the public in thorough management, and without doubt the element, uncertain and precarious though it be, of "public satisfaction," will be induced.

A TOUCHING PLEA.

LAST month we mentioned the escape and capture of Secretary Beggs, with \$10,000 of his company's funds,—the Oakland Consolidated. In court, surrounded by his wife and children, Beggs pleaded guilty, and after relating the extenuating circumstances which led him to commit the crime, closed by saying: "If you were to set me free to-day, Judge, I would be unhappy, my reputation is gone and my family is scattered and dependent upon strangers. There are my little ones, and in their innocent faces I can see myself. Oh, Judge, their innocence condemns me. I beg of you to have mercy upon me, Judge. For their sake, have mercy upon me." He was sentenced a week later to five years in the penitentiary.



MILWAUKEE.

POSSIBLE BRAKING POWER WITH ELECTRIC TRACTION.

(From *Engineering News*)

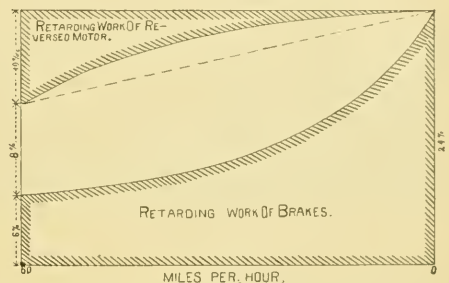
IN his interesting paper on "Coming Development of Electric Railways," Mr. Frank J. Sprague makes a true statement, which has been often both asserted and denied, on mistaken grounds. So far as we can judge, Mr. Sprague himself makes the claim on mistaken grounds. He states that by turning the motors into dynamos, when it is desired to stop a fast train, and thus reconverting a part of the energy into electricity, instead of destroying it all by brakes, not only is a certain economy promised (which is, of course, true) but that the train could be "more quickly and effectually stopped," which is also true, and which is the question in dispute.

The reasoning by which this claim is often made is plausible, but erroneous. It is in substance that, in addition to the usual retardation from shoe brakes, which is open to the electric train as to any other, the electric train will get the further retardation due to the resistance of the motor acting as a dynamo. The error in this claim, put in this way, is that, as both the retarding forces act on the same axles to prevent their revolving, and as the brake shoe friction alone is now made as high as is possible, without skidding the wheels, we cannot add a new resistance without decreasing the other pro rata. We need hardly say that if the wheels once skid, the retarding force is suddenly and greatly decreased, to about one-third of what it was before. The recognized end and aim of all brake practice therefore, is to make the brake pressure as great as is practically possible without endangering sliding of the wheels. Of course, to do this in practice it is necessary to leave quite a little margin between the ordinary working shoe-pressure and the skidding pressure; but that margin cannot be safely encroached upon by adding a new retardation any more than it can be encroached upon by increasing the shoe pressure, which latter is a mere matter of leverage and can be made anything one chooses, without varying the cylinders or air pressure.

These facts seem to indicate that a reversed motor will not and cannot add anything to the braking power of the train, and the reasoning which leads to this conclusion is certainly more plausible than that first stated, which leads to a contrary conclusion. And yet there is an error in it which is none the less real, though not so obvious. There is a saving fact which does make it possible, both in theory and practice, to add to the full retarding power which can be had from the brakes, the full retarding power which can be had from the reversed dynamo, and to utilize the sum of the two resistances in stopping the train, so that an electric train can make considerably quicker stops (assuming always that it is safe and practicable to thus reverse the motors into dynamos) than it is possible for a steam driven train to make.

This saving fact is, that the maximum retarding effect from the brakes comes only at low speeds, and is much less at high speed, whereas, the maximum retarding effect of the motor-dynamo comes only at high speed, and becomes a vanishing quantity at low speed, when the brake resistance is at a maximum. Therefore, the two do not clash, and the sum of the two at all speeds is actually available.

In the accompanying diagram we have illustrated graphically the conditions which obtain between 60 miles per hour and a dead stop, and with some approach to a correct vertical scale. There is no particular horizontal scale. The limit of retarding force is that which will stop the wheels revolving, and this is substantially constant at all speeds, at 24 per cent of the weight on the wheels. Therefore, if our braking power were maintained at its



maximum limit throughout the stop, the distance between the top and bottom lines of the diagram would represent the total retarding work done at all speeds.

But, although the coefficient of static friction between a rolling wheel and the rail, is practically constant at all speeds, the coefficient of sliding friction between wheel and brake-shoe is by no means constant. At 60 miles per hour it is only about .06, and it slowly increases thence to about .10 at 30 miles per hour, .20 at 10 miles per hour, and .24 to .25 at one mile per hour or less. Assuming the brake-cylinder and brake-shoe pressure to be constant (as it is, except for the leakage which slightly decreases it), the height of the lower shaded area in the diagram represents in magnitude and distribution the maximum retarding force which is obtained and obtainable from the brakes at any speeds in terms of the load on the wheels.

On the other hand, the upper shaded area represents in like manner the maximum retarding force, which is obtainable from the reversed motor, acting as a dynamo to reconvert energy into electricity. Speaking broadly, and neglecting frictional losses, the maximum retarding effect would be the same as the maximum accelerating effect of the same machine acting as a motor. Now, in railway service, few steam locomotives are capable of exerting as much as 50 lbs. per ton accelerating effect upon the trains which they haul, which is only 2½ per cent of the weight, but electricity, which is revolutionizing everything, may perhaps revolutionize this also, and the electric motor of the future limited expresses

may perhaps be able to exert as much as 200 lbs. per ton of accelerating force, (10½ per cent of the weight), or an equal retarding force when reversed.

But as the speed of the train falls, the speed of the reversed motor will fall also, and the retarding force from it will fall still faster. How much faster we will not inquire. One can hardly predict. If it fell directly as the speed, we should get the dotted line in the diagram as the limit of the upper hatched area. Actually, the line must always be (so far as we can now foresee) more or less concave toward the dotted line.

In either case, it will be seen that the two hatched areas of the diagram can never overlap each other, nor even occupy the entire height available at any point, except at the very end of the stop. In other words, both retarding forces together can never utilize the entire theoretical braking power, 24 per cent of weight on the braked wheels. We have assumed a maximum speed of 60 miles per hour for convenience, but we may write in 100, 150 or 200 miles per hour, on the diagram, in place of it, and still the diagram will remain substantially correct. The upper shaded area will be wholly unaffected, and the lower area will be affected only at the left, where it will be a little smaller, leaving a still larger central area of unused braking power between the two. The lowest aggregate of efficiency will be seen to be in any case near the middle of the stop, when the retarding efficiency of the reversed motor has decreased and that of the brake shoes has not very greatly increased.

In order to avoid the loss of braking power at high speeds, which has been noted, Mr. Geo. Westinghouse at one time devised an apparatus by which a great excess of pressure could be applied to the brake shoes at first, this pressure automatically decreasing as the coefficient of friction between shoe and wheel increased. In this way he maintained the retarding force constant, instead of the cylinder pressure, and thus maintained the former throughout the stop, just short of the 24 per cent which would suffice to skid the wheels. With this apparatus he made experimentally the quickest stops ever made; and were this device in general use, the reasoning heretofore used and embodied in the accompanying diagram would fall to the ground, because the lower hatched area alone would then occupy the entire diagram. But this apparatus has never been put into practical use, and is never likely to be, as it sensibly adds to the complexity and cost of the brakes without an adequate return.

So far, we have considered only the case of the "emergency stop," in which the full power of the brakes is exerted, in order to stop as quickly as possible. These stops are so rare, however, that so far as any economic question is concerned they may be disregarded. In the ordinary service stops, the mean braking force throughout the stop rarely exceeds 4 to 6 per cent of the weight on the braked wheels, nearly all of which might be conceivably supplied by the reversed motor, if as powerful as we have assumed. In any case the percentage of the energy saved in this way would be likely to be much larger than our diagram shows. On the other hand, it

would rarely be the case that the motor alone could be relied on to stop a train, since it can only stop a train about as quickly as it gets it under way. Hence, much of the energy must in any case be wasted at every stop.

Finally, in one important department of brake work graduating a run down hill, a resistance of from 1 to 4 per cent of the weight of train is the most ever required and this should be all obtained from a reversed motor, if so designed as not to burn out armatures or otherwise suffer injury as an effect of reversion.

The conclusion of the whole matter is that all stops can be made more economically and emergency stops more quickly also, by reversing the action of the motor, the full retarding power of the motor-dynamo being in all cases utilizable. If so, here is a legitimate field for effort so far as its possibilities of economy are concerned. It rests with the electric experts to devise a motor which shall be conveniently capable of such reversion, without injury to itself or loss of efficiency. When this has been invented, it will be the only kind to use in electric railway service. It has not yet been invented, however, so far as we are informed.

ST. LOUIS PASSENGERS.

THE city of St. Louis has a national reputation as a rapid transit success, and the following figures bear out the assertion.

The report gives the number of trips made and the number of passengers carried during the last three months :

| Line. | Trips. | Passengers. |
|--------------------------------|-----------|-------------|
| Baden and St. Louis..... | 5,155 | 43,720 |
| Belle-Fontaine | 36,306 | 801,090 |
| Cass Avenue | 54,650 | 845,650 |
| Citizens..... | 101,346 | 2,437,289 |
| Fourth Street and Arsenal..... | 2,528 | 5,760 |
| Jefferson Avenue..... | 45,794 | 503,790 |
| Lindell..... | 169,958 | 3,333,839 |
| Missouri..... | 278,430 | 3,842,071 |
| Mound City..... | 82,432 | 1,126,494 |
| Northern Central..... | 41,084 | 550,674 |
| Peoples..... | 58,058 | 1,260,725 |
| St. Louis..... | 204,240 | 3,127,456 |
| St. Louis and Suburban..... | 29,806 | 1,766,119 |
| Southern..... | 70,186 | 1,232,885 |
| Union..... | 50,870 | 415,202 |
| Union Depot..... | 142,956 | 2,107,404 |
| Total..... | 1,373,799 | 23,450,168 |

The aggregate for the year at this rate will be little short of 100,000,000.

THE biggest line in South Africa is the Sea Point trams, which carry more passengers in a year than any other line in the Colony. Last year over 551,000 passengers, exclusive of season-ticket holders, were carried on this line, a greater number than in any previous year. Next in order comes the Port Elizabeth line, with 295,000, closely followed by the City Tramways Company with nearly 294,000 passengers. The Kimberley line is owned by a private company, the cars carrying about 312,000 persons per annum.

IN THE LAND OF THE GREAT SALT LAKE.

A City of the Plains.—The Superior Rapid Transit System of Ogden, Utah.—Sketch of its Chief Executive.

LIKE the confluence of mighty rivers do the arteries of trans-continental transportation after threading their way through misty canyons, over lofty mountains and across great deserts, at last converge and unite at the city of Ogden, the second largest in the territory of Utah. It might well be termed a great railroad clearing house for the roads leading to the coast, Puget Sound, the South and the far East. The first impressions of the city are full of surprises to the visitor. Coming across desert country from every direction, the traveler is suddenly ushered into a rich valley, and presently finds himself in a beautiful plain, surrounded by mountains whose snow-clad summits form a delightful transition, as the eye wanders from the richest green below to the deepest blue above.

The city, for it is a city of nearly 25,000, is laid out in regular squares, the streets, which are 130 feet wide, crossing at right angles. From a large and sightly union depot the main street extends to the mountains, upon the foothills of which are costly mansions, and along the lower portion solid business blocks of brick. This street is paralleled and crossed by other business streets, all the cars in the city passing the central point at Washington and 25th streets. At one corner is the stately court house, surrounded by extensive lawns and filled

width and the streets constructed from gravel found in the mountains, and which packs as solid as a pavement. They are as smooth as a boulevard, and offer great



THE POWER HOUSE.

attractions to light vehicles and the growing army of bicyclers. It has never been found necessary to put down any other pavement, and never should. There is an easy drive to Salt Lake, eight miles distant, and visible from the city, but on account of poor beach facilities, the lake is not largely visited. While a stranger divides his attention between the mountains and the many points of interest in the city he cannot but admire and be astonished at the excellent system of

RAPID TRANSIT.

In no eastern city can be found better tracks, more comfortable rolling stock and better time; while few are on so uniform a degree of excellence in all respects. The road was operated for some years with Baldwin motors, and until its purchase by the Jarvis-Conklin syndicate, which was consummated in July, 1891, for the purpose of introducing electricity. All the lines in the city belong to the company, though there is a suburban line, operated by Baldwin motors, running from terminus on Washington street out to Hot Springs, a famous pleasure resort, ten miles distant.

The official list includes H. M. Beardsley, president; R. M. Spivey, secretary and superintendent; and S. L.



WASHINGTON AND 25TH STREET.—HOTEL AND OPERA HOUSE.

with flowers and blooming shrubs. None but those who have crossed the weary waste of desert plains can realize the beauty which is made impressive from the strong contrast. Throughout the city, the walks are 16 feet in

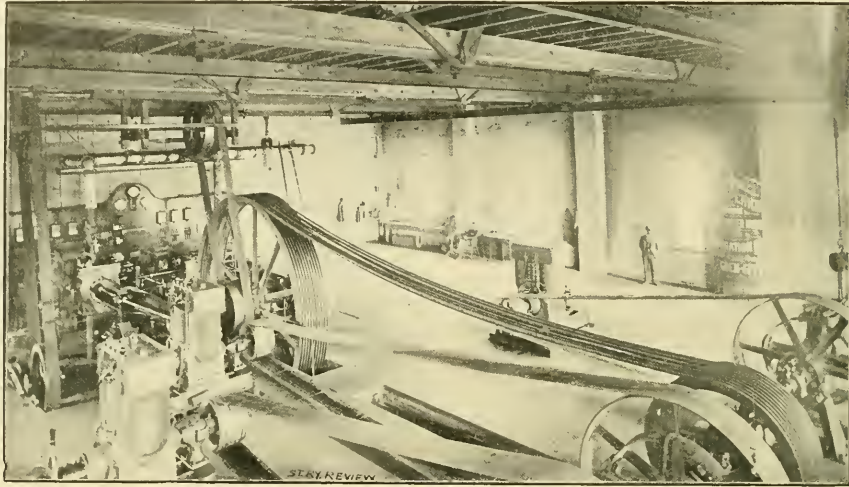
Conklin, treasurer. The track comprises 10 miles, laid to standard gauge, with 30 pound steel tee rail, made by the Illinois Steel Company. The maximum grade is $2\frac{1}{2}$ per cent, on Washington street, from 25th to the foothills, and has a rise of 225 feet.

In the heart of the city at the crossing of the two principal business streets may be seen as artistic piece

are used in the same truck. Both Edison and Westinghouse motors are used of 15 and 25-horse-power. Cars run at 15 and 20 miles an hour.

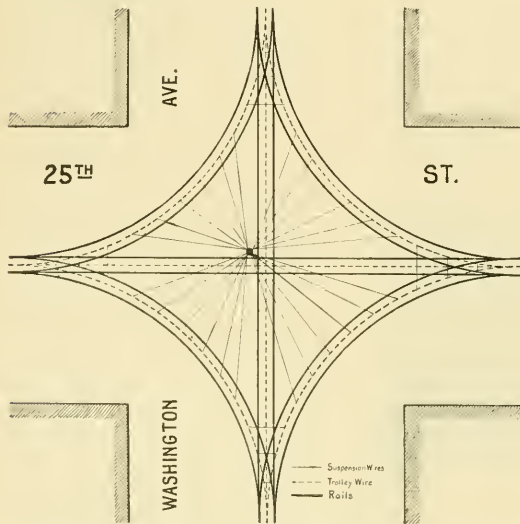
THE POWER HOUSE

possesses no little interest, being a two-story brick structure, 65 by 111 feet. The upper story is used in front for



INTERIOR POWER STATION—OGDEN CITY RAILWAY.

of cross suspension as can be found anywhere in the country. The key to the construction is the tall centre pole, planted in the centre of the street and from which the pull over wires radiate. The illustration shows the arrangement, which has proven highly satisfactory to both the company and city officials.



There are 12 cars, nicely furnished within and without, built by the Laclède and St. Louis Car Companies. St. Louis Car and McGuire trucks are used and also some home-made, in which a pair of large and small wheels

offices and in rear for repair shop. Two compound condensing Fraser & Chalmers, Chicago, engines, of 300-horse-power each, furnish the power, and are both regulated by one governor, placed between the engines. The boilers are also made by the same firm, are three in number, and of 150-horse-power each. Coal is the fuel, and comes direct in the original car, being hauled at night by a Baldwin motor, after the electric cars have ceased running. The feed-water is heated in a Baragwanath, all the exhaust being sent into the heater, leaving no visible exhaust steam, and heating the feed-water to a temperature of 100° as it goes into the boilers.

Four 80,000-watt Edison generators are planted, although two are usually sufficient for the work. Feed-wires connect with trolley wire at every other pole. Poles are all set in middle of the street, and present a pleasing appearance, being painted white. A 10-rope transmission connects engines and generators, and is shown in the illustration. A valuable and novel feature is the circuit breaker alarm, the device of Mr. Smith, the chief engineer. This alarm is operated from three Samson batteries, from which a positive wire is led to each of the armatures of the breaker, while to the switch board is a small contact piece, to which is connected the negative wire. When the breaker flies out, the two contact pieces form a circuit which causes the gong to ring. Another useful device is the low-water alarm, necessary from the fact that the well is fed with pipes from a canal in which the supply of water often varies; to detect low water in the well, a large alarm gong is connected with the set of batteries already mentioned, and to a board,

4 feet long and 4 inches wide, which is securely fastened on the wall; in the center of the board is a slot, lined with brass, for a distance of 18 inches from the top, one strip connected to battery, the other to the bell; a weight with cross strips of brass travels in this slot being suspended by a cord passing over a pulley at the top and fastened to a float in the well; when the water falls so does the float, which pulls on the cord, raises the

1862, when he enlisted as a confederate soldier in the 35th Alabama Infantry, and served until the close of the war. After the close of the war, he entered the Southern University, at Greensboro, Alabama, where he remained two years and finished his collegiate course. Emigrated to Kansas, in January, 1869. He taught public school in Valley Falls, Kansas, and in May, 1870, was appointed one of two commissioners to survey and appraise the land grant of 6,200,000 acres, belonging to the Atchison, Topeka & Santa Fe Railroad, in Kansas. Continued in that work until September, 1875, when he was appointed immigration agent of the same railway, in which work he continued until January, 1881, when he engaged in the banking business, in Newton, Kansas, in connection with real estate, but still continuing his connection with the A., T. & S. F. R. Co., and in July, 1886, he was appointed general agent of the Arkansas Val-



THE ROUND HOUSE.

brass weight, which closes the circuit on reaching the brass strips, and sounds the gong, which can be heard in all parts of the building.

THE ROUND HOUSE

Is quite a novelty in street railway buildings and will be readily understood from the illustration. Trolley wires are run into each stall, into which the cars pass from a turn table in the centre of the house. The arrangement is found very convenient as it admits of taking out of any car in the house without moving any other car and requires but one track from the house to the street. Among the equipments are two 50-horse-power Baldwin motors, which haul coal and in the winter couple together and push a snow plow of the company's own design and construction, and which is quite similar to a steam road plow.

In addition to the Hot Springs already mentioned, the company are laying out a pleasure resort and park in the opposite direction. The main line is 5 miles long, runs on Washington avenue and has for its termini a settlement called the Five Points and the new park. The bridge over the Ogden river on this line is a fine iron structure, 200 feet long, and was built by the company for its exclusive use, at a cost of several thousand dollars. Owing to the excellent facilities furnished and the quick time made, the Ogden City Street Railway is enjoying a large patronage, justly deserved, and and rapidly increasing.

CAPT. ROBT. M. SPIVEY.



CAPT. R. M. SPIVEY.

ley Town and Land Company, owners of town property on the line of the Atchison, Topeka & Santa Fe railroad and auxillary lines, in which position he continued until August, 1889, when he resigned, and became associated with Messrs. Jarvis & Conklin, of Kansas City, Mo., in their extensive and varied land, street railway and water works business, and November 1st, 1891, Capt. Spivey was appointed superintendent of the Ogden City Street Railway and Ogden City Water Works, both of which properties are largely owned and controlled by the Jarvis-Conklin Mortgage Trust Co., of Kansas City, Mo.

R. M. Spivey was born in Maysville, Madison County, Alabama, April 27, 1845. He attended the village schools of his county until the spring of 1860, when he was appointed a cadet to the Lagrange, Alabama, Military Academy, and remained there until February,

Capt. Spivey assumed the management of the electric street railway, immediately after its completion last November, and by hard work, good street car service, courteous treatment of the patrons of the street railway, and has made the enterprise a financial success, and the people of Ogden have shown substantial appreciation of one of the best equipped electric street railways in the West, by their patronage.

Captain Spivey is a gentleman, of the old school, with plenty of good progressive ideas to back him, and although his good right arm was lost at Shiloh, he has twice the executive ability of many men of the full complement.

In 1872, at Topeka, Kansas, Captain Spivey surrendered at discretion to Miss Lina Owens, and has since had much reason to commend his judgment.

The Captain at 47 is happy, healthy and the best of comrades. He is a member of the I. O. O. F. and a true Knight of Pythias. To his ability is due in great measure the success of the Ogden City railway system.

Valley Town and Land company, in the capacity of assistant engineer and town lot salesman. March, 1889, saw the subject of this sketch in street railway work, with the Topeka, Kansas, Rapid Transit company. Going into the shops, Mr. Smith applied his usual energy in the mastery of details, under the supervision of Mr. Haywood of the Thompson-Houston company.

In August, 1890, Mr. Smith went to Augusta, Ga.; taking charge of the electrical and mechanical workshops of the Augusta Railway company. Hot weather drove him north the following summer, and the Salt Lake City Rapid Transit company obtained his service in a similar occupation for two months.

A. V. Abbott, of the Ogden City company, next obtained his services for a short time and so pleased was he that he insisted upon retaining Mr. Smith.

With the advent of Capt. Spivey, Mr. Smith became his assistant as well as electrician of the road.

While in Topeka, Mr. Smith had the good luck to meet, woo and marry Miss Lulu Wallace, of that city.

A RARE AND INTERESTING PHOTOGRAPH.

ON the wall, in the luxurious office of general manager, John Walker, of the Walker Manufacturing Company, Cleveland, is a large photograph, which is the only one on this continent, and is one of the only four in existence. The scene is no less than the illustrious workshop of James Watt. This room is in his former residence at Heathfield Hall, Mansworth, Birmingham, England, and when visited by Mr. Walker recently was still in exactly the same condition, save for an accumulation of the dust of 73 years, as when left by the great inventor. So religiously has it been preserved, not an article in the room has been moved from its place. Clearly shown in the photograph is the work-apron, made of calf-skin, lined with cloth, hanging from its peg in the wall. Also, a large bust of Watt, made by himself; he being the only engineer who is known to have made his own bust, though many since his time have "busted" their friends. At the left are the old ovens for the assay of ores and metals, and a little Dutch oven in which James was wont to cook his own provender, during times of special application, when he would lock himself in the room for long periods of time and refuse to see any person. In the centre of the room are various lathes, embodying the same mechanical principals which are to be found in the finest workshops of to-day; also the first machine for engraving coins;—all in a perfect state of preservation. On a shelf rests the unused portion of a large ball of snuff, which was a favorite solace of Sir James. Other historic relics make the room replete with interest and value.

Below the photograph are the words, James Watt, born, Greenock, Scotland, January 19, 1736, died, Heathfield Hall, August 19, 1819.

He sat upon the open car and caught a cold of course,
And then he said he thought he was a little street car hoarse.



W. H. SMITH,

The electrical engineer of the Ogden City company, belongs to the Ohio branch of the Smith family, and began his temporal existence at Columbus, on the first day of April, 1856, and as such things as birthdays go by contraries, we find that April Fool's day has given the West one of its most competent and practical electricians.

Young Smith was educated at Columbus and at Fairbury, Illinois, but at the age of 15, went west on a cattle ranch with his father. Life on a Kansas farm is not all poetry and Indians, but meant in '71 about as difficult an existence as can well be imagined. After this experience, Mr. Smith cast his lot with the Arkansas

CREATED TRAVEL IN MINNEAPOLIS.

A Practical Illustration of Induced Traffic.—Pleasure and Profit in the Lake Harriet Resort.

One of the Five Thousand, and What's There.

WHEN Col. John H. Stevens built the first house in Minneapolis, over 40 years ago, it isn't at all probable that he located it with the least reference to Lake Harriet. That pretty sheet of water was a Sabbath day's journey from his original dwelling in those days, but now the city has grown out to the lake, and the lake has been made easily accessible for residents in all parts of the city, by electricity.

Ten or twelve years ago Lake Harriett was a place rarely resorted to. It was practically just as Dame Nature had left it then, and the visitors to the place were restricted principally to those who were well enough off to own or hire conveyances, or ambitious pedestrians,

distance between the transfer and the lake has been covered by a special train over this route in 14 minutes. The average time is from 23 to 25 minutes. Hennepin Boulevard was laid out and opened under the direction of the Park Board of the city, and special provision was made for the car tracks, which are laid in a parked and turfed strip down the center of the thoroughfare. This strip is slightly higher than the rest of the boulevard and is separated from a 40-foot drive at each side by a curbing of patent stone. On days when there is no special rush, trains run over this line every five minutes. Each train consists of one motor and one trailer, and these two are capable of carrying from 175 to 200 passengers. When there is a pleasant Sunday or holiday in the sum-



REAR VIEW OF THE GRAND STAND.

the utmost limit of whose ambition was the distance to the lake.

There is a contrast in the condition of affairs to-day. Given 23 minutes and 5 cents and there you are on the shore of one of the most beautiful of Minnesota's 5000 lakes. There are soft drinks there for you if you are thirsty, refreshments of a more solid nature if you are hungry, shady nooks and well-kept turf where you can lounge if you are inclined to be lazy, other attractions, including pretty girls to flirt with, if you are anxious to get rid of a bit of ennui, and a car waiting to take you back to the heart of the city any time you want to go.

Lake Harriet is situated between four or five miles from the transfer at the corner of Hennepin and Washington avenues, which is the center of the business part of the city. Ordinarily the resort is reached by the cars which run over the Hennepin Boulevard line. The

mer months this service is supplemented by trains running out over the First Avenue South and Nicollet avenue line, which is the original route to the lake, Hennepin Boulevard having been opened so recently as last autumn. This arrangement gives a train reaching and leaving the lake every minute. A loop at the farther end of the line enables trains to be reserved and placed on the return track with the greatest economy of time.

Early in the '80's a steam motor line skirted the shore of Lake Harriet on its way to Lake Minnetonka. The lack of accommodations at the former place however, favored the Minnetonka, eight or ten miles further on, and which was supplied with steamers, smaller crafts of all kinds, and other attractions. Upon the introduction of the trains to Minnetonka by the railroads this steam motor line became unprofitable, and after several seasons of idleness it was rebuilt by the Minneapolis Street Railway

Company as an electric line as far as Lake Calhoun, about one mile inside of Lake Harriet. This was in the summer of 1890. The following season the work was completed as far as Lake Harriet and regular service was put on.

In 1885 the city recognized the value of the lake as part of the elegant park system maintained by the municipality and the land contiguous to the shore passed into the control of the Park Board. Since that time \$80,000 has been expended in drives and ornamental features, and \$6,000 is expended annually in keeping up the improvements.

A visitor getting off the car at the lake to-day sees a pretty picture. Across a concourse 300 feet in width, he sees the pavilion and beyond is the lake. To the right and left run the drives which girdle the three mile shore lines and which broaden out into the concourse before the pavilion. This structure, the successor to

This pavilion is owned and operated by the street railway company, the city reserving the right to purchase it at any time, as the building is situated on park property. The refreshment and amusement privileges are under the direct management of H. M. Barnett, who buys them from the street railway company.

Mr. Barnett has a herd of 14 Shetland ponies, which are usually busy drawing little folks around a small circular track for a small consideration. This is the only special attraction of the resort proper for which there is any charge. Everything else (with the exception of the boating which is operated by the city) must be free, and any profits accruing to the lessee of the pavilion must be made from the sale of cigars and refreshments. There are other special attractions at the place, but they are usually in the form of musical specialties in connection with some band or orchestra. A unique provision for the musicians, and for their hearers as well, is a large



FLOATING BAND STAND AND PAVILION BUILT BY MINNEAPOLIS STREET RAILWAY.

the one which was burned in May, 1891, stands in the edge of the water, the entire building resting upon piles. It was opened about the middle of the summer of '91, having been built by the street railway company at a cost of \$15,000. There are two floors and a broad expanse of red roof of the rustic design which characterizes the entire work. The second floor projects slightly over the first, giving the effect of an awning. All exterior woodwork is covered with stained shingles and the interior is finished in Georgia pine. On the lower floor are a restaurant and cigar stand which fill all the space except a broad promenade at the four sides. The second floor is supplied with chairs in case some indoor gathering is on hand, but ordinarily these are stacked up in a small space and only a sufficient number to line the railings are made available. These floors are 159x75 feet over all, and both stories are open at the sides in pleasant weather, though there are glass partitions to be swung down in case of rain.

floating band stand, anchored out in the lake, covered by a sun-bonnet-like sounding board, which seems to keep the music from losing itself over the water, and as a roof for the players.

As previously hinted, the boats in the lake are owned and controlled by the city. There are 175 light row boats, accommodating from three to six persons each, and three sail boats, which are, above all things, safe. The city keeps a force of four men looking out for the boats throughout the week, and on busy days this force is increased to nine. The usual number of boats going out in a day is 125, but on Sundays and holidays the number often is as high as 1,000. A charge of 25 cents an hour is made for row boats, and even at this nominal rental the net proceeds from this source last year were \$5,200.

Just outside the tract owned by the city, near the pavilion, is an inclosure fitted up with seats and a stage. It was built last season and was opened by an out-of-door performance of "As You Like It." The novelty proved

to be attractive, and ran several weeks with fair success. This year the place has been the scene of a very wild west show, and a steam merry-go-round is now holding forth there. All these affairs have been under the management of private parties, but have been encouraged in a manner by the street railway company as they induced people to patronize the cars.

Since the advent of rapid and cheap transportation to Lake Harriet, the resort has become of incalculably greater value to the people of the city. Every week during the season it is the breathing place of thousand, who would otherwise have to find their fresh air and leave their respective tired feelings within the necessarily limited boundaries of some of the city parks. Family parties go there every day of the week to take their suppers. There are stationary benches and tables to accommodate them in a grove near the pavilion, or if they prefer their luncheon more on the al fresco order, they can find good picnic grounds at any point on the lake shore, which is wooded all around.

The pavilion is rendered attractive in the evening by 30 arc lights, which, together with 45 other lights strung about the lake shore and in the woods, are on a circuit supplied by a dynamo at the Third Avenue north powerhouse of the street railway company.

The exodus to Lake Harriet on Sundays, or occasions like Memorial Day and the Fourth of July, is something tremendous. It has a noticeable effect on the city. Aside from street parades or other organized observances, holidays in Minneapolis are marked by less than half the noise which characterizes the corresponding occasions in other cities. It is because there is a place where all can afford to go and where all will be amused and kept out of mischief. Last Memorial Day the crowd at the Lake was variously estimated at from 25,000 to 30,000, and the season was not then considered opened. On the Fourth the electric lines carried out fully 30,000 people to Lake Harriet and 15,000 more to Lake Calhoun nearer the city on the same line. The cars were crowded, to be sure, for a large proportion of the crowd wanted to go out at the same time, but the rush had been anticipated, a one-minute service had been put on and the trains ran as regularly as if they had all been empty. Once at the lake the crowd had a large area to spread over and, although no special attractions were provided, the place could not have been more popular had there been elaborate preparations for entertaining the visitors.

In operating the lines running to the lake the Minneapolis Street Railway Company is performing a positive benefaction. They are the safety valves of the city. There is a mercenary side to the matter, to be sure, but that does not affect in the least the real benefit which the masses receive by having such a place as Lake Harriet thrown open to them. The present division of responsibility between the city and the street railway company seems to be working satisfactorily and, barring the possibility of the former taking charge of band music, there is no prospect of any immediate change.

Since the above was written a somewhat peculiar condition of affairs has developed in regard to the attractions at the lake. In June, Vice-president C. G. Goodrich, of the street railway company, came before the Park Board and asked that that body would help the company to bear the expense of music for the season. The board demurred at giving \$2,000, the amount asked, but finally agreed to give the company the proceeds from boat hire in excess of \$5,200, provided that the sum was not to exceed \$1,500. As the season was wet and cold at that time the company did not feel like assuming a responsibility which would occasion the expenditure of \$6,000 to \$8,000 before the season was over, when the aid promised by the board was based entirely upon an uncertainty. A contract had previously been made with the Currier-Thompson band, of Chicago, for the season, but this was cancelled, and since the last of June there has been no special attraction at the lake in the shape of music. The result has, by this time, become painfully apparent both in the way of decreased attendance at the resort and in a general tendency to criticize both the company and the park board, the latter coming in for a larger share of the blame.

Thomas Lowry, as president of the Twin City Rapid Transit Company, was recently criticized by the St. Paul Pioneer Press because he was not willing to sanction the immediate construction of an electric line to Como Park, the finest piece of park property in the St. Paul system. Mr. Lowry has urged all along that such a line would be unprofitable unless there were some special attraction at that place, and, to convince the St. Paul authorities of the wisdom of such a provision, he invited them to come to Minneapolis and look over the park system with special reference to the Lake Harriet pavilion. On Friday, July 22, this invitation was accepted by a party of 25 St. Paul aldermen, park commissioners and newspaper men, who came to the city on a special electric motor and were given a carriage drive through the prettier portions of the Minneapolis park system. The drive ended at Lake Harriet where the visitors ran upon a good sized Sunday school picnic and were exceedingly impressed with the convenience and orderliness of the pavilion. The result of the visit will probably be the erection of a pavilion at Como Park next season as the St. Paul people left with the avowed intention of seriously agitating the matter.

At Toledo, the Consolidated Company has been encouraging street car parties, as urged and outlined at various times in THE REVIEW, and to this end have had a number of signs printed bearing the legend, "Private." Numbers of clubs of young people have chartered cars to this purpose and ride around the belt to the music of guitars, mandolins and vox humana. Recently a party took two cars and spent a hot evening in the coolest place in the city. In the smaller towns, where the practice can be followed, it would be well for managers to begin to make it fashionable, and once started will rapidly develop increasing business.

VACUUM GAUGE TO INDICATE STACK DRAUGHT.

AN interesting and useful device has been constructed by P. A. Patterson, the intelligent engineer at the power station of the East Cleveland Street Railroad Company, Cleveland. A U shaped glass tube, open at both ends, is two thirds filled with water and cross lines marked on the tube at intervals of $\frac{1}{4}$ inch. One end is then connected by rubber tubing to inch iron pipe and carried into the base of the stack which is 175 feet high. On an ordinarily warm day the gauge indicates $\frac{5}{8}$ of an inch rise which is equivalent to a draught of about 26 miles an hour. The apparatus is very simple and can easily be constructed and placed by any engineer and is valuable in forming data as to economical use of fuel. The indicator lines are painted on a pane of glass which forms part of the door covering the gauge and resting against the tube.



Another very useful contrivance of Mr. Patterson's ingenuity is in operating the valves which control the water supply into the boilers. The valves were all placed in the rear, but when the battery was increased to fourteen, often the men would be uncertain which boiler to regulate by the time they had made the trip around, and at best much time was consumed. An iron rod was passed over the boilers and a sprocket wheel fastened on each end, from which depends an endless link belt, one end of which operates the valve. By this means the fireman can easily, by pulling one side or the other, open or close the valve in an instant.

CONNECTICUT'S RENAISSANCE.

AT Norwich, a trial run of the new electric railway has been successful and 15 cars will be added.

The New Britain city council will be petitioned to allow the substitution of electric cars for the "bob-tail" horse cars now in use. It is also proposed to extend the line to Plainville, following the general line of the New England road's tracks.

At New Haven, electric cars have been put on the line to West Haven and Savin Rock, and give good satisfaction. The road to Morris Cove is also open. A syndicate has been formed to build an electric road from the Savin Rock terminal of the New Haven and West Haven road, westward to Woodmont station, on the Consolidated railroad and thence to Merwin Point. Construction work will begin this fall.

Bridgeport people are clamoring for electricity as a substitute of the creeping horse car, which is altogether too slow for that pushing city.

Waterbury people have largely signed a petition for the use of electricity in that city. It had 141 names and a remonstrance circulated received only 60 signatures.

A glance at the two lists of names shows who the people of broad views are. In the minority there are few familiar names, while the petition in favor, headed by E. C. Lewis, contains a large representation of men who have helped make Waterbury what it is. The remonstrants are of the "afraid of my horse" class.

Up in Springfield, the Union says that rapid transit by electricity has created a real estate boom in the outskirts of the city. In every direction new streets are being laid out, house lots are plotted and building is going on. Property which two or three years ago seemed too far away from the business portion of the city to be available for residences, is brought within fifteen minutes' ride by the electric cars, and hundreds of people are pushing out to find homes in quiet and pleasant locations.

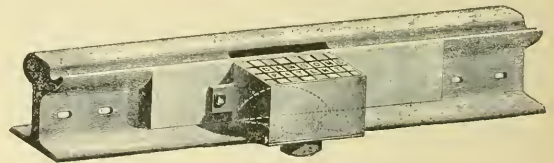
As to Hartford, electric railroad enterprise appears to have come to a dead stop.

Construction work at New London goes merrily on.

A DRAIN RAIL.

THERE has been invented and described before the (English) Tramway Institute, a drain rail of novel construction, which we take this opportunity to lay before the readers of the STREET RAILWAY REVIEW.

The rail, made of crucible cast-steel, is 8 feet 6 inches long, a slot 12 inches long is cast in the groove of the rail casting, which allows the water to flow freely from the rail to the sewer. The section takes the place of the rail for the length of the casting, and is fished up to the rails in the ordinary manner. It is practically self-cleans-



DAWSON'S DRAIN RAIL.

ing, but every part is easily accessible, and can be readily cleaned out when required by removing the lid of the dirt-box, shown on the side, and passing a rod down the pipe to the sewer.

The drain rail was devised by W. H. S. Dawson, of Bradford, England, and has been laid in that city.

The grooved rail, so commonly used in Europe, has not been generally adopted here on account of the greater severity of our climate.

CREATED TRAVEL AT ROCKFORD.

THE new management at Rockford has instituted several reforms not the least of them being an attempt to create travel. To this end during the remainder of the summer season a series of outdoor theatricals will be introduced. The performances will be given at the base ball park by professional theatrical combinations. The idea is well received, and without doubt, will be of great interest and profit.

THE WASHINGTON & GEORGETOWN NEW CABLE PLANT.

Installed at a Cost of \$3,000,000.—One of the Most Complete in the World.—A Magnificent Enterprise.

The Washington & Georgetown Street Railway Company has just equipped the Pennsylvania avenue and Fourteenth street branches of its road with a new cable plant, at a cost of \$3,000,000. This, together with the Seventh street road owned by this company, and already using the cable system makes the most complete, and one of the largest cable systems in the country. The company's tracks cross the entire length of the city, from east to west, over Pennsylvania avenue, and across the width of town north and south, by double tracks on Seventh and Fourteenth streets. The entire system contains 22 miles of single track, all Johnson's girder rail, 80 pounds to the yard. The track gauge is 4 feet 8½ inches, and the maximum grade is 6 per cent, occurring on a stretch of

Company, of Milwaukee. They are 36 x 72 inches cylinders, and 750 nominal horse power. The fly wheel is 30 feet in diameter, and weighs 100,000 pounds, and has a normal speed of 50 revolutions per minute. The 15 inch line shaft is 66 feet between the engines. Steam is furnished to the engines from a battery of 8 Babcock & Wilcox boilers, of 184 horse power each. Four of them are for use, and four for reserve, and the two sets are run alternating each fortnight, the engines changing in the same period. The boiler room occupies the south front of the power house, and opens by large double doors and numerous windows, directly on the street, giving an abundance of light and air. The fuel is soft coal, and is received into the sub vaults by openings



POWER HOUSE AS IN PRESENT COURSE OF CONSTRUCTION.

about 1,000 feet, on what is known as Capitol Hill. The entire system has a capacity of 400 cars, but only 210 in regular daily use.

The power house of the new plant is at Fourteenth and D streets n. w. It is in the center of the business section of town, and the site, which is 141x241 feet in extent, cost alone \$556,000. The ground, however, was insecure, which necessitated the sinking of 2,100 piles, from 25 to 30 feet long, on which the masonry foundation was laid. The building, while plain in outline, is a handsome structure of selected red pressed brick with red Seneca sandstone trimmings. It covers the whole of the square of ground bought by the company. It has a height of 98 feet in three stories. The ground floor and a part of second floor will be occupied by the company for the cable plant and offices, and the remainder will be let for offices and manufacturing purposes.

The engines of the new plant are of the Reynolds Corlis type, and are furnished by the Edward P. Allis

direct from the street. The fuel is fed to the furnace by the Rooney Mechanical Stokers, and the ashes are disposed of in the same way. The Berryman feed water heater is used, and all the steam connections of the building are by Blake and Williams, of New York.

The driving plant was furnished by Robert Poole & Son Company, Baltimore, whose reputation for cable driving machinery is world wide, and who have built a large number of the heaviest plants in the country.

Three cables are operated from the house, one known as the West Avenue section, containing 23,760 feet, the Fourteenth Street section, containing 27,900 feet, and the East Avenue section of 31,660 feet. An auxiliary cable of 4,000 feet, carries a line of cars from the main line of the road, at the foot of the Capitol, to the Baltimore and Ohio depot, by an ingenious device, the design of Mr. Upton, chief engineer of the road, and it is as simple as it is ingenious. It is practically a small driving plant on the plan of those at the power house, but minus the engine.

The East Avenue cable, on its way to the Navy Yard, is passed by a turn around the drum of this secondary driving plant, which is sunk in a vault 14 feet deep, beneath the pavement, and in this way the 4,000 feet of auxilliary cable is kept going at a rate of 6 miles per hour without interfering with the rest of the line.

Besides the power house, in the center of the city, there are two new car barns, one at Mount Pleasant, the terminus of the Fourteenth street road, J. L. Parsons, Washington, D. C., contractor, and the other at the Navy Yard, the eastern terminus of the Pennsylvania avenue line, S. H. & J. F. Adams, Baltimore, contractors. Both these buildings are of pressed brick, with red sandstone trimmings and are quite an ornament to the neighborhood in which they are placed. The old stables and business offices of the company in Georgetown will still be retained and used for car storage and office rooms.

The road was designed by W. B. Upton, chief engineer of the road, in consultation with Danl. Bontecou, of

and 9 grooves in each set, but on the East Avenue section, which is 3,760 feet longer than any of the others, the pulleys have 12 and 14 grooves. The power is transmitted from the line shaft drum by "stevedore" manilla ropes, to the 26 feet pulleys on the cable drum shaft. The cable is $1\frac{1}{4}$ inch, Lang lay, 6 pieces of 19 strands each over a hemp core, and was made by the John A. Roebbling Company.

The cable tension device is one of the most interesting features of the whole plant. It is the design of W. B. Upton, chief engineer of the road, and was designed especially with a view to remedy the surging of the cars by means of an automatic variation of the tension. It was tried on the Seventh street road for several months with entire success, and all three of the cables in the new power house are fitted with it. The tension carriage is also Mr. Upton's design.

The principle of the device is a weight, suspended between lever arms, in such a way as to bring the tension



NAVY YARD CAR HOUSE—CAPACITY 250 CARS.

Kansas City, consulting engineer, and the construction was carried out under the supervision of D. S. Carll, erecting engineer.

The driving plants for the three cables at the power house are entirely independent, and by means of friction clutches any cable may be operated by either of the engines without regard to the others. The total length of the 15 inch drum-shafting is 95 feet. The cable drums are 14 feet in diameter, fitted with Walker differential rims, which, in the Seventh street power house, have given wonderful service, and after two years wear were measured but a short time ago and failed to show a wear of 1-32 of an inch. The cable drums are of 6 grooves each and are both operated by a rope drive, an entirely new departure in cable construction. The pulleys on the line shaft are 9 feet $8\frac{1}{2}$ inches, and those on the drum shaft are 26. On the West Avenue and Fourteenth street sections the line shaft drums have 7

heavier or lighter on the levers, as the tension is heavier or lighter on the cable. The accompanying cut fully illustrates the working of the tension device. The grip is also the Upton patent, $15\frac{1}{2}$ inch side jaws, lined with cast steel dies.

The cable speed will be 9 miles per hour.

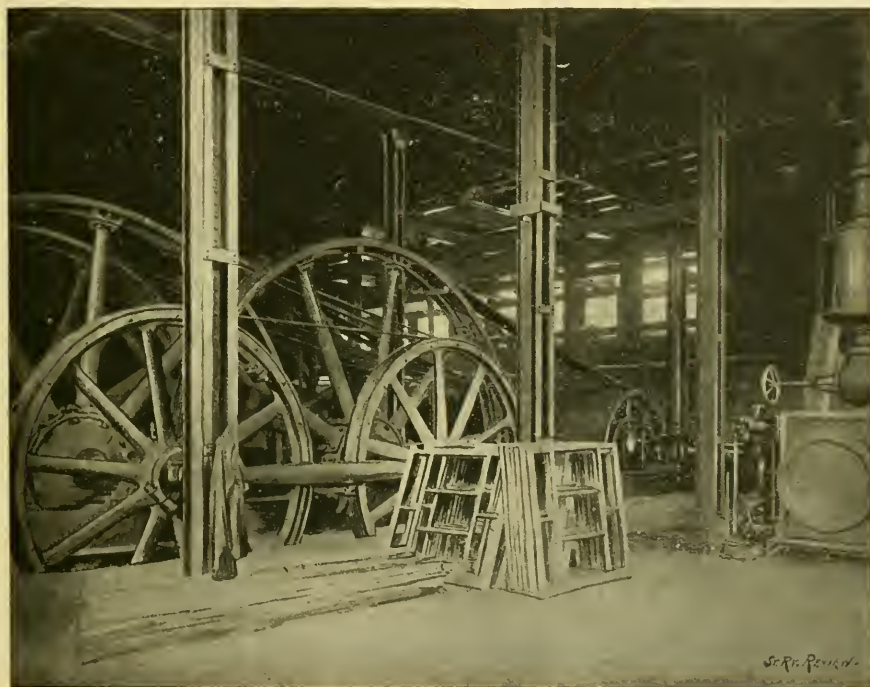
The contract for the road bed was given to E. Saxton, of Washington, who has had a wide experience in that line of work, and who is one of the most prominent cable builders in the country, having constructed in Kansas City, the Grand avenue and Fifteenth street, the Grand avenue and West street, the Holmes street and Loop Line routes, the Seventh street line in Washington, D. C., and the Eleventh and Thirteenth street lines in Tacoma, Wash.

Work on the road was begun in May of 1891, and finished in July, 1892, but the construction was not pushed during the whole time, there being some months

when no work was done. The dimensions of the conduit are shown in the accompanying cuts. The girder rails rest on cast iron yokes, furnished by the Smith & Vaile Company, as were all the other castings used on the work. The weight of the yokes was 345 pounds. They are imbedded in the cement of the conduit, which was made by the following formula: 1 barrel best Portland cement to 13 cubic feet of sand and 22 cubic feet of broken stone. The rails are in all cases laid flush with the surface of the pavement, offering no obstacle to vehicles, and the track is paved with asphalt or Belgian block, according to the paving of the street through which it runs. The 14-inch pulley wheels are placed at intervals of 31 1/2 feet. The slot rails are Johnson's pattern, size, 6 1-16 inches, and weight, 60 pounds. The

machinery, so the last car leaves each end of the route at 1 o'clock a. m., and the first starts at 5. The grip cars are on Stephenson trucks with Baltimore gear, and the trailers on Baltimore trucks. Cars are switched at the ends of the line, no turn tables being used.

The power house was designed by W. C. Root, of Kansas City, and was placed in the hands of J. E. and A. L. Pennock, contractors, of Philadelphia. All of the architectural iron work was furnished by the Champion Iron Company, of Ohio. The work was greatly delayed by the insecure ground, which necessitated the sinking of piles for the masonry foundation, and by bad weather during the winter, which hindered the brick workers. Even now the house is by no means completed, but enough has been done to enable a roof to be put over the



INTERIOR POWER STATION WASHINGTON & GEORGETOWN CABLE PLANT.

pulley wheel pits are on the level of the floor of the conduit and are drained as is the rest of the conduit, by direct connection with the sewer main.

The cars are operated with a grip and single trailer, or with two trailers in the crowded hours of the day. The 70 grip cars were manufactured by the John Stephenson Company. They are 14 feet long, and have a seating capacity of 20. The 180 passenger cars are from the American Car Company, St. Louis. The closed cars have a seating capacity of 32, and the open cars will carry 40. A strong effort was made by the public to have an all-night schedule enforced on the line, but it was claimed that 3 hours was the least time that would suffice for the nightly overhauling and repairs to cable and

machinery, and the finishing touches will have to be given to the place while the plant is running at full capacity.

The Washington & Georgetown Street Railway Company was organized in May of 1862, using a very poor quality of horse power on bob tailed cars. It has grown constantly with the growth of the city, its improvements keeping well abreast of the times, in spite of occasional adverse Congressional criticisms to the contrary. The Congressional provision for the change in motive power was made just two years ago from the 6th of the present month, and was a very short time for the accomplishment of such an undertaking, but by constant, steady work the change was made and the first car was run over the line on the last day of the two years time

limit allowed by Congress. The present officers of the road are Henry Hurt, president; C. M. Koomes, secretary and treasurer; and C. C. Sailer, superintendent.

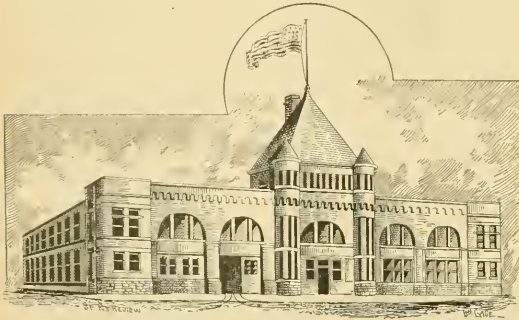
This brief description would not be complete without paying honor to the man to whom more than all

enterprise. That man was President Hurt, and the readiness with which his company authorized this large expenditure, and the leaving to him for decision of so many important matters, are tributes of confidence of which any man may justly feel proud.

THE improved English cable recently put in service on the Kansas City Cable Road, stranded after running five weeks. American made cables usually last upwards of nine months on the same line.

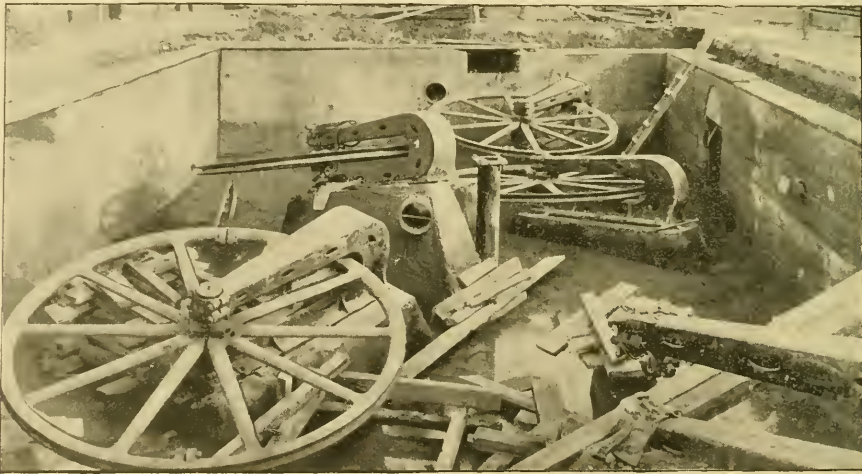
A LADIES' seminary and the usual complement of pretty girls, that are to be found in all New England towns, seem to have been too much for the boys operating the electric road in Andover, Mass. Superintendent Norton has been obliged to issue a special bulletin with "Flirting" for the text and "must be stopped" for the application.

IN recommending "steam trams" for suburban and smaller town uses, the Railway Times, of London, takes occasion to defend their safe operation, as against the present means of conveyance in the places where severe



MT. PLEASANT CAR HOUSE.

others, is due the splendid system the city of Washington now enjoys. President H. Hurt, is a self made, but thoroughly well made man in the best sense of the word,



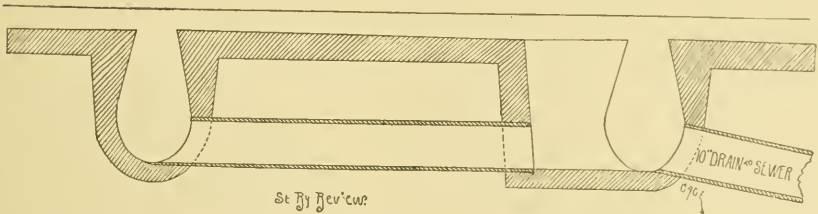
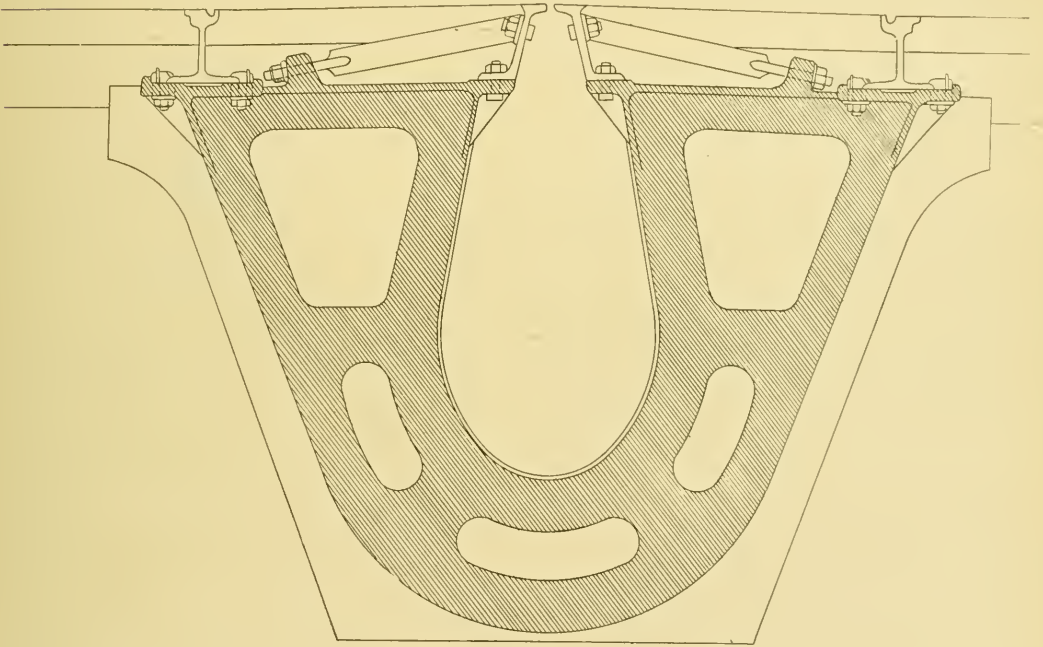
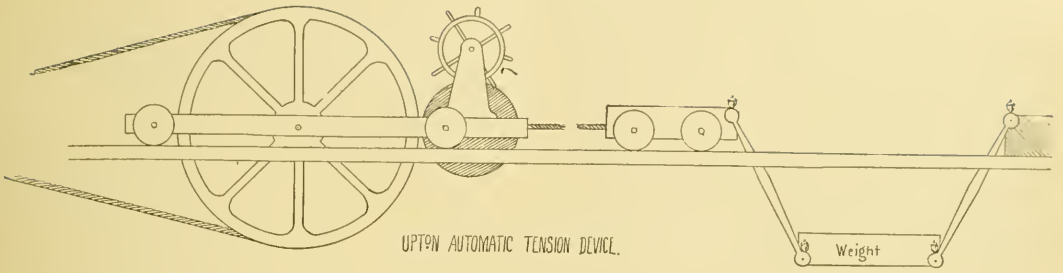
VAULT AT CORNER PENNSYLVANIA AVENUE AND FOURTEENTH STREET FOR TURNING CABLE INTO POWER HOUSE.
(NOW COVERED WITH ASPHALT PAVING.)

and one whose sincerity, integrity and high sense of honor are beautifully blended with a genuine modesty, which persistently refuses to take any special credit to himself. He gallantly says: "In a special way I would be gratified to see due credit for planning the road and buildings, and for superintending the construction and erection thereof, given to our able engineers, architects and contractors, to whose skill and efficiency the company is indebted for a magnificent piece of work."

Nevertheless there was one man upon whom rested the responsibility for recommending the expenditure of three millions of money, and the selection of plans and the best men to carry them out to completion, all of which involved the ultimate success or failure of the

prejudice exists. It says—"For, compared with a carrier's cart, such as it exists in the more remote parts of the British Isles, the lighter "wild-cat" railway over a shaky trestle-bridge in the Far West of America, is a paragon of safety."

WILLIAM BARAGWANATH & SON, 54 West Division street, Chicago, report the demand for their feed water heaters on the increase. During the month of July they shipped one 1,000-horse-power to Duluth, Minn., for the Duluth Street Railway Company; one 100-horse-power for the St. Joseph and Benton Harbor Street Railway Company and one 300-horse-power to the Chicago City Railway Company.



See Review

WASHINGTON AND GEORGETOWN CABLE RAILWAY.

Upton's New Tension Carriage and Tension.—Cross Section Track Construction.—Connection of Conduit with Sewer.

THE DISPOSITION OF MANURE.

If there is any one particular substance that sits as a nightmare upon the superintendents mind, that gives him worried days and sleepless nights, it is the question of disposing of the most prominent product of his stables—that is to say the manure.

The Chicago roads have perhaps as difficult a time as any to get rid of the incubus and many are the means employed and many are the failures of schemes advanced to cheaply, expeditiously and hygenically put the product of the stables out of harm's way and satisfy the management, the stockholders and the health commissioners.

The Chicago City Railway Company once tried the furnaces as a crematory with a powerful blower to assist in the combustion. This, however was not a glowing success, and the 20 loads daily of manure were carted to the railroad and shipped.

The West Chicago Railroad with 30 loads to dispose of daily is by 10 loads to a greater disadvantage. The carting method has here been in vogue and Superintendent Nagle has even advocated the purchase of a swamp farm down in Indiana where the refuse may be dumped.

Although all of these methods have had their disadvantages, as related in the pretext, they have been the only available methods, until the one described here was hit upon, and which may be the 'very thing.'

Some time ago, when Jas. S. Kirk, the great soap millionaire, was out west, he saw the process of hay baling, so widely used out there for convenient shipment of 'hoss bread.' This set him to thinking and the question suggested itself to the observer, that manure might be disposed of in the same manner. On Mr. Kirk's return to Chicago, the experiment was tried at the stables of the soap factory.

THE STREET RAILWAY REVIEW, with an eye to the use of the bailing device in street car stable, interviewed Mr. Kirk on the subject.

"We use," said Mr. Kirk, leading the interviewer to a room back of the barn, "an ordinary hand hay-baler, made by the Champion Company of this city. This press cost \$40, but horse-power machines for heavier work are proportionally cheap, and hydraulic presses could be used. These would cost from \$75 to \$400. It costs me 2 cents per bale, this expense being for wire, on account of the acid properties of the chemicals, galvanized iron must be used. I have no question in my mind but that manure may be made a commodity. My own bales go to my Wisconsin farm, and as there is no smell, it can be corded up and left until some convenient time. I use hay for bedding, but I think shavings can be pressed as readily.

I have had several offers lately, of free shipment and labor in return for the manure, but as I find a use for all of it, I do not care to dispose of it."

A dozen bales were corded up near the door, and although a hot sun had just been shining after a shower, no effluvia arose from the bales.

Manure thus baled can be loaded on a gondola car to a capacity of 60,000 pounds, whereas loose only 20,000 can occupy the space.

One of the bales referred to above weighs 275 pounds and occupies a space 18 inches by 28 inches by 4 feet; two men feed the press and supply the power.

The West Division Railway Company has already begun investigation, and the only wonder is, that the matter has not been broached long ago, by the men who were most vexed by this exasperating detail of economy.

WOODS TROLLEY WIRE CLAMP.

NO little difficulty has been experienced by electric railway builders in securing the numerous small devices needed in first class construction, of a sufficiently perfect model to eliminate aggravating annoyances. The larger matters have received the careful attention of expert designers, while too often, the little details have in a manner shifted for themselves, not infrequently finding a common level with the scrap pile, after brief use. Time

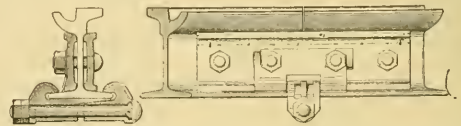


and experience is changing this, however, and such things as pole ratchets, strain insulators and trolley hangers are getting their share of attention.

A recent improvement in the latter class is shown in the illustration of Wood's Trolley Wire Clamp. It is of the simplest possible construction and seems to have been planned with the purpose of making it a universal clamp; it will hold any size of trolley wire, and can be used with any of the usual insulating bells. It offers no projections to cut and wear the trolley wheel, no flashing or sparking whatever takes place as the wheel passes the clamp. It is made by the Electrical Supply Co., cor Michigan Ave. and Randolph St., Chicago.

BROADWAY CABLE RAIL JOINT.

A SPECIAL joint has been laid on the Broadway Cable track, New York, designed by the late A. D. Whitton, and made by the Johnson Com-



pany. In addition to the fish plates a supporting joint of malleable iron is used, but as shown, without punching the base of the rail.

ELECTRICITY FOR STEAM ROADS.

NO little interest centers around the application of electricity, for moving the passenger trains of the Baltimore & Ohio; through its new tunnel, to the main depot in the heart of Baltimore. Although electric cars are running on nearly 50 per cent. of all the street railways, it has never been used for hauling trains on a steam road. The nearest approach is a few instances where freight is hauled in factory yards, and these in a comparatively small way.

Under the new regime the passage through the tunnel will be relieved of the extreme unpleasantness of smoke and gas, which render similar tunnels in other cities almost unendurable. The result of this enterprise, on the part of the B. & O., and the General Electric Company, who have taken the electrical contract, it is to be hoped, will lead to similar improvements on even larger scale, elsewhere. The last monthly bulletin of the General Electric Company contains the following:—

DESCRIPTION OF PLANT.

"The power station of the plant is to consist of a one-story brick building with basement under the engine room, and with engines and boilers under one roof. This building will be equipped with a steam and an electric generating plant of about 2,200 horse power capacity. The engines and dynamos will be arranged to be coupled directly together.

The motive plant is to consist of three 80-ton electric locomotives, each capable of a continuous draw-bar pull of 32,000 pounds. These locomotives are to be built to attain a speed of 30 miles per hour. The distance over which the locomotives will operate is about $2\frac{1}{2}$ miles, and the calculated time of transit is just six minutes.

From the foregoing data it can readily be seen that the plant will be able to handle all the traffic of the Baltimore & Ohio Railroad at that point at the present time, with a large allowance for increase in the future."

OTHER ROADS.

The fact of the adoption of electricity as above stated seems to have started a string of wild statements in the columns of certain would-be electrical journals, whose editors seem to have drawn chiefly on their own imaginations, rather than official headquarters for information; and have even had several prominent roads under contract to substitute the new found power for steam locomotives. While many of the best railroad and electrical engineers concede this as the ultimate result and greatly to be desired, the problem has not as yet been worked out to a practical, commercial point; and these gullible enthusiasts do more harm than good in this demonstration of their unreliability. They have swallowed whole the ingenious fictions of the summer newspaper reporter, in whom there is little truth, and whose chief end is to hatch out canards.

A recent instance of this was the case of the New York, New Haven and Hartford Railroad, which has

been quoted all over the country as having completed arrangements for equipping two of its four tracks between New York and New Haven with electricity. The actual facts are set forth in the following letter:—

New York, New Haven & Hartford Railroad Co.
Civil Engineer's Office.
NEW HAVEN, Conn., July 28, 1892.

Editor Street Railway Review:

DEAR SIR:—Replying to yours of the 25th, in regard to the report that this company is to equip two of its tracks between New York and New Haven, to operate with electricity. This is a mistake, and I cannot imagine for what object the report was started. However, there has been no intention on the part of the company, so far as I know, to use electricity for a motive power on the line of its road, at least for the present.

Yours truly,

F. S. CURTIS,
Chief Engineer.

Considerable has also been printed relative to electricity on the Kings County Elevated, in Brooklyn, which "is changing to storage battery system."

KINGS COUNTY ELEVATED.

The following letter, addressed to the editor of THE STREET RAILWAY REVIEW, under date of July 28, from the general manager of that company, tersely sets forth their position in this matter:

"Relative to the matter of substitution of electricity over steam power, in the moving of trains over our elevated road, I would say that this company is willing to make the trial with 'storage battery,' provided success is assured, and the cost below that of steam.

"We believe that each train should be independent of the other, that is, each train should be supplied with its own power, to avoid delays, in case of break-downs or blockades, where it becomes necessary to cross from one track to the other, and run in opposite directions. We have been approached by a number of electricians, all of whom claim to have 'just the thing,' but as none of them seem satisfactory to us, we believe the proper motor has not yet been made."

ROBBERS RAISE \$5,000.

AT the offices of the Sea Shore Electric Railway, at Asbury Park, New Jersey, one morning recently, the night watchman was found beaten and bound, the safe door blown open, and \$5,000 missing, which were the receipts for several days of heavy traffic.

PARTICULARS are published in the Spanish papers, of the underground electric railway project for Madrid, due to Senor Garcia Faria. There would be four principal lines, which, in addition to the termini, would each have five or six intermediary stations. Passengers would ascend from and descend to the railway by means of electric lifts. The gradients would not exceed 0.025 metre, and the curves would have a minimum radius of 150 metres. Motive-power would be supplied by hydroelectric stations erected on the banks of the Tagus and the Gamara, which would produce a working-force of 4,410 horse-power. Passengers would be carried from 8 a.m. to 1 a.m. The remainder of the twenty-four-hourly period would be devoted to the transport of merchandise.

NEW PUBLICATIONS.

THE Q. & C. company have mailed their friends a neat little folder, containing views of the principal World's Fair buildings.

THE report of the ninth annual Convention of the Street Railway Association of State of New York, is at hand. Seventy-two companies are now members.

ON the authority of a prominent member of the syndicate, we are able to state that the rumor of the absorption of the Los Angeles cable by the Electric company, of Los Angeles, is without foundation. The Electric people have tried to buy bonds, but the Cable management do not choose to sell out.

THE Popular Electric Monthly, issued from 1522, Monadnock Building, Chicago, under the management of G. O. McKibben, is the latest of several dozen of popular Electric publications. We sincerely hope that there is a *raison d'être* and that volume II may appear on its cover. The aim of the magazine is entirely elementary, and without doubt there is room for many such, as the rising generation becomes interested in electrical phenomena.

THAT greatest encyclopedia of railroad statistics, "Poor's Manual," has just issued its 25th annual number, and is even more complete and extensive than ever. For street railway men a separate Manual will be issued, devoted to a short history, statements and list of officers, so far as it has been possible to obtain them, of the leading street railroad, on the continent. Also an "Introduction" to the Manual, containing an epitome of railroad building, mileage and operations. Price, 25 cents. Manual, \$6, H. V. & H. W. Poor, 70 Wall Street, New York.

ALTOGETHER the most complete, and in fact the first exhaustive treatise on street railways ever published, is the handsome volume just issued and entitled "Street Railways, their Construction, Operation and Maintenance." Its author, C. B. Fairchild, editor of the Street Railway Journal, needs no introduction to railway men and has followed out his subject in the same thoroughly pains taking manner which has characterized his editorial labors on the Journal.

The subject is a much larger one than is generally supposed, and even railway managers will be surprised at its range and extent. The work not only consecutively takes up every department of street railroading, from track repairs to the general office, but follows out details with a faithfulness that places the street railways of the country under great obligations to Mr. Fairchild. The text is presented in concise and entertaining style and illustrated on almost every one of the 426 pages. The book is a most valued addition to street railway literature. Price, \$4. Street Railway Journal, New York.

JOHN B. PARSONS, general manager of the West Chicago Street Railway, has returned from a ten day's trip in Philadelphia, where he was warmly welcomed by a host of old time friends.

HENRY C. PAYNE.

THE Vice President of the Villard Syndicate, at Milwaukee, was born of good old New England stock, in Ashfield, Franklin County, Massachusetts, on November 23, 1843, hence comes the family tradition that he is 48 years old.

Mr. Payne's school days were passed at his childhood's home, finishing his education at the same place. His early business training was acquired under the tuition of practical men in various mercantile lines. After this he was enaged in business in the East.

In October, 1863, Mr. Payne, then 20 years of age, removed to Milwaukee, where he has resided since, and is counted among the men who have made Milwaukee the lively business town and modernly equipped city that it is.

On his arrival in the city, Mr. Payne entered the extensive business and political career which we have need only to outline.

In the capacity of president of the Milwaukee & Northern Railroad Company, he is called brother by our street road contemporaries. The Wisconsin Telephone Company look up to him as head of that important organization, while his voice is heard in the commercial councils of men that shape the policy of the First National Bank. Besides this wide range of executive duties he is connected with a number of other financial enterprises.

From his interest in local politics, Mr. Payne has been twice delegate-at-large to the National Conventions of the Republican party; once at Chicago in 1888, and at Minneapolis in 1892. He has also served his political affiliation as Chairman of the State Republican Organization, and is now for the third time an active member of the committee that has shaped its national policy—once as chairman of the executive committee. In fact, in the less than thirty years of his active life, perhaps, no other man in Milwaukee has been more prominent in every phase of public spiritedness.

Mr. Payne now resides at 586 Astor street, Milwaukee, in the full enjoyment of his well-earned honors and affluence.

A POLITE colored man in Orange, N. J., recently became possessed of a desire to sneeze while riding on a street car. To avoid offence, this sensitive individual thrust his head out of a window and came in contact with a center pole, during which connection his skull was seriously injured. He is now in the hospital.

A NEW use for horses crowded out of service by electric cars has been discovered. The Salvation Army has organized a cavalry corps, and under the training of ex-cow boys some dashing charges may be looked for.

The editor of the Pawtucket, R. I., Times, has evidently discovered a cool place. "The era of open street cars has brought to the masses all the coolness, exhilaration and enjoyment that was once at the command only of the privileged few who own their own carriages."



HENRY C. PAYNE,

Vice President, Milwaukee Consolidated Street Railway Company.

THE SCHAFFER HYDRAULIC WHEEL PRESS.

RECENTLY, when in the very complete repair shops of the Consolidated Street Railway company, at Portland, Oregon, we noticed a wheel press at work which was both rapid in action, simple in construction and of ample power. Examination showed it had journeyed a long distance to reach its place of occupation, having been made by the J. T. Schaffer Manufacturing Company, Rochester, N. Y. As every road operating any considerable number of cars needs a wheel press among the first requirements of a repair shop, managers will be interested in the illustration herewith of the Schaffer press for removing and pressing on wheels, pinions, gears and amature hubs of electric motors.

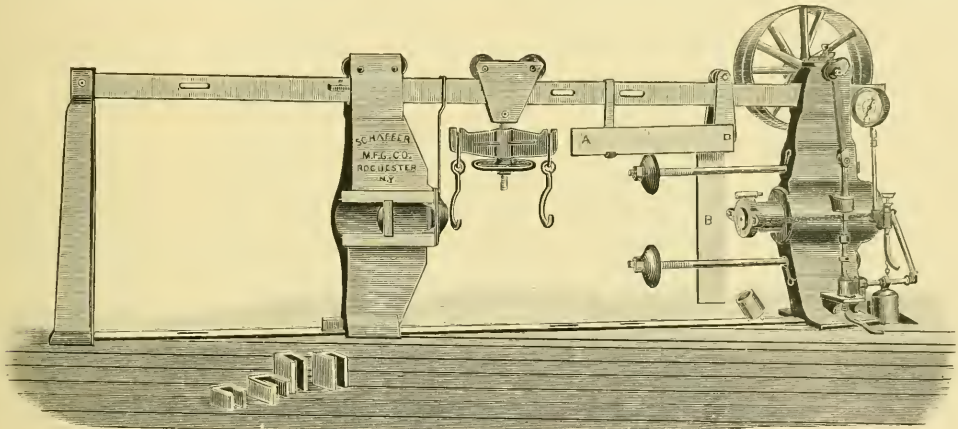
All ordinary demands are provided for in two sizes, one of 60 tons and the other 80 tons pressure, although both presses are tested to 20 tons additional. They may

“Values show considerable increase over last year. The increase has been from 10 to 15 per cent, and is applied 1½ blocks each side of the line, and two blocks beyond the terminus. There has been no general raise in valuation in any section except on street car extensions. Much complaint has been made of the valuation of so-called farm land. I know of no such in the city limits. I will venture to say that there is not a 20 or a 40-acre tract in the city that could be sold for a farm or that could be bought for a price that would pay the purchaser one-tenth of a cent on any crop that could be raised on it.

This increase, all things considered, is flattering and the good feeling of values is undoubtedly due mainly to the increasing desirability by electric traction.”

The only danger in general, attendant upon real estate booming, by means of rapid transit, is losing sight of economy in routes by the often competing lines.

Several sad instances of this kind are well known, but the fault lay in the over-doing, not the doing.



SCHAFFER HYDRAULIC WHEEL PRESS.

be worked by hand or belt power, as desired. They are equipped with the “Schaffer Pump,” standard gauge, sealed tanks, return weights, improved cylinder packing and best fittings throughout. The bars A and B, are of 2½ inch steel. These presses are giving excellent satisfaction.

REAL ESTATE AND RAPID TRANSIT.

TAKE a sufficient quantity of useless farm land, introduce at proper intervals tracks and rapid transit, stir the mixture with a little brains and vim, adding all the while printers’ ink until the right color is obtained, and the result is money, a town, happier homes and better people. Not only is this true but the same agent of electricity acts as an equalizer, and instead of the enormous values of central property a fairer value is obtained for more remote land and the greatest good accrues to the greatest number.

The recent report of the city assessor of Minneapolis gives a few facts and figures that are of the highest interest to all real estate and real estate railway builders.

VITRIFIED BRICK FOR FILLING.

THE street railway company at Springfield, Mass. has bought 30,000 vitrified brick, at about \$30 a thousand, with which to fill the crevice between the rails and the paving. This will be done as an experiment on a number of streets. The supervisors heartily approve of the scheme, knowing the inconvenience caused to drivers by the crevices. The supervisors have granted permission to the company to replace flat rails with those of T pattern, on several lines.

THOMAS C. NASH has been made superintendent of the power stations of West Chicago Street Railroad. Mr. Nash was in charge of the cables of the Chicago City Railway for 8 years, and for the past 3 years has been connected with the John A. Roebling Sons’ company looking after their cable ropes and collecting statistics of the various cable railways of the United States. The experience he brings to his new position well fits him for the responsibilities, and when the two new plants now building are finished will have a very demanding position.

A COURAGEOUS UNDERTAKING.

The Tacoma and Steilacoom Electric Line.—Thirteen Miles Through Giant Forests and Deep Canyons—Difficult Construction, but Successful Operation—Sending Power Eleven Miles from Station.

ANYONE who has never ridden through the mighty forests of Washington can poorly form any commensurate idea of their vastness and density. Giant firs and cedars, three and four feet in diameter at the base, rise majestically to a height of three hundred feet, and so numerous are they it seems as if an additional tree could scarce find standing room. The warm climate and exhaustless moisture furnish unequaled growing weather the year 'round. As one looks into these woods vision is obstructed at a short distance by what seems a solid wall of trees.

But it was through no less impregnable a forest that the Tacoma and Steilacoom Railway Company chose its course, and taking the policy of the steam roads of the far West, followed a river canyon as far as possible. At the time of its construction it was the longest continuous electric line in the country; now it divides that honor with several others.

It was in August, 1890, that construction was commenced from the city of Tacoma to the town of Steilacoom, Washington, on the line that in many respects takes the lead among electric roads, especially in the character of country traversed. Its completion demonstrated that such lines are a great factor in the development of a new country, and are a success both as to operating details and as a business proposition. The Tacoma & Steilacoom Railway Company awarded the contract for the construction of their road to the Northwest Thomson-Houston Electric Company, of St. Paul, Minn., including the grading and laying of the track. The work was begun in August, 1890, and was completed and ready for operation on April 1, 1891. The road commences at corner of K and 11th streets, in the city of Tacoma, and runs west and south to the town of Steilacoom, a distance of 13 miles. The country between the two towns is very rough and covered with a dense growth of giant fir and cedar trees, which had to be cut down for the right of way and the immense stumps blown out with giant powder. Hills were cut through in places to a depth of 17 feet, and corresponding gullies filled up, and creeks

crossed on long trestles making a very expensive road-bed. The track is laid with 40 lb. tee rail on fir ties, hewn from timber cut off right of way. The poles are all of cedar and were cut along the line. Ten miles of the road have bracket poles, and the other three in corporate limits have cross suspension. Leaving K street the car runs west through West Tacoma, a distance of 2 miles, to the power house. This section of the city two years ago was a forest. Today it is the home of 3,000

people, and has 10 miles of graded streets, a fine school house, stores, handsome houses and water and electric lights. The power station and car house is a frame building on brick foundation, 120x125 feet, including engine and dynamo house, 70x70 feet, two stories in height, the upper story used by the offices and by the employes; car barn 55x120 feet, with capacity for 15 thirty-foot cars, and boiler and fuel room 50x70 feet, the building being wired for 50 incandescent lights. The steam plant consists of one 250-horse-power tandem compound non-condensing McIntosh and Seymour engine, and two 125-horse-power return tubular Erie steel boilers, with feed water heater, purifier, injector, deep well and boiler pump.

The Electric plant consists of three 80-horse-power Thomson-Houston railway

generators. The switch-board is made of black oak, the instruments being connected with polished copper rods on the front of board, presenting a very handsome appearance. The rolling stock consists of seven double-truck motor cars, 30 feet over all, each equipped with two 25-horse-power T.-H. railway motors, and two open cars, each equipped with two 15-horse power water proof motors. The dynamo room at the power house is finished in oil and has a travelling crane of ten tons capacity, built in Tacoma, after designs by Mr. Livermore, engineer in charge of construction. Leaving the power house the road runs one mile west through an immense cut 17 feet deep and 1200 feet long descending an 8 per cent grade 1500 feet long. Then turns to the south and west and runs several miles



FOREST SCENE ON THE STEILACOOM ROAD.

through a dense forest of immense fir trees until after descending a horseshoe curve on a 6 per cent grade for half a mile, the country opens out to a beautiful prairie dotted with dwarf firs and scrub oaks and covered with flowers and vines. Crossing this prairie for a mile the road suddenly plunges down into an immense canyon following the contour of the side on a 5 per cent grade for over a mile, making a most beautiful and romantic ride. At many points it was necessary to blast a roadway out of the mountainside, and as the car glides along its narrow path, winding around the jutting points of rock the tree covered mountains above afford a striking contrast to the dashing water an hundred feet below. The canyon ride is one never to be forgotten. Reaching the bottom of the canyon the river is crossed on a trestle 300 feet long, and the road winds along its banks for a mile and a half, at last abruptly turning a point opens out onto Silver beach and follows the shore of Puget Sound to the quaint old town of Steilacoom.

The view here is magnificent. The car runs along only 20 feet above high water giving the passengers a lovely view of the sound with its deep blue waters shining like a mirror, its lovely islands, and in the background the grand rugged summits of the Olympic mountains, always snow-covered and beautiful. Then up a 7



TRESTLE AT ENTRANCE OF CANYON.

per cent grade into Steilacoom, the oldest town on Puget Sound, the early rendezvous of the Hudson Bay Company's employes and a place of refuge for the adventurous white settlers during Indian wars. The road runs through the center of the town on a fine graded avenue and reaches the water on Union avenue where the Company has built a handsome depot and restaurant. This road leads all others in distance to which power is trans-

mitted from station, the Steilacoom end being 11 miles from the power house. This is successfully accomplished by a complete system of feeders and by using the waters of the sound and of a creek for a ground return. The construction and equipment of this road was done under the sole supervision of S. B. Livermore, who has been an engineer of the railway department of the Thomson-



A LONG CUT ON GRADE.

Houston Electric Company since March, 1889. The road having reverted to the Northwest Thomson-Houston Company by reason of failure of local parties to carry out contract, Mr. Livermore has remained in charge as General Manager, in the interests of the Construction Company. Although the road was not expected to do much for the first three years, under his careful management it is now on a paying basis and its prospects most flattering. Mr. Livermore is a thoroughly practical, progressive man, and with his charming wife are prominent in Tacoma society. The other officers are H. M. Bylesby, president; H. W. Goode, vice president; Robert Sale Hill, secretary and treasurer.

Arrangements have just been completed by which this interesting line becomes a part of the Tacoma Railway & Motor Company's system.

ENOUGH TO START AN IRON MINE.

A VISIT a few days ago to the extensive iron works of the Walker Manufacturing Company, Cleveland, afforded a sight which has never before been seen. More than 165 car loads of finished work, for the New York cable roads, is piled up in great stacks, to such an extent as to occupy all the available room even in these great shops. Imagine a line of completed work over 300 feet long, 25 feet wide, and in places 30 feet high, stowed away as compactly as possible, and including sections of immense 40 rope drive wheels, differential rims, pillow blocks weighing several tons each, shafting in 30 foot sections and 16 inches diameter, shaft couplers, bed frames large enough to furnish a foundation for a good sized house, sheaves, and a great variety of other parts. It is the largest amount of cable machinery ever massed in one factory at one time, and is a most interesting sight. The nicety of finish and the accuracy of adjustment is wonderful.

STREET RAILWAY LAW.

EDITED BY MR. FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Injury by sudden Starting of Car.

The conductor of a street-car must see that a passenger entering the car is in a place of safety before he gives the signal to proceed, and the passenger is entitled to damages if he is thrown down and injured by the premature starting of the car.

Maynard, J., delivered the opinion of the Court:

There was sufficient evidence to go to the jury upon the issue of the defendant's negligence. The jury could properly give credence to the testimony of the witness Kerkow, who was in a better position to know just how the accident occurred than any other person examined upon the trial. If she was to be believed, the conductor signaled to the driver to go ahead before she had reached a place of safety upon the car, with the plaintiff's five-year-old child, and the car immediately started with a jerk, which threw her upon the seat, and the child into the street, and under the car, where his right leg was so crushed that amputation of a portion thereof was necessary. The car was an open summer one, with seats running crosswise, and a place between the seats at the sides for the passengers to enter by means of steps running the entire length. If the car started as the plaintiff's child and its attendant reached the topmost step, there would be danger that the sudden motion imparted to it, while they were in that position, would throw one or both of them to the ground, or otherwise cause them injury, and the defendant owed them a duty in this respect which the jury may have found was disregarded by their agents and servants, who then had charge and control of the car and its movements.

Earl, Ch. J., dissenting:

Miss Kerkow was the sole witness on the part of the plaintiff to prove the circumstances and occasion of the accident. Her testimony is clear that she was in the car with George before it was started. She does not state what occasioned the jerk or how violent it was. There is no evidence that the horses were mismanaged, or that the driver was careless in starting them, or that he started them with more energy than was necessary at the time and place. It is difficult to believe that the horses could start a heavy car with a severe jerk. It is true that she fell down in her seat and that George fell out of the car; but we do not think that that circumstance furnished evidence, of itself, of culpable want of care on the part of the driver of the car. When a car is stopped long enough to permit a person desirous of becoming a passenger to safely enter it, he is then in a safe place, and must take some care of himself so that he will not be thrown down by any ordinary management of the car. Upon this evidence, as it now appears, we are unable to say that there was any negligence which can cast the pecuniary consequences of this most unfortunate accident upon the defendant.

(N. Y. Ct. App. *Akersloot v. Second Ave. R. Co.*, 15 L. R. A. 459.)

NOTE.—It is the duty of the driver of a horse car, when signaled to stop, to ascertain what passengers intend to alight at that place, to wait a sufficient time to enable them to alight in safety, and to see and know that no passenger is in the act of alighting or is otherwise in a position which would be rendered perilous by starting the car. *Sup. Ct. Ala. Birmingham U. R. Co. v. Smith*, 8 So. Rep. 86; 1 STREET RAILWAY REVIEW, 50.

The fact that a passenger is evidently very young, is a circumstance that must be taken into consideration by the carrier, in the discharge of its duty to stop the car a sufficient length of time to give the passenger reasonable opportunity to alight in safety. *Sup. Ct. Mo. Ridenhour v. Kansas City R. Co.*, 14 S. W. Rep. 760; 1 STREET RAILWAY REVIEW 180.

A street railway company is not excused from liability to a passenger for injuries from the sudden starting of the car, while he is alighting therefrom, by the fact that it was the ordinary and usual way of the driver's conducting his business, to start his horses suddenly and violently with a whip. *Sup. Ct. Mich. Britton v. Grand Rapids St. R. Co.*, 51 N. W. Rep. 276; 1 STREET RAILWAY REVIEW, 359 —ED.]

Street Railways—Charter Powers—Trolley Wires—Injunction.

A street railway will be enjoined, at the suit of property owners along the line of the road, from the erection of the trolley system of motive power, where its charter authorizes a single or double track, to be used exclusively with horse power, or where the company had constructed a city passenger railway under a supplement to its charter obtained by an Act of Assembly, which authorized only the motive power incident to passenger railways, which, as then understood, included only horse power.

Where the consent of councils necessary for the erection of the trolley system is given expressly to a passenger railway company, and where such consent is imperative by reason of the terms of its charter, such consent cannot enure to the benefit of a traction motor company operating the line without further ordinances for that purpose.

Whether the electric trolley system is dangerous or safe, or whether it is wise or unwise to permit its erection in a populous part of the city, is a question with which the courts have nothing to do, because, under existing laws, this is a matter which pertains to the city councils and municipal executive officers.

Dist. Ct. Pa. Watkin v. West Philadelphia Pass. R. Co., 49 Leg. Intel. 269.

Corporation Law—Ultra Vires—Street Railways—Trolley Motor.

A street railway company, formed under the Act of May 14, 1889, which authorizes the formation of companies for constructing, maintaining and operating street railways, for the conveyance of passengers by any power other than locomotive, whose articles of association expressly provide that "said railway is to be operated by horse power," cannot, even with consent of councils, operate its road by the electric trolley system.

Dist. Ct. Pa. Haines v. 22nd st. & Allegheny Ave. Pass. R. Co., 49 Leg. Intel. 286.

Statute requiring Street Railways to keep Streets in Repair—Lessee of Corporation formed under other Law.

A provision in a street surface railway act, that companies incorporated thereunder shall keep the portion of the street between and for a stated distance outside of the rails in permanent repair, and that upon their failure to do so it may be done by the State at their expense, does not apply to a company chartered thereunder, which is operating a street railway line as the lessee of another company chartered under a general railway law imposing no such obligation, even though the lessee may have relaid tracks in streets in different positions, or laid down an additional track.

Sup. Ct. N. Y. *Gilmore v. Utica*, 29 N. E. Rep. 841

Street Car approaching Excavation. Driver proceeding on Signal from Foreman. Injury to Workmen.

It is not negligence for the driver of a horse car, who brought his horses to a stop on approaching an excavation, on the edge of which a section of sewer pipe had been placed, so close to the rail that the car in passing struck it, to proceed on a signal from the foreman in charge of the work; and the horse car company is not liable for an injury to a workman near the track who was struck by a piece of sewer pipe which was toppled over by the car.

Sup. Ct. N. Y. *Schmidt v. Steinway & H. P. R. Co.*, 43 N. Y. S. Rep. 683.

Municipal Regulations of Streets—Payments—Compelling Street Railway to relay Tracks.

A street railway which has laid its track in the streets of a city, authorized by statute to prescribe rules and regulations in regard to street railways requisite for grading, repairing and paving the street, under an ordinance reserving the right to make such regulations, and providing that in case of grading, paving, or otherwise, if it shall be necessary to relay the track, it must be done at the expense of the company, must conform the construction of its track to a regulation requiring projecting ties to be cut off, to prevent vibration injuring a pavement to be constructed, although such requirement necessitates the entire reconstruction of its track in a manner adopted by another road in the same city.

Su. Ct. Mich. *Detroit v. Ft. Wayne & E. R. Co.* 51 N. W. Rep. 688.

Location of Power House—"Adjacent" Streets—Construction of Charter.

The Charter of the Brooklyn Heights Railroad Company authorized it to construct a cable road from Court Street, through Montague Street, to Wall Street ferry, and to erect necessary power and car houses in streets, "adjacent to Montague street west of the hill" in locations to be approved by the Commissioner of City Works. The conformation of the ground was such that the grant was valueless, unless the Company should be permitted to erect its power houses in one of the streets,

parallel to and in the vicinity of Montague street. Held there being no streets touching Montague street West of the crest of the hill, that the word "adjacent" so used must be construed to mean neighboring streets.

In such case, the Commissioner of City Works having approved the location of the power house in a neighboring parallel street, and the Common Council having authorized its erection in such locality as should be approved by him, a subsequent ordinance of the Council could not operate to withdraw such consent, and render another one necessary.

City Court of Brooklyn. *Brooklyn Heights R. Co. v. City of Brooklyn.* 18 N. Y. Supp. 876.

Bridge Companies—Powers of Directions—Free Passes—Use of Bridge by Street Railway.

The provision of the Constitution prohibiting railroads from granting free passes does not apply to bridge companies, and the board of directors may grant such number of free passes as in their sound discretion will enure to the best interests of the stockholders of the bridge.

While the proviso of the Act under which the bridge company is incorporated, providing that said bridge shall not be used for railroad purposes except street passenger railways, does not create an express grant of power to contract for the use of the bridge by a street railway as an incident, which might be necessary for the accommodation of the public as well as the benefit of the corporation; but such use should not interfere with the use of the bridge by the public.

Dist. Ct. Pa., *Hasson v. Venango Bridge Co.*, 49 Leg. Intel. 264.

Use of Streets—Consent of Turnpike Company—Borough Authorities.

Consent of a turnpike company does not give a street railway company the right to construct its railway upon the bed of a turnpike road, which is also a street, within borough limits, without the consent of the borough authorities.

Pa. Ct. Com. Pls. *Steulton v. East Harrisburg Pass. R. Co.* 20 Wash. L. Rep. 447.

IN Madison, Wisconsin, the old saying that a mule never dies was beautifully illustrated the other day when a mule moted car was going down the hill on East Jackson street at a great rate, one of the poor old weather-beaten mules stumbled, fell and the heavy car plunged forward and landed directly over the animal. It was supposed that for once a dead mule would be on exhibition, but when the car was lifted from the track by a force of men, the old mule got up and looked about with a knowing air as much as to say: "Gentlemen I am a little scared but am still in the ring, and intend to be until killed by lectricity."

Law Reports, No. 5, 6, 7. issued by the American Street Railway Association has been mailed to members by W. J. Richardson, Secretary, and will be found of great value.

THROUGH AVENUES OF PALMS.

The Delightful Route of the Oakland, San Leandro and Haywards Electric Railway.

IN the year of our Lord one thousand, eight hundred and ninety-two, on the seventh day of May, there were scenes of great rejoicing all along the way from Oakland to Haywards. Old Californians who had lived in the state ever since the exciting days of gold fever, and who were to witness for the first time in their lives the operation of an electric car, came from far and near to participate in the opening ceremonies of the new road. The event was a great success and the line entered at once on a prosperous business, paralleling as it does the Southern Pacific Railroad, and furnishing for the first time adequate facilities to a large territory.

dence street, on either side of which are elegant mansions, bordered with long rows of luxuriant palms and tall eucalyptus trees, whose straight, smooth trunks and fragrant leaves stand out clear cut against a panorama of orange, fig and peach trees, and great banks of mammoth geraniums and rose trees, which latter energetically cover the sides of the houses and clamber high upon the roofs. Flowers in endless variety and profusion rise from well kept lawns of richest green and mingle their perfume with great bay trees and stately cypress. The whole picture is one of commanding beauty and loveliness and furnishes a sight which alone many times repays the traveler for the necessary time to complete the trip.



OAKLAND, SAN LEANDRO AND HAYWARDS POWER AND CAR HOUSES.

and at rates which have so largely cut into the local business of that steam monopoly as has caused the latter to curtail its car service and haul many empty coaches which formerly were crowded with passengers.

Owing to obstacles which were well understood to have been instigated by the steam road mentioned, it was at first impossible to place the Oakland terminus in the business heart of the city and at this writing the electric cars start some little distance from the main street. Public clamor, however, became so strong that the desired franchise could no longer be denied and the ordinance was passed and the line is now constructing which will give the cars the coveted access to the business district.

The road receives its name from the towns which it connects, and San Leandro through which it passes. In the city of Oakland the route is along a magnificent resi-

Passing out from Oakland, the overhead construction which has been of cross wires and side poles for a distance of three miles, the route leads out along the San Leandro road, a public thoroughfare and on which center poles and brackets replace the cross wires. In the city the rail was a 40-pound girder: the balance of the way it is a tee rail of same weight laid on a splendidly rock balasted track, spliced with heavy fish plates, and smooth and firm enough to carry a fast express train. The cars, which were made by Carter Brothers, Newark, California, are mounted on Tripp roller bearing double trucks, and are combination pattern. The inclosed body seats bear the well known name of Hale & Kilburn, Philadelphia, and are placed across the car with a good sized aisle running lengthwise between. The seats are rattan, reversible and very comfortable. The greater part of

the year the windows are removed entirely, converting the closed portion, which seats 20 passengers, into an open car. A platform at each end has side seats facing outward, the entire seating capacity of the car being 28. Notwithstanding the average speed is 20 miles an hour there is almost entire freedom from oscillation. Cars will soon be put on, whose running time will be 30 miles an hour. There are at present 7 motor cars, and during the morning and evening hours, and when picnics are being held at any of the several resorts along the line, 5 additional open trailers are hauled. On Sunday, band concerts are given and draw large crowds, who go out to enjoy the delightful air, the bright sunshine and the music.

Each motor car is driven by one 25-horse-power Thomson-Houston motor of the W. P. type. With the exception of one grade not exceeding 300 feet in length and having an ascent of only 6 per cent, the entire line is

travelers where facilities admit, and hence surprise soon vanished as to where all the passengers were destined, who filled the seats of the motor and trail cars.

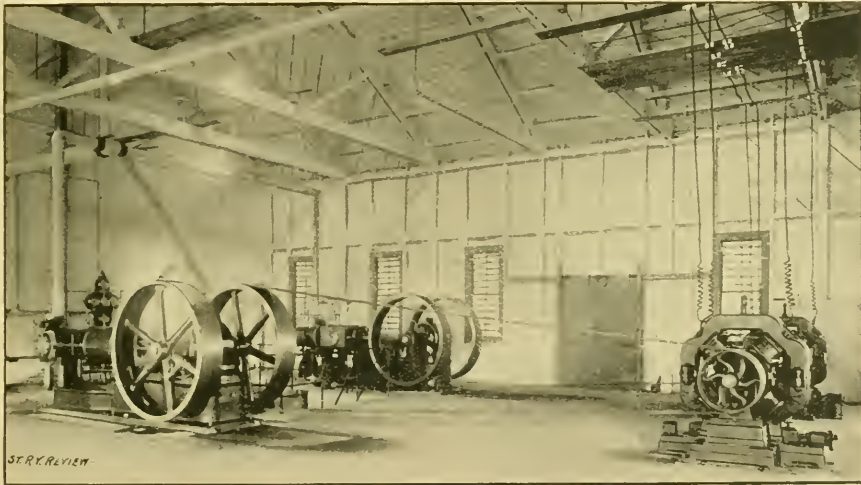
On the public highway the track occupies 8 feet at one side of the road, in no way interfering with the team travel, and as cars are moved on as regular a schedule as steam trains, the meeting points at turnouts seldom cause delay. The motorman and conductors are bright, intelligent men, nicely uniformed and attentive. As the line is so long and a continuous ride all the way, it was necessary to adopt a system of graded fares which are as follows:

Between Oakland and San Leandro, 15 cents; round trip, 25 cents.

Between Oakland and Haywards, 30 cents; round trip, 50 cents.

Between intermediate points, from 5 cents up.

Monthly tickets, good only for purchaser, are sold



MCINTOSH-SEYMOUR ENGINES—THOMSON-HOUSTON GENERATORS.

practically level and was an extremely easy one to build, as it is now to operate. The route is through the rich valley cut up into fruit ranches, which, like a gigantic garden, stretch back to the foothills, a mile distant, while on the opposite side are similar ranches with an occasional glimpse of the blue waters of the bay beyond. The entire length of track is $13\frac{2}{3}$ miles and the business between the towns named would not permit of sufficient revenue to make the investment largely profitable. But California "country" is unlike that east of the Rocky Mountains and here 10 acres constitutes a good sized fruit ranch, 50 a large one, and the man who looks out over his 100 acres of prunes, pears, almonds, apricots and peaches is a genuine aristocrat. This division of small acreage per owner means a settlement which in population is very surprising to one accustomed to the many-hundred-acre farms of the Mississippi valley. These people, moreover, are as a rule well educated, great readers, and frequent

between Oakland and San Leandro for \$3, and between Oakland & Haywards for \$5. San Leandro is 5 miles from Oakland and 8 miles from Haywards.

The power house is a neat, commodious structure of wood, located one mile from the business centre of San Leandro. Here are installed and working beautifully, two McIntosh & Seymour tandem compound engines of 140-horse-power each. Steam is supplied from three Heine tubular boilers of 200-horse-power each. Only two are in use, the third being kept in reserve. They are giving excellent satisfaction. Fuel used is coal. Two large T.-H. generators are in service, but the station has been built so as to permit of doubling the number of engines and machines. The skeleton switchboard is well placed and conveniently arranged. Current is supplied to the trolley wire at intervals of each two miles.

At a safe distance from the station is the car house, also of wood, a neat building erected the present sum-

mer. It has a capacity of 24 cars, and at one end a room for winding armatures, and a machine shop. The last car reaches the barn at 1:30 a. m.; first car out, 6 a. m.

Work was commenced in November, 1891, and carried on during the winter, numerous delays occurring owing to parts of apparatus failing to arrive, by being delayed en route from the east. but under the circumstances was pushed with very commendable speed. Frank M. Leland is the superintendent of the road, and a wide awake, energetic man he is too. The construction was entirely in the hands of the Thomson-Houston Company, of San Francisco, and was personally directed by their resident engineer, F. F. Barbour.

The extension at the Oaklands end this season will probably reach 5 miles and already the residents beyond Haywards are lifting up their voice for tracks in that direction, so that while the lines have certainly fallen to the company in pleasant places, there are still sufficient other fields on every hand to supply which will keep the Oaklands. San Leandro & Haywards vigorously building for some time to come. Twelve cars are now building and further additions are only a question of a short time, if business increases as it has from the opening day.

A NEW LINE OPENED AT SIOUX CITY.

THE Sioux City and Morning Side railway, of Sioux City, Iowa, was formally opened to the public travel recently.

About 100 people, including many of the leading business men of the city, crowded the three handsomely decorated coaches that made up the train that left the Jones street station, on the elevated road, at 4:30 o'clock. A large number of invitations had been sent out for the occasion, by President James A. Jackson. The trip out was made as far as Cleveland avenue. near Cheney's Villa, over the track of the Sioux City Rapid Transit company. At this point the track of the new road begins, and the train passed around the curve to the new rails, amid the cheers and handclapping of the party. The trip from Jones street to the end of the new line, a distance of about six miles, was made without stopping and in very quick time. The new line passes along a pretty valley to the southeast from the junction with the rapid transit line. It is two and a half miles long, and splendidly built. With equipment, which has not yet arrived, it will represent an investment of \$75,000.

PASSENGER TRAFFIC IN BERLIN.

Translated for the Street Railway Review from the *LaJournal des Transports, Paris.*

BERLIN disposes of the transportation of the 1,625,000 inhabitants within her walls in the following methods of transit: 2,626 carriages of the first class; 2,588 of the second class; 316 wagonetts; 219 omnibusses and, 1,072 street cars, of which number 86 belong to the Berlin-Charlottesburg company. 859 held by the Great Tramways company of Berlin and 127 the New Tramway Company.

The Berlin-Charlottenburg company owns 29,173 meters of track, the Great Company 243,176 meters, and the New company 50,983 meters. A total of 39,008 meters are out of the city limits.

The passenger traffic foots up the following figures: Railroads, metropolitan and suburban, 25,476,603; omnibus traffic, 25,243,203; Berlin-Charlottesburg Tramways, 4,905,630; Great Tramways, 1,440,000; New Tramways, 13,245,000; Steam tramways, 1,665,166; steam boats (number 43) 443,705, or a total of 185,379,307. These means of transit are notoriously insufficient on account of the continual increase of population and in the last few years a number of schemes have been exploited designed to remedy the difficulty. An underground road scheme was presented by the All-gemeine Electricitats Gesell and Schaft, and Siemens and Halske have devised an elevated electric with a main trunk and three branches.

INDIAN ENGINEERING is the oldest, and has the largest circulation of any weekly engineering paper in India and the East. It is ably edited by Pat Doyle, C. E., and published in English, in the city of Calcutta. Its editor has recently won a celebrated libel suit brought by W. H. Boyd and Son of the Indian Engineer.

| | | | | | | | |
|---|--|----------------------|----|----------------------|----|----|----|
| Oakland, San Leandro & Haywards ELECTRIC RAILWAY. | | HAYWARDS | | JUNE 4, 1892 - WEST. | | | |
| PASSENGER'S FARE CHECK. | | CASTRO VAL. JUNC. | | | | | |
| GOOD FOR THIS TRIP ONLY. | | SAN LORENZO | | | | | |
| <small>The conductor is required to identify this check in the presence of the passenger by properly punching out the points between which the passenger is riding, and also the amount of cash paid.</small> <small>This check is void when the point of destination herein is reached by the car, or the passenger leaves the car before it reaches said point of destination.</small> | | SAN LEANDRO | | | | | |
| | | POWER HOUSE | | | | | |
| <div style="font-size: 2em; text-align: center;">814</div> | | FRUIT VALE AV | | | | | |
| | | OAKLAND | | | | | |
| A. L. STONE, Sec. | | 5 | 15 | | 20 | 25 | 30 |
| Form A A | | | | | | | |

As the rates of fare are so diversified, ranging from 5 to 30 cents, the company have adopted a novel method of fare collecting. When fare is paid, the conductor with his own punch, cancels on a ticket the names of the points between which he collects, and with his bell punch cancels the amount. These chips with the amount thereon furnish the basis of settlement at the end of the day's run. Every passenger receives the cancelled ticket and naturally becomes a check on the conductor, as the former looks to see what he has punched as having paid. He also holds the ticket until he leaves the car, and if any question arises as to whether he has ridden a greater distance than he has paid for, the punched ticket is his proof. The arrangement, while not practical on heavy lines and short hauls works very nicely and satisfactorily on this road. The reproduction of one of these tickets appears below, being No. 814, a ticket issued our representative while riding west from Oaklands to the power house, on June 4, the fare between these points being 10 cents.

POWER for August, tells of a steam engine at the Stanford university, at Palo Alto, Cal., whose exhaust steam passes into a receiver and is thence conducted and drives another engine 500 feet away, and it is said satisfactorily. The "American Machinist" aptly terms the application a "long range compound."

THE PRESENT STATUS OF STORAGE BATTERY TRACTION.

BY PEDRO G. SALOM.

Read before the Franklin Institute, Philadelphia.

A DISTINGUISHED scientist once told me that many years ago he was invited to give his first public lecture. He chose a subject that he thought he was very familiar with, as it was one in which he had been making long and careful investigations, but much to his amazement, after talking ten or fifteen minutes, he found that he had exhausted the subject, and had told his audience all that he knew about it. Then he said he began to repeat himself, and he has continued to repeat himself ever since. Personally, I am in very much the same position. I feel that I have already told all that I know about storage batteries, except what has been already told by others. Still an old truth presented in a new light sometimes carries conviction for the first time.

This, then, is my reason for being here this evening. In discussing "The Present Status of the Storage Battery System of Electric Street Railway Propulsion," there are three questions to be considered:

- (1) Why is it that so promising a field in electrical engineering has as yet produced no adequate commercial results?
- (2) What definite knowledge has been gained by the trials and failures of the past? and
- (3) What are the prospects for the future for the introduction of storage battery traction?

Now, in respect of the first question, I would say that undoubtedly the dreadful patent litigation in which the whole subject of storage batteries has been involved is largely responsible for the failures in the past, although there are other causes which I will touch on presently.

I will not burden you with a history of the patent litigation, which has now extended over a period of five years, and which has been prosecuted with a degree of vigor and intensity (and I might even say malignity) worthier of a better cause, further than to say, that the fundamental principle upon which all forms of storage batteries are constructed has been thrice awarded to Chas. F. Brush, in the lower courts, and the case is now before the court of last resort, whose decision may be expected at any time, and which, of course, will be final.

This brings us, then, to our second query.

What definite knowledge has been gained by the trials and failures of the past?

This, of course, is a vast subject of inquiry, as it embraces our entire experience during the past six years, and my time will only permit me to dwell on the essential features.

Assuming, now, for the sake of argument, that electric storage traction is practicable, what are the problems that confront the engineer?

The first and most important, is the life of the battery.

- (2) The capacity.

- (3) The rate of discharge.
- (4) The weight and size of elements.
- (5) The loss of power in the various transmissions between the prime mover and the axle; or, in other words, the relative efficiency compared with other methods.
- (6) The distance or total length of line.
- (7) The grades and curves.
- (8) The speed.

We will not consider all these points separately, but the whole question in a general way.

In traction work there is only one reliable method of determining the life of the battery, and that is on the basis of car mileage. It is all nonsense to talk about batteries lasting eight months or eighteen months, unless there is a record at the same time of the amount of work accomplished, measured in electrical horse-power hours. The highest record yet obtained, that I have any reliable knowledge of, is that of a single set of 108 accumulators making over 6,600 miles. This record was made on the Citizen's Passenger Railway, in Indianapolis, and was made under the most trying and unfavorable circumstances.

Assuming that the battery could make 100 miles per day, this would mean that the battery would have to be renewed every sixty days. If fifty miles per day, then the life would cover a period of four months; and at twenty-five miles per day, eight months, etc. So you can readily understand that the bare statement, that a battery would last six or eight months, does not convey a correct idea of the real life of a battery.

Let us see what it would cost to run 6,000 miles with a single set of accumulators, or since two sets are always employed, the one being charged while the other is in service, we will make the calculation on a basis of 12,000 miles.

| | |
|---|------------|
| 216 positive groups, at \$2.50, | = \$540 00 |
| Credit 2,592 pounds lead scrap at 3 cents..... | = 77 76 |
| Balance, | \$462 24 |
| <small>462 24 ÷ 12,000 = 3.85 cents per car mile.</small> | |

What amount of work is represented by this 6,000 miles, so far as the accumulators are concerned?

It was found by keeping the most careful records on the Fourth Avenue Line in New York, that the amount of energy consumed per car mile was about one and one-half E. H. P. hours. This is to say, that after making a round trip of eleven and one-half miles, it required about seventeen E. H. P. hours to replace the energy drawn from the batteries. Six thousand miles would, therefore, require 9,000 E. H. P. hours, and since a battery of 108 cells has a capacity of fifty-four E. H. P. hours for each

total discharge, if we divide 9,000 by 54 we get 166 discharges that are required of the battery, before the positive plates break down. Any one who has had any extensive experience with storage batteries knows that this is a very conservative estimate of the amount of work that a good battery will perform.

It may be asked, have there been no improvements in late years with a view of diminishing the number and weight of batteries required to propel a car? I regret to have to answer, no, and this brings me to the consideration of the limitations of storage batteries.

I have said that it requires about one and one-half E. H. P. hours per car mile, and that 108 accumulators are used and necessary for a twelve-mile run, and they have a capacity of fifty-four E. H. P. hours, or three round trips.

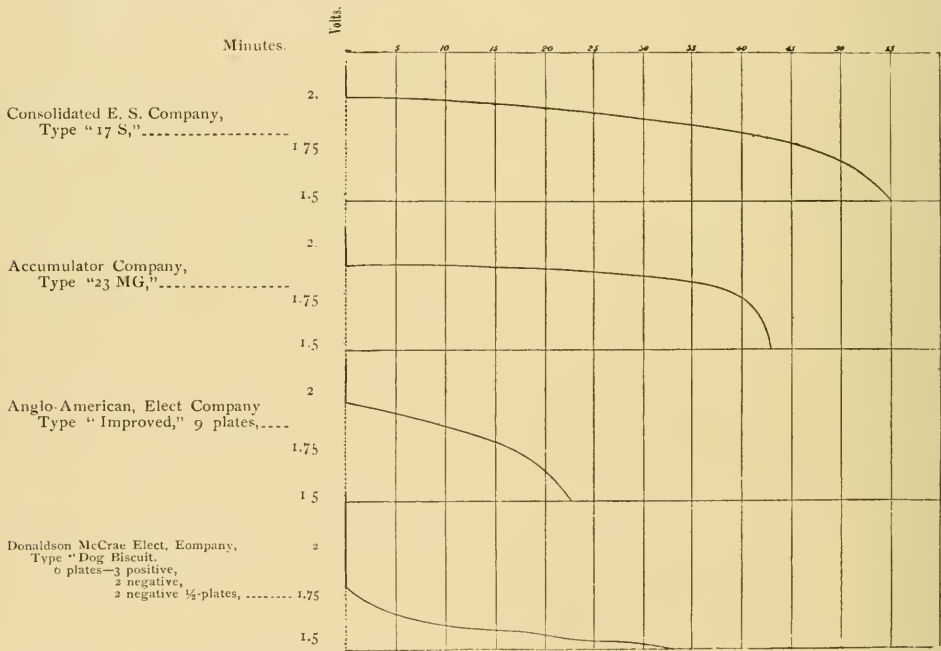
Now, if we were to use a smaller battery of less total capacity, there would not be sufficient surface area of active material exposed to develop such a current, the E. M. F. would drop and the car stop running. This is the trouble with all thick plate batteries. The amount of surface area exposed is comparatively small for the weight of battery.

A reference to the following diagram, showing the curves of discharge (at 100 amperes) of four types of accumulator, will illustrate very forcibly why thick plate batteries are not available for traction purposes.

The first two curves are from thin plate batteries, and the second two from thick plate batteries, all tested under the same conditions.

This comparison is not intended as a disparagement of the thick plate batteries, the Donaldson-Macrae type in

DISCHARGE OF ACCUMULATORS AT 100 AMPERES (RATE MAINTAINED.)



Why is it not possible to use a battery with one-third the weight? Simply because the weight of battery required is not according to the total amount of work to be done, but according to the rate at which it is to be done.

Let us go back to our twelve-mile run again. This requires one and one-half E. H. P. hours per car mile, or 1,119 watt hours, and since the E. M. F. is about 225 volts, this would be equivalent to nearly five ampere hours per mile, or sixty ampere hours for the round trip; and since the trip consumes two hours' time, this is an average rate of discharge of thirty amperes all the time.

Of course, it is very much greater than this at times, when the car starts or is going up steep grades, etc., when the battery is frequently called upon for a rate of discharge of over 100 amperes.

particular having a number of very valuable features embodied in its construction, but it is only designed and intended for comparatively low rates of discharge.

It will be observed that in the thick plate batteries that the E. M. F. falls in one case to 1.5 volts in twenty-three minutes, while in the second case, although it falls more rapidly at first than the former, it maintained the current ten minutes longer before a fall to 1.5 volts was reached.

When the E. M. F. falls below two volts per cell the efficiency of the motor begins to fall *pari passu*.

Finally, we come to the consideration of the prospects for the future of storage traction.

It seems to me, in view of the facts which I have just stated, and which are indisputable, that the introduction of storage traction for surface roads in our large cities is inevitable.

Now, inasmuch as nearly all the electrical and mechanical conditions are constant in both the trolley and storage systems, with the exception of the overhead line and batteries (with some minor advantages favoring the storage system), if we can show that the additional cost of the batteries, over and above the entire cost of the trolley system, does not exceed four or five cents-per car mile, then it is manifest that the storage system will supersede the horse system, as the collateral advantages are so great as to render the consideration of any other system out of the question.

This, I think, we have already demonstrated by the record of the Indianapolis battery given above, and which is confirmed by the report of the Birmingham Central Tramway Company, Limited, wherein it is shown conclusively that with only a small installation of five or six cars, it is cheaper to run with storage batteries than with horses. I append below the results obtained at Birmingham with horse and storage battery traction.

COMPARISON OF COST OF OPERATING PER CAR MILE WITH HORSES AND STORAGE BATTERIES AT BIRMINGHAM, ENGLAND.

The number of miles made by the storage battery cars, from July 24 1890, to June 30, 1891, was 138,396, and they carried 1,444,718 passengers. If five cars were in service this would make nearly 28,600 miles per car.

| | |
|-----------------------------|--------|
| The gross revenue was..... | £8,732 |
| The gross expenditures..... | 5,711 |
| Balance | £3,021 |

STORAGE BATTERY TRACTION.

| | |
|--------------------------|--------------|
| <i>Electric Haulage.</i> | |
| | <i>Pence</i> |
| Wages..... | 2 6 |
| Fuel..... | 1 66 |
| Stores..... | 73 |
| Water and lighting.. | 07 |
| Sundries..... | 09 |
| | — 5 15 |
| <i>Machinery.</i> | |
| Material..... | 29 29 |
| <i>Car Repairs.</i> | |
| Wages..... | 6 |
| Material..... | 1 33 |
| | — 1 93 |
| Total traction expenses, | 7 37 |

HORSE TRACTION.

| | |
|------------------------|--------------|
| | <i>Pence</i> |
| Wages..... | 2 44 |
| Forage and bedding.. | 3 72 |
| Veterinary and shoeing | 40 |
| Water and gas..... | 06 |
| Harness repairs..... | 16 |
| Stable utensils..... | 04 |
| Sundries..... | 05 |
| Renewals..... | 43 |
| | — 7 33 |
| <i>Repairs.</i> | |
| Wages..... | 28 |
| Material..... | 26 |
| | — 54 |
| Total..... | 7 87 |

From which it appears that the total cost for storage battery traction was 7.37 pence or 14.74 cents per car mile, and for horse traction was 7.87 pence or 15.74 cents per car mile, and I would call special attention to the fact that, under the heading car repairs, the item of material is only 1.33 pence, or 2.66 cents per car mile, and assuming that this was all for renewals of battery (although, of course, some of the expense must have been for repairs to motors, etc.,) we find that the cost of battery renewals (really the only unknown quantity in this problem), was only 2.66 cents per car mile. In view of such facts, is it possible to contend any longer that storage battery traction is not commercial?

I have purposely refrained from discussing the subject except from the one point of view—the storage battery. Every one knows that electric traction is a brilliant and

phenomenal success, and in advocating the storage system, we are merely proposing to furnish current to the motors indirectly by means of a battery instead of directly through a central station.

Of course, the same problems obtain in regard to gearing and motors, etc., in both systems and do not enter into the question as propounded.

Give the storage battery a chance. Let the same engineering skill and ability be applied to the storage system as has already been done with the trolley, and the results will be surprising.

SYNDICATE NEWS.

THE Philadelphia syndicate, through its New York brokers, Clarke, Dodge & Co., has begun negotiations looking toward the absorption of the Troy and Lansingburg railway. It is rumored that an option on two-thirds of the stock at \$225 per \$100 has been given, and that the deal will involve \$2,000,000, if, in addition to the capital and outstanding bonds, the rentals be capitalized at five per cent. The Troy and Lansingburg railroad pays \$6,400 a year for their right to run cars across the Delaware and Hudson bridge there, the Lansingburgh and Adams island bridge and the Lansingburgh and Waterford bridge. This estimate of the cost to the syndicate is made by one who has an inside knowledge of affairs of the negotiations:

| | |
|---|-------------|
| T. and L. stock, par value, \$600,000..... | \$1,350,000 |
| T. and L. outstanding bonds..... | 300,000 |
| Bridge rentals capitalized at 5 per cent..... | 128,000 |
| Troy and Cohoes railroad rental, capitalized at 5 per cent..... | 70,000 |
| Lansingburgh and Cohoes railroad rental, capitalized at 5 per cent..... | 21,000 |
| Waterford and Cohoes railroad rental capitalized at 5 per cent..... | 36,000 |
| | \$1,905,000 |

As but very few of the present owners of the stock paid very much over par value for shares, and those who bought in the highest market paid but \$180, the present offer of \$225 is a dazzling one, and nearly all are agreed that the deal will have a successful outcome.

THE RICHMOND ROAD.

A MATTER of topography that is not very well understood is the location of the Richmond and Manchester Railway, of Virginia. The facts in the case, as furnished by a friend, are these: The offices, power-house and barns are situated in Manchester, a small town separated from Richmond by the historic James river. The tracks, however, extend 7 blocks on the Richmond side.

The road now has 16 miles of track laid with 45-pound flat and T rail, with a 2-mile spur which reaches a resort known as Forest Hill Park. There are 22 motor cars in commission equipped with Westinghouse and Edison motors. Fourteen cars have recently been received from the Lamokin car works. The officers of the company are: A. H. Rutherford, president; W. C. Seddon, secretary and treasurer, and B. R. Seddon, superintendent.

A TRANSFER STATION

ONE of the most unique transfer stations in the country, is represented in the following engraving.

The station in question is built by the Belt Electric Line Company, of Lexington, Ky., of which organization C. H. Stoll is president, and W. J. Laughteridge is vice-president.

The building is located alongside the track and is 30 feet long, by six feet wide, and so arranged that passengers enter at the ends, and leave from the sides. The end doors open inward, and the side doors outward.

Ordinarily, however, the doors are kept locked, the transfer agent remaining on the outside always, and opening the end door to let passengers in, while a boy on the outside performs the same office by opening the side door for the exit of passengers.

The general design of the building is very much like a car. The windows are made with double sash, so that they can be let down from the top or raised from the bottom. The monitor deck and extra height also conduce to the best of ventilation in every kind of weather. A cellar below will be fitted with some simple and efficient heating apparatus before winter.

The station is narrow in form, in order to conform to



STREET RAILWAY TRANSFER STATION.—LEXINGTON, KY.

There is a small vestibule at the side so that the door opening outward does not come in contact with the passing car. As the building is nearly twice the length of a car, the car is enabled to stop with the front platform opposite the side or exit door. The passengers are therefore required to leave the car from the rear platform, and to leave the transfer station from the side exit, entering the car by way of the front platform.

No transfer checks or tickets are required on ordinary occasions, as the number of passengers are counted by the agent in charge of the station, and he notifies the conductor of the number of transfer passengers.

On occasions when traffic is unusually heavy, and the building is unable to accommodate all transfer traffic, the doors are thrown wide open, and transfer tickets given.

the limits of space, but is found wide enough for every purpose. On one side of the interior is a seat running the length of the station, from the end to the vestibule and on the other side a row of chairs facing the vestibule. This arrangement provides ample passage way, and gives seating room for ordinary traffic.

As every one leaving the station is presumed to be a transfer passenger, any one may take advantage of the station as a waiting room, by paying the fare on entrance.

The station is a great convenience to all concerned.

SPACE for exhibits at the Street Railway Convention, at Cleveland, in October, is being rapidly taken, and any who have not already done so should make application at once.

A NEW CANDIDATE.

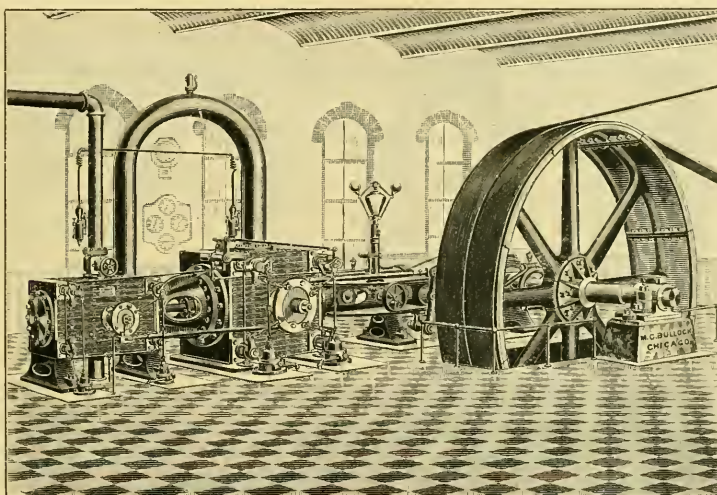
THE BULLOCK-CORLISS.

THE fall campaign is upon us. Men, who, in their capacity as ordinary citizens, cared nothing for coal miners, brick makers and hod carriers, but, who, "at the earnest solicitations of their many friends," are candidates for public office, are hustling after the aforesaid hod carriers, brick makers and coal miners, anxious to shake each by the hand, and impress upon him the importance of "our party" winning next November.

The candidate we wish to introduce herewith is not seeking the acquaintance of laborers, but is their powerful agent and servant in many factories and mines throughout the length and breadth of our land.

The Bullock-Corliss engine, illustrated on this page, has taken rank with the very best makes of this type of engine from the start. It is the result of years of close study and careful experiment. It presents many attrac-

The Pullman Palace Car Co. last week started their third large Bullock-Corliss engine. The Cicero Electric Light and Power station, have two 250-horse-power engines in their station. A 350-horse-power is being built for the Deering Harvester Works. Two 300-horse-power engines were shipped to Northern Michigan last week, and a 150-horse-power to Colorado. They furnished the entire power plant for the San Antonio, Texas, electric street railway, illustrated in our last month's number, and are now filling an order for a 300-horse-power plant for the Belle City Street Railway, Racine, Wis. A few days ago they received an order, by wire, for a 150-horse-power single cylinder, and a 300-horse-power tandem compound (as shown in cut), both engines to go into service in St. Paul, Minn.; while another telegram from Utah, brought an order for two 300-horse-power engines. Other orders being executed include engines for local firms in Chicago, and a large one to go to Logansport, Ind. So busy are they at their extensive



THE BULLOCK ENGINE.

tive points in beauty and strength of design, that have since received the highest possible endorsement by its competitors, viz., imitation.

Realizing the fact, that the higher boiler pressures now carried, and daily being increased; needed more rigid frames and heavier, larger wearing surfaces, especially when called upon to meet the sudden and excessive strains found in electric street railway work, the builders of this engine have spared no metal anywhere, to provide ample resistance and strength. While looking out for these features they have not sacrificed grace of outline to secure mere weight.

They have also given careful attention to the governing devices necessary to secure absolute control and complete regulation of the engine, as well as attaining thereby, the highest degree of fuel economy.

That the firm has succeeded in producing a superior engine, is evidenced by the class of people they sell to

works, that they are obliged to run nights to meet demands.

Street railway men visiting Chicago, will be made welcome at the city salesrooms of the firm, centrally located at the corner of Canal and Washington streets. We can heartily commend them to the favorable attention of our readers.

THE Duquesne Traction Company, of Pittsburg, some time ago purchased double-decked cars which they were unable to use on account of various viaducts. The Lake Roland Elevated, of Baltimore, has purchased 25 of them for use on their track. The cars have been remodeled, repainted and renamed.

THE London County Council has sanctioned the use of mechanical power other than steam on the Deptford and Greenwich tramways.

THE HARVEY TRANSIT COMPANY.

The Excellent Transportation System of the Magic City.

ABOUT two years ago the bald prairie, 22 miles south of the Van Buren street station of the Illinois Central, was greatly astonished and pained by an unaesthetic surveyor's gang ornamenting its maiden breast with town lot stakes, where formerly the gopher had its home and the long-legged grasshopper spent his happy, brief existence.

As if by magic the town grew and builded and extended its borders, and was baptized Harvey, after T. W. Harvey. Factories began to enquire for cheap land, and almost every paper in the land heard of "cold-water Harvey," the manufacturing suburb of Chicago. Printers' ink was liberally used until Harvey to-day has nearly 4,000 people.



WATER WORKS AND POWER STATION, HARVEY.

The manufacturing interests include the large Buda Foundry, the Steel Car Works, and the Craver-Steele Manufacturing Company, a large concern making the Randolph Header, rakes, mowers, buggies and light wagons. The factory employs several hundred men and turns out goods for domestic and foreign consumers. Hon. C. F. Craver is president and A. H. Craver secretary and treasurer.

The business portion of the town gathers about the Union depot of the Grand Trunk, C. C. C. & St. L., and Illinois Central railroads, gives the stranger a favorable impression of the town, while, although scattered, the residences are modern and pretty.

The churches and school interests are well represented by several denominations, and the Harvey Academy, which now occupies a roomy brick structure.

World's Fair visitors will no doubt be a considerable addition to Harvey society during the coming year, and a large hotel is under construction to that end.

The town is divided by several stretches of prairie into rather a spread-out appearance, and to remedy the trouble of communication between the business and manufacturing interests near the great artery of traffic, the railroads, and the residences which, clustered together at various distances, are often a mile or two away, an electric street railway was deemed a necessity.

With the idea in view that Harvey was destined not only to outgrow its petticoats, but to extend the borders of its toga virilis to the fine districts outlying, the

HARVEY TRANSIT COMPANY

was organized July 17, 1891. J. M. Wanzer was chosen president; C. Duval Stanwood, secretary, and R. Titus, treasurer. W. S. Reed was the first superintendent and installer of the plant. After getting the plant into its present fine condition, Mr. Reed resigned, to assume similar duties elsewhere, and P. B. Lamb succeeded him.

THE ROADBED,

although laid directly upon the good fertile soil of Illinois prairie is very substantial and the iron is 40-pound T, made by the Illinois Steel Company. The gauge is 4 feet 8½ inches and there is no grade worth measurement in the 2½ miles of track.

THE ROLLING STOCK

consists of three beautiful vestibuled Laclede Car Company's cars, 35 feet long over all and lighted by electricity. Shorts' 15-horse-power motors, two to each car, are giving the best of satisfaction. The McGuire trucks and Griffin Wheel & Foundry Company's wheels conduce to the general ease of riding on the Harvey road, and the management says that repairs are almost nil.

THE POWER STATION,

as represented in our engraving, is used in conjunction with the water works, and here are sheltered an A. L. Ide & Sons', Springfield, engine of 100-horse-power capacity, with two 100-horse-power boilers made by the Porter Boiler Manufacturing Company. The Stilwell-Bierce feed-water heater is used and pays for itself twice over. The line runs from one hundred and fifty-fifth street and Columbia avenue to one hundred and fifty-sixth, West on the same to Marshfield avenue to one hundred and fifty-seventh street, over to Spaulding avenue to the Bellaire Stamping Company, Western Steel Spring Company, Well's Glass Company, Chicago Rock Faced Stone Company, and the R. J. Sweeney Manu-

facturing Company. The road connects these factories with the Craver-Steele Company, Harvey Steel Company, Buda Foundry and the Middleton Car Spring Company, the Automatic Mower Company and Matthews Manufacturing Company.

These factories dividing the East and West district



SCENE IN HARVEY, ILL.

would make Harvey virtually two towns were it not that the electric line brings all interests to a common center, and all residents to a common neighborhood.

The growth of Harvey has but just begun, and in the future the electric railway will no doubt be an important factor in its growth.

PATTON MOTOR REJECTED AT DENVER.

MUCH was claimed for the Patton Motors sent the Denver, Lakewood & Golden road, at Denver, a few months ago. They have been rejected, according to the Denver Daily News, which says:

"The officials of the Denver, Lakewood and Golden road got together and spent several hours in discussing the situation and resolving upon plans for the future. From one of the gentlemen in attendance, it is learned that all hopes of using the Patton motor were voted as blasted, and the unanimous sentiment was in favor of erecting an electric plant capable of furnishing power for the Denver end of the line."

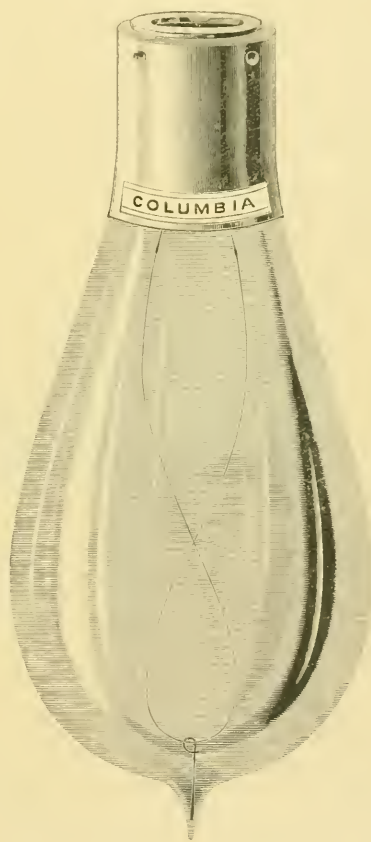
The Patton motor combines a gas engine on the car, operating a generator supplying storage batteries, which supply the car motor.

The Lakewood Company seems now to be on a fair basis, and the terminal facilities so long sought will be completed before the power house. Temporary assistance will be asked from the Denver Tramways power house, but this is to be but for a short time. The directors of the D. L. & G., have given up all expectations of selling out to the Aspen people.

FOURTEEN conductors in Portland, Ore., were recently arrested for defrauding the company. For six months the company, the Metropolitan, had been losing an average of \$4,600 per month, and evidence to the above effect was collected. The company will prosecute.

THE COLUMBIA SPECIAL RAILWAY LAMP.

WE present in this issue, a cut of the Columbia Special Railway Lamp, manufactured by the Columbia Incandescent Lamp Co., of St. Louis, Mo. Great care is taken in the manufacture of this lamp, and it is specially measured for uniformity of current, so that the lighting throughout each car, where a series of Columbia Lamps are used, will be entirely uniform. A great many lamps have been made for street railway use, in which the carbons have been simply hooked at the bottom, but there has been no attention



FULL SIZE.

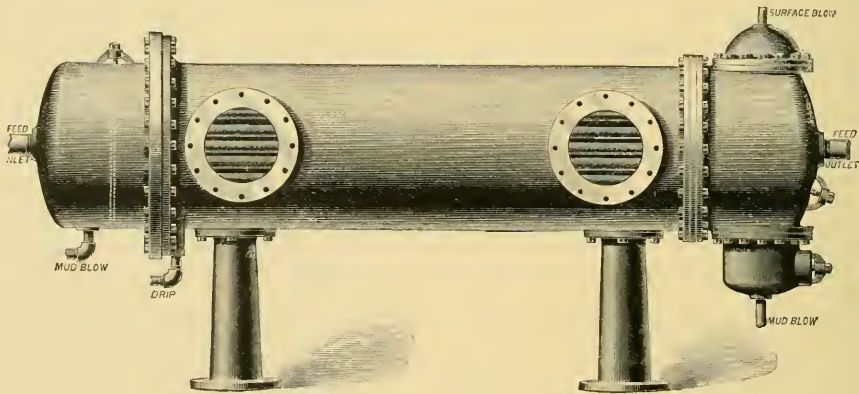
given to the fact that lamps for use in street railway circuits must be uniform as to current consumed, if the best results are to be obtained.

The lamps are efficient, and will not blacken, and will give a very satisfactory life. They are mechanically perfect, and all are guaranteed to make a perfect contact in the socket. They are used in a great many of the street railways throughout the United States, where they are reported to be giving good satisfaction.

The Columbia Commercial Lamp is too well known among its many users in central station and isolated plants, to need further comment.

THE GOUBERT HORIZONTAL FEED-WATER HEATER.

THE higher pressure in boilers for producing steam—which is gaining in practice—requires the use of some sort of a feed-water heater. As the upright heaters are not adapted for all styles of boilers, nor all situations, the horizontal heater shown in the accompanying cut will command the interest of many engineers. This piece of apparatus was recently put upon the market by the Goubert Manufacturing Company, of 32 Courtland street, New York. It is designed to meet the difficulty of insufficient head room, frequently encountered where the cellars of city buildings have to be utilized for the location of the steam plant. It is also specially adapted for use in connection with condensing engines, as the steam nozzles can be placed in any position required. For instance, the inlet nozzles may be directly under the engine exhaust, and the outlet nozzle bolted to the top of the condenser. This arrangement practically takes the place of the exhaust pipe, and makes a very neat connection.



GOUBERT HORIZONTAL FEED WATER HEATER.

The heater is shown in the engraving as resting on a pair of columns; but it may be provided, instead, with either lugs, bolts or straps, to be hung from the ceiling, or it may be supported by beams, or by saddles. The manufacturers have preserved in this horizontal heater all the advantages of construction found in their well-known vertical heater.

PERVERTING THE TRUTH.

ALL that the trolley's friends and supporters wish, is that a just construction be put upon a just judgment formed in regard to the the so-called "deadly trolley" accidents.

The New York World for July 25, contains a double-column, double-headed article, with the caption "The Deadly Trolley," and under this gives, besides rot, bombast and lies ad libitum, a seemingly just termination by listing exactly and truthfully, 31 accidents that have

occurred in Newark, N. J., from September 13, 1891 to July 22, 1892 and two others are hinted at in the pretext.

After a column of the most highly colored diatribes and ignorant penny-encyclopaedic, so-called scientific exposition of the deadliness of electricity in general and of generated electricity in particular, with the usual amount of slush, driveling idiocy and cant about "overhead naked wires," carrying a high potential, the cases are mentioned. The appositeness of the casualties cited as the exposition of the peculiar deadliness of the "deadly trolley," is shown by a careful examination of the honest and unbiased list, which shows an actuality of exactly one case of the 33 which might be directly attributed to the the current, and even in this case, which was a lineman working on a tall pole, there is no certainty that death was not due to the fall instead of shock, although it is admitted the current caused the man to lose his hold.

In another case four horses were shocked and one killed. The remaining cases were run-overs, which happens in every place as all attendant on the introduction of rapid transit and the rather agricultural habit

some have of protruding the head from a car window for various purposes.

In fact, the only reasonable objection is the speed, and if we must seek the greatest good for the greatest number, let the transit be rapid. If 1,000,000 people gain a day a year for a life time of thirty years, why is it not better to have rapid transit than to have slow cars and loose that number of days from the world's usefulness. Careless people must of necessity come to grief under any conditions, and only experience will teach care.

The Pittsburg Dispatch says in regard to the article, editorially from a city deemed particularly 'cursed' with rapid transit,—“The trolley should go when something superior to it is found. But the persevering efforts to represent it as especially deadly, by presenting lists of accidents which are clearly due to rapid tranist, is in tolerable good proof that its danger is not a tithe of what it is represented by the howl against it.”

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

JOHN G. HOLMES, PRESIDENT, Pittsburg, Pa.
 THOMAS H. McLEAN, FIRST VICE-PRESIDENT, New York, N. Y.
 JAMES B. SPEED, SECOND VICE-PRESIDENT, Louisville, Ky.
 ALBION E. LANG, THIRD VICE-PRESIDENT, Toledo, O.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE PRESIDENTS, and HENRY M. WATSON, Buffalo, N. Y.; LEWIS PEBBINE, JR., Trenton, N. J.; W. WORTH BEAN, St. Joseph, Mich.; MURRY A. VERNEA, Pittsburg, Pa., and THOMAS C. PENNINGTON, Chicago, Ill.

Subjects for Discussion and Committees Appointed to Report Thereon.

"Power-House Engines."

T. W. WRENNE, President United Electric Railway, Nashville, Tenn.; L. H. McINTIRE, Engineer, Harlem Bridge, M. & F. Railway, New York; F. S. PEARSON, Chief Engineer, Electrical Department West End Street Railway, Boston,

"Relative Cost of Operation of Horse, Cable and Electric Roads."

WM. Mc C. RAMSEY, Electrical Superintendent Federal St. & P. V. Passenger Railway, Pittsburg, Pa.; F. R. GREENE, Secretary Chicago City Railway Company, Chicago; JOHN L. HEINS, Superintendent Brooklyn City & Newton Railroad, Brooklyn.

"Standards for Electric Railways."

O. T. CROSBY, Utica, N. Y.; H. J. BETTIS, General Manager Atlanta Consolidated Railway, Atlanta, Ga.; E. E. HIGGINS, General Manager Short Electric Railway Company, Cleveland; CHAS. W. WASON, Vice-President East Cleveland Railroad Company, Cleveland; J. E. RUOO, Superintendent Citizens' Traction Company, Pittsburg.

"Form for Street Railway Electrical Statistics."

THOS. H. McLEAN, Secretary Twenty-third Street Railway, New York; HENRY W. WATSON, President Buffalo City Railway Company, Buffalo; CHAS. E. WARREN, New York.

"A Model Electric Street Railway Roadbed and Underground Wiring."

GEO. W. BAUMHOFF, Superintendent Lindell Railway Company, St. Louis.

"A Perfect Overhead Construction."

CHAS. H. SMITH, General Superintendent Troy & Lansingburg Railway, Troy, N. Y.

"Economy of Machine Shops for Electric Street Railways."

J. H. BICKFORD, Salem, Mass.

Next meeting, Cleveland, O., October 19th, 20th and 21st.

Massachusetts Street Railway Association.

President, CHAS. B. PRATT, Salem; Vice-Presidents, H. M. WHITNEY, Boston
 AMOS F. BREKED, Lynn, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON, Lawrence.

Meets first Wednesday of each month.

Ohio State Tramway Association

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice President; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus, Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice President, THOS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee, OFFICERS and C. B. THURSTON, Jersey City; H. ROMAINE, Patterson; LEWIS PEBBINE, JR., Trenton.

The Street Railway Association of the State of New York.

JOHN N. BECKLEY, PRESIDENT, Rochester, N. Y.
 THOS. H. McLEAN, VICE PRESIDENT, New York, N. Y.
 GEO. LAW, SECOND VICE PRESIDENT, New York, N. Y.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—D. F. LEWIS, Brooklyn, N. Y.; C. DENSMORE WYMAN, New York, N. Y.; CHAS. CLEMENSRAW, Troy, N. Y.
 The next meeting will be held at Saratoga, September, 20th, 1892.

Subjects for Discussion.

"Recent Improvements in Cable Traction."—GEO. W. McCLYTY, Engineer Broadway & Seventh Avenue Railway, New York.

"Recent Improvements in Electric Traction."—L. H. McINTIRE, Engineer Harlem Bridge, Morrisania & Fordham Railway, New York.

Arizona.

PHOENIX, ARIZ.—The City Council has granted two franchises to build and operate electric railways in the city of Phoenix. One was granted to men representing San Francisco capital, and the other to Lem Harris of Denver. They are compelled to begin construction in six months.

Arkansas.

HOT SPRINGS, ARK.—The new electric light and power plant in course of erection, will supply the power for the Suburban Electric Railway Company. Work of construction will soon commence.

FT. SMITH, ARK.—The railway franchise has expired and there is now a change for enterprise here.

California.

STOCKTON, CAL.—The new electric street railway system is now in successful working order, and cars are making regular trips.

GRAND FORK, N. D.—The projectors of the electric railway, are C. F. Arrall and C. F. Stephens, of St. Paul, and W. G. De Celle, manager of the northwestern agency of the Westinghouse electric and manufacturing agency at St. Paul, promise immediate action in the matter of the construction. Four miles of track will be laid.

MAYFIELD, CAL.—The Board of Supervisors of Santa Clara county have granted the petition for a franchise for an electric railway from the Southern Pacific depot through the town of Mayfield and College Terrace to the grounds of the Leland Stanford, Jr., University.

OAKLAND, CAL.—The East Oakland Street Railway Company has grant for a number of long extensions.

THE council has ordered safety fenders to be placed on all street cars and dummies.

EAST OAKLAND, CAL.—The contract has been signed for the changing of the Sessions Highland Park & Fruitvale lines into an electric road. The T. H. has the electrical contract and the Risdon Iron works will furnish the power.

Colorado.

DURANGO, COL.—Articles of incorporation of the Durango Street Railway Company were filed recently. The company is capitalized at \$250,000, for the purpose of constructing and operating a street railway in Durango, and other parts of La Plata county. The office of the company will be at Durango. Directors: George Ditchfield, S. E. Herr, W. G. White, W. S. Pickerill and W. J. McClosky. Electricity and horse power will be used.

PUEBLO, COL.—To improve the railway system of Pueblo, the company is putting in \$20,000 on the power plant and equipment.

DENVER, COLO.—The earnings of The Tramway Company for July were \$96,000. Some new loop construction is to be put in this season and several extensions are proposed.

DENVER, COLO.—A meeting of property owners will be called after the rush of the conclave is over, to agitate the building of an electric line on South Pear street.

Connecticut.

NEW HAVEN, CONN. The work of equipping the State street road with electricity will begin soon. The contract has been awarded to Berry & McTigue, electrical engineers, of William street, New York, York, the same firm that equipped the Morris Cove road.

NORWALK, CONN.—E. J. Hill, president of the Norfolk Tramways Co., which has a charter for 4 miles of road and capital of \$50,000, says that he will have an electric road running by November. The officers of the company are: E. J. Hill, president; John O. Osborne, W. Frank Bishop, Asa B. Woodward, J. Thornton Pratt, John S. Seymour and John H. Lee, directors.

District of Columbia.

WASHINGTON, D. C.—A bill has been introduced in the Senate incorporating the Washington, Deanwood & Benning Railway Company. The incorporators named are H. K. Willard, Robert E. Morris, B. C. Pole, J. uliah W. Deane, W. E. Clark, William Maysner, G. J. Johnson, J. C. Pratt, Edward Baitzley and Bushrod Robinson.

WASHINGTON, D. C.—Tennallytown & Rockville Electric Railroad Company will double track road from Tennallytown to Bethesda Park.

Georgia.

MACON, GA.—The Dummy line has been sold to the Macon Indian Spring road. Reconstruction will begin immediately.

ATLANTA, GA.—A new dummy line, between this place and Decatur, is on deck. Clyde Brooks, of Atlanta, is solicitor and work will begin in 30 days.

Illinois.

AURORA, ILL.—August 5, a severe electric storm burnt out the light circuits on ten cars, and an armature on one.

BELLEVILLE, ILL.—A petition has been presented by some of the principal property owners on Busch avenue to allow the Belleville and St. Louis Railway company to build and operate its lines along that street.

BLOOMINGTON, ILL.—The Citizens' Street Railway Company, organized several months ago has disbanded on account of adverse ordinances. The council made a fool of itself, as country councils are wont to do.

CAIRO, ILL.—The Delta Electric Railroad Company has purchased ground for their power house, and work of construction will be commenced at once. S. W. Beard is at the head of the enterprise.

CHAMPAIGN, ILL.—The Champaign and Urbana Street Railway Company has been purchased by B. F. Harris of Champaign. He assumed management at once.

CHICAGO.—The Griffin Wheel & Foundry Company lost their cupola room and perhaps their machinery Aug. 10. Loss \$35,000; fully covered by insurance. Work of rebuilding will be prosecuted night and day and only two weeks will be required. The street car wheels in stock will suffice to fill present orders until more can be cast.

THE Calumet Railway is building a double tracked extension on 75th street.

A NEW corporation is the Track & Car Supply Company, Chicago; capital stock, \$275,000. Incorporators, Jos. Schneider, J. Elliott and Chas. A. Burton.

THE new World's Fair Loop of the Chicago City will soon begin construction.

DECATUR, ILL.—The ordinance granting a 20 years franchise has passed the council to the delight of J. R. Mills and W. L. Ferguson.

ELWOOD, ILL.—The Elwood Electric Railway Company, with a capital stock of \$150,000, has been incorporated to build an electric line through the streets of Elwood and connect with other towns.

JOLIET, ILL.—J. D. Paige has been elected superintendent of the electric railway here.

PEORIA, ILL.—A new organization is the Peoria Heights Street Railway Company; capital stock, \$100,000; incorporators, Martin Kingman, Benjamin Warren, Jr., Theodore J. Miller and others.

ROODHOUSE, ILL.—The Roodhouse and Whitehall Consolidated Street Railway Company has been organized with a capital stock of \$100,000. Foreign money only will be used in the enterprise. The company will place a park midway between the towns.

Indiana.

FT WAYNE LINES.—Difficulty in obtaining power has delayed the opening of the Ft. Wayne lines. The present engine equipment is not sufficient. It is probable that a new line will be opened on Cass street. The report of the purchase of the Lakeside line is branded as false.

HUNTINGTON, IND.—This place needs a street car line. It has a stretch of river water over a mile long, in which a steamer is run, but it is located about a mile and a half from town, and not used very much. The lime industries of the city employ three hundred men, and are two miles from the court house. The depots are situated a half mile apart and a good car line would pay.

INDIANAPOLIS, IND.—R. R. Hammond, G. V. Voss, P. C. Light et al., who agreed to provide a tunnel or viaduct for street and steam cars to the State Fair Grounds seem to have backed out, and the contract will probably be re-let.

INDIANAPOLIS, IND.—W. E. Avery, of Detroit; C. D. Haskins of New York and R. J. Randolph, of the Thomson-Houston Electric Company, Chicago, in an interview said that if offered \$125,000 bonus they would build the Broad Ripple road.

MICHIGAN CITY, IND.—The Citizens' Company contemplate an extension to Greenwood cemetery.

TERRE HAUTE, IND.—It is probable that the County Commissioners will grant the petition of the street railway, asking for the same franchise as was given the Suburban Company, now defunct.

TERRE HAUTE, IND.—Suburban franchises have been applied for by The Terre Haute Company and extensions will be made.

TERRE HAUTE, IND.—Superintendent Burke of the railway, recently surprised his men with a supper.

Iowa.

BOONE, IA.—The Kansas City capitalists, Hart, Chandler, et al, as the successors of the Boone Street Railway will put in an electric line and electric lights.

CEDAR RAPIDS, IA.—The electric railway has bought a Reynolds-Corliss of 350-horse-power and a 200 Kilowatt T. H. dynamo.

DES MOINES, IA.—A large force of men is making rapid progress in track laying on the new extensions on thirteenth street. Other extensions will soon be begun.

FORT DODGE, IA.—Local parties are again agitating a street car line here.

IOWA CITY, IA.—G. E. Gooch and F. Tanner, in company with J. VanGinckle, of Des Moines, looked over the ground for a 3/4 mile electric, and decided to submit a franchise. Van Ginkle is doing a large business of this kind.

WASHINGTON, IA.—Chicago parties will build an electric road if the council will grant franchise.

Kansas.

FORT SCOTT.—Work has commenced on the extension of the electric railway system.

LEAVENWORTH, KAN.—The Leavenworth Electric Transit Company with capital of \$500,000 and the following directors: C. F. Brotherton and Newman Erb, of Kansas City, Kan., S. F. Neely, C. S. Harlough and William C. Hook, of Leavenworth, is organized to build a line 15 miles long.

Louisiana.

NEW ORLEANS.—The Crescent City Railroad has bought up the Electric Traction Company, and will equip with electricity.

NEW ORLEANS, LA.—In the injunction suit; J. S. Richardson vs. City of New Orleans to stop the sale of extended franchise of the Crescent City Co on grounds of illegality of the ordinance, the plaintiff's petition was sustained in every particular.

Maryland.

BALTIMORE, MD.—The Lake Roland Elevated Railway Company held a special meeting authorizing the issue of \$1,000,000 of 5 per cent first mortgage bonds. The interest and principal will both be payable in gold, and the bonds are to run 50 years. The Baltimore Trust and Guarantee Company will be trustee of the mortgage. The bonds will be issued in September, and for the present will be held by the company.

CUMBERLAND.—Permission has been given the company to cross the new Baltimore street bridge.

SALISBURY.—A company has been formed at Salisbury to build a street railway in that town. It will be five miles long, and is estimated to cost \$3,300 per mile. The incorporators are: L. E. Williams, James A. Perry, C. L. Waller, Wm S. McConkey and E. Malone.

Massachusetts.

HAVERHILL.—The Haverhill & Groveland voted to increase their capital stock \$275,000 for electrical equipment.

It is expected the electric line to Amesbury will be completed October 1st. Work has already commenced.

Michigan.

BENTON HARBOR, MICH.—The Union Electric Company have been incorporated. Capital stock, \$150,000. James S. Clark of Chicago, chief promoter.

GRAND RAPIDS, MICH.—The Reed's Lake Electric Railway Company are asked by the city attorney to give up their franchise as they have not lived up to their contract in running their line.

GRAND RAPIDS.—C. R. Cummings of Chicago, in a recent interview said that a number of improvements should be added among them a large pavilion and theatre.

ISHPEMING, MICH.—Directors voted to extend the line to Salisbury mining district.

PORT HURON, MICH.—There is talk of an electric road from the city to Algonas.

Minnesota.

DULUTH, MINN.—The Duluth Electric is now owned by the Hartman Electric Company. Improvements and a new station will be added.

ST. PAUL, MINN.—The council committee has decided to grant the electric a right-of-way through Como Park. Mr. Lowry was refused the pavilion privileges.

Mississippi.

VICKSBURG, MISS.—The street railway franchise, allowing electricity will probably be granted.

VICKSBURG, MISS.—The franchise asked by C. R. McFarland & E. F. Fuller, of New York City, and J. P. Roach & J. B. Mattingly of Vicksburg, has been referred to a committee, with Alderman Evans as chairman.

Missouri.

FARMINGTON, MO.—The Farmington proposed electric road scheme is dead. All expenses incurred by the company have been paid.

KIRKWOOD, MO.—Considerable interest is being manifested in the building of the electric railroad proposed by Messrs. Drake and Orton. A committee is hard at work on the matter, and it is believed that the required \$150,000 will be raised in a few days, when the company will immediately begin operations.

KANSAS CITY, MO.—The City Council has taken the \$10,000 forfeit put up by the Union Cable Company.

ST. JOSEPH, MO.—It is a general opinion that an electric line from this city to Lake Contrary would be a paying investment. The run could be made in about 15 minutes and during the summer the traffic would be immense.

ST. LOUIS, MO.—A new suburban road is talked of, an effort is being made by the residents of Ferguson to secure an electric railroad connection with either the Baden & St. Louis or the Bellefontaine lines of North St. Louis, or the St. Louis & Suburban.

ST. LOUIS, MO.—The contract for 80 new cars for the Cass Avenue road will be let in a few days.

ST. LOUIS, MO.—The Manchester Road Electric Railway Company, capital \$20,000 has been incorporated, S. A. Post, Commercial building, St. Louis, Mo.

Nebraska.

MILFORD, NEB.—Some of the enterprising business men of Milford have been in correspondence with eastern capitalists with a view to organizing and building an electric railway from Lincoln to Milford, utilizing the water power at this end of the road and developing the

the natural parks, springs and boating which Milford affords. They have so far succeeded that a company will be organized for that purpose as soon as the preliminaries are completed.

New York.

ALBANY, N. Y.—The Stillwater & Mechanicsville St. Railway company has filed a statement declaring the cost of the road to June 30 has been \$30,044 3/5, the assets \$39,298.34, and liabilities \$29,801.45. their surplus is \$497.08.

BINGHAMTON, N. Y.—The Binghamton & Port Dickinson Railway Company have increased their capital stock from \$160,000 to \$350,000 The entire line will be changed to electricity. Work will be commenced on the new road Jan. 1st. 1893.

BINGHAMTON, N. Y.—A meeting of the Binghamton State Line R. R. Co. is set down for August 17th, at which time the capital stock will be increased from \$130,000, to \$500,000. From what can be learned, it now seems probable that the road will go through this fall. Five preliminary surveys have been made, and the most feasible will be chosen. The depot as heretofore stated, will be located at Rossville, and the road will go as far as the lakes, if not through to Montrose. It is said money is back of the venture, and every man interested is firmly convinced the road would pay, and intends to see it built.

BROOKLYN, N. Y.—The town board of Babylon find little opposition to the street railway, the Deer Park & Babylon.

BUFFALO, N. Y.—At the annual election of the Buffalo & Tonawanda Electrical Railroad Company the following officers were elected: president, E. A. Butler; vice president, M. Nellany; secretary and treasurer C. H. Howard. Resolutions were passed to immediately improve and greatly amplify the service by the purchase of new cars and motors and a double equipment for the boiler and engine-house.

CANANDAIGUA, N. Y.—The stock and franchise of the Canandaigua Street Railway were sold at public auction. Charles C. Sackett, of this place, one of the original stockholders and directors, was the buyer, the property being struck off to him at \$32,000.

FORT LEE, N. J.—On Friday of last week the directors of the Fort Lee Electric Railway Company held a meeting at the residence of Mr. E. W. Lawson, and elected Abram Beveridge, of New York, president; and E. W. Lawson, of this place, secretary.

GLOVERSVILLE.—It is not often that an electrical contract of \$300,000 is awarded. Hence there has been a very severe competition over the contract for the equipment for 17 miles of road for the Cuyadutta Electric Company. The contract has been finally awarded to H. Ward Leonard & Company, of New York City, who act as Bulk Electrical Contractors for the entire equipment of the road, including building, steam plant, electric generators, track work, bridges, overhead work, cars, etc.

HORNERSVILLE, N. Y.—The electric road has been opened here with great eclat.

JAMESTON, N. Y.—President A. N. Broadhead of the Electric is organizing a company to build a road along the north shore of lake Chautauqua to Mayville. The line will be 25 miles long.

NEW YORK CITY.—The Houston, West Street and Pavonia Ferry will make extensions and connections.

NEW YORK CITY.—The Aldermen have given permission to the Judson Pneumatic Company to test their compressed-air motor on the tracks of the Twenty-eighth and Twenty-ninth Street Railroad Company.

PASSAIC, N. Y.—The State Electric Subway Commission gave the Passaic & Newark Electric Company permission to run a line between Newark and Passaic.

ROCHESTER, N. Y.—A request to lay track in front of the county buildings has been granted.

ROCHESTER, N. Y.—The Rochester Railway has a number of bob tail cars for sale.

Ohio.

CINCINNATI.—The South Covington & Cincinnati has secured right of way to Evergreen Cemetery.

CINCINNATI, O.—The Cleveland Syndicate's Cincinnati bonds have passed into the hands of the Farmers' Loan & Trust Company of New York City, as trustee. The street railroad company executed a \$3,000,000 mortgage, covering all its franchise rights and property and in security thereof will issue gold bonds for that amount. The property covered by this mortgage is the line of the Cincinnati & Covington roads, the South Covington & Cincinnati Railway Company, the entire capital stock of the Newport Electric Street Railway Company, the Cincinnati, Covington, & Rosedale Company, and the Covington & Latonia Railway Company.

CINCINNATI, O.—John Kilgour notified the Board that his company owns the right of way for double tracks in Spring Grove avenue, on the center portion, the entire length. This franchise was purchased years ago, and the Street Railway Company will insist on the ownership when the city buys the avenue.

CINCINNATI, OHIO.—The Cincinnati Street Railway Company has presented amended ordinance for extensions on the John street line. An ordinance to change the motive power of the Third and the Fourth street lines from horse to electricity, and also of the Fifth street line.

COLUMBUS, O.—Three franchises, aggregating 10 miles of track, have just been granted to the Leonard Avenue Company, the Westerville Company and the Consolidated.

COLUMBUS, OHIO.—The Worthington, Clintonville & Columbus electric with Dr. O. W. Aldrich, of Worthington as its leader is making a gallant struggle towards becoming a reality. Considerable money has been subscribed and all along the route great interest is shown.

CLEVELAND, O.—Hon. Martin Dodge, backed by the East Cleveland Railway Company, and the Storage Company, is getting right-of-way for a suburban line, electric, to bring in produce from the vineyards and market gardens outlying Cleveland. The line from Berea to Cleveland will begin track laying again. Mr. Dodge will introduce a Rural Electric Railway Bill at the next session of the legislature and deserves all needed help.

COLUMBUS, O.—The Consolidated Street Railway Company has a mortgage which they have executed to Peter Merkie for \$4,638 12. The mortgage was executed May 29, 1891, on lots 16, 17 and 18, Northwood Heights addition, and redeemable two years after date.

DAYTON, O.—The White Line here will buy new motors, and have already made arrangements for generators.

PORTSMOUTH.—The city council has awarded the contract for Portsmouth electric railway to Messrs. J. A. Blount and S. F. McGrew, of Springfield, Ohio. Work will probably be begun at once.

SPRINGFIELD, O.—W. B. McKinley, of Champaign, Ill., is representative for a company now in possession of the Electric Railway and the Citizen's line, both will be consolidated and all lines will be electrified. S. L. Uelson, of Defiance, will be manager. A new power house, with oil as fuel, will be built and new equipment made and extensions built.

TIFFIN, O.—Route No. 3 is granted to the Electric Railway & Power Company. J. F. Bunn, secretary; Geo. D. Loomis, president.

TIFFIN, O.—Three companies are making efforts to gain franchises in Tiffin.

WELLSTON, O.—Harvey Wells has returned from New York, where he says he has arranged for an electric belt railway from Hamden to Coalton. Work will begin shortly it is reported.

Oregon.

PORTLAND, ORE.—The Portland Cable Railway will be offered at receiver's sale on August 30.

Pennsylvania.

BETHLEHEM, PA.—The Bethlehem & South Bethlehem Electric Railroad Company, a concern recently chartered, has a large force of men at work in the borough of South Bethlehem, laying tracks on the principal streets of the town, for an electric railway.

PITTSBURG, PA.—The Dillsburg, York Springs and Gettysburg Street Railway Company, with a capital of \$150,000, has been granted a charter. Directors: Dr. William Egle, president, Harrisburg; John A. Gardner, Uriah, Adams county; Adam H. Gardner, Steelton; W. C. Sheely, Gettysburg; Levi M. Lauck, Bowmansdale; John C. Comfort, treasurer.

CHESTER, PA.—Judge Clayton has rendered an opinion denying the injunction sought by the citizens to restrain the Chester & Media electric from building line.

EASTON, PA.—Among the recent incorporations, we notice the Easton and Bethlehem Transit Company; capital, \$125,000. Directors: Howard Mutchler, C. A. Laros, Charles Bucan, W. Mutchler, Easton; George W. Cope, Nazareth; E. H. Laubach, Steintown.

ETNA, PA.—A charter has been given to the Connecting Street Railway Company, of Etna, Allegheny county, five miles long wholly within Etna Borough; capital, \$18,000. David S. McCann is president.

GREENSBURG, PA.—Work will commence at once on the Kensington electric road, five miles in length.

GREENSBURG, PA.—The directors of the Kensington Street Railway have decided to begin operations for construction. The road will be 5 miles long and electricity will be used.

LANCASTER, PA.—It has been decided by the stockholders of the Horse Railway Company, to change to electricity and increase the capital stock to \$50,000. The new company will be called the Lancaster Electric Street Railroad Company.

McKEESPORT, PA.—An important line between McKeesport and Wilmerding will be built on private property this summer. The officers are: President, A. W. Smith; vice-president, B. W. Carscaddon; secretary, John C. Devenny; treasurer, Dr. C. R. Stuckslager. President Smith is a capitalist. Mr. Carscaddon is the right of way and real estate agent of the Pennsylvania railroad, Dr. Taylor is a prominent physician of this city, Dr. Stuckslager is president of the People's bank and the secretary, John C. Devenny is a prominent real estate agent.

PHILADELPHIA.—The Traction Company has decided to issue 20,000 shares of new stock, offering it to shareholders at \$85 per share. The par value is \$50 per share, and, while the capital stock will be increased by \$1,000,000, the company will acquire \$1,700,000 of new capital. This is the first time that Traction stock has been put upon the market at a price above par.

The company is paying dividends of \$3 per share, which is equivalent to about 3½ per cent. upon the cost of the new stock. The last sales of Traction stock were at \$7¼ @ \$8; and subscribers at \$85, while paying a premium of \$35 per share, are still getting the stock below its market value before the stock allotment was announced.

This increases the capital to \$7,000,000. Shareholders must give notice of their intention to subscribe by September 1. The stock may be paid for in four instalments.

This will make \$3,700,000 of fresh capital attained by this company within a few months. The funds will be used for improvements and extensions and to construct the trolley when the right is determined by the Courts.

PHILADELPHIA, PA.—The Traction Company has voted to lease the Ridge Avenue Passenger Line. The Traction people, it is said, pay \$10 per share for 2 years, and \$12 per share to the limit.

PITTSBURG, PA.—It is reported that the Duquesnes Traction Company will extend to Walls.

Rhode Island.

WOODLAWN, R. I.—The building containing the plant of the Jamaica Electric railway was struck by lightning and destroyed August 10. Loss \$25,000; partly insured.

Tennessee.

CHATTANOOGA, TENN.—The Chattanooga Electric Railway has been reorganized. Capt. C. A. Lyerly sent in his resignation as president, and Sam M. Divine was elected in his stead. Maj. P. K. Roots, of Little Rock, was elected manager. Work will begin on all the proposed lines at once. The road will be furnished with new cars of the latest patterns.

Texas.

BEAUMONT, TEX.—The City Railway Company has elected the following officers: President, G. W. Carroll; vice president, W. R. Caswell; secretary and treasurer, H. J. Blanchford. G. C. F. O'Brien and R. B. Morris are the other members of the board.

WACO, TEX.—Henry C. Scott of St. Louis, was re-elected president and John A. Brockenborough, secretary and treasurer.

Vermont.

RUTLAND, VT.—The annual meeting of the stockholders of the Rutland street railway was held recently, and the following officers were elected; J. W. Cramton, president; S. M. Wilson, clerk; M. McKeogh superintendent.

Virginia.

LYNCHBURG, VA. The solicitors, Otey Walker & Bowyer, have issued a circular to the stockholders of all lines in the city. The circular says: "A plan of organization and consolidate of the street railway and electric system of the city of Lynchburg has been proposed, and, in our opinion, can be speedily effected with the concurrence of the stockholders.

OLD POINT COMFORT, VA.—The Electric street railroad which now runs to Hampton, about three miles west, is to be extended to Newport News, and the company expect to have it in operation by October 1st.

Washington.

EVERETT, WASH.—Everett & Lake Stephens Water & Electric Company. Capital stock, \$25,000, to operate electric power plants, street railways, etc. F. N. Brownell is at the head.

WAITSBURG, WASH.—The Waitsburg Light and Power Company has been incorporated. Capital stock \$25,000. Geo. R. Preble, Jno. C. Ouderdonk of Spokane are among the promoters.

NEW WHATCOM, WASH.—The Lynden Electric Motor Company has made application for a franchise.

SEATTLE, WASH.—R. Hilton, John P. Fay and Herman Chapin petitioned for right to lay track, and the city council passed by concurrent resolution, passed on the 26 day of July, 1891, determined that such franchise should be granted, and the city council now propose to grant such franchise over and along the route above specified, and offers to grant the same to the person, company or corporation who will pay the highest sum for said franchise.

SPOKANE, WASH.—The Manhattan Company, with the following incorporators and trustees: W. S. Norman, of Spokane, Laughlin MacLean of Chelan Fall, Lyndon K. Armstrong of Spokane, Stephen E. Barton of New York, and John Brainerd of New York. The Company will build railways, electric light stations and other industries. They say that they will build a 25 mile electric railway at Chelan Lake

West Virginia.

HUNTINGTON, W. VA.—The Huntington Belt Line and the Electric Street Railway Company will consolidate and be named "The Consolidated Light and railway Company." Organization: J. L. Caldwell, president; F. F. McCullough, vice-president; C. L. Aefner, treasurer; and F. L. Doolittle, secretary and general manager.

WHEELING, W. VA.—An extension will be made on Fourth street by the Electric Railway.

Wisconsin.

MADISON, WIS.—This road has 66 mules and 12 horses for sale.

MILWAUKEE, WIS.—The Villard syndicate will run an extension from National avenue to the Soldiers Home and Fair Grounds.

MILWAUKEE, WIS.—There is talk of building an electric line out on the old Jamesville Plank-road to run as far as Root Creek, with the intention of making it a big summer resort.

RACINE, WIS.—The company has been allowed to lay trail by giving \$5,000 bonds to place stungers on both side the rails.

WEST SUPERIOR, WIS.—The street railway company announces its intention to lay ten miles of track this season.

The Bountiful Northwest.

The bountiful crops in the Northwest last season have directed the attention of everybody interested to this section of our country, and the indications are that the volume of travel in this direction the present summer will be the largest ever known. Those intending to visit any portion of the Northwest should be particular to see that their tickets read over the Chicago, St. Paul & Kansas City Railway, the quickest best and most popular line. Its equipment is new and elegant, and accommodations offered in high-back sofa seats, only obtained via this route, without any extra charge whatever, are far preferable to the old style of chair car seats. Its trains arrive at and depart from the Grand Central Passenger Station, Chicago, the handsomest station in the world, and Union Depot connections are also made at St. Paul with through express trains for the Great Northwest and the granaries of the world.

This is the only line in the Northwest running Vestibuled Compartment Pullman Sleeping Cars, also standard form of Pullman Sleepers the price for the exclusive use of a drawing-room in the former being no more than the cost of a section in the ordinary style of sleeping cars. Its dining car service is unsurpassed and its trains are run on the fastest schedule time.

Ticket agents will tell you all about this popular railway.

TWO MORE OPPORTUNITIES FOR CHEAP RATES TO THE WEST.

HOMESEEKERS' EXCURSIONS.

Two Grand Excursions via Union Pacific, on August 30th and September 27th, 1892, to points in Kansas, Nebraska, Colorado, Texas, Wyoming, Utah, Idaho, New Mexico and Montana. This is a great opportunity to see the magnificent tracts of land offered for sale by the Union Pacific at low prices and on ten years' time. For this occasion the Union Pacific will sell tickets at the rate of one fare for the round trip. See your nearest ticket agent.

W. H. KNIGHT, General Agent,
191 S. Clark Street, Chicago, Ill.

HARVEST EXCURSIONS—HALF RATES.

AUGUST 30TH AND SEPTEMBER 27TH.

The Burlington Route will sell round trip tickets at half rates, good 20 days, to the cities and farming regions of the West, Northwest and Southwest. Eastern Ticket Agents will sell through tickets on the same plan. See that they read over the Burlington Route, the best line from Chicago, Peoria, Quincy and St. Louis. For further information write P. S. EUSTIS, General Passenger Agent, Chicago.

MONON ROUTE.

The equipment of this line is not surpassed by that of any road in the land. All trains are vestibuled, from the engine to the parlor and sleeping cars. They are run through solid, without change of any character between Chicago, Indianapolis and Cincinnati; heated by steam, lighted by electricity, and fitted with every device that adds to the comfort or convenience of passengers.

The day train, known as the "Velvet," consists of a Parlor Car, Ladies' Car, Smoking Car and Dining Car. This train leaves Dearborn Station at 10:30 A. M. daily and "Sundays too," arrives at Indianapolis at 4:20 P. M., and at Cincinnati at 7:45 P. M.

The constantly increasing travel via the Monon demands additional accommodation. Hereafter the night train, known as "The Electric," will consist of a Compartment Sleeping Car, a regular Sleeper, a Ladies' Car, with an additional Sleeper for use of Indianapolis passengers. The entire outfit has been built by Pullman expressly for this line, and is simply the best. The addition of a Compartment Sleeping Car to the equipment, fills the bill. Families traveling together will appreciate this special accommodation, while those preferring the regular Sleeping Car can have their choice. This train leaves Dearborn Station daily, "as well as Sundays," at 8:05 P. M., reaches Indianapolis at 3:25 A. M. and arrives at Cincinnati at 7:20 A. M. Passengers in Indianapolis Sleeper can occupy their berths until 7:00 A. M.

Seats in Parlor Cars, berths in Sleepers and compartments in Parlor Cars can be secured at City Ticket Office, No. 232 Clark street.

Double lower berth in Sleeping Car or Compartment Car \$2.00; section in Sleeping Car, or compartment in Compartment Car, \$4.00.

JAMES BARKER,
General Passenger Agent, Monon Route,
Chicago, Ill.

CHICAGO LETTER.

M. F. Faran, a Chicago city conductor, and Daniel, Sherwin and Hoyt, machinists, are under bonds to answer a charge of conspiracy to fraud, having stolen and altered a register of the company's.

Judge Horton has entered a decree, allowing the Pacific Rolling Mill Company to foreclose on \$56,000 worth of bonds of the Pacific Railway Company, of Los Angeles, California. C. F. Morse is receiver.

At the grade crossings the delay in street traffic is enormous. At 36 crossings in one day, out of a total of 68,315 vehicles, 15,003 delays occurred. At the same time, 6 a. m. to 7 p. m., the total number of times that traffic was stopped was 3,031, with a total minutes of 6,036; of a total street car traffic of 9,150, 2,320 were delayed, and of 119,181 passengers thereon, 51,367 lost time by waiting for steam roads. Pedestrians to the number of 119,181, passed these points, and 18,212 of these were stopped. The total loss in dollars, as near as can be estimated, was \$1,194 in the 13 hours.

What is now known as the North Shore & Evanston Road, has at last received its ordinance from the City Council. Among other things provided, is that cars shall run at 10 minutes headway from 6 a. m. until midnight, and with 8 minutes headway at rush hours. The life of the ordinance was made 20 years. President J. L. Cochran and Vice-president D. H. Louderback say that unfair means have been taken to fight the trolley, and the gentlemen say that as soon as the traffic will warrant, the motor power or method of application will be changed.

The Metropolitan Elevated has disposed of its bonds as follows: On a basis of 90 per cent for the bonds, with a bonus of 25 cents in stock. That is, for every \$900 subscribed the subscriber receives a \$1,000 bond and \$250 in stock. The first \$5,000,000 of the bonds was taken by Lee, Higginson & Co., of Boston, Clark, Dodge & Co., of New York, and an English syndicate. The Boston and New York firms each took \$1,500,000 and the Englishmen took \$2,000,000. The English Syndicate is composed of Rathborn Bros., bankers, of London; William Lidderdale, the former head of the Bank of England; Mr. Goschen, the English Chancellor of the Exchequer; C. T. Hambro, Thomas Ashland, of Manchester, and Busk & Javons.

The remaining \$3,000,000 was taken by Boston, New York and Chicago capitalists. Chicago was allotted \$1,000,000, and the \$4,000,000 was distributed as follows: The Guarantee & Indemnity Company, of New York, and Kuhn, Loeb & Co., each subscribed for \$1,000,000; Mr. Forbes Leith, \$750,000; Maitland, Phelps & Co., \$250,000; Ballgarten & Co., \$300,000; the Knickerbocker Trust Company, \$300,000; Loeber & Kelley, \$300,000; and Col. Wolcott, \$40,000. The \$1,000,000 subscribed in Chicago was placed through Spencer & McDonald. One house took \$500,000; a bank took \$100,000, and there were four individual subscriptions of \$100,000 each.

The Love Electric Traction Company, whose loop in North Chicago has created so much interest in Railway circles, is running successfully. The only trouble experienced, is the grounding of the wires at times, on account of the narrowness of the conduit. There is no doubt that a better road bed will make the running quieter. The company has lately undergone some changes in its stock, in a deal engineered by M. J. Jamieson, of Jamieson & Co. P. C. Hanford, J. G. Shortall and J. G. Wheeler are the Chicago managers, and an interview with the latter elicited little information, except that the newspaper reports were "3 words truth and 7 words of lies." It is pretty well assured that the capital of \$10,000,000, six tenths is now in the hands of eastern parties, and the report is that Elkins, Widener, et al. are the purchasers. The Love people claim that their operating expenses are cut down 75 per cent.

The West Side power house, of the Blue Island avenue line, discovered that the earth is rather uncertain after all. As the workmen were excavating for the foundation, an ancient slough was found, which let the astonished engineers into about 18 feet of soil about as substantial as apple-butter. The 800 tons of machinery, the 500 tons of building and 650 tons of smokestack, needed a better foundation and so down they went. This discovery saved the railway a large expense, and cost them \$50,000.

The construction of the South Chicago City lines is progressing favorably. The company has purchased three acres of land fronting 500 feet on Ewing avenue and the same on the dock from the Calumet Canal and Dock Company for \$27,500, and will build on this a fine power house. The track has all been laid from Jackson Park to South Chicago.

VICTORIA, B. C.—The Electric Tramway lost its entire equipment by fire August 7. Loss \$300,000, small insurance.

NEW YORK LETTER.

The Metropolitan Traction Company has been re-organized with a capital of \$30,000,000. Each holder of 100 shares of present stock will be given 120 in the new. There will be \$24,000,000 of the present capital distributed to present stockholders, and they will be allowed to subscribe for 10 per cent of their present holdings in new stock, at par.

The aldermen of Brooklyn have over ridden Mayor Boody's veto. The Union Elevated received right to lay track from Hamilton Ferry and and operate by trolley.

The good and worthy citizen now kicked against the proposed storage battery. The same ones will kick about their wings when they go to join the angels.

The Fiftieth Street, Astoria Ferry, and Central Park Railway Company has projected a system of cross town lines with connections that will be of the greatest value to all the district covered. Of course, great opposition will be encountered, but it is reasonably sure to be overcome. The lines proposed run from river to river, through Fiftieth and Fifty-first streets, Sixty-fifth and Sixty-sixth streets, Seventy-ninth and Ninety-sixth streets, connecting on the East Side by avenue A, and running to the Astoria ferry through a part of avenue B. The three upper lines to run through Central Park at Sixty-fifth, Seventy-ninth and Ninety-seventh streets. Single lines to run through Fiftieth and Fifty-first, Sixty-fifth and Sixty-sixth streets; and Seventy-ninth and Ninety-sixth streets to be double lines.

It is proposed to connect the Sixty-fifth and Sixty-sixth street single lines by running through Fifth avenue between those streets, and also to connect the Ninety-sixth street line with Ninety-seventh street by way of Fifth avenue.

The appearance before the council was postponed until August 17 to allow time to file paper, briefs and complaints.

The application for a franchise was signed by Frederick A. Bartlett, secretary of the company. The incorporators are: Frederick A. Bartlett, H. S. M. Ruggles, Robert A. Grescen, David F. Harrison, W. H. Bartlett, E. C. R. James, John W. Mersereau, W. Langdon, Andrew Ward, F. L. Pemberton, Alfred A. Sparks, S. H. Hurd and A. W. Byrt.

The New York, Mapleton & Van Pelt Manor Railway, another electric to Bensonhurst and Coney Island has filed its incorporation. The incorporators are A. D. Baird, J. P. Puels, W. P. Rae, W. H. Northridge, et al.

An overhead Cable Company has been organized with several million dollars capital, ostensibly to make a departure in cable construction. John H. Harris is president, Frederick Meyer, secretary and treasurer, and Mr. Butler, general manager.

The Brooklyn conductors now use a whistle of duccet tones with recollections of Richard Wagner, W. Damrosch and the dying calf intermingled and conjoined. The new whistle will cause the sleeping passenger to image a German band and angel's voices.

The total journeys of New Yorkers in the past year reached 431,000,000.

The Brooklyn City will build a big car barn at Fifty-eighth and Second avenue. It will cover the block, 700 by 200 feet and have room for 800 cars. The site cost \$72,500, and the three story building will cost \$200,000. The road will occupy it in November.

The Houston, West Street & Povia Ferry Railroad has elected the following officers: President, John D. Crimmins; vice-president, Henry Thompson; secretary and treasurer, D. B. Hasbrouck; board of directors, John D. Crimmins, Thomas F. Ryan, P. A. B. Widener, W. L. Elkins, Henry Thompson, D. B. Hasbrouck and C. E. Warren.

The Harlem Bridge Consolidated, known as the Union Railway, has elected these officers: President, Edward A. Maher; vice-president, Charles A. Stadler; secretary and treasurer, Thomas W. Olcott; directors, Anthony M. Brady, Robert C. Pruyn, John C. De La Verne, William Shaw, John W. MacNamara, William Caldwell, Edward A. Maher, Charles A. Stadler and Thomas W. Olcott.

MAP OF THE UNITED STATES.

A large handsome Map of the United States, mounted and suitable for home use, and issued by the Burlington route, will be mailed to any address on the receipt of 12 cents in postage by P. S. Eustis, Gen'l Pass, Agent, C. B. & Q. R. R., Chicago, Ill.



WORLD'S FAIR.—THE FISHERIES BUILDING.
Length, 1,100 feet; width, 200 feet; cost, \$200,000.

J. H. H. & Co. Engravers
CHICAGO, ILL.

THE WAUWATOSA SUBURBAN LINES.

LYING five miles west of Milwaukee is the pretty little suburban village of Wauwatosa. As the valley of Menominee lies between the city and suburb, for years no attempt at connecting the two by rapid transit lines, was made. Finally, however, faith enough accrued to the enterprise to bring into existence the great viaduct across the valley of the Menominee.

The projector of the enterprise was A. B. Meyer and to him and his associates who placed their faith and their good gold in the enterprise belong the glory and the success.

This viaduct, which is illustrated very fairly in our accompanying engraving, is in some respects the most remarkable in the United States. The entire length is 2,085 feet and at the point where it spans the noisy little stream, it is 90 feet high. In the construction 1,300,000 pounds of iron and steel were used, 500,000 feet of timber enter into the construction of floors and railing and the

J. Johnson. The officers elected at the start and who still serve are: James Petley, president; J. W. Bingham vice-president; Rudolph Nunnemacher, treasurer, and A. B. Myers, secretary. The capital stock of the company is \$200,000, with \$100,000 in preferred and \$100,000 in common stock, the preferred to receive 9 per cent of the dividend out of the earnings and the common to receive the same with the surplus to be divided equally between the two. The right of way cost the company \$50,000, several valuable tracts having to be condemned. Work on the bridge began about August 1, 1891. The road starts at Thirty-sixth street, where it connects with the Becker road and runs out Wells to Fifty-ninth street, thence north along the bluff overlooking the valley and St. Paul tracks, crossing the river on the Wauwatosa road, near the Chemical works, and thence to the village, ending near the railway station and river, in all six miles of road. The road has now been in operation for several weeks, and the prospect for a good traffic is very flattering.



VIADUCT OVER THE MENOMINEE VALLEY.

structure complete cost \$77,666. The substructure alone cost \$6,616 and used 3,914 cubic feet of rubble stone, 358 cubic yards of crushed stone, 3,907 cubic feet of stone pieces and 125 square feet of coping. The building occupied only three months, which is a fine compliment to Keepers & Wynkoop the builders.

The viaduct is double tracked and thirteen feet from the center to either side, thus allowing for wagon passage and pedestrians. The safe strain of any span is 128 tons. The longest span is 120 feet. No vibration is felt from the passage of the heaviest teams. J. G. Wager of the Milwaukee Bridge and Iron company furnished the material for the construction.

The company which had the enterprise to build this fine structure was organized in the fall of 1889.

The directors of the company, as organized by Mr. Myers, consisted of A. B. Myers, James Petley, J. W. Bingham, Jacob Wellauer, Everette A. Smith and Walter

PUT-IN-BAY ELECTRIC RAILWAY.

MANY summer resorts, although commercially dead for about half the year, find during the rush of the season that an electric line is not only a very desirable addition to the pleasures of the place, but a financial success. The Put-in-Bay road, connecting the new hotel Victory with the town and harbor, a distance of two miles, was recently put in commission, and is proving a grand financial success. The same company also owns and operates the water works.

John P. Carruthers is resident manager, and is a Mansfield, Ohio, man. J. K. Tillotson, president of the Industrial and Mining and Guarantee Company, of New York City, has purchased \$125,000 worth of bonds and \$100,000 in stocks, thus obtaining a controlling interest. The road will be made a belt, reaching to Peach Point, but the part already in operation has paid \$200 per day in profits, so rumor says.

PERSONALS.

GEORGE PRATT, Lamokin Car Works, has been in the city for several days.

O. W. MEYSENBURG, of the Siemens-Halske American house, is in Europe on business.

C. A. BINZE, of the Shultz Belting Company, is off for a vacation tour of the great lakes.

C. J. MAYER, of the R. D. Nuttall Company, Allegheny, gave us a pleasant call a few days ago.

G. T. W. BRAMAN and Mrs. Braman, of the West End, of Boston, are at Bar Harbor, Maine, for the summer.

W. FOREMAN COLLINS, Chicago manager of the Electrical Engineer, has returned from a two months' trip abroad.

WM. CROSSLEY, of Cleveland, Ohio, spent several prosperous days in Chicago last week, and called at the REVIEW office.

D. F. LONGSTREET, general manager of the West End Street Railway Company, of Denver, was a caller at the REVIEW office during the month.

C. E. STUMP, of New York, the genial business manager of the Street Railway Journal, made us a very pleasant call while in the city a few days ago.

PRESIDENT HENRY M. WHITNEY, of the West End Street Railway Company, and family, of Brookline, are at their summer residence, at Jerusalem Road, Mass.

A. S. HALLIDIE, of San Francisco, the father of the cable system, made us a pleasant call a few days since, while on his way East. Mrs. Hallidie accompanies him.

W. J. GRAMES, formerly general local manager of the Edison Company, at Seattle, Washington, now represents the General Electric Company, with office at 807 Front street.

JAMES N. NEWCOMBER, president of the Delaware, O., Street Railway Company, was a welcome caller at our office, and reports construction of his road advancing rapidly.

J. B. WOODS, who was formerly connected with the Great Western Electric Supply Company, has become assistant general manager of the Knapp Electrical Works of this city.

F. D. SAMPSON, railway expert of the Northwest General Electric Company, of St. Paul, was recently presented with an elegant diamond pin by his employees, as a token of their esteem.

H. L. CARGILL is now the assistant manager of the Duplex Street Railway Track Company, in New York city. Mr. Cargill is well known as a valuable member of the Thomson-Houston Electric Company.

THE name of Capt. Robert McCulloch, General Manager of the Syndicate Street Car lines of St. Louis, has been mentioned in connection with Congressional honors next fall, in the Eighth district, on the Democratic ticket. He has once before declined the same nomination.

GEORGE W. LYNCH, General Manager of the Portland Cable Railway, has resigned to go into business for himself, and F. I. Fuller has been elected to fill the vacancy. Mr. Fuller has been a successful civil engineer and is meeting with good success in operating the road.

JAMES R. CHAPMAN, general manager of the Consolidated Grand Rapids, has been made general manager of the South Chicago Electric, and will divide his time between the two places. Mr. Chapman has been a very successful street railway manager and the South Chicago will be in good hands.

E. SAXTON, the contracting engineer, who is so prominent in cable road building, has so far completed his work on the Washington and Georgetown cable road as to be able to leave for Baltimore, where he takes up the construction work of the Blue Line cable. His office is at Biddle and Cathedral streets.

GEORGE FLETT, assistant managing director of the extensive establishment of Dick, Kerr & Company, London, made us a pleasant call when in the city recently. Mr. Flett made a careful inspection of the street railway facilities in Chicago and other cities, and expressed himself as delighted with Chicago and the buildings at the World's fair. Mrs. Flett accompanied him on the trip.

H. DURANT CHEEVER, manager of the Okonite Co., Ltd., has gone to Europe on a well earned vacation, and generally in the business interests of the company. This is the third trip that Mr. Cheever has made across the great pond. It will be remembered that, owing to the European demand for Okonite wire, it was found necessary, a year ago, to erect large branch factories in London. Mr. Cheever will inspect the factories and besides, make a circuit of the continental cities.

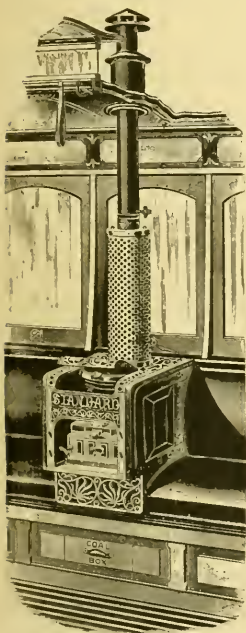
THE MERIDEN STRIKE.

STRIKING drivers and conductors at Meriden, Conn., took the bit in their teeth last month and carried on mob proceedings that were a disgrace to the employes. Aided by some factory hands, an attempt to run cars was settled by showers of dirt, stones, stale eggs and other remembrances, besides track obstructions. Boarding house keepers were so intimidated that no non-union men could find accommodation. An extra force of police was required to keep order and protect the non-union men, who came mainly from Hartford, New Haven, Providence and New York. The company has closed up its business, turned the horses out to grass and stopped all cars for two months. The medicine is severe, but necessary.

THE NEW STANDARD CAR HEATER.

A RADICAL departure and marked improvement in street car heating stoves, has been made by Garson Myers, President of the Standard Railway Co., Monadnock Building, Chicago, the advantages of which are so clearly evident, that we feel safe in bespeaking for the same, a hearty welcome and liberal patronage from wide awake street car managers and car builders. The new stove will be known as the "Standard" heater, which, as shown in the illustration, is designed to occupy the seating space of one passenger, and to rest upon the car seat instead of upon the floor.

As stated, the stove-case occupies the seating space of one passenger, and extends from the seat to the window sill. The sides of the case are designed to be cut to conform to the shape of the seat and back, whatever that may be, and so made as to be readily applied to seats of all kinds, whether of plain wood, cushioned or upholstered. The case is thoroughly insulated with linings of asbestos and sheet zinc, which allows passengers to sit directly next to the stove case without the least discomfort from excessive radiation.



The entire stove is made of cast iron, neatly designed, and constructed in the most substantial manner, and top and front plates handsomely nickle plated. The coal fed into the stove at the top, as shown in cut, and it is claimed that less fuel is required to accomplish satisfactory results, than with any other street car stove heretofore placed on the market.

before placed on the market.

The capacity of the stove is as ample, if not greater, than stoves occupying twice the space, being 15 inches high and 12 inches in diameter. The ash-box is made to hold all ashes that accumulate during twenty-four hours. For convenience, a supply of coal is designed to be carried in the coal-box underneath the seat, as shown in cut.

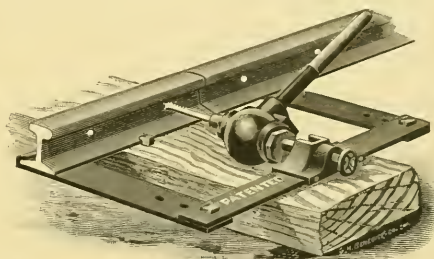
Another advantage derived by the construction shown, is the straight smoke pipe, the stove pipe collar being set far enough back on the stove to take the pipe up straight through the lower deck, thus doing away with the unsightly elbow so commonly used in connection with street car heaters, as the stove is entirely above the floor, the car can be flushed out when cleaning without the annoyance of dirt and water getting into the stove box.

Notwithstanding that the stove is entirely new, we learn with pleasure that several large orders have been

taken from leading street railway companies, for early delivery, and that companies anticipating purchase of new stoves for coming winter use, are invited to communicate with the manufacturers.

THE SCHUTTLER RATCHET TRACK DRILL.

PRESENTED herewith is an illustration of the Schuttler Ratchet Track Drill, recently placed on the market by the Car Truck Supply Company, of Chicago. A brief examination of this device easily proves its value as a labor saving tool. All the parts are of first class workmanship, and the material of the best quality, crucible steel being used for the working parts, while the gears are made of cut steel. The working parts of the drill are covered with a malleable iron shell to pro-



tect them from water and dirt. All parts are interchangeable, and the drill so made that it is quickly attached to either the inside or outside of the rail without interfering with a passing train. Once attached, all the holes for a joint can be drilled without moving the clamps. One great advantage over the old style drills is the fact that the drill works continuously in one direction by the movement of the handle in either direction, thus effecting a great saving in time and labor.

DULUTH'S FERRY.

THE Duluth-Superior line, adverted to in the last issue of the REVIEW, is progressing finely towards completion. Grading on the interurban line has begun. To accomplish the interurban transit sooner, the novel idea of a ferry has been put into use. Within a few months street cars from Superior will be running on Duluth lines and Duluth cars will do the same thing on Superior lines. The boat is to be built after the model of the famous ice crusher, St. Ignace, only on a smaller scale, and will run regular trips, winter and summer alike. The plans and specifications for this boat have already been prepared, it is said, and submitted to the officers of both street railway companies.

The boat will have accommodations for a number of vehicles and also foot passengers. Passengers leaving the Spaulding house, in Duluth, can be landed at the West Superior hotel inside of twenty-five minutes.

GEORGE H. WHEELER, president Chicago City Railway Company, is absent on an enjoyable trip in the East and is the guest of the president of Monmouth Park.



AFTER a long discussing, the Paris Conseil Municipal has voted the concession to Mons. Berlier for the establishment of an underground tubular electric tramway, proceeding from the Bois de Boulogne to Vincennes.

LONDON Tramway shares have a poor showing for the past few months, owing to the scarcity of fodder and grain. The London Trade and Finance Journal advocates electric cars and severely scores the foolish objections that have been raised to the employment of the Trolley.

THE Birmingham Central Tramways Company have just placed an order for 600 Epstein cells, with the Midlands branch of Messrs. Woodhouse and Rawson, United, Limited, at the Minories, Birmingham, the cells being for use upon their important electric car route in that city.

IN England, the municipalities own about 30 tramway undertakings out of 158, or about 250 miles out of 700. By the Tramway Act of 1870 they are, however, forbidden to work their own tramways, and consequently are obliged in most instances to let them out to private companies, except under statutory provision.

THE United Tramways of Dublin, in the secretary's report, show the gross receipts at £62,961, and the working expenses £45,388, besides this, £4,788 were expended on track construction, leaving £14,824 profits. The traffic for the first half of the year amounts to 8,454,788 passengers against 8,251,440 of last year, with an increase of £1,600 in revenue thus obtained.

THE omnibus and tram lines of Cardiff, Wales, have been authorized by the Post Master General to convey letters of any person from any place on the line to any point in the route. For this service the company must pay the post office department 1d. The companies may also convey messages intended to be sent as telegrams, and for this service no charge will be levied upon the company.

IN the United Kingdom there are 963 miles of tram lines, requiring 29,012 horses and 579 engines to operate 4,067 cars. During the year ending June 30th, 1891, which is the latest compilation, there were transported 565,621,478 passengers, affording a revenue of £3,429,686, and to earn which cost £2,630,920; leaving a net of £798,757. Passengers carried show an increase over previous year of 7.5 per cent; increased gross receipts

6.7 per cent; increase in expenses 9.5 per cent, and decrease in net earnings 1.6 per cent. The above is taken from Duncan's Tramway Manual, just issued.

AMONG the new schemes of intramural transportation that the London County Council has to dispose of, is that of the Baker Street and Waterloo Railway bill, which proposes to create an independent company, with a capital of £1,250,000, to construct a line indicated by the title of the bill, with intermediate stations at Charing Cross, Piccadilly Circus, and Oxford Circus. The estimate for the line is £990,000, with additional £300,000 for rolling-stock, hydraulic lifts, and electrical plant, and the distance of the rails below the surface of the ground will vary from 15 feet to 8 feet, passing under the bed of the Thames at a depth of 16 feet 6 inches. There were numerous opponents to the measure.

ONE of the reasons for the backwardness of electric railway construction in England, is a condition which has attained some notoriety under the title of the "twenty-four hours" clause. It is an arrangement by which the contracting tramway company can, at the pleasure of the local authorities, be compelled to remove its cars after twenty-four hours notice. The point is not the shortness of the notice, but such discretionary powers in a possibly interested party. The Board of Trade have authority to stop any car, or line of cars, after due examination, if the public safety be endangered. But then this proceeding is carried out by an independent and absolutely impartial party.

THE Barking-Canning Town accumulator cars are running under a "twenty-four hours" clause; and the steam cars at Bradford were recently stopped under a similar agreement. In 1890, the North Metropolitan Tramway Company obtained Parliamentary permission to extend the electric system over the northern districts of their lines; but the West Ham Corporation insisted on the "twenty-four hours" clause, even in the face of the Board of Trade's approval of the scheme and the experience gained during three years working of the proposed system at Barking. With such a state of affairs it is little wonder that the capitalists and promoters do not rush into the sinking of \$100,000 or so, in putting in expensive equipments.

COMPRESSED AIR AT BERNE.

THERE is said to be operated in Berne, Switzerland, a compressed air street railway. The line operated is about 1.8 miles in length and built at a cost of about \$100,000, including rolling stock. The number of passengers carried during the past year was 1,146,532, and the receipts amounted to 118,935 francs, of which about 83 per cent went to cover the working expenditure. The most serious difficulty encountered was that of freezing mains, which necessitated a heavy covering of nonconducting material. The grades are sufficient to give good drainage.

ECHOES FROM THE TRADE.

THE LIMA REGISTER is in strong demand and the factory occupied with abundant work.

T. C. WHITE & COMPANY, St. Louis, find constant use for all of their new quarters and are handling a large quantity of supplies.

THE AMERICAN CAR COMPANY, St. Louis, are full of work and are soon to add an important department to their already extensive works.

THE ST. LOUIS CAR COMPANY'S shops present a busy view these days, They are getting out a large number of winter cars for fall delivery.

THE BRILL COMPANY recently sent out four more cars to Dubuque, Ia. The new cars are 16 feet in length and will have 40-horse-power motors.

THE offices of the Thomson-Houston International Electric Company have been moved from Boston to the Edison Building, 44 Broad street, New York.

THE CUSHION CAR WHEEL COMPANY are meeting with continued good success, and have just sent 56 wheels to Racine, Wis., and a trial order to Toledo, O.

SHORT MOTORS are to be used on another of the Hartford, Connecticut, lines, a contract having recently been closed by this company, with the Hartford & Wethersfield horse railway company.

THE NEENESHA WOOD SPLIT PULLEY COMPANY, of Neenah, Wis., has entirely rebuilt the works destroyed by fire last fall, and now covers some four acres. The works are operated both day and night, and further additions will be made to the plant.

It is said that the new cars on the Fort Wayne Street Railroad, Fort Wayne, Indiana, are the finest equipment in the west. The cars were built by the J. W. Jones Sons of West Troy, New York, and they are mounted on the Dorner & Dutton trucks, and are equipped for the "Short" electric system.

THE AMERICAN MICA COMPANY, at 620 Atlantic avenue, Boston, have purchased the entire mica stock and good will of the Gould & Watson Company, of Boston. G. B. Watson, who has been treasurer of the Gould and Watson Company, has been made general manager of the American Mica Company.

ALBERT & J. M. ANDERSON, Boston, writes us: "We have nothing new and strange to talk about, we are unusually busy building switch-boards of all kinds,

particularly Ajax switches, which are in great demand at all stations where the best apparatus is used. In our regular lines we are hard at work all the time, as usual."

E. J. WESSELS, of the New York office, has recently closed an important order for the Short Electric Railway Company, which he represents. The order covers thirty (30) horse power Single Reduction motors, and a one hundred (100) horse power generator, for the Syracuse, Eastwood Heights and DeWitt Railroad Company, of Syracuse, N. Y.

THE EASTERN ELECTRIC CABLE COMPANY, Boston, Mass., are handling a larger volume of business this summer than ever before in the history of the company. They are getting a large share of the new construction work in the East, as well as in the West, and are called upon to fill many orders from parties who purchased their material last year.

JOHN A. ROEBLING'S SONS COMPANY make a good cable. One of them has been in use on the Brooklyn Bridge Railway 415 days, has travelled 88,590 miles, and handled nearly 27,000,000 tons miles of traffic, and is still in good condition. A former cable made by the same firm lasted 607 days, ran 120,232 miles, with a traffic of 25,492,892 ton miles.

GEORGE CUTTER has just organized a company for making rheostats and electric heaters with the wire imbedded in enamel. The company starts with a capital of \$250,000, and controls the patents on enameled resistances. It will operate factories both at Chicago and in the East, for making the devices which are now being developed at George Cutter's shop.

EDWARD BEADLE, manager of the Railway Register Manufacturing Company, New York, says the present is one of the busiest seasons he has ever known in his line. Their latest improved Monitor Register is being sold as fast as they can be produced, and a surprisingly large demand is coming in for Bell Punches; in fact, they are at present behind on orders, and the same may be said of the Model Register.

THE PIERCE & MILLER MANUFACTURING COMPANY, 42 Courtlandt Street, has just completed the work of increasing the plant of the Merrimac Valley Electric Railway Company, at Lawrence Massachusetts, from 500 to 800 horse power; the increase in power being necessary to meet the demands of the growing traffic. The first installation of the plant was made by Pierce & Thomas last year. It now consists of three McIntosh & Seymour engines, three Babcock & Wilcox boilers, and Worthington pumps and condensers.

THE HEALY MOTOR has a good report of faithful service well performed. A gentleman who knows writes us: "No skilled labor has at any time been in charge of these motors, and in this respect they have been subjected, and still are, to the severest forms of service and test, much more than doing the work first asked of them. Within the year's service the tests have been so unexpectedly satisfactory that demonstration has shown that the gearing believed necessary for so light a motor to frequently use, producing surplus power available to start a heavy load, has been found unnecessary and has been taken out of each motor in service, with in no case unsatisfactory results. There continues no sound of an engine even under the heaviest loads, nor any puffing of steam. The expense per motor by these changes, has proven less than expected, the durability much increased and where more power was desired, a larger engine has been added, giving very favorable results from the same boiler."

THE LAMOKIN CAR COMPANY gave our reporter the following list of late orders: Williamsport Passenger Railway of Pennsylvania, four eight seat, closed ended, open cars, two to be mounted upon Robinson motor trucks, and two for McGuire trucks. Paterson Central Electric Railway, Paterson, N. J. eight 16 feet palace vestibule car bodies, finished in quartered oak with Cochran's patent vestibule observation window in roof. The following deliveries will be made in August: Four cars, Belle City Railway Company, Racine, Wis.; four cars, Citizens' Passenger Railway Company, Harrisburg, Pa.; four cars, York Street Railway Company, York, Pa.; two cars, Rome Street Railway, Rome, Ga.; eight cars, Consolidated Street Railway Company, Oskaloosa, Ia.; four cars, East Harrisburg Railway Company, Harrisburg, Pa.; two vestibule cars, Williamsport Passenger Railway, Williamsport, Pa.

BALL ENGINES, of Erie, it hardly need be said are still in it. The City of Mexico orders 24-horse-power, Fort Clark Street Railway, of Peoria, 130-horse-power; North Avenue Street Railway, of Baltimore, 260-horse-power; Shamokin Electric Railway, of Pennsylvania, 130-horse-power; Prohibition Park Railway Company, Port Richmond, one 150-horse-power; H. Ward Leonard, one 150-horse-power; Hot Springs Electric Company, Va., a complete steam plant, 100-horse-power and two 80-horse-power boilers; Guantananno, Cuba, one 80-horse-power engine, and thirteen late orders are to be credited to F. B. Chinnock, New York sales agent.

J. G. BRILL COMPANY has its usual full complement of orders. Their No. 13 truck sold to the number of 200 in July. Contracts during the last month mention the following buyers: Columbus Street Railway Company, Columbus, Ohio; North Hudson County Railway Company of Hoboken, N. J.; the Philadelphia Traction Company of Philadelphia, Pennsylvania; the Toledo Consolidated Street Railway of Toledo, O.; the McKeesport &

Reynoldton Passenger Railway of McKeesport, Pa.; the Washington, Mt. Vernon & Alexandria Railway of Alexandria, Va.; Mobile Electric Railway Company of Mobile, Ala.; Delaware Electric Railway Company of Delaware, O.

THE FALLS RIVET & MACHINE COMPANY, of Cuyahoga Falls, O., has done some heavy work lately for a number of electric companies, and the future is bright, with promise for more work.

M. M. BUCK of St. Louis, met with great success with his oil filter, and is being generally and favorably received. His headlights, car trimmings and lamps, it goes without saying, find a ready sale.

THE MCGUIRE MANUFACTURING COMPANY, Chicago, make trucks that seem to fill the wants of street railway managers. At present their factory is running to its utmost capacity to fill orders now on hand.

CHAS. A. SCHIEREN & COMPANY report several large orders for belts, for electric power houses, during the past month. The belts manufactured by them have a justly wide reputation.

THE DETROIT ELECTRICAL WORKS report business pushing to the full extent of their capacity. Their motors have recently been adopted at Chattanooga, Tenn., after a committee had inspected several of the other systems in neighboring cities.

THE BATES MACHINE COMPANY, of Joliet, Ills., has sold during July, among other orders, engines as follows: People's Electric Street Railway Company, (second engine), Springfield, Ill., one 24x48. Field Engineering Company, New York City, for West Side Electric Street Railway, at Elmira, N. Y., two 25x42. Robberson Avenue Electric Railway Company, Springfield, Mo., two 16x42, twin engines. Elgin, Joliet and Eastern Railway Company car shops, Joliet, Ill., one 14x36. Pullman Palace Car Company, for electric light plant, one 18x42, vertical, two 24x48.

THE FULTON FOUNDRY COMPANY, of Cleveland, are turning out a large amount of track material, railroad crossing and special work. Their works are crowded as never before. H. A. Everett, General Manager of the Toronto, Canada, writes:

In response to yours of the 7th inst., I beg to state that we have adopted exclusively for our road here the Fulton Foundry Truck, after having tried a great many trucks of other makers; and we feel satisfied there is no better truck in the market.

Chas. W. Wason, Vice-President of the East Cleveland Railroad Company, writes:

"We are using about 20 of your trucks made on the general plan, and our experience has been that the wooden truck is easier kept in repair, and does not make such a noise and we think will last longer than any other truck.

We have tried about all the iron trucks on the market, and do not think we shall purchase any more. We can most assuredly recommend your truck to parties wishing to equip their road, and would be pleased to answer any question they might desire putting to us."

DERMAGLUTINE PINIONS, made by Groetzing & Sons, Allegheny, have made a good record during the hottest weather, showing them to be unaffected by extremes of heat and cold.

THE CHICAGO RAW HIDE COMPANY, Chicago, recently received a cable order from England for a large amount of their raw hide belting.

SWEET'S METAL CROSS TIE COMPANY has organized at Los Angeles, Cal., with L. A. Grant, president; H. W. Miles, vice-president and H. C. Whitehead, secretary.

THE GILBERT CAR COMPANY is now fairly overrun with orders waiting to be filled. The shops are running with a full complement of men numbering in all about 500 workmen. Thus, this year, has been the most successful in the history of the company.

BROWNELL CAR COMPANY, St. Louis, have just delivered seven 12-foot grip cars to the North Chicago Street Railroad, which are attracting much attention.

THE LEWIS & FOWLER MANUFACTURING COMPANY, Brooklyn, are full of work in all departments, and while their's is an always busy institution, they have been especially so of late. Orders for snow plows are now being placed, and managers who are short on this equipment, will consult their own interests by ordering early.

WILL BE FINE.—One of the handsomest isolated plants being put in at present, is that in the Power Station of the Broadway Cable Road. The plant will comprise between 3,000 and 4,000 lamps, and quite a number of electric motors. Slow speed dynamos, coupled directly upon the engine shaft, will be used. H. Ward Leonard & Company are acting as the bulk contractors for the entire electrical equipment.

THE PIERCE AND MILLER ENGINEERING COMPANY will soon have the 1,200 horse power steam plant, which it is installing for the Globe Street Railway Company of Fall River, Mass., completed and in running order. It



SOME FAMILIAR MOTOR TYPES OF THE RECENT HEATED TERM.

They are neat and strong, and contain three double seats. the driver standing in the center of the car.

GRIFFIN WHEEL & FOUNDRY COMPANY, Chicago, which suffered from fire August 10th, will not be seriously delayed, as the very large stock of wheels on hand, in all styles, is ample to take care of customers, and the works will be in operation again in two weeks.

THE BABCOCK-WILCOX COMPANY, during the six months ending June 30th, installed in the United States 71,000 horse-power, of which 20,000 was put in during the month of June. The report of their business abroad shows an aggregate for the six months nearly as large as that in country.

THE AMERICAN ENGINE COMPANY of Bound Brook, N. J., have been forced to make additions to their vast machine shops. They are now building an addition 40x60 feet to meet the demands. An electric crane has been ordered, and with new machinery they will be able to fill all orders very promptly.

will consist of a 620 horse power McIntosh and Seymour double compound tandem slow speed, and one compound andem engine, both condensing, Babcock & Wilcox Boilers, Blake pumps and condensers. This installation was made with a view of doubling the capacity of the plant.

THE SIOUX CITY ENGINE WORKS have been very prosperous lately and brought 18 companies into the fold within the past few weeks. They report a decided increase in the demand for engines since the 20th of June, and have every prospect for a very large demand for their engines, during the balance of the season. and in anticipation of this, they have completed a number of standard selling engines, ready for prompt delivery, and are now engaging additional force for a night gang, to take care of the rush orders on hand. They have also in preparation a new list of users of the Sioux City Engine, which will soon be ready for the trade; also in preparation a descriptive catalogue of their Corliss engines, which they hope to issue a little later.

THE RAILWAY EQUIPMENT COMPANY, Chicago, report business as constantly on the increase. Owing to the fact of this company having had such a long and practical experience in the electric railway material line exclusively, they are prepared to furnish the best class of material for such work. The use of their standard appliances is a guarantee of the most satisfactory equipment, and several new devices lately brought out by the company, have been recognized as having superior merit. The opinions and advice of the managers of the company is constantly in demand, not only in this country, but wherever electric roads are being built, and a number of orders have been received lately from foreign countries. The company appreciates the importance of keeping in touch with the managers of electric roads, and are always pleased to examine new devices.

E. B. PRESTON & COMPANY, Chicago, make a specialty of electric railway belting, and offer their celebrated "Acorn Brand" with a guarantee. They have quite recently filled several orders for plants that are increasing their power.

THE MEAKER MANUFACTURING COMPANY, are still on the rush to fill orders for their registers. The workmanship and accuracy of the Meaker Register, not only makes it an ornament, but a shure thing for the railway company.

COMMENDED TO THE POWERS THAT BE.

WE have had frequent occasion to comment on and show the inconsistency, not to say stupidity, of much would-be legislation against street railways, on the part of officious members of city councils. One would not have thought that the dead of summer would incite to any unusual hostility, but down at Galveston they are trying to ordain that when two cars approach a cross street from opposite directions, "both shall stop until the other has passed!" Just how many moons would elapse before this feat was accomplished is not stated. The Galveston Mercury, however, comes to the company's rescue with a proposed amendment, which, if anything, is an improvement on the original. It declares thusly:

"No street car shall employ a cross-eyed driver, or one who has not passed a rigid medical examination by a board of physicians appointed by this council, and whose fees shall be \$5 for each driver so examined, to ascertain if he is color blind or is liable to become so. And it shall be further ordained that if any street car driver, or motorman, or conductor, or any boy who may be stealing a ride on the dashboard, or any passenger who shall cause or assist in being instrumental in causing any street car or cars to run by any intersection of any street in this city, then such person or persons mentioned in the foregoing shall immediately place or cause to be placed on the back end of said car or cars, a red flag, which shall be a signal of distress, warning all persons who may be passing on the streets that said car or cars has, or have, went beyond the limit, whereupon any policeman walking on his beat is empowered to grant said car full and free permission to back up to the spot where it should have stopped before crossing said street intersection or intersections. Any driver or assistant driver, or motorman or assistant motorman, who fails to observe or assists others to fail in observing this ordinance shall be fined in any sum not more than \$50 nor less than \$10, or hung up in an ice house with his head down, or both, or all three, as the court may see fit."

BELGIAN TRAMWAYS.

BELGIAN engineers, sent to examine the Bremen Tramway, overhead trolley, report favorably on the scheme to their principals, and the Societe Nationale des Chemins de fer Vicinaux has made arrangements with the Thomson-Houston Company to provisionally equip its Brussels line, Avenue du Midi to La Petite Espinetti. The same system will, it is understood, be also applied to one of the sections of the Brussels Tramways. The Liege Tramways have, further, entered into negotiations with the Compagnie Internationale d'Electricite for the conversion of the rolling stock of its Herstal line and the establishment of a central station at Herstal. Brussels has at present two projects for urban railways under discussion. One, by Mons. Wellens, is for an aerial line, and the other, that of Mons. Gillon, provides for an underground system. Liege has also under consideration a scheme for the construction of an urban railway in that city. There is also mentioned a project for connecting Antwerp and Brussels by an electric railway, on which the journey should be performed in from 20 to 25 minutes.

PROGRESS OF EXHAUST STEAM HEATING.

THE American District Steam Company of Lockport, N. Y., has just commenced the construction of about one and one-half miles of their protected underground pipe, for the Cedar Rapids, Iowa, Electric Light and Power Company. This is to be an exhaust steam plant, and will bring a liberal reward to the company, from that which now is a waste product. The largest pipe to be laid is twelve inch. The company is admirably located for the sale of its exhaust steam, and has already a large number of applications for steam to heat residences, stores and public buildings. The American District Company is, we are informed, preparing material for several other large plants, including electric plants at Rockford, Ill., and St. Joseph, Mo.

The exhaust plant put in two years ago for A. L. Idle, of the Springfield, Ill., Electric Light and Power Company, is also being extended.

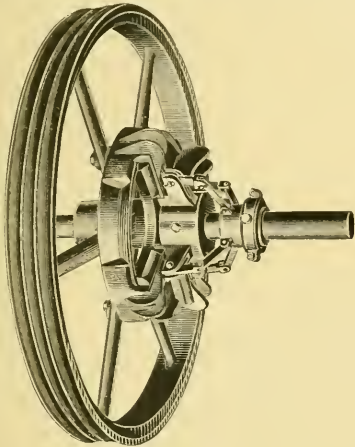
PLANS WANTED.

PRESIDENT WEISS, of the San Antonio Street Railway Company, San Antonio, Texas, writes the REVIEW that his company contemplates building a pavilion or summer theater at the end of one of its lines, and that he wishes to open correspondence with architects with a view to purchasing plans.

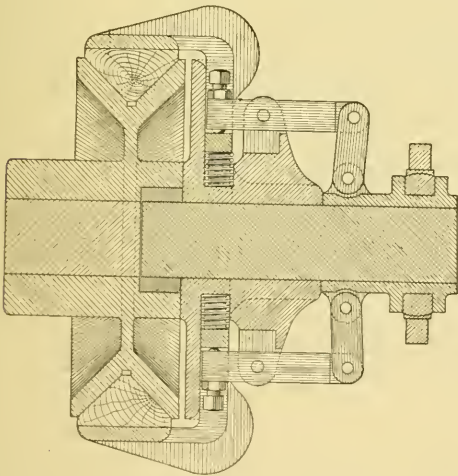
THE ECLIPSE CLUTCH COMPANY, of Beloit, Wis., have recently filled several large orders for their clutches with shafting. They also recently placed several engines, manufactured by them, in various street railway plants. Two of their latest orders were for two 250-horse-power engines, for St. Joseph, Mich., and one large engine for Battle Creek, Mich.

A NEW CLUTCH.

THE accompanying cuts show a new clutch recently placed on the market by the Chicago Clutch and Machinery Company, 76 Illinois street, Chicago. The friction surface is shoe-faced, with hard wood made in a V shape, which is brought in contact with the



cast iron V sheave by the use of levers and links in connection with sliding collar, which all users of friction clutches are familiar with. The shoe moves forward and back, in ways provided, in driving part of clutch. A



spring is placed under bridge of shoe to force the surface apart when clutch is released. The gripping mechanism of the clutch is strong and positive.

THE National Fare Box Manufacturing Company delivered during July, orders for their new boxes to the Lima Electric Railway Company, Lima, Ohio; New Castle, Pa.; Hon. W. B. McKinley's Electric Road of Defiance, Ohio, and have orders in hand for the Belle City Electric Street Railway Company, Racine, Wis., and a large order for the American Car Company, St. Louis, for an electric road at Columbus, Ohio.

\$200,000 WORTH OF AIR.

THE Leavenworth Times is authority for the statement that General Manager Earl, of the Judson Company, has returned from the East with \$200,000, for investment in the project recently described in this paper, of constructing a pressed air plant for operating the street cars in that city. On a horse car project, money is said to have caused the mare to move, but whether the same influence will prevail in the case of air motors, remains to be recorded later.

SAND STOPS CARS IN ST. PAUL.

A N undeveloped 500-volt cyclone one night last month, picked up nearly all the sand in Minnesota, and dumped it on the street railway tracks in the Sainly City. The rain which accompanied the wind, packed down the sand into mud, and washed out considerable filling, and in some places the mud and sand was two or three feet deep for a distance of 200 yards. The poles were undermined in several instances.

To add to the general display, a sewer burst just in time to derail a Grand avenue car.

If it had not been for the careful management of Supt. Sloan, and the unremitting watchfulness of that gentleman, the damage would have been succeeded by a very much more expensive tie up. Several hundred dollars were required to repair and exhume the track. At midnight but three lines in the city were running.

The principle power plant soon had several car loads of sand on top and the roof collapsed ruining the buzz of five dynamos. The damage besides loss of traffic has been very severe but as the old woman said when her husband died, "It might have been the cow."

Another destructive storm was at York, Pa.

York was visited July 27 by a destructive windstorm which demolished, among other property, the car barns of the street railway company and completely destroyed two fine cars and injured a number of others. A double-decker was badly crushed on top. The entire building, 275 feet long was wrecked, and in the same annex, then nearly completed, two workmen were killed.

ANOTHER SCHEME.

THE "Buena," a 65 foot launch of 10-foot beam and capable of 250 pounds steam pressure, is competing with North Chicago rapid transit by carrying a few wealthy gentlemen from Van Buren street to Buena Park over the expanse of Lake Michigan. The boat costs about \$7,500 or about \$200 per passenger. Good weather permitting, the "Buena" will be in commission from June 1 to October 1. Evanston, Edgewater and some southern suburbs will soon build similar crafts. The new crafts will not diminish the receipts of the cable companies to any perceptible degree.

LITTLE ROCK ROAD.

An Unique Construction, Some Interesting Details.

ONE of the most unique power houses in the world, and one of the most interesting in the south, has just begun to furnish power for the propulsion of the new electric railway system of the town of Little Rock, Arkansas. For many years the town has dragged along with horse cars as the only means of transit. until last year, when the Little Rock Street Railway Company was organized, with the following officers: H. G. Allis, president; Geo. B. Rose, vice-president, H. P. Bradford, secretary, treasurer and manager; W. N. Stannus, Geo. R. Brown, Jno. M. Taylor, directors.

When the decision was made to introduce electric traction, the Thomson-Houston Company was asked to put

The building as shown in our diagram (and we wish to distinctly state that the diagram does not adequately represent the plan but gives simply a conventional idea of the peculiarities of the situation and building) has five departments. That next to the river represents the well and condenser to which the nearness to the river gives water with little expense and trouble.

On the next step is the smoke stack which is 180 feet. Next we find the boiler-room equipped with Baragwanath heaters, Hopper's live steam purifier and Heine water tube boilers of 1000-horse-power in the aggregate, designed for 3000. On the half-step above, to use a musical term, are compound condensing Hamilton-Corliss



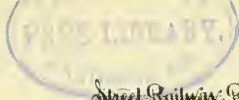
FRONT VIEW ON TRACK LEVEL, OF LITTLE ROCK POWER HOUSE.

its best foot foremost in the matter of planning, equipping and furnishing the proposed system. The best foot proved to be the brain and hand of B. J. Arnold, the well-known electrical and consulting engineer of the Thomson-Houston Company. Mr. Arnold's peculiar executive genius has never been shown to greater advantage than in this plant, which he has made his *Chef de'œuvre*, and where he centered for 133 days and many nights, the energy and ability which he so abundantly possesses. In fact, the power of one man is as well shown, in the result of his labors, as can well be shown anywhere.

The plant is situated on the banks of the Arkansas river, which place was selected on account of its advantages of water and transportation of fuel.

engines, one of 500 and one of 300-horse-power, designed when complete to aggregate of 3,000-horse-power for the boilers and engines.

Above this room we find five of the Thomson-Houston Company's dynamos of the following capacities: 5 railway generators of 110-horse power each, with plans for 4 additional machines for 10,000 16-candle-power light, and for 1,000, 2,000 arc-lights. Above this, flush with the street is the car-storage, and just below the floor of the room is a washing and cleaning pit. Above this is a pretty little theater, with a seating capacity of 1,000 people, where shows will be held, thus inducing traffic and adding to the popularity of the road. To this is also added refreshment facilities where the hungry and thirsty may satisfy their wants.



WINDSOR & KENFIELD,

PUBLISHERS AND PROPRIETORS,

334 DEARBORN ST., - - - CHICAGO.

Published on the 15th of each month.

SUBSCRIPTION, - - - ONE DOLLAR.

FOREIGN SUBSCRIPTION, - - - TEN SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW, Care of Building, 374 Dearborn Street, Chicago.

H. H. WINDSOR, Editor.

F. L. KENFIELD, Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to conductors or officers. Address:

THE STREET RAILWAY REVIEW, 334 Dearborn Street, Chicago

Entered at the Post Office at Chicago as Second Class Matter.

This paper member Chicago Publishers' Association.

VOL. 2 SEPTEMBER 15, 1892. NO. 9

As is our custom, the October issue of this paper will not appear on the 15th inst., our regular publication day, but be a few days late in order to contain a complete verbatim report of the Cleveland Convention of the American Street Railway Association.

BASIS of wages for conductors and drivers of the Tacoma Railway and Motor Company has been changed, and is now made on the mileage. As a result the men are anxious to make longer runs and nothing is heard of long hours. The time card has been changed to give very little laying time at termini, and the result is a better service and increased receipts.

WE chronicle this month in an illustrated article, the opening of the new Gilmore Street extension of the Baltimore Cable line. Aside from the interest which accrues to the power-house as having been formerly occupied as a prominent church, two features are introduced which will specially attract our readers.

The first is the rope transmission, and in which application engineers have questioned the even distribution of power. In the Baltimore plant this is secured by using two instead of one rope driver on the line shaft, and with a compensating device between them. The graduating system of tension is quite novel and is worthy of careful study. It is so arranged that if desired the tension can increase from a minimum of 2,500 pounds to a maximum of 25,000 pounds, but by gradual resistance, increasing in exact proportion to its necessity, and avoiding any sudden strain on the rope. This has been accomplished

too, under adverse conditions, the available speed for tension run being less than is ordinarily deemed necessary.

The Baltimore plant is very complete and the cable is proving a most popular change from the plodding animal locomotion to the tireless forces of steam.

FROM advices already received at this office, we can promise the delegates to the Cleveland Convention an exhibit of street railway appliances which may well rank as an exposition.

The occasion is made a special date at which new devices are displayed, and already quite a number of manufacturers have informed us of inventions which they have been a long time perfecting and which will make their debut there.

Not only is the display in itself interesting and instructive, but the opportunity to compare the same article of several makers one with another is of the highest advantage to the prospective buyer.

On the other hand, the opportunity offered the manufacturer to place before the trade the actual goods he advertises to sell, is a chance he cannot well afford to miss. To see the exhibit of 1892 will alone be worth a trip to Cleveland.

THE demands upon the time of the delegate at the annual conventions have increased, as the scope of its work has each year enlarged, that at the last meeting a most sensible method was adopted to take effect this year, namely, the publishing and distributing in advance to members, of copies of the reports to be made at the meeting. This not only permits of a great saving in time, by allowing the report to be read in open meeting by its title only, if desired, leaving more time for discussions, which are usually the best part of a report; but enables every one to get his data and bring the actual figures to prove statements in the experience of the members, which, otherwise, could only be referred to in a general way. These papers will very soon be mailed to all member companies, and we cannot too strongly urge the careful study of these reports and the preparation of data in your own case, of what experience has taught, perhaps, at no small cost. In this way, the collated experiences of so large a number of persons will constitute a fund whose worth to themselves and others will prove invaluable. Let each one come prepared to contribute, at least one fact, and let it be put in writing, if possible, so that the most may be expressed in the fewest words, and in this way economize the limited time necessarily devoted to discussion. Even the best speakers are tempted to talk at considerable length, when on their feet, and not realize how much time they are occupying; when the same remarks could have been fully expressed, and, doubtless, in more logical order, had some little preparation been made with this in view. Come prepared to say something, but know just what that something is. A long-winded speaker, at such times, usually deprives others and himself of valuable ideas that others might have found time to present.

A SUGGESTION is made the street railways of this city, that a ticket be issued for use during the World's Fair, which shall be on sale at convenient place and good over any of the surface lines. As the rates of fare are the same, the companies could easily settle among themselves on the basis of collections and sales. An idea would be to issue them in say ten-ride books, at fifty cents. This would save much time in change making on the part of the busy conductor, and would also induce riding to a certain extent.

Also let the ticket be made emblematical of the Columbian Exposition, and a large number of them would be carried away as inexpensive souvenirs of the occasion and the companies would be direct gainers in not being called upon to redeem them. The tickets could be made to expire with the close of the Fair. For our own citizens there would be little advantage in the plan, but for visitors from other cities and more particularly foreigners the arrangement would be a very helpful one.

THE presence of the ladies in such large numbers at Pittsburg, did much to add to the pleasure of the occasion, and the indications are that the managerial better half will constitute a large proportion of the pilgrims to Cleveland this year. A man's wife does, or should, take an active interest in her liege lord's daily occupation, and we know more than one successful manager who has gone as a last resort in times of sore perplexity and been glad to seek her counsel on questions he was hard pressed to solve. Most women are better advisers than some men are inclined to admit, and with her keen perception can often give unbiased judgment on points which have so hemmed in a man that he looks from one to another in helpless despair and sees no loophole for escape.

Bring the ladies to convention; they not only take a lively interest in all the doings, but make acquaintances, as the years gone by testify, which are of untold pleasure and which not to have enjoyed would have been the leaving blank of what are many bright pages in life's book of memory.

SOME action should be taken as to an earlier date of the 1893 meeting of the Association, and such a time selected as will enable those who are at a distance from Chicago to make one trip suffice for the convention and the World's Fair, say in early September.

Some have expressed the wish that the next year's meeting could be held in this city. While we speak for the street railway fraternity of Chicago, in expressing the pleasure and honor such a gathering here would afford them under ordinary circumstances, the fact cannot be ignored that it would be thoroughly impracticable to attempt it here next year.

The necessary accommodations, both as to halls, exhibit rooms, and hotel facilities will be not only at a premium, but practically not to be had in the amount required, in any one place.

To properly take care of the meeting requires a central headquarters hotel, where accommodations can be

promised for nearly one thousand delegates and supply men, with the use of parlors and the like. It would be asking too much to expect this while the whole civilized world were guests of this city.

Hotel rooms could be secured, of course, but they would have to be engaged and their price pledged months in advance; and our readers know from past experience that hotel rooms for delegates are, in the main, engaged from three days to one week in advance. The reason for this is, so few are absolutely certain of attending until the day has almost arrived. Then, too, the distracting influences of a crowded city and the attractions of the Fair would make it scarcely possible to secure a quorum at more than the first session, and the meeting would be but a faint-hearted, listless affair.

As already stated, the railway fraternity of Chicago do not wish to appear inhospitable, and the entertainment tendered the Association here in 1883 should decide that; but they realize they are considering the comfort of the delegates and success of the meeting when they request that the convention visit us when we can take care of our friends as we would want to do, with satisfaction to others and credit to ourselves.

The meeting should, however, if possible, be held at no remote part of the country, so the journey would, in most cases, take in both.

MUCH has been written, more said, about uniformity of standards of terms used in electric railway practice. It would not be amiss to consider a uniformity in street railway supplies.

This does not mean that any one particular make, or size of make is desirable, for the varying conditions of various roads create local requirements, which must be accommodated. But aside from such a range, as every one will understand, there has been no small disposition on the part of some "experts" and self-constituted engineers, and occasionally by men whose experience has been quite extensive, to create the impression in the minds of owners, who are new in some forms of building, particularly electric, that they are much more capable than they really are. This has been done by insisting on special sizes of materials, and which are in practice so little different from the regular sizes made, as to absolutely cut no figure whatever. To be furnished, however, usually requires new patterns, and the special work which special orders always involve, with the necessarily increased and special price to be paid for. And all, really, to no more than suit the whim of somebody who has not a dollar in the plant.

We have in mind a so-called engineer, now retired, as he should have been before he entered on his career who, in drawing specifications, religiously ignored standard sizes and never missed an opportunity to use special work. If it were girders and I beams, he managed to draw plans which called for sizes an inch longer or shorter than standards, necessitating special rolling or cutting down a larger size. If it were bolts, he must have a sixteenth or thirty-second longer or shorter, or larger or

smaller, than the nearest size kept in stock, and so it went. This too, on a class of work where there was not the least necessity or excuse for not using regular sizes as carried in stock.

In his mind it characterized his work as different from other men, certainly his method involved a different expense account, and as it did not come out of his pocket he did not feel the loss. But somebody had to pay for it, and after a time somebody discovered his peculiar "characteristic" and hired a new man in his place.

We have in mind an instance which occurred only a few days ago. A telegraph order was sent to a large car wheel works for wheels, which it was specially necessary to have at once. Although the company carry in stock at all times no less than seventy different styles of street car wheels, there was a small fraction of an inch difference between the order and any combination of diameter, tread and flange, to be found in the stock on hand. In fact the order was for a combination seldom ever used, and one which has been out of date for a long time. There were wheels in stock in plenty, which combined all the desirable qualities of the special order and several good points which the other did not possess, and while in practice the nearest stock wheel would have completely filled all requirements, as a matter of fact the desired dimensions were a fraction different. The buying party suffered annoying and expensive delay, while the special work was rushed out, and after all had a less serviceable wheel than had they trusted somewhat to the judgment of the maker. Similar instances in other lines of supplies are all too frequent and familiar to ever supplyman.

It is at least reasonable to presume that he who makes an exclusive business of manufacturing any line of supplies is going to produce the very best in his power. Poor goods do not promote second orders and flattering testimonials. It is so reasonable that one who makes a careful study of good and weak points, and who has daily opportunities to observe the success or failure of his product, is at least directly interested in selecting and recommending that which he discerns to be the best. Where there is a radical difference in style and make and method of operation, the buyer must be his own judge. but in numberless cases of materials, not involving any such pronounced difference, the buyer can often promote his own interests by consulting his supplyman. In this case, as in calling a doctor, trade with a good one who has a reputation at stake. Neither can afford to humbug you.

Steam roads have settled down long since to a practically uniform standard as regards a large number of materials. Interchange of cars has had much to do with this it is true, but the good results have been none the less advantageous on that account.

Street railway building is just now passing through a sort of metamorphosis, but eventually will settle down to a much greater uniformity than now exists, and the sooner a series of standards can be worked out and accepted as such, the quicker will come the day of useless extra expense, which benefits neither the stockholder, the service, or the seller.

ONE of the most interesting advances in regulating the movement of cars which has been devised, is that worked out and put in operation on the entire system of the Denver Tramways Company, by its progressive superintendent, C. K. Durbin. We will not detract from the interest our readers will experience in perusing the detailed description on another page of this issue, by a resume here. We cannot, however, refrain from highly commending the system which is proving so successful in Denver. It has always been the misfortune that in street railway work so large a proportion of the company's employes are so far removed at all times from direct communication with the general office, and in case of emergency, a very considerable amount of time must elapse before every car on the road can be reached. With Mr. Durbin's system he has every man in direct touch with a central office, so that emergency orders can be promulgated with every possible dispatch. The effect in promoting good discipline alone is well worth the cost of the system, which however, directly effects a saving over the old method, of wages saved by doing away with starters: while the vastly greater economy in operating cars to catch loads where otherwise they must have run empty, will amount to several thousand dollars in the course of the year. The greatly improved service made possible by this method alone warrants the adoption of dispatching system. In our judgment it is by far the most practical, serviceable and economical method yet suggested, and we predict will be generally adopted as soon as managers become fully acquainted with its workings and consequent advantages.

WE have been repeatedly urged to call the attention of the association to the advantages of an earlier date for the annual convention. The third week in October was chosen as a time when summer construction would be done and snow plowing not yet commenced. Everyone probably could attend two or three weeks earlier just as well, and this would bring the meeting sufficiently early in the fall to insure pleasant weather. Since the excursions about the convention city have become so desirable a feature, it seems too bad that cold weather should mar the occasion, as it certainly did in Pittsburg, Buffalo, the Duluth trip and many others. But for the lateness of the season an excursion on the lake would have been tendered this year.

ANOTHER year has nearly completed its round trip and the intervening months since the last convention of the American Street Railway Association meet at Pittsburg, seems scarcely longer than as many weeks. We live faster with each year, and as our cars are stimulated by new powers to run, where once they slowly dragged along, so our work has taken on a new, increased current of intensity and activity which it never knew before.

To such an extent has demanding duties increased in case of many managers that they are even now as they read this asking themselves the question as to whether they ought really to spare the necessary time to attend

the convention this year. As in the case of contemplated purchases of additional motive power or cars, perhaps the better way to put the interrogatory is "Can I afford not to?" Business cares like leaks in a ship do not grow smaller with time, and the very fact that this has been the busiest year in all your official connections, is alone sufficient reason why you should leave it all for a few days and get out into another atmosphere and amid new scenes and faces. You do not work your horses, engines, employes or equipment as you do yourself. If you did they would not last long; but the manager never seems to consider that he requires any rest or if he does feel the need of recreation, that just at this particular time he can possibly be spared. However valuable your services to your company, and in no way underestimating the indefatigable labors, which in but few cases are fully realized the fact remains that when you are dead, the cars will still run, and as we shall all be dead a long time and

absent at the convention but a few days, we believe in almost every instance, members can arrange to attend if they once resolve to do so.

It does a man good to mix with other men engaged in same occupation, and this is the only occasion of the year to do so. If any company is so stingy and narrow minded as to consider the expense of sending one or more representatives as a bar to their attendance, let the selfish motive of ultimate economy decide the question, for it is doubtful if a single delegate but gains knowledge and ideas which are worth his company in actual dollars many times his expenses in going and coming.

The accommodations this year will be ample, the expenses for traveling and entertainment are low, and the break in the daily round of endless duties will rest the mind and body, and you will return to the work with new ideas, higher ambitions, and renewed energy.

By all means go.

A PIONEER STREET RAILWAY BUILDER.

Account of the Life and Labors of Charles Hathaway and his Connection with Mr. Train in England.

IN writing a history of the inception and progress of rapid transit railway systems, in both American and European cities, the careful student would be guilty of a gross neglect should he fail to record the life and services of Charles Hathaway, of Cleveland, Ohio. Few of the pioneers are as widely and as favorably known to street car men as he. As builder, contractor and operator, his career has been long and interesting. As investigator, perfecter and enthusiast, his life is worthy of emulation. The street railway has been his life specialty, and he has studied it no less faithfully than a devoted student scans his Blackstone. It is this close attention to business, this careful adherence to purpose, which has placed Mr. Hathaway where he is to-day—a prominent figure in the ranks of railway builders of the time.

Born at Grafton, Mass., November 7th, 1824, he spent his childhood on a farm. His father and mother were both sturdy New Englanders, imparting to their children that rugged health and clear-headedness so characteristic of those who hail from that locality. His grand-parents, on his mother's side, were natives of America, while those on his father's side, came from Stratford on Avon, England. The grandfather was a descendant of Lucy Hathaway, sister of the wife of Shakespeare.

At the age of fifteen, Charles was sent to one of the numerous schools then located at Worcester, where he remained three years. During his studies there he developed a strong liking for mechanics, and devoted much of his leisure to personal investigations. Later in his course he applied himself to engineering, which he studied most assiduously. Upon his departure from the college he obtained an apprenticeship in a machine shop,

and took his place at the bench, there to investigate the working of machinery and become familiar with the laws which governed it.

In 1844 he began his career proper by undertaking the construction of several branches of road for companies interested in steam railways. He laid and ballasted the first track on the Hudson River Railroad, from Poughkeepsie, N. Y., to Bennington, Vt. He then formed several contracts with the Pennsylvania Company, constructing the road between Lewistown, Pa., and Altoona. This piece of track was difficult of construction, as it encountered many obstacles because of the mountains. In 1857, Mr. Hathaway turned his attention to the building of street railways, in that year constructing a system of lines in Philadelphia. Since then he has built, equipped, leased or operated, roads in nearly every leading city of the United States and Canada, in fact, street railways and cheap real estate are his hobbies, and, he often says, he "knows nothing else."

HATHAWAY AND TRAIN IN ENGLAND.

Besides his work on this side the pond, Mr. Hathaway has had some very unique and interesting experiences abroad. In 1860 he went to Europe, where he contracted for the construction of street railways in a number of the more important cities, working in company with George Francis Train. This company built three roads in London, one in Birkenhead, one in Staffordshire and still another in Darlington. At that time there was no act of Parliament permitting the building and operating of street railways in England. Accordingly the company obtained permission from so-called vestries, permitting the construction of the roads, the vestries, how-

ever, reserving the right to tear up the tracks at any time should they so decree. In 1861, Mr. Hathaway and Mr. Train, together with the obliging vestrymen of Lambeth, were arrested on the charge of "breaking up the Queen's highway." The party were

PUT IN PRISON,

but secured their release on payment of bail, amounting to five hundred pounds each. An amusing feature of the affair was that each furnished bail for the other. The final hearing was held in London, before the good Judge Blackburn. Mr. Hathaway was fined one shilling, which he cheerfully produced, to help replenish the exchequer of her majesty. This was the only trouble worth mentioning experienced in his long career of work. Injunctions and petty differences with corporations and private parties have, of course arisen, but none so serious as that in London.

The cars for the roads in England were manufactured in Philadelphia. They were boxed up in sections and shipped to Birkenhead. Mr. Hathaway then had a shop of his own, where he put the cars together, painted them and put them in running order. The rails and other equipments were obtained in England. He remained abroad eighteen months, returning to this country in July, 1862. During his foreign visit he made a pleasure trip through the leading countries of the continent, taking especial delight in traversing the roads of Germany and Italy. His association in business with George Francis Train was productive of a mutual regard. It was through correspondence with Mr. Train that Mr. Hathaway was induced to go to England and combine forces in advancing street car transit. The impression which Mr. Hathaway received of the business tact of Mr. Train is most favorable indeed. Train is a man who never forgets anything, and according to Mr. Hathaway's opinion, has a remarkably fine mind.

MR. HATHAWAY CAME TO CLEVELAND

In 1873, since which time he has been prominently identified with the street railway interests of the city. He built the Broadway & Newburg railroad, the Superior Street railroad and the Payne Avenue railroad. The former is now operated by the Sprague system, while the

two latter are cable roads. In 1884 he bought the St. Clair Street road, and operated it until 1890, when he consolidated with the Cleveland City Cable Railway Company. At the end of that year he retired from active work. During his term of service he was president of the Superior Street railway for a term of fifteen years, and for a long time president of the St. Clair Street Company. He held a like office in the Evansville, Ind. Street Railway Company. The firm with which Mr. Hathaway is still connected is known by the name of Hathaway & Robison. Mr. F. D. H. Robison, a son-in-law of Mr. Hathaway, now attends to the business of the firm. Mr. Hathaway is largely interested in real estate, and is now engaged in looking after that branch of his business, spending the balance of his time in traveling,

fishing and hunting. For a man sixty-eight years of age he is remarkably well preserved, and enjoys the comforts of his beautiful home on Euclid avenue to the fullest extent.

Mr. Hathaway takes great pleasure in telling that he paid the first money ever received by the STREET RAILWAY REVIEW in payment for a subscription.



CHARLES HATHAWAY.

DORNER AND DUTTON, of Cleveland, issue a neat circular, setting forth the advantages of their so generally used track cleaners. The list of roads using their device covers several pages, and the flattering testimonials several more. The fact is also mentioned of the manufacture of other supplies, as tracks, brake shoes, wheels, etc.

R. B. PIERPONT, formerly manager of the Chicago branch of Gould & Watson, has resigned his position and entered partnership with James W. Longstreet. Their office is in the Stock Exchange building, Boston, and the new firm will handle electric railway and light securities and municipal bonds. Mr. Pierpont is well-known to street railway men and needs no introduction. Mr. Longstreet is a nephew of D. F. Longstreet, formerly general manager of the Boston lines, and has been engaged in banking and brokerage for some years. The new firm start out with favorable prospects and have our best wishes for success. They invite any visiting brethren when in Boston, to make their office, which is centrally located, headquarters.

CITIZEN TRAIN ON STREET RAILWAYS.

Reminiscences of the Builder of the First Street Railway in England. Remarks on Citizen Train and Things in General.

THE editor of the STREET RAILWAY REVIEW, in quest of the beginnings of things, wrote to Citizen George Francis Train, at his New York residence, where he passes his time surrounded by a troop of children. Citizen Train replied as follows:

Citizen H. H. Windsor,
Editor Street Railway Review,
Chicago.

Yes! In Europe, Asia, Africa, Australia and South America, I was the *Cosmos Pioneer*, Street Railway King!

Chief of Three Great Clipper Ship Houses of Train & Co. (Boston, Liverpool and Melbourne, 1846 to 1853), on first voyage round world, Four Decades Ago, (see *Young America Abroad*) I was surprised to find that while SEWING MACHINES, SLEEPING CARS, STEAM ROADS, GAS LIGHTS, OMNIBUSES, MATCHES, PIANOS, YANKEE NOTIONS, COCKTAILS and MINT JULIPS were evolving over planet, there were no street railways in the OLD WORLD!

It seems to have been my destiny to introduce ON LAND AND SEA, IN FOREIGN LANDS, new inventions promoting TRADE AND COMMERCE everywhere!

*I Clipper shipped the Cosmos Sea,
And iron railed the continent,
To introduce Trade Industry
From Occident to Orient.*

As agent for Queen Christiana I struck Philadelphia 1857, to look after her *Forty Thousand acres of coal land* at Farronsville. (relic of United States Bank investment), and launched Atlantic and Great Western, (middle link between Erie and Ohio & Mississippi), and cash made then was pint of water, on which I earned *hundred millions* to build Union Pacific! (*stole by Gould in Twced Ring through Judge Barnard's order!*)

AMERICAN STREET RAILWAYS.

New York had started first line on avenues and Philadelphia was busy with new city locomotives! Easton, Charles Hathaway, Saunders, (my contractors), were pioneers in the business when I launched my first "tramway" (the English call it), abroad, at Birkenhead, opposite Liv-

erpool, England! John Laird, builder of the "Alabama" (Blockade Pirate), gave me contract; (I taking all risks and agreeing to remove it if failure!)

That road was opened August, 1859, and extended to adjoining towns! My opening banquet had *four hundred* "Notables," Prince Albert writing friendly letter! John Stephenson (the great Car Builder, still alive) sent me first car (in shooks) from shops opposite where I am writing this (surrounded by "Tots," in Madison square)! My first London Road was from Marble Arch (Hyde Park) to Bogswater! next from Victoria Station to Westminster Abbey and Parliament House! third, from Westminster Bridge to Kensington Gate! Each line, (with lines promised in all leading parishes)! inaugurated with Banquets at Fenton's, St. James street; Edwards Hotel, Hanover Square, Westminster Palace Hotel; London Tavern and Last Road at St. James' Hall, Regent street! (where I had *six hundred* guests and scores of M. P's!—) My patents were made fast all over World and America; Ministers and consuls in all lands gave me responsible agents to represent my interests in all the great Cities of the World!



CITIZEN GEO. FRANCIS TRAIN.

[From latest photograph, taken in '62.]

HALF MILLION DOLLARS RE-
FUSED FOR PATENTS.

I was the most popular American ever abroad! My name was on EVERY STAGE, EVERY THEATER, EVERY MUSIC HALL, and back once chalked, I was guest with FOUR HUNDRED SET in palaces of the Lords.

Lombard street and Capel Court offered me HALF MILLION CASH, (the grants and patents were worth FIVE MILLIONS!)

The new locomotives took like wildfire. Fortune was opened when, *Mirabili dictu*, Beauregard fired, Fort Sumpter and England went solid with the Pope, Louis Napoleon and the South! I was furious! Then came battle of one man against all Europe. But for me, Bonaparte and Palmerston would have made Davis King of the South and Mexico! Like "D——— IDIOT" I

played patriot, lost tramways, and won Glory! Seward sent HUNDRED THOUSAND speeches, (published by Peterson in Philadelphia in two large pamphlets), through the Union Armies! I gave *New York Herald* Alabama Blockade marks of goods, got through Admiral De Rohan, (half brother Admiral Dalgren), and my detectives, in hold of ship as Stevedores! When I begin typing books again, the "STRANGE STORY" will be told! I have *one thousand* letters from European notables in '61 and '62, which will be illustrated in book form by *De Gemine-Wilson* syndicate! My FIFTEEN JAILS began by making Union speeches against the English cut-throat Press gang of secession!

SHALL CLAIM FIFTEEN MILLIONS ROYALTY.

My patents (as promotor and patentee can not be outlawed. *Three hundred million dollars* now are invested in street railways in England and my royalty will amount to \$15,000,000.) Then I take charge of my \$20,000,000-estate in 6,000 lots and 1,000 houses in Omaha, the future capital of one hundred states.

The tramways system with horses is obsolete!

The underground and elevated Rapid Transit Systems in London and New York is temporary evolution!

The cable (for hill cities will shortly be a memory!

The Trolley electric will pass away!

Then comes Storage Battery and adoption of electric power on Steam Railroads and steam ships world around!

On threshold of Wildest Financial Panic, racing with (Continental) Cholera, ever known.

Hold your horses! If you owe anything keep it in trust for the other fellow! If any one owes you collect now or never.

A Buzzard at Buzzards Bay.

A Lunatic at Loon Lake are still catching minnows and cat fish.

And ten thousand newspapers are talking—"Sullivan-Corbett Slug."

World's Fair with 25,000,000 contracts and 10,000,000 cash only sighted thus far, is playing Panama Canal without De Lesseps! *But when Committee has failed I can guarantee success!*

105 Dr. Hain

MADISON SQUARE, NEW YORK.

COUR D'ALENE ELECTRIC.

THE electric road that is to connect Spokane and the famous Cour d' Alene mines, about 30 miles distant has in view a power supply at Post Falls. The water power at this point was found ample and satisfactory but the deed conveying the power to the Post Falls Water Power Co., from Frederick Post, is null and void, say experts. Thus the purchased power cannot be delivered and the Cour d'Alene road remains in statu quo.

Every effort will be put forth to endeavor to persuade Mr. Post to give a new and legal deed to the Power Co., if as represented the present one is a nullity.

PAVING PRACTICE IN ENGLAND.

WITH a view to arriving at a consensus of opinion on the subject, an English technical journal prevailed upon the various tram and omnibus companies to send circulars to their drivers, asking two questions. First: Which form of paving do you consider the best form of roadway; and second, What do you think the worst? In reply, 750 considered wood the best, 219 favored macadam, 197 voted for granite blocks and 51 thought asphalt the ideal. One man thought macadam the worst, 13 granite cubes, and 1,015 decided that asphalt was the worst. Wood paving is the established institution in London now, but all older streets are paved with cobble.

STORAGE BATTERY DEFICITS.

The Birmingham accumulator cars in England have been operated at a loss of \$8,395 in '91-'92. The miles run amounted to 188,700, and 1,382,997 passengers were carried. The table herewith given shows the relation with other traction.

| Department. | Miles run. | Pas. carried. | Total receipts. | Total cost per car per mile run. | U. S. Currency About. |
|-------------------------------|------------|---------------|-----------------|----------------------------------|-----------------------|
| Steam..... | 1,212,624 | 14,659,240 | £80,625 | 12.03d. | 24.06 |
| Horse (trams and 'buses)..... | 634,551 | 3,753,741 | 29,606 | 9.96 | 19.92 |
| Cable | 621,210 | 5,922,304 | 31,585 | 6.18 | 12.36 |
| Storage | 188,700 | 1,382,997 | 10,422 | 15.39 | 30.78 |

The particulars of the accounts come under the following items: To electric haulage, 5.88d.; to machinery, 4.03d.; to car repairs, 1.1d.; to traffic expenses, 1.44d.; to maintenance and buildings, 1.72d.; to general charges, 1.21d. These are the first authoritative figures published by a storage battery company.

THE MASSACHUSETTS SUPERINTENDENTS.

OUR Boston correspondent sends tidings of the Massachusetts Railway Superintendents' Association meeting, at Lovell's Grove, on August 24. Superintendent Weeks, of the Quincy and Boston road, of Quincy, was the host and president over the orgies. Topics of general and particular interest were discussed and the new Quincy power house. The festivities included a shore dinner at the Pine Point Hotel.

The members of the party and the railways represented by them were as follows: George A. Murch, of the Worcester, Leicester & Spencer; F. L. Noyes, of the Worcester Consolidated; F. G. L. Henderson, of the Newton & Waltham; Phillip F. Bagley, of the Lowell Suburban; J. J. Hennessey, of the Framingham Union; Perley Wentworth, of the Middlesex; H. E. Bradford, of Marlboro, J. E. Sewall, of the North Woburn; Charles E. Barnes, of the Plymouth & Kingston and B. J. Weeks, of the Quincy & Boston.

The next meeting will be held at Newton.

WHERE DISCUSSERS WILL DISCUSS.

THE Young Men's Christian Association has kindly allowed the use of the assembly room of their building for the use of the association as an auditorium. The building is situated at the corner of Erie and Prospect streets, it is a magnificent structure of rough finished stone, and is well represented by the accompanying engraving. The building was opened February 2nd, 1891, and is one of the finest and best appointed in the United States. The cost was \$247,000.

The building also contains a fine gymnasium and a swimming pool, the latter conveniently near the assembly room, and will make a handy place to work off a long winded brother, should any aspire to a 60-minute speech.

The assembly room is seated with opera chairs and is well lighted and well appointed. A commodious gal-

lery and two side galleries, together with the body of the room, give a seating capacity of 900. The local committee has arranged for the press, and places for the accommodation of the knights of the pencil will be arranged directly below the speaker's platform. Committee rooms are conveniently located on the same floor, and, without doubt, no better or more convenient place could be found than the one provided. The situation of the building is three blocks from the exhibit and only three from the Hollenden headquarters. We present also a good view of the interior of the assembly room looking from the rostrum.



Y. M. C. A. BUILDING.

The employees of the City Cable Company, of Denver, are now in utmost harmony with the management, and the strike that was averted by Col. Randolph has made him very popular with the men who, although "Union" employes, decided not to send delegates to the national convention at Indianapolis.



THE CONVENTION AUDITORIUM.

HISTORY OF CONVENTIONS.

From the Cradle to Cleveland—The Men and the Places—Pleasant Recollections of By-Gone Days.

BY A FAITHFUL ATTENDANT.



THE American Street Railway Association has for its membership one hundred and ninety-six of the leading street railway companies in the United States and Canada. While each member-company has but one vote in proceedings, it may send as many delegates from its officers and directors as desired, and representatives of non-member companies and any others connected with the work are cheerfully admitted to any but the executive sessions. No company, however small, can afford not to belong to the association.

Doubtless in no other industry have more radical changes occurred in the past ten years than have come to the street railways of this country. The changes in policy, service and motive power, have been so general as to constitute a positive revolution.

Up to the time of the organization of the association there was little in common between the various companies scattered throughout the country. One knew but little of what and how the others did: even in the same city where more than one company existed, local jealousies and conflicts prevented mutual assistance, except in occasional cases, where the common danger was so great as to force a united defense. But early in 1882 thoughtful, aggressive men, looking into the future, caught the spirit of progress, and while they knew not in what form deliverance was to come, were full of faith and hope for ultimate relief, and cherished the belief that the greatest success was only possible through a strong organization.

The first decisive step was taken November 7, 1882, when H. H. Littell, then superintendent of the Louisville City Railway, sent out a circular letter to all the railway companies, making a call for a convention to be held in the city of Boston on the twelfth day of the following month, December. Two days after the call for the Boston convention, R. B. Hopple, vice-president of the Cincinnati Street Railway, issued a call to the various companies in Ohio, and the Ohio Tramway Association was organized November 22 of the same year.

The burden of local arrangements for the Boston meeting fell upon J. E. Rugg, then superintendent of the Highland railway, and who left nothing undone to promote the comfort of the guests. The gentleman's hair has since turned white, probably as the result of his exertions at that time.

It was an interested and representative body of men who gathered in Young's Hotel that Tuesday, the twelfth day of December, 1882. H. H. Littell called the meet-

ing to order at 2:15 p. m., and after outlining its purpose asked for nominations for chairman. Hon. Moody Merrill, of Boston, received this honor, and in a moment of extravagance two secretaries were appointed in the persons of C. C. Woodworth and C. B. Clegg. At the roll call 56 gentlemen responded. Of this number several have since died, and some have left railway work to engage in other occupations, but among those then present who have been constant in attendance ever since, are H. H. Littell, W. W. Bean, J. E. Rugg, W. J. Richardson, Henry M. Watson, Charles Hathaway, Frank D. Robison, Tom L. Johnson, Thomas Lowry, Chas. Cleminshaw, Geo. B. Kerper and D. F. Longstreet.

With the energetic business methods which have always characterized the association, a committee was at once appointed to draft a constitution and by-laws and nominate permanent officers. The gentlemen upon whom devolved this important work were: Chas. Cleminshaw, H. H. Littell, Thos. Lowry, Walter A. Jones, Moody Merrill, D. F. Longstreet, Julius S. Walsh, T. H. Robillard, H. M. Watson, Abner C. Goodell, Wm. J. Richardson and Tom L. Johnson. An adjournment was then taken to Wednesday morning.

When the convention convened the next day, so thorough and complete had been the committee's work, but few changes were found desirable, and the fact that during the subsequent years of marked change in railway policy the constitution has not been found wanting, is a high tribute to the foresight of its framers. A permanent organization was then effected by adopting the constitution and by-laws, and unanimously electing the first officers, as follows: President, H. H. Littell, Louisville; first vice-president, Wm. H. Hazzard, Brooklyn; second vice-president, Calvin Richards, Boston; secretary and treasurer, Wm. J. Richardson, Brooklyn; executive committee, the above and Julius Walsh, St. Louis; Chas. Cleminshaw, Troy; Thos. Lowry, Minneapolis; James K. Lake, Chicago, and D. F. Longstreet, Providence.

Mr. Goodell, president of the Naumkeag Street Railway, Salem, had the honor of being the first to sign the articles and pay his initiation and dues. The others rapidly followed.

And thus was the Association born.

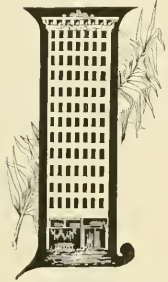
The first meeting of the American Street Railway Association was then held, ratifying the work of the convention, and adjourned to enjoy a banquet, for which



event the lamented Calvin A. Richards was chiefly responsible and at which he was forced to preside. The banquet closed the two days sessions.

The Boston meeting opened the eyes of all present to the almost limitless possibilities of usefulness of the association; created the strongest enthusiasm in its work; and discovered the fact that street railway men are among the brightest, liveliest and warmest-hearted individuals in all the land: which discovery has constantly grown from that day to this.

THE CHICAGO CONVENTION.



IN 1883 Chicago was struggling to work up a boom, and the Association kindly consented to give its street railways a lift by holding the second convention within its borders. Twenty new member-companies were added, and the attendance was gratifying. Papers read were, "Track Construction," "Propelling Power," "Buildings," "Labor and Wages," "Collection of Fares," "Removing Snow and Ice," "Horse Shoeing," and "Heating and Lighting." Charles Hathaway, the veteran railway manager and builder, presented the first paper. Car heating was hotly discussed but received a cold reception. The delusive car starter was also scored at this time, and has never been able to make a good start since.

Visitors were taken from headquarters at the Grand Pacific to inspect the cable road, for a drive about the city and a ride on the lake. There was a banquet, too, potatoes being served with every meat order, and those who abstained from lake water got extra dry.

And so the Association grew and prospered and decided to hold the next convention in

NEW YORK.



The extent of the work had now assumed such importance that an extra day was added to the services, and so on October 15, 16 and 17th, 1884, the Fifth Avenue Hotel was pre-empted by the fraternity.

At this meeting Wm. H. Hazzard, of New York, presided, while Wm. J. Richardson, as he has continued to do at each succeeding gathering, accounted for the fares collected and made out the trip sheets.

Papers read included the following subjects: "Completed Construction of New Road," "Repairs of Track," "Track Cleaning and Removal of Snow and Ice, and Use of Salt," "Stables and Care of Horses," "Electricity as a Motive Power," "A Uniform System of Accounts," "Labor and the Graduating System of Compensation," "Ventilation, Lighting and Care of Cars," and "Taxation and License."

The salt issue was a fresh one and discussed at great length; some companies having got in a pickle with their

municipal parents by its use. The decision was, however, that when it had not lost its savour salt was good for man and beast, and car tracks in particular. The problem of watering horses when warm came up; one advocating plenty, another, none at all, and the final decision was that everybody would continue to do just as before.

In these good old days such subjects elicited a warmth of debate seldom seen now, and were real vital issues, presented with an earnestness appreciated only by those who were there.

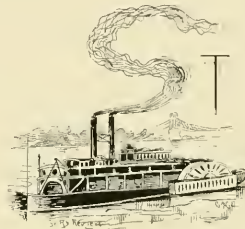
It was at this session also that electricity, then a curiosity as applied to car service, was first discussed, and then it was Calvin A. Richards in one of his eloquent outbursts that flashed like a meteor across the dark skies of uncertainty, said: "What is electricity? No man living can tell what electricity is. It seems to me, sir, that when the Creator desires to confer a new blessing on the world it is never done at once. I firmly believe that this idea being born and given by the Creator to the world, that now all the scientific men and all the scientific intelligence and knowledge of the world is upon it; not with the brain of Morse who conceived it; not with the energy of Bell who used it; but each and all lending their aid in its grand development. And now who shall dare tell me, when I walk at night under its light, which almost equals the sun at noonday; when I can stand here, and, if need be, hear the voices of dear ones at home; who shall dare tell me that we shall not have a motor impelled by that power? What is a motor to us? It is simply the power to drag our cars. To-day, for the most of us here, it is horses. A step has been taken with steam, and that is the cable; and the next step, gentlemen, as sure as God reigns, is going to be electricity."

Notwithstanding Mr. Richard's firm faith in what he said, few of his hearers really believed the advent of electric power to be so near at hand.

The third annual Dinner was given at Delmonico's, who killed the fattest calf, sent out for a pail of oysters, and opened some of his best preserves, so that altogether the guests managed to get along very well until breakfast next morning.

As the tide ebbs and flows so the West received the assemblage of

1885.



LOUIS being the favored city, in which, at the Southern Hotel, on October 21st, 22nd and 23rd, the fraternity assembled. Calvin A. Richards, of Boston, was the honored executive that year, and the president's address was one of the choice contributions to railway literature.

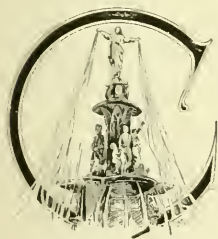
The Executive Committee's report, now so important a document, here received prominence for the first time. The entertainment on the part of the St. Louis roads was

lavish, including carriages, entertainments, and a big lunch at the Fair Grounds.

Special reports at this meeting were: "Diseases Common to Car Horses, and their Treatment," "Progress of the Cable System of Motive Power," "Progress of Electricity as a Motive Power," "Repairs of Track," "Rules Governing Conductors and Drivers," "Taxation and License," and "Ventilation, Lighting, and Care of Cars." The only disturbing feature was the attendance of a lone lady delegate representing a western road. The president appointed several committees of one to wait upon and invite her to the sessions, but men who would take a car through a strike without fear, seemed determined to run past the passenger now. At last a reinforcement of three ventured on the perilous undertaking, and although great respect and deference was paid the lady secretary, she confessed to a feeling of "being all soul alone," only attended one session, and never availed herself of the life membership clause.

This convention was the best thus far held, both in attendance, papers and discussions. The banquet was tendered by the local companies, and was the finest ever given in the city, while the floral decorations rivaled Shaw's gardens. Julius Walsh presided at the table, where the faithful remained until to-morrow had long since become to-day.

A generous rivalry had been waged as to what city the next convention should go, but the "Little Giant" had not been in railway work for many years not to know how to carry the day, and he did it, and took the whole convention with him



IN 1886 TO

INCINNATI. The sister city where the preceding convention was held, had been honored with the office of chief executive, which was ably filled by Julius Walsh. As experience had demonstrated

discussion to be no less valuable than the papers suggesting it, a less number of subjects was assigned this year, to allow ample time for each, and with gratifying results.

"Cause, Prevention and Settlement of Accidents," "Sanitary Condition of Street Cars," and "Progress of Cable Motive Power," were the practical, timely topics for consideration. The papers were excellent and the debate participated in by a large number. The attendance was very large and eighteen new members entered the fold. The entertainment included a long carriage ride, a visit to the various street railways, the Chamber of Commerce, Eden Park, the splendid Art Institute, one of the mammoth brewing establishments, and the zoological gardens where everybody saw snakes and things.

The banquet was one of which Cincinnati had reason to be proud. It was tendered by the street railways of the city as a compliment to the visiting brethren, and was held at the Gibson House. Throughout the convention the weather was perfect and the whole occasion a most pleasant and profitable one.

PHILADELPHIA



HAVING felt the need of the stimulating, enlivening influences of a street railway conclave, had secured the meeting for 1887, and had also the double honor of furnishing the president for that year, Thomas W. Ackley, since deceased.

The membership had now reached 153 companies, which with few exceptions, were represented by from one to four delegates. The literary menu included "Cable Motive Power," "Motors other than Cable and Electric," "Roadway Construction," "Street Railway Mutual Fire Insurance," and "Practical Devices in the Economical Management of Street Railroads." The reports were unusually good, the discussion earnest, and the sessions well attended and profitable.

Invitations were tendered to visit Fairmount Park, Girard College, Union League Club, Masonic Temple, Baldwin Locomotive works and the mint. Mr. Wharton exhibited two storage battery cars, the first ever seen by most of the visitors.

The late Chas. Van Depoele also addressed the meeting at considerable length on the subject of electric traction. The banquet tendered by the board of presidents of the Philadelphia City Passenger Railways, was in many respects the finest ever given the association, as indeed, it was the last, the expense of which was born by the resident companies, owing to a change in the by-laws providing that in future banquets be paid for out of the yearly dues. It was held in the grand old Union League Club, whose spacious hall was crowded with guests, upon whom historic paintings looked down from every wall. There was everything in associations to inspire the speakers, and the toasts on this occasion have never been equaled since.

WASHINGTON, 1888.



THE offers of hospitality a year before a voice had been heard above the roar of doughty congressmen, and it was the voice of President Henry Hurt, bidding the Association a Washington welcome, and

Mr. Hurt being withal a most gallant gentleman, included the ladies also. The supply men, who had first landed in considerable numbers at the St. Louis meeting, and who had been rapidly multiplying ever since, had now mustered sufficient forces to make a very creditable exhibit; and as in the case of the sheep and the goats, a place was now set aside for them likewise. Chas. B. Holmes had been elected president at Philadelphia and gracefully wore the honors in 1888. The report of the executive committee was the most complete to date, and among other matters recommended the making of car line mail routes.

Papers discussed were, "Street Railway Mutual Fire Insurance," "Conditions Necessary to the Financial Success of the Cable Power," "Location and Construction of

Car House and Stables," "Progress of Electric Motive Power," and "Street Railway Taxation."

The pleasure features of the meeting included individual visits to the government buildings, the monument and White House, and a drive taken in a body about the city, as a part of which a visit to the treasury vaults was made, where the delegates gazed at small mountains of new nickles and made mental calculation of how many half trips would be required to ring them all up as fares. The excursion down the Potomac accompanied by the Marine band, visiting Mt. Vernon and lunching on the lawn at Marshall Hall, was the most delightful outing in the history of conventions. Banquet was held at the Willard, and here for the first time the ladies were invited to the festive board.

"GO WEST, YOUNG MAN."



THE convention of 1889, venturing farther toward the wild and woolly West than any of its predecessors, found itself in the rising metropolis. Minneapolis, but was none the less successful and enjoyable on that account. George

B. Kerper, of Cincinnati, had been placed in power at the last election and still sat upon the throne. Ten new companies enlisted at this meeting, which was largely attended. "Street Railway Mutual Fire Insurance," "Street Railway Mutual Benefit Society," "Conditions Necessary to the Financial Success of Electricity as a Motive Power," "Street Railway Motors, other than Animal, Cable and Electric," "Food and Care of Horses," "Public and State Treatment of Corporations," were the topics reported on and discussed.

The excursion included a long carriage drive around the city, a visit to Lakes Harriet and Calhoun, the Pillsbury Mill and Minnehaha Falls, at which point the fire department had thoughtfully been stationed a short distance up the stream, to enable Minne- to properly ha-ha. The banquet was held at the West hotel, and was a well managed and elaborate spread. The toasts also were excellent.

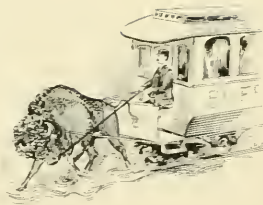
A special train was also tendered, and a large number accepted President's Lowry's invitation to visit Duluth, where the Board of Trade gave royal entertainment, and drove the guests about that interesting and surprising city.

The Association not only carried over until the next year most pleasant memories of the Minneapolis meeting, but had found its president for 1890 in the genial person of Thomas Lowry.

BUFFALO

Had likewise been chosen as the happy hunting grounds, where the festive supply man was to be let loose as never before, in search of whom he might devour.

The electrical exhibit was made a specially attractive one, and several of the car builders had handsome samples of their handiwork displayed.



THE spacious Iroquois Hotel furnished headquarters, while the assembly hall of the magnificent Public Library Building had been tendered for the business sessions.

Subjects for discussion were furnished in ably prepared papers on "A Perfect Street Railway Horse," "Electric Motive Power. Technically Considered," "Novel Schemes for the Development of Street Railways," "Public and State Treatment of Corporations, No. 2," and "Relative Cost of Motive Power for Street Railways."

President Watson tendered a special excursion train to Niagara Falls, and distributed handsome illustrated souvenir books. The banquet was fine: C. Densmore Wyman presiding in the absence of the president, and the toasts were varied and good.

PITTSBURG, 1891.

And now we come down to facts of more recent date and need but briefly to recall the largest gathering thus far held, which assembled at the Monongahela House, Pittsburg, October 21st and 22d, 1891. Henry M. Watson, of Buffalo, presided in an able and impartial manner. The papers discussed were: "A Perfect Electric Motor," "A Year's Progress in Cable Motive Power," "Public and State Treatment of Corporations, No. 3," "The Dependent—Overhead or Underground—System of Electric Motive Power," "The Independent—Storage or Primary Battery—System of Electric Motive Power," and "Standards in Electric Railway Practice." The excursion was on the Ohio and Monongahela rivers, on the steamer Mayflower, including frequent stops to visit the iron and glass industries, where numerous souvenirs were given the guests.



This was the first convention at which the STREET RAILWAY REVIEW was present, being then but nine months old. It was pronounced a nice, fat, promising baby, and was highly complimented on its good looks and clean "face."

The exhibition of railway appliances on this occasion was a great attraction, being visited by hundreds of citizens in addition to the delegates. It occupied the whole of two large barges, moored on the bank directly in front of the hotel.

And thus having hastily glanced over the road along which the Association has journeyed, and traced its growth from birth to stalwart manhood in a few years, no one can fail to anticipate with the greatest expectation and interest the coming convention in Cleveland, the attractions of which beautiful city are portrayed in detail elsewhere in this issue.

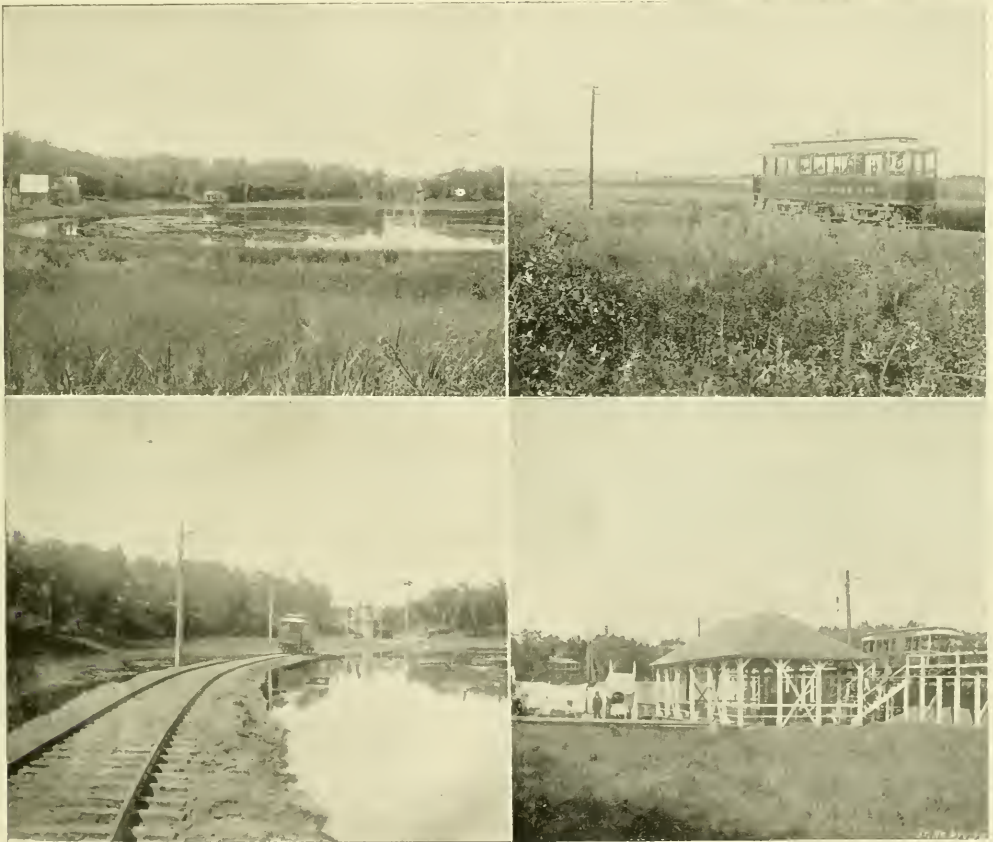
ST. PAUL—WHITE BEAR INTERURBAN.

HERE recently occurred the formal opening of what promises to be one of the most important pleasure lines in the country. The line referred to is the St. Paul and White Bear Electric Railway, which runs 10 miles north of St. Paul, Minnesota, to the White Bear Lake, around the shores of which body of water not long ago a pathless forest held indisputable sway, and upon whose bosom only the wild duck and the still wilder redman caused a ripple.

The trial trip was made by about 75 distinguished strangers and well known citizens of the Saintly City,

which has literally sprung up in a day. Further on, through Castle, on the shores of beautiful Silver Lake, along the strands of several lovely little ponds and the famous Four Lakes, when, after a long descent, the beautiful expanse of the largest comes suddenly to view and White Bear is reached.

From a wild forest the grounds secured by the Company have been transformed into the loveliest of pleasure resorts. The forests have been tamed into groves, and instead of the White Bear other white animals disport in the water. These grounds secure a view from White Bear



SCENES ALONG THE ROUTE FROM ST. PAUL TO WHITE BEAR.

who, at the request of the management, left the East seventh street power house, the city terminus of the electric line, where the new palace cars received them. The run to North St. Paul was made over the tracks of the North St. Paul motor line. The road, after leaving East Seventh Street passes on through the suburb of Hazel Park. Further on, the Wood harvester works are reached, where a great industry bids fair to raise another suburb. Beyond, the eye can reach the poor farm, the suburb of Gladstone, with its railroad shops, Lake Phelan and other parts of the city. It is 15 minute's ride to North St. Paul, the thriving little manufacturing town

beach to Wildwood. The lake itself is three miles long and two miles wide, with an island and two peninsulas. On its shores are several large hotels, two villages, White Bear and Wabtomeda, and many costly villas. Eight or ten steam yachts plow its bosom, besides 50 or more sailing yachts and hundreds of boats belonging to private parties and the boat club.

Wildwood beach, on the eastern shore of the lake, is the terminus of the electric line, and here the company has exerted all its skill. Here is a pavilion, a building 80 by 250 feet, of Moorish design, with dancing hall, refreshment room, restaurant, cloak and toilet rooms, and

moveable sides, so that the entire place may be made a covered addition to all out-doors when necessary. Picnic grounds, supplied with tables and swings, hammocks and chairs, add to the attractions. Two unique water toboggan slides, 65 bath houses, zoological rarities, musical novelties and artistic exhibits complete the list.

The entire outfit is owned by the company and managed by Frank J. Pilling, and members of the departments, who report to him. All privileges are held by the company and return from \$50 to \$200 per day. No intoxicants are sold. From 500 to 1,000 people are usually transported daily, but the traffic very often exceeds the accommodations and steam cars are run extra. Designs are now being made for double tracks.

The road itself is 10.8 miles long, to be exact, from the Seventh Street Cable to the Lake. The rail is Illinois Steel Company's 50-pound T, laid on ties 22 inches from center to center, balanced with gravel and



POWER HOUSE.

strong enough for steam cars and freight. The wire is high enough to allow the brakemen to stand upright on the highest cars. The power house, located about the middle of the line, at North St. Paul, is of Chaska brick, 84 by 128 feet. Babcock-Wilcox boilers are used, two in number, of 100 horse-power each. Two multipolar 80 Thomson-Houston generators are driven by two 100-horse-power, non-condensing Ideal engines. The offices of the company are in the building.

The rolling stock consists of five 28-foot La Clede cars, mounted on McGuire trucks, with two 25-horse-power motors per car.

The entire run is made in 40 minutes, and for the first 21 days of operation, 21,000 were carried.

The work commenced by the North West Thomson-Houston Company, clearing for road bed, power house and grading, April 28, and the first car run was July 1, which was very speedy work, considering that Minnesota was blessed with 27 rainy days in May.

The officers of the Company are: Walter S. Morton, president and general manager; Henry A. Castle, secretary; Walter Ruan, treasurer; Superintendent, John Murphy.

BALTIMORE-WASHINGTON ELECTRIC.

THE new proposed electric railroad takes more definite shape as the peculiar advantages of the route are unfolded by investigation. The country intervening displays no steep grades and fortunately for the capitalists, if unfortunately for the engineers, there will be no requirements for their technical skill. The two cities, one a manufacturing and the other a residence district, and the same advantages that led Morse to select them as the termini of the first telegraph wire, lead the projectors of this scheme to the same points.

The charter of the company is a most liberal one and the road will be double tracked and the line will carry freight as well as passengers, although, of course, the latter will be the heaviest.

The cost of both boulevard and road is estimated at \$15,000 per mile. The directors are Stephen Gambrill, D. M. Newbold, M. L. Badell, R. S. Carswell, C. S. Gilbert, J. J. Dobler and C. B. Calvert.

A MAYOR WITH SENSE.

THE mayor of Galveston, Texas, should be re-elected for a double headed term. In vetoing an ordinance recently passed by his council, and which required the cars to come to a full stop before passing over cross streets, he said:

And in this connection I feel constrained to suggest to your honorable body that this "regulating" business of the city railroad is, in my opinion, being altogether overdone. There is no institution in the community that has done so much to promote the advancement of the city as the Galveston City Railroad company, and the adverse legislation that is undertaken at almost every meeting of the council does not, I believe, meet the approval of the people of Galveston.

MORE RESORTS FOR MINNEAPOLIS.

THE next step to induce traffic that the Minneapolis street railway people will take, will probably be towards the improvement and popularization of the beautiful Minnehaha Park. The late heavy rains and the prospect of stormy weather up in Lake Amelia, have insured a permanent supply of the liquid element for the falls and thus a perennially beautiful display.

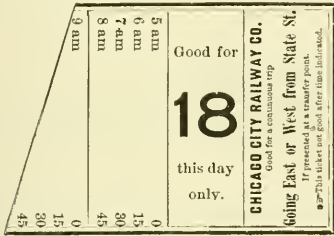
The principal attraction, under the consideration of the railroad company, is the illumination of the falls by means of electric or calcium lights, giving about such an effect as is now obtained from the electric fountain at Lincoln Park, Chicago, although not so brilliant or varied in display.

The street railway will also increase the Falls service and otherwise popularize the resort, and, although the Lake Harriet crowd will not be perhaps perceptibly diminished, a larger number of people will attend the new resort on account of the smaller crowd. The park board will assist in the festivities, but the greater part of the expense will fall to the company.

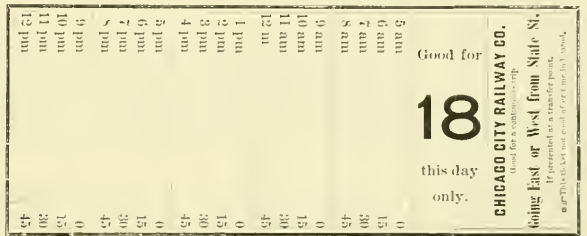
A NEW TRANSFER TICKET.

THE very latest in the way of a transfer ticket is the invention of Frank R. Greene, the able secretary of the Chicago City Railway Company. This road uses more transfers every day than any other in the country, requiring seldom less than 200,000, and often 250,000, for a day's supply. As the present form in use uses a date of month and year, any surplus which may be left over are a dead loss, and also require considerable

cannot extend his time by tearing off a portion of his ticket, the latest use of which is designated at the torn end. Additional check on conductor lies in the fact that his stubs show at just what hour each ticket was issued, and the use of any abnormal number on any one trip may require an explanation, or suggest a comparison with the trip sheet as to just how many passengers were on the car to receive transfers. The brass clip is flat, smooth and with a straight edge in its portion resting on the face of the ticket, and passes around the book at one side, hav-



PORTION GIVEN PASSENGER.



THE TRANSFER BEFORE BEING TORN.

work on the part of conductor in punching the hour when issuing; and finally tickets are good if used within the sixty minute limit, while every railway man knows the life of the transfer should be shortened to as near the time of the next connecting car as possible.

Mr. Greene's first aim has been to lighten the conductor's work, by doing away with the punch entirely and substituting a brass clip. Tickets are bound in books containing any desired number, and bear only date number, shown in the cut as "18." As there are but twelve "18's" in the course of a year, the use of twelve colors of paper would bring an "18" of any given color but once in all that time; while six colors would enable a change once in six months. As no one, outside the general office knows what color will be used next month, there is no

ing a spring on the under side of the book, which holds the clip in place and tight, so the tickets can be torn quickly and accurately. With an occasional change, as the hour progresses, one setting answers for all day; although it can be adjusted in a moment. This transfer arrangement is, in many respects, the best we have ever seen, and affords a check on the issuing conductor which has never been secured before. Mr. Greene is trying the ticket on some of the south side lines, and reports the plan as very successful. It is a new departure in the way of transfers, and is the result of no small amount of study on the part of the inventor.

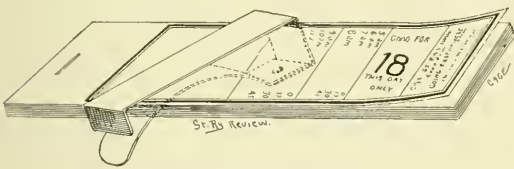
THE BUFFALO-TONAWANDA RAILWAY.

THE new Buffalo, Kenmore & Tonawanda Railway is now under contract. The Field Engineering Company took the enterprise at \$125,000 and will build the eight miles of road.

A picnic ground has been bought by the company midway between the two towns. Twenty-eight acres will here be fitted up to induce traffic. The road bed is of crushed stone and laid with 55-pound girder and T rail. A 140-horse power General Electric Company's dynamo will be installed in the power house, while the Lake Erie Engineering Company will furnish the boilers. The General Electric Company will do the line work and furnish the motors which will be 25-horse power, water-proof, moving Brill 29-foot cars.

The line gives great promise and Tonawanda seems tonier than ever. Col. F. K. Hain positively denies a call to Philadelphia to manage the new L. Mr. Hain says that he was called in to consult on construction and hence the report.

THE operating of a cable grip car seems to possess quite a fascination for many men. In Pittsburg several ex-teachers are now working as grip drivers.

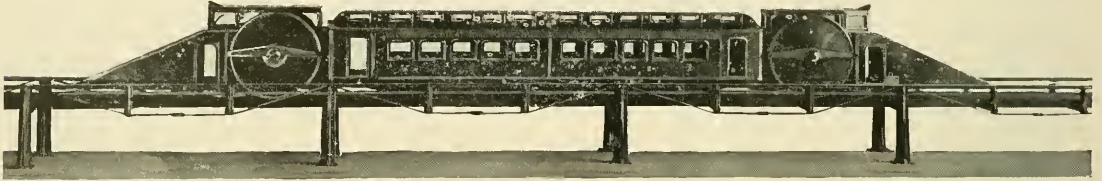


CLIP FOR TEARING TRANSFER.

inducement to keep unused tickets against a time so indefinite. In this way unused books can be turned in by conductors and kept for future use. The great feature, however, is the check on the conductor. As will be seen, the ticket admits of a limit to any fifteen minutes of each hour, the ticket being torn off at any quarter-hour desired by the conductor as shown in the sample herewith, which is good only if used by 9:45 a. m. on the 18th day of the selected month. The remaining portion of the ticket is retained untorn from the conductor's book, and on examination at the close of his day's run, at once shows whether he has issued any tickets irregularly. They must all follow consecutively in point of time, and on the other hand the hours are so arranged that the passenger

A NEW DESIGN FOR HIGH SPEED CARS.

ALTHOUGH ingenious man has accomplished much toward the annihilation of distance, and the world has begun to confidently expect the day when the speed of 200 miles an hour will metamorphose from theory to practice; such a thing has not yet been made practicable. As in the evolution of all things, one idea suggests another, we present below the plan invented by Charles C. Burton, of Utica, N. Y., with an illustration of the large working model now on exhibition in this city.



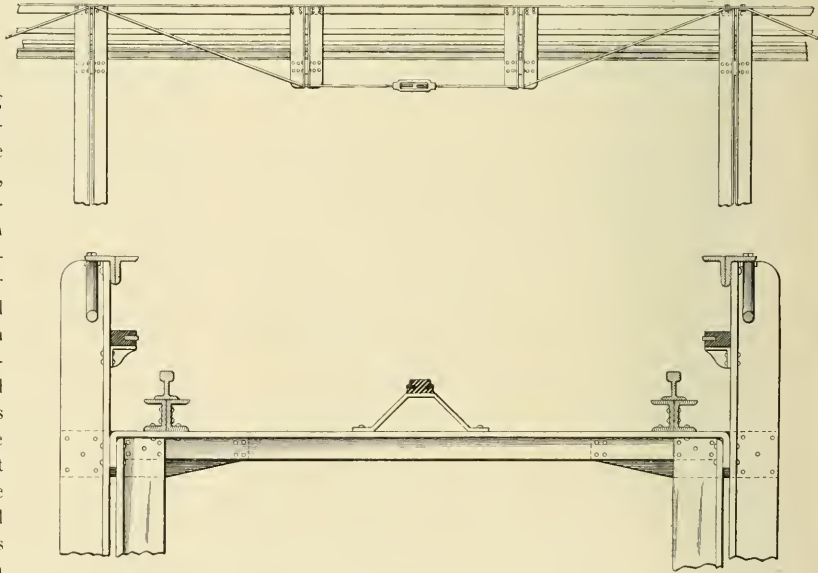
CAR DESIGNED FOR 200 MILES PER HOUR.

Mr. Burton's model car is thirteen feet long, and affords a very interesting study, containing as it does several novel features. The dimensions of the full sized car are to be 156 feet long over all, 15 feet wide and 10 feet high; to be constructed of wrought iron and steel, and built in three sections—two prows and a car body. The prows are each to be 35 feet long, in one piece, with flat bottom. Fifteen feet of length devoted to the motors, driving machinery and cab, and the remaining twenty feet tapering toward the end, in which latter portion mail, baggage and express are to be carried. The form of the prows is such as to insure least atmospheric resistance when traveling. The center section is carried wholly by the end sections, into which it telescopes with a vestibule joint, and hung by a vertical pivot to allow ample lateral motion in rounding curves. This center section, or car body, is to be 80 feet long, 15 feet wide and 10 feet high, and fitted up to accommodate 120 passengers, besides buffet and smoking apartments. The plan is for three sittings on each side of a center aisle. The entire car is to ride on the four driving wheels, two in each prow section, which it is expected will permit of mounting quite severe grades, as every pound of weight is carried directly on the drivers. Entire weight of car and load is estimated at 40 tons. Drivers to be spoke wheels, 15 feet in diameter and covered on both sides with steel plates joined to the wheel at the rim, quite like two saucers set face to face and placed on edge. Axles to be of faggotted steel, 12 inches in diameter and 13 feet long, with bearings on both sides of each

wheel. To insure ease in rounding curves, horizontal guide wheels on both sides the car and set directly in front of the drivers travel against guide rails, thus relieving the drivers of all lateral strain. The driving machinery has not yet been worked out in detail, Mr. Burton having confined his labors wholly to the car and structure, which latter is an iron truss elevated roadway, supported on iron posts placed at intervals of 50 or 75 feet as necessity demands.

The cuts of cross section and side elevation fully explain the inventor's ideas in this respect. Electricity is the con-

templated power, current being taken through a six foot diameter horizontal trolley wheel placed beneath the car. In addition to a band brake working on a large drum mounted on the driver axles, additional braking force is provided from a series of air resistance plates on the prow.



SIDE ELEVATION AND CROSS SECTION OF STRUCTURE.

which open with one movement of a lever, very much as seats on a blind are operated. Mr. Burton believes this type of road can be constructed at a cost which will not prove prohibitory.

THE employes of the Utica, N. Y., lines held their first annual field day and picnic a few days ago. A large attendance, and competition for prizes offered by the company and local business houses made the races and games highly exciting.

CLEVELAND, THE CONVENTION CITY.

History of its Growth and Manufacturing Interests—Points of Interest—Its Men and its Money—
Its Progress and People.

IF Moses Cleveland should awake some fine day and stroll away from his present rather cramped condition in that Connecticut cemetery, down to the corner of Superior and Water street, which he once knew in their primitive loneliness, and should there see not only small houses pulled by horses, but houses riding evidently by broom-stick power and others without any visible means of support, the father of his City would in all probabilities forget the beauties of parks and buildings, paving and people, and disappear with considerable celerity whence he came.

disregard of acres and distances, which characterized our hardy forefathers, in 1792 the Nutmeg State ceded to the United States 500,000 acres of the West end of the Reserve, for the use of the federal government, in benefiting her citizens who had suffered British spoliation.

Three years later 3,000,000 acres, the remainder of the "Reserve," was sold to a syndicate of Connecticut citizens, who banded and incorporated themselves as the Connecticut Land Company. General Moses Cleveland, before mentioned, was made agent, and General Cleveland left his law practice at Canterbury, and like his Israelitish



CORNER SUPERIOR AND WATER STREETS—LOOKING EAST ON SUPERIOR.

From ox-cart, to electricity and cable, in Cleveland, has not been a matter of so many years however, and some, still young men, remember distinctly the driving of the first spike of the crucifixion of leg-weariness.

The history of Cleveland and the country of which it is the Metropolis, reads like a romance, with the cash account of a Yankee shop-keeper running parallel to it.

The land upon which the Forest City stands was originally the property of the State of Connecticut and known later as the Western Reserve. With the beautifully simple

namesake led a little band into the wilderness. This was in 1796, and the same year, the September sun aided the mapping out of a town named in honor of the leader of the expedition. General Cleveland having planted the seed, returned to Connecticut, never to see the outcome of his labors, leaving three men to hold the spot where now nearly 300,000 gather.

Of course the following year brought few settlers into the forested wilderness, but three families occupied their log cabins and promenaded the gentle cow up and down

Superior, Ontario. Water and Huron streets. Other settlements called Newburg and Kinsman were about this time established.

Cuyahoga county was created in 1810, Cleveland being, of course, the county seat. The first court of record was under the presidency of Judge Ruggles and held in the woods on the north side of Superior street, west of the square, June 5, 1810. In 1812 the first log court house was erected on the public square, and the same year is famous for the first legal execution, the case being that of an Indian who was judiciously hanged for the murder of two white men near Sandusky.

In 1814, Cleveland became a chartered village by act of legislature. In 1815, the Commercial Bank of Lake Erie was established, with Leonard Case as president. In 1817, an Episcopal church was founded and a building erected at the corner of St. Clair and Seneca streets.

the pioneers. As early as the year 1844 an aggregate of \$20,000,000 was the value of the lake commerce.

The next great event of progress was the opening of a railroad to Columbus in 1851. In 1841 the Pennsylvania & Ohio canal had opened transportation between Pittsburg and Cleveland.

With the increased population new streets were added, and with transportation facilities, business in all departments felt the tingle of new life. In spite of other means of transport the lake commerce had increased to a total of \$87,000,000 in 1853, or quadrupling in 9 years.

The free school system was instituted in 1838 by the purchasing of the old Academy building by the city. In 1840 a slave owner was defeated in his attempt to recover three refugee negroes, which precedent settled Cleveland as an abolition city. In 1846 the High School was built and gas and telegraph facilities followed by 1850. It



SCENE IN THE PUBLIC SQUARE.

The commercial importance of Cleveland was greatly furthered and in fact, assured, by the completion of the Ohio canal to Cincinnati, in 1832.

At the same time and perhaps, on account of this event, the improvement of the harbor facilities was resolved upon. For this work Congress appropriated \$5,000,000. By the great care, the frugal management and the honest endeavors of the citizens, this amount was made to cover the expense of cutting a new channel for the river and for the building of piers.

The first stone church was dedicated in the year 1834. It was burnt in 1838 and the present grand structure arose in its place.

Cleveland's future was now assured, new settlers began to pour in and the primeval forests gave way, little by little, to the leveling axe and the determined efforts of

soon became patent to the inhabitants of Cleveland and Ohio City that in "Union there is Strength," so in April, 1854, this question of consolidation was submitted and carried by a large majority. The Union passenger depot at the foot of Water street, was opened Nov. 11, 1866. A metropolitan system of police was introduced May 1 of the same year. The Cleveland Bethel Union was incorporated in 1867. The Western Reserve and the Northern Ohio Historical societies were organized in this year. The present magnificent Jewish orphan asylum, on Woodland avenue, was inaugurated July 14, 1868. Two important industrial events occurred in this year. The first was the launching of the iron steamer "J. K. White," from Blaisdell's shipyard, and the second was on Sept. 5, when the Cleveland Rolling Mill company made its first product of Bessmer steel.

East Cleveland and a part of Brooklyn were annexed Nov. 19, 1872, and in 1873 Newburg was also absorbed. In the fall of 1875 operations were commenced for the erection of a breakwater, an important adjunct to the lake commerce. The event of the year 1877 was the completion of the Superior street viaduct. This magnificent structure was supplemented ten years later with the Jennings avenue viaduct.

To-day Cleveland's magnificent homes, finely paved streets, its 60 millionaires, its fine colleges and schools, hospitals and almost innumerable churches, co-operate with the rapid transit facilities to make her a city where life is worth living if it is anywhere.

The visiting engineers and street railway men should see the following points of interest in the Forest City.

VIADUCTS.—SUPERIOR STREET

viaduct was the first. Masonry, west end, ten arches. Number of perches 80,500. Iron work, east end,

Widths in the clear 48 feet: roadway 36 feet, sidewalks 6 feet each. Length over N. Y. C. & St. L. railway tracks 228 feet 6 inches. Height above track 38 feet 6 inches, (1 span 112 feet, 2 spans 56 feet.) Width 48 feet. Work began November 1884. Completed June 1886.

CENTRAL VIADUCT.—CUYAHOGA VALLEY PORTION.

Length of floor 2,838 feet. Height above city base of levels at river, 99 feet 2 inches. Height above river, ordinary stage, 101 feet. Height above N. Y. C. & St. L. tracks, 33 feet 5 inches. Length of draw span (floor) 239 feet. Width of roadway 40 feet. Width of sidewalks 8 feet. Grade 0.3 feet per 100.

WALWORTH RUN PORTION.

Length of floor 1,092 feet. Height above city base of levels at N. Y. C. & St. L. railway 105 feet 6 inches. Height above N. Y. C. & St. L. railway tracks 35 feet.



SUPERIOR STREET VIADUCT.

total weight 792 tons. Weight of pivot span, 570 tons. Weight of turn table, 105 tons. Total length of viaduct, 3,211 feet. Width of pivot span, 46 feet. Width of remainder of structure, 64 feet. Height of top of pivot span above water mark, 68 feet. Lineal feet, white oak piling 227,000 feet. Time of opening or closing pivot span, 1 minute. Engine for pivot span, 50 horse power. Cost of structure, \$2,250,000. Work began August 1874. Completed and dedicated December 27, 1878.

KINGSBURY RUN VIADUCT.

Total length over valley, 834 feet 8 inches, consisting of one span 100 feet; 6 spans 60 feet; 2 spans 45 feet and 8 spans 30 feet each. Height above masonry 75 feet 6 inches, above creek 87 feet, above foundation 96 feet.

Height above Scranton avenue 76 feet 6 inches. Height above C. C. C. & I. railway tracks 68 feet 6 inches. Width of sidewalks 8 feet. Grade 0.5 per 100. Distance from intersection of Ohio and Harrison streets to Abbey street abutment 5,425 feet. Work began May, 1886; completed December, 1888.

For the sake of comparison the following relative figures are given for the Central and Superior street viaducts:

| | Superior. | Central. |
|--|-------------|---------------|
| Total length of structure proper..... | 2,482 ft | 3,931 ft |
| Total length including approaches..... | 3,211 ft | 5,229 ft |
| Width of roadway..... | 42 ft | 40 ft |
| Elevation above river..... | 68 ft | 101 ft |
| Total width pivot span..... | 46 ft | 56 ft |
| Cost, exclusive of right of way..... | \$1,600,000 | \$675,574 |
| Time of construction..... | 4 y. 4 m | 2 y. 7 1/2 m. |

To all engineers and to many others attendant on the convention

THE WATER WORKS

will be of great interest. The principal stations are the high service on Woodland Hills avenue at Norman street.

The low service reservoirs on Kinsman street are reached by the Cedar avenue and Quincy street cars and the high service station is reached by the Woodland avenue and Kinsman street lines and will amply repay any investigation. The main pumping station, as shown in our engraving, consists of two buildings in which are housed six pumps with an aggregate capacity of 70,000,000 gallons per diem. The system includes two tunnels extending out under the bed of the lake 8,642 feet, where the supply is received from the crib. Besides these a 12,000 foot tunnel is proposed. There are 351 miles of piping with 33,821 connections and 236,000 consumers. Our engravings show the crib and the main pumping station both of which will no doubt be visited by the engineers who attend the convention.



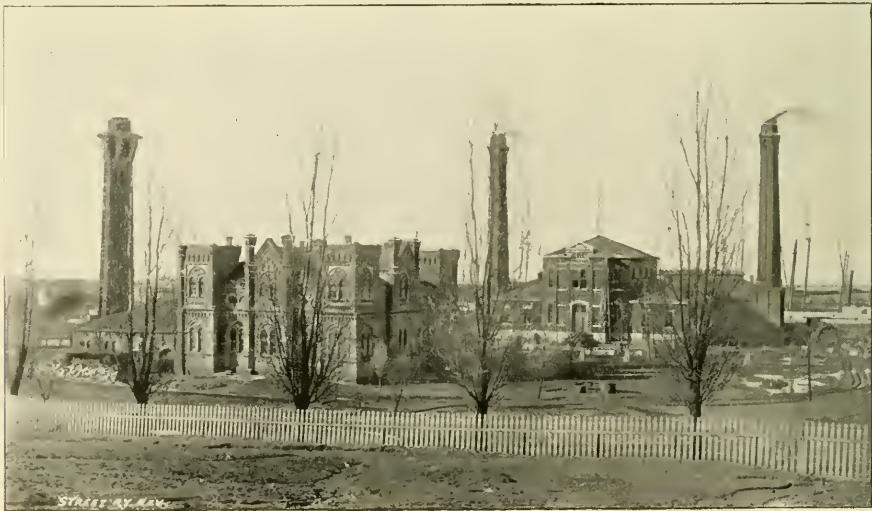
THE CRIB IN LAKE ERIE.

shaded by rows of stately elms which meet and form a graceful arch of green; bustling business streets with store windows artistically arranged; stupendous viaducts, marvels of engineering skill; shipping interests which rival the famous Clyde, and mountains of iron ore and coal in transfer from the mines of Michigan, Minnesota and Pennsylvania, each constitute attractions of special interest. Of the residence streets, one famed above all others throughout the land is the magnificent

EUCLID AVENUE,

reaching from the business center to the city limits, a distance of 6 miles, 100 feet wide and paved with Belgian block. On either side a broad stretch of parkway is bordered by two rows of trees, one at the curb the other next the broad stone walks: over the middle of the avenue at short intervals are suspended electric arc lights, which at night cast fairy shadows of elm and

maple leaves upon the graceful stretch of lawn, which slopes back for several hundred feet to the stately mansions of the millionaires.



THE HIGH PRESSURE STATION, CLEVELAND WATER WORKS.

When a leading citizen of Cleveland was asked the other day where to find the principal

POINTS OF INTEREST

he replied, "The entire city;" and truly the visitor cannot go amiss, ride where he will, so replete with attractions is this city by the lake. Magnificent residence avenues,

THE PARKS

while not large or numerous are worthy of investigation. The Public Square, intersected by Ontario and Superior streets, is surrounded by the post office, jail and other rather unromantic points but contains to offset these a monument of Commodore Perry and of General

Moses Cleveland. Reached by the Superior street cable and by the Euclid Avenue line of the East Cleveland, one finds

WADE PARK,

the most extensive and the most beautiful of all the city parks. It is the city's by a deed of gift from the late J. H. Wade. It has a large artificial lake, where boating is freely indulged in, and a zoological garden which is fast approaching excellence. Wade Park is on the north side of Euclid avenue, just beyond Fairmount street, and across the street from Adelbert college and the Case School of Applied Science.

Lakeview park is found on the bank of the lake, just east of the Union depot, with nothing between it and old Erie excepting a few railroad tracks. It is laid out in pretty paths and flower beds, and has in it some tasteful statuary. As one approaches the city from the east by train it gives one a favorable impression of Cleveland at once.

Franklin circle is intersected by Franklin avenue and several diverging thoroughfares lead out of it, the whole being a few hundred feet west of Pearl street on the west side. It is a pretty little spot and serves to enhance the beauty of an already handsome thoroughfare. Euclid



STATUE OF GARFIELD—INTERIOR OF MONUMENT.

avenue cars land the passengers at the beautiful Lake View Cemetery, and within a few steps of the stately

GARFIELD MONUMENT

situated in the south-east portion of the grounds and marking the resting place of the lamented and honored President.

SUPERIOR STREET,

extends from the river to the city limits, a distance of 10 miles. It is 125 feet wide, paved with stone and cabled the entire length by the Cleveland City Cable Railway. It is the main business street and is the one on which the Hollenden fronts. From the viaduct at Water street to



GARFIELD MONUMENT—LAKE VIEW CEMETERY.

the Public or Monumental Square, there are four tracks cable in the center and electric and horse on the outside. Over these tracks every car in the city passes every trip, making an arrangement of the utmost convenience for travelers from one portion of the city to another. Here they can step from one car to another without setting foot on the ground. During the morning and evening "rush" over 400 cars pass a given point in one hour.

THE ARCADE,

is a six story building extending from Euclid avenue to Superior street, arched with an immense glass roof and floored with mosaic work. The interior is a vast court, with stores on either side and numerous elevators taking shoppers to the stores on the upper floors. At night when brilliantly lighted with hundreds of electric lights the sight within is a most pleasing one, and the immense glass arched roof as seen from the headquarters hotel half a block distance is very striking.

There are in the city 2,503 streets, with a length of 470.48 miles 83.34 are graded, 46.35 are both graded and curbed, and 68.32 are paved and graded.

The total park area is 93 acres.

The city area is 26.48 square miles.

DEPOTS.

The following list of depots may be of service to the traveller: The Union depot, on the Lake Shore, is reached by the Cable Railway and here is the center of the trains of the C. C. C. & St. L., the Lake Shore, the Cleveland & Pittsburg, the C. A. & C. and the C. L. & W. The Nickel Plate trains run into the Broadway depot. The Erie lines enter the Viaduct depot at the foot of South Water street and the Cleveland & Canton



THE PERRY CANNON.

reaches the city at the Ontario street depot. The depots are thus well centralized and the Cable Railway passes directly in front of the Hollenden headquarters.

INDUSTRIAL INTERESTS.

in Cleveland, have two or three great center nuclei, namely: The shipping and the coal transportation; iron and steel manufacturing, and the oil industry.

With these foundation stones there has arisen almost every conceivable manufacture. The city not only turns out the product but makes the tools wherewith to do it. One industry requires another, until the whole network presents an amazing complication of varying methods and designs.

THE TRANSPORTATION

highways of the great lakes are threaded by Cleveland built vessels, bearing Cleveland's products or bring raw material to be used in Cleveland shops.

As nearly as the oldest inhabitant has left any record, the first ship was built in Cleveland in 1818. The boat was the "Pilot," of 32 tons burden, and built by Levi Johnson. In 1832 the first steamer left a Cleveland yard, when the "Enterprise," of 25 tons burden and 65-horse power, cooled her keel in Lake Erie's waters.

The year 1856 showed 37 vessels of Cleveland's builders. The most remarkable of these was the "Rich-

mond," which, with a cargo of wheat at Chicago, sailed for Liverpool, England, where both vessel and load were sold, and Cleveland made her first contribution to the salt water marine. When the copper and iron trade assumed such proportions that stronger vessels were required, Cleveland builders began their since highly successful experiments with steel constructed boats.

According to the latest federal census there was constructed in the United States in 1890 a total tonnage of 294,122 tons, of which 108,525 tons were constructed for the lake marine. Cleveland stands at the head, with 39,095 tons as her year's production, or 36 per cent of the entire tonnage of the lakes, and 13 per cent of the new tonnage of the United States. For the years 1889-90 the tonnage construction of the three leading shipbuilding cities is as follows:

| | | |
|---------------|-----------|--------------|
| Cleveland, | - - - - - | 71,322 tons. |
| Philadelphia, | - - - - - | 53,811 tons. |
| Bath, Me., | - - - - - | 49,830 tons. |

The statement has been made, that in case every ship, iron and steel plant of every other fresh water port in the country was destroyed and wiped out of existence, the immense ship building plants and yards of Cleveland alone, would be entirely able to supply the demand for new vessels on the lakes.



SUPERIOR STREET AT PUBLIC SQUARE.

The Globe Iron Works Company, with machinery departments on Center, Elm, Spruce and Hemlock streets, adjacent foundries and with ship yards of 1,400 feet frontage, on the old river bed, have a capital of \$500,000, and an honorable history since 1853. There are 1,200 men employed, with a pay roll of \$13,000 per week and an annual metal consumption of 15,000 tons.

The Cleveland Ship Building Company, organized in 1886, with a capital of \$500,000, is the successor of an earlier and less extensive plant. The office of the company is 120 Viaduct and the yards are on the Cuyahugo

River, extending back to Detroit street and the West River. The company has built a large number of boats of all sizes and is now building for its own use a monitor steamer, of 324 feet keel, 42 feet beam, and 24 feet deep, which will be one of the largest carriers on the lakes. President Coffinberry is a director of the State National Bank and prominent in many financial and industrial interests, and in every way the management of the company is under the most worthy and competent direction.

The immense industries allied in this work, such as founding, engine building and machinery designing, have their representatives that will make an immense showing, interesting to both sightseer and delegate.

The marvelous growth of the industries of Cleveland cannot be better explicated than by a comparative statement of the mere matter of number of plants and capital interested therein. No adequate comparison can be made between 1870 and 1880, as the census returns excluded by re-classification many industries which were relegated to mining and other branches, to which they properly belonged.

In 1890 the number of establishments were 2,065, in 1880, 1,055, increase 1,010. The capital invested in 1890, (not including property hired), \$53,974,346; in 1880, \$19,430,989, or an increase of \$34,543,357 in ten years. The hands employed in 1890 were 47,357; in 1880, 18,018, or an increase of 29,339. The total wages paid in 1890 amounted to \$30,423,635; in 1880, \$18,502,935, which is an increase of \$21,920,700.

The cost of material used in 1890 was \$56,321,073; in 1880, \$31,629,737, which gives \$24,691,336 increase. The value of the product in 1880 was \$98,926,241; in 1880, \$48,604,050, which shows \$50,322,191 increase. With this remarkable showing who can fail to view this

solid city with other than the eye of prophecy that declares that it shall take its place among the great of the earth.

The special industries in which our readers are most interested, the foundry, machine products and the iron and steel products which are made necessary by the above, deserve special mention. Foundry and machine shops put out \$11,189,667 worth of goods at a cost of \$5,117,042, using a capital of \$7,122,196 and 7,061 men drawing \$3,863,808 in wages in 98 establishments. The iron and steel bolts, nuts and washers and iron forging industries are capitalized at \$13,992,572, employing 9,280 men at \$5,683,839 in wages, with an output of \$23,879,930 from 19 establishments, at a cost of \$16,315,531.

It has been very truly stated that a well-to-do working class is the bone and sinew of a city, and that the affluence of their class is best shown by institutions for saving.

With these axioms of political economy in sight, let us glance for a few moments at a few totals. Cleveland has ten national, twenty savings and two private banks, with an aggregate of \$62,000,000 in deposits. The twenty institutions for saving have an aggregated capital of \$3,429,000, with \$26,236,234 in loans and discounts and \$38,577,062 in deposits. Seven of these institutions are entrusted with over \$1,000,000 and one of the seven has \$20,000,000 in deposits. It is

safe to say that no other city of the same size in the country has an equal showing.

Thus this cursory glance at a few of the large general industries, and a still shorter account of the saving and industrious inhabitants of Cleveland brings to view two indisputable facts, namely: that Cleveland in itself, is a complete plant, following out that highest ideal of a commonwealth—self-sufficiency, and that the individuals have learned the secret of capital.



INTERIOR OF THE ARCADE BUILDING.

THE HOTEL FACILITIES

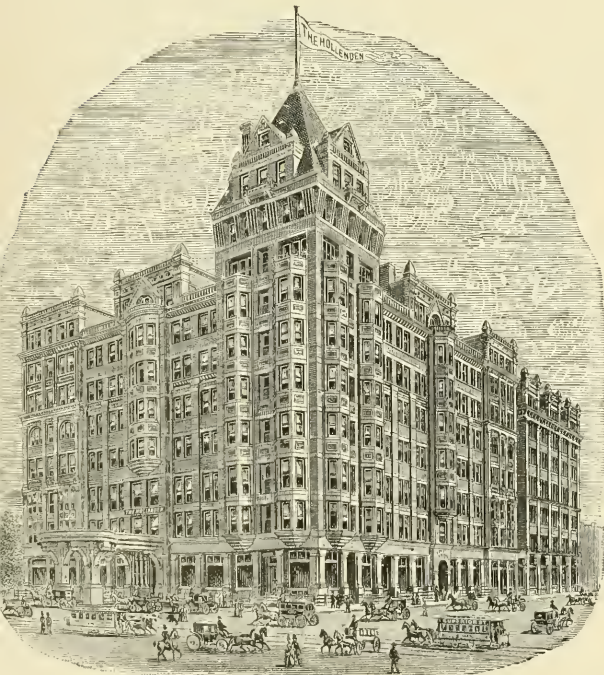
are ample for both ordinary and extraordinary occasions. The following list of first class houses, capacities and rates may be of interest:

| | Capacity | Rates. |
|-------------|----------|----------------|
| Hollenden | 800 | \$3 to \$5 |
| Stillman | 250 | \$3 to \$5 |
| Weddell | 350 | \$3 upwards |
| Forest City | 300 | \$2.50 |
| American | 200 | \$2.00 to 2.50 |
| Kennard | 250 | \$2.50 to 3 00 |

giving a total of accomodations of 1,900, besides which there is room for 1100 other guests at cheaper hostleries.

The Hollenden, where the head quarters of the conventions will be located, is a magnificent structure of 10 storie situated on Superior street, one block from the public square and reached directly from the City Cable, or indirectly by the East Cleveland's Euclid avenue branch. Here if necessary 1,500 people can find accommodation.

The building, an engraving of which is presented, is fire proof. It was erected in 1885 but practically rebuilt in 1890. It is run on the American and European plan, and ably managed by Frank A. Brobst, who has fifteen years experience in that line.



HEADQUARTERS' HOTEL.

The Stillman is an elegantly fitted and exclusive house, more on the family order. It is four blocks from head-quarters.

THE REVIEW AS READ IN JAPAN

IN a recent issue we reproduced a page printed in Japanese characters of a catalogue issued by a firm dealing in electrical supplies in Osaka, Japan, and believing our readers will appreciate the sentiments contained in their letter to us, give it full below:

"Your post card, together with April number of STREET RAILWAY REVIEW came duly to hand and have had our



STILLMAN.

best attention, for which please accept our sincere thanks. We paid much close application of the mind to your magazine, especially the part where you have kindly inserted Japanese; vertically reading and rightly commencing, and leftly marching characters. We have at first little shamed to have had our vernacular characters interview, but gradually our heart became wide open and we have been revealed that not only your art has so skillfully executed but we merit the Editor's higher characteristic than we would commonly esteem it a favor, for only thanking a sender's will. We valued that number very highly and will in course of time not fail to send our catalogue whenever it renewed.

We may send Japanese railroad news to you from time to time should you not object to the idea. We shall be much pleased to receive more of your copies. Again thanking you for your kindness, we are, "etc" W. C. Sakia.

As we do "not object to the idea" our readers may hope to hear from Mr. Sakia before very long.

THE lamentable death of Mrs. Walter E. Hoopes at the time of the terrible Johnstown, Pa., flood, has just had its sequel in the discovery and identification of her remains. She was the wife of W. E. Hoopes, secretary of the Johnstown Company, who was lost in the same disaster.

TRAMWAYS IN HOLLAND.

HOLLAND, with the perseverance and economy so distinctly displayed by the Dutch at home or abroad, has a fine system of intramural transit in every town deserving the appellation. Nearly every country road has its steam tramway, and in such great and busy centres as Amsterdam and Rotterdam, the traffic by tram, although heavy, is well managed, as far as the comfort and convenience of passengers are concerned. At Amsterdam, the net work of the omnibus company (horse trams) is sufficiently complete and well planned to satisfy all the requirements of an active mercantile community. The cars, as a rule, are full, and a well-devised system of transfers between the different

6 hours work every fourth day and a holiday once in 17 days, unless extra duty be done, which is common.

The men are not allowed to use the cars in going to or coming from work. The weekly wages of the drivers are from \$3.68 to \$5.74, and of conductors from \$2.76 to \$5.30, with the necessities of life in the proportion of 22 to 38 cents higher than in England. To add to this, on some lines, a day's work is 19 or 20 hours.

With this state of affairs, it takes all Dutch frugality to make both ends meet, especial for men with families to support. The government will try to regulate matters.

ALL are invited to call at THE STREET RAILWAY REVIEW Headquarters at the Hollenden Hotel, at Cleveland, both old friends and new.



CLEVELAND CITY CABLE POWER HOUSE.

lines followed by the cars, enables passengers to reach any point of the town speedily and at a relatively trifling cost.

The laborers are, as in this country, conductors and drivers, the latter being the superior class, and the conductors, are the broken down and unfortunate members of almost every trade, vocation and profession. They are in high favor with the passengers, however, and a director recently complained that the employes were demoralized by the attention, tips and treats afforded them by the patrons of the line. This is strengthened by the hopelessly miserable pay and long hours.

The working day of the men is 17 hours (from 7 a. m. until midnight), with an hour-and-a-half for meals, with

A NEW HORSE SHOE.

AN inventive Parsian interested in our friend, the horse, has invented a new shoe, that promises to be a success. This new hoof gear is made of Bessemer steel, in appearance like an ordinary shoe but that a bent lever attaches itself half way up the rear of the hoof without compressing it. A clamp encloses the hoof, parting the two heels of the shoe and is supported on the lever which sustains it. The shoe is also fitted with three small interior clamps which penetrate the horn of the hoof, without raising the clamp. A number of private firms in Paris and a tram company are experimenting with this departure.

STREET RAILWAY LAW.

EDITED BY MR. FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Ordinance Requiring Both Driver and Conductor on Street Car.

An ordinance requiring both a driver and a conductor to accompany every street car, is a proper exercise of the police power.

Sending a street car back to the stables for failure to comply with such ordinance, is not an infliction of punishment without a trial, but merely removes a nuisance from the street, and the ordinance may properly provide for such return.

The Board of Councilmen passed this ordinance: "That all street cars running in the city of Newport shall have two persons—a driver and a conductor—on each car; and every failure to have said driver and conductor on each car shall subject the president and each of the officers of the company to a fine of not less than twenty-five dollars nor more than one hundred dollars for each and every day; and the police of said city shall cause any car without driver and conductor to be returned to the stable. The appellees, the mayor and chief of police of the city, being about to enforce the ordinance by having the company's officers arrested, and its cars returned to the stable, this action was brought enjoining it.

If the ordinance was invalid, then, to prevent a multiplicity of prosecutions, and such consequences as would necessarily result from its enforcement, the company had a right to ask preventive equitable relief.

The city charter provides: "They (Board of Councilmen) shall have power to pass all ordinances and by-laws, not in conflict with this charter or the constitution of this state, that may be necessary for the due and effectual administration of right and justice in said city, and for the better government thereof." It also provides: "They shall have power to cause the removal or abatement of any nuisance." Clearly no power is attempted to be expressly given in the charter to regulate the number of employes on the street railway cars, or how they shall be operated; but if the requiring of both a driver and a conductor be the exercise of the police power, then the provision of the charter above cited authorized the enactment of this ordinance. If it be not police regulation but a mere attempt to enter into and regulate the company's business, then it cannot be sustained. These cars pass through crowded thoroughfares and centers of crowded population. Persons are constantly getting on and off the cars. The cars are apt to be crowded, at least in the morning and evening, when people go to and return from business. If it be said that they have heretofore been operated without both a driver and conductor, it can also be said that the cities have grown, and the travel has doubtless increased.

It is said, however that now power existed to direct the return of a car not having both a driver and a conductor to the stable; that this is an enforcement of an ordinance without a trial, and the infliction of punishment before the party has been found guilty by judicial process. It is, in no sense, however, a forfeiture of the property, but

merely authorizes an effective exercise of the police power. If, for instance, a car were found without both a driver and conductor, it is to be merely stopped and remain upon the street, blockading travel, and constituting a nuisance. Suppose a municipality, in the exercise of the police power, were to forbid the driving of elephants or other wild animals along the streets, and some were found upon them, would it not have the power to direct their removal? The ordinance in question merely protects the public from the danger existing from running the cars without proper control and without sufficient force; and, if it be attempted, provides for their removal, to prevent their becoming a nuisance.

Court of Appeals, Kentucky, *South Covington & Cincinnati Street Railway Company v. Berry*, 15 L. R. A. 604.

Street Railways—Bridges—Dedication—Reasonable Toll.

The bridge was opened to the public on the first of January 1867. Rates of toll were fixed by the president and directors, and that of a vehicle drawn by two horses at twenty cents. When this act of incorporation was obtained, and at the time the bridge was built, there were no street railways in the city of Covington, but the bridge company, seeing the necessity for a more convenient and rapid transit from one city to the other than by the ferry boat, and contemplating the existence of street railways in Covington, so constructed its bridge, by laying down iron rails upon it, as that street cars might pass over it, and in doing so necessarily increased its cost and added to the expense of keeping it in repair. It constructed approaches to its bridge for cars on each side of the river, and invited companies subsequently organized to use its bridge, charging the first company as much as two and a half cents for each passenger coming on the street cars, and finally reducing it to two cents. While it is evident that the street car company could not have compelled the bridge company to place rails on the bridge, still, when the appellant has seen proper to enlarge its franchise, and to make it a street railway bridge as well as one for ordinary travel, it has assumed a public duty with reference to street car companies, that requires it to permit street cars to pass over its bridge at reasonable rates of toll, and cannot at its pleasure destroy this means of travel by removing its rails or refusing to permit such cars to go upon its bridge. This bridge is a highway and dedicated by the company, not only to the uses of ordinary travel, but to its use by street railway companies in passing cars over it from the one city to the other. This company has permitted this use of its bridge for more than a quarter of a century; has induced from time to time large expenditures of money in building street railways, and inviting the travel upon its structure by all such corporations. It is the only way of reaching the city of Cincinnati by the use of street cars, and to stop this public travel

would not only destroy much of this capital invested in such enterprises, but would be disastrous to the public interests.

A toll of two cents for each passenger crossing the bridge in a street car is not unreasonable or an unjust discrimination as compared with a charge of 20 cents for each two-horse vehicle.

Court of Appeals, Ky. Covington & Cincinnati Bridge Co. vs. South Covington & Cincinnati St. R. Co., 15 L. R. A. 828.

Municipal Control of Streets.—Exclusive Privileges granted to Street Railways.

A grant by the city of a right of way to a railway company, though extending to nearly all the streets of a city, is not void as conferring an exclusive privilege, the city not being precluded by its terms from extending like privileges to other railway companies.

Sup. Ct. Tex. Houston v. Houston City St. R. Co., 19 S. W. Rep. 125.

Street Cars—Reasonable Time to board—Passenger having Parcels in His Hands—Care required of Driver.

The servants of a street car company who control the movements of its cars, are bound to use due care in starting the same, so as to allow passengers a reasonable opportunity to get safely on board, regard being had to circumstances of each case.

The train men were bound to allow plaintiff a reasonable time to get safely upon the car, and the plaintiff having packages in his hands, they were bound to conduct themselves in starting the train in reference to that fact. These trains are not, of course, ordinarily expected to make long stops. But if anything is apparent in the condition of the passenger so that he would be likely to be thrown or injured by the motion of the car, then proper regard for his safety might require a train to be held in position to avoid it.

Sup. Ct. Minn. Steeg vs. St. Paul City Ry. Co., 20 Wash. L. Rep. 541

Contract for building Sewers—Interfering with Street Railway Tracks—Injunction.

In this contract between the city and the defendant Massey, there are specifications made a part of the contract, and according to the 25th paragraph thereof the city seeks to protect the street railway's tracks, gas and water pipes. Of course it must be assumed that the contractor made his contract and fixed his price having these specifications in view, and he is to be paid for protecting these structures just the same as he is to be paid for doing his work.

In view of the fact that there is a purpose, and has been a purpose, to interfere with the traffic of the road by this system of shoring, which can be avoided, as it appears to this Court, and when by a very small expense this could be averted, I think the defendant (the contractor) ought to be required to do that work in a manner so as not to interfere with the plaintiff's traffic.

Superior Court, Spokane Co., Wash. Spokane Cable Ry. Co. vs. City of Spokane. Not yet reported.

Electric Railways—Overhead Wires—Telephone Companies.

An electric passenger railway is bound to use reasonable care and prudence in placing its wires and poles, and to adopt all ordinary and usual appliances and methods to prevent contact between its trolley and feed wires and the wires of the telephone company stretched along or across the same highway; failing to exercise this degree of care, it may be restrained by injunction from operating its line until the defect is remedied.

It is the duty of a telephone company using a public highway for its poles and wires to so construct and maintain its line as not to incommode the public use of the highway for purposes of travel or transportation, whether by ordinary vehicles, horse railways or electric railways lawfully used on the same.

In this case if the dangers from contact of wires are due to the negligent manner in which the telephone line was constructed, the telephone company is not entitled to be indemnified for the cost of making the necessary changes.

Ct. Com. Pls., Luzerne Co., Penna. Central Pa. Telephone Co. vs. Wilkes Barre & West Side R. Co., 49 Leg. Intel. 335.

Crossing Street Car Track—Rule as to Care required—Failure to look and listen.

The plaintiff was driving a one-horse market wagon and in attempting to cross the defendant company's road his wagon was struck by a moving car, causing the injury for which this suit was brought. He was driving down the street in the same direction as the car, and when about fifty or sixty feet from the track, according to his testimony, he looked out, but did not see a car coming. He then drove his horse, to use his own expression "cati-corned" across the track, and without looking out again before he crossed it. When seen by a motorman in charge of the car, his wagon was moving in the same direction, and the accident was evidently caused by pulling his horse directly across the track in front of the car.

The rule to stop, look, and listen, is applicable in part, at least, to street railways. A person driving a vehicle has but to use his eyes to avoid such accidents. There is no danger, as in the case of steam roads, of stopping a horse at the very edge of the track. When, therefore, the citizen attempts to cross such track, it is his duty when he reaches it, to look in both directions for an approaching car. It very rarely, if ever, happens that the street is so obstructed that the car may not be seen as the citizen approaches the track. It is his duty to look at that point, and if there is any obstruction, to listen, and his neglect to do so is negligence *per se*. This is an unbending rule to be observed at all times and under all circumstances.

Sup. Ct. Penna. Ehrisman vs. East Harrisburg City Pass. R. Co. 150 Pa. Rep. 180.

A CATSKILL CLIMB.

THE most unique cable railway, with the steepest and most continuous grades known in this country has just been put in commission in New York State, and has for its road bed the billowy breast of the eastern slope of the Catskill mountains.

If Mr. R. Van Winkle should now propose to make another trip into the fastnesses of the Kaaterskill, he could save much of his carefully husbanded strength by taking a car and ascending by steam power. However, Mr. Van Winkle's decedents, Mr. Hoffman Howse and Teddy Van Doodle, have made the necessity, and the Otis Elevating Railway Company has furnished the means. Of this company, C. L. Rickerson is president, C. C. Hagar, secretary and treasurer, and Chas. A. Beach, superintendent. Chas. L. Bucki, of New York, was the general contractor for construction, and the sub-contractors were Pennell, O'Hern & Co., for grading; Mairs & Lewis, for the track-laying, buildings, trestles and timber work; Otis Brothers & Co., of New York, for the machinery. Otis & Co., in turn, sublet the engines and hoisting machinery to the Walker Manufacturing Company, of Cleveland, and the boilers to the Q. N. Evans Company, of New York. W. G. Howell, of Washington City, and G. Thomson and C. F. Parker, of New York, planned and directed the work, and to these gentlemen and the Walker Manufacturing Company's engineers, due credit should be given. The original surveys for the line were made in December, 1891, and the work, which was immediately begun, was finished early in '91. The large rock cuts and the natural difficulties of



WHEN THE SPOOL TIPPED OVER.

the way were admirably met and conquered by the contractors, as a visit only can adequately show. The rails and ties for the total 7,000 feet were laid on a timber superstructure, with the exception of about 1,000 feet at the base. The rocks taken from cuts were used as ballast here, and as bents for the trestles. The timber superstructure above the trestles is two courses of longitudinally arranged beams, 6 x 10 inches, on sub-sills, six feet from center to center, and supporting 6-by 6-inch by 8-foot cross-ties, two feet from center to center. The rail is 35-

pound T, and laid with suspended joints, spliced with 4-bolt angle bars, slotted for spikes. The trestles, whose maximum height is 72 feet, have a total length of 2,600 feet, and 1,250,000 feet of Georgia pine were used in the construction. The upper terminus is the site of the powerhouse. The boiler and engine rooms are separated about fifty feet, the former being on a lower level. The boiler house covers two 150-horse-power Manning vertical tubular boilers, each containing 152 tubes, 15 feet long and 2½ inches in diameter, with a total heating area of 1,563 square feet. The boilers are 22 feet 10½ inches high to the top of the bonnet, with a waist diameter of 53 inches. The furnaces have an inside diameter of 66



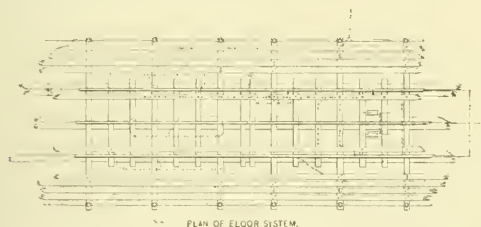
AT THE TOP OF THE CLIMB.

inches and a height of 44 inches. E. Hodge & Co., of East Boston, Mass., made the boilers, and the Q. N. Evans Company, of New York City, the furnaces. A Worthington pump is in use.

The Hooven, Owens & Rentschler engines, so widely and favorably known, and manufactured at Dayton, Ohio, are 12 by 30 reversible Corliss type, operating one shaft, which carries a pinion geared to two Walker differential drums, each of which is 12 feet in diameter, with 6 rings. The engines are geared in a ratio 22 to 100. From an operating tower, the throttle valve, reversing lever and brakes are controlled, as is also the cut-off gear. The cables were manufactured by the old and reliable firm of John A. Roebling Son's Company. It is of steel, with a hemp center, 7,250 feet long and 1¼ inches in diameter, with a weight of 2½ pounds per lineal foot.

The ends of the cables are attached to the two, one ascending and one descending, train. The portion of the rope on the right hand track ascending makes two wraps about each drum, and is then passed over a tail sheave of 8 feet diameter, to a guiding sheave, 6 feet in diameter, and from this to the left track descending. At the turnouts the sheaves are 24 inches in diameter and turned so that the axes are at right angles with the strain. The carrying sheaves are 14 inches in diameter on the straight track, and are spaced to 30 feet, except at the terminus, where they are 15 feet apart. The sheaves are mounted on self-centering and self-lubricating

bearings. No depression sheaves are found necessary, as the weight of the cable keeps it in place. Every precaution against accident is made. A friction brake on each drum is governed to 12 miles per hour. In addition there are safety clutches on the car and friction brakes to the engines. A system of electric gongs is also placed that the signal to stop can be given at any point along the line. The breaking strain of the cable is 50 tons, and ordinary strain 10 tons.



The rolling stock is as simple and meagre as the traffic will allow. Each train consists of a baggage and passenger car, and four cars is the total, built by Jackson & Sharp, Wilmington, Delaware.

The grade at commencing is only four per cent, and at finishing is thirty-three per cent, that a person in the seat of a cable car at commencement will be reclining almost the same as if in a barbers' chair, and when at the top of the road will be pretty well elevated.

The cars seat 75 people comfortably, and will carry 90. They weigh 22,000 pounds each, with stationary seats.

The road is of the three-rail type, and midway on the route is a turnout for a distance of 100 feet. The maximum grade is 34 per cent, and the average 12 percent, with a total rise of 1,630 feet in the 7,000. The gauge of the track is 3 feet. With the exception of the turnout the road runs in a straight line, and the grade line is composed of vertical, compound, circular and parabolic curves, so designed that the loads balance each other at all points on the line.

The question of mountain cables and inclines is of the most profound and growing interest. The Engineering News, in a late number, collates the following figures of the leading inclines in the world:

| Name and Location. | Length on incline | Total rise | Total Gr'd | G'ge, per c. feet |
|------------------------------|-------------------|------------|------------|-------------------|
| Mt. Vesuvius, Italy | 10,500 | ..... | m'x63 | ..... |
| Mt. Supurga, " | 10,243 | ..... | " 20 | ..... |
| Catskill Mountain, New York | 7,000 | 1,630 | " 34 | 3.0 |
| Mt. San Salvatore, Italy | 5,358 | 1,973 | " 60 | 3.28 |
| Lookout Mt., United States | 4,360 | 1,170 | ..... | 3 |
| Burgenstock, Switzerland | 3,071 | 1,444 | " 57 | 3.28 |
| Knoxville, Pittsburgh, U. S. | 2,640 | 375 av. | 13.8 | 9 |
| St. Clair, " | 2,660 | 361 | " 14.2 | 7 |
| Penn, " | 840 | 330 | " 39.2 | 10 |
| Duquesne, " | 780 | 400 | " 58.5 | 5 |

Without doubt this road as it connects with the Catskill Mountain Railway and the pleasure resort of the Catskill Mountain House, just four hours from New York, will have paying traffic. The ascent is made in ten minutes, and the rate is thus 700 feet per minute.

COMBINED SWITCH AND FUSE BOX.

THE accompanying cuts illustrate a very neat combination switch and fuse box, for use in the lamp circuits of electric street railway cars.

Figure 1 shows the box complete, with the switch handle in place. Figure 2 shows the body of the box, with the rotation ratchet switch in the lower compartment, and figure 3 the reverse side of the cover, with the terminals and thumb screws for the metal fuse. This box possesses many advantages over anything heretofore in use for railway lighting service. It is very compact, neat, and, as it is entirely made of porcelain, perfectly incumbustible.



FIG. 1.

The switch is of the latest improved type of rotating ratchet switch, manufactured by the General Electric Co., and possesses the essential points of good contact and sudden break. The fuse is placed on the inside of the cover, so that in replacing a blow-out fuse, the fuse terminals are taken completely out of the circuit, and it is utterly impossible to receive a shock in any way. The brass clips on the cover fit over the contact posts in the box, and serve the double purpose of holding the cover in place, and forming part of the circuit.



FIG. 2.



FIG. 3.

As will be seen in figure 2, the box is divided into two parts, the lower holding the switch and the terminals for the wires, and the upper part consisting of a shallow recess, into which the thumb screws on the inside of the cover project. In the back of the box, behind this upper recess, is a magnetic blow-out, which breaks the arc formed when the fuse is blown. In general appearance the box is quite ornamental, and with its great superiority over other and older devices for the same purpose, it should commend itself strongly to all street railway men.

THE NEW CHICAGO CITY CAR BARN.

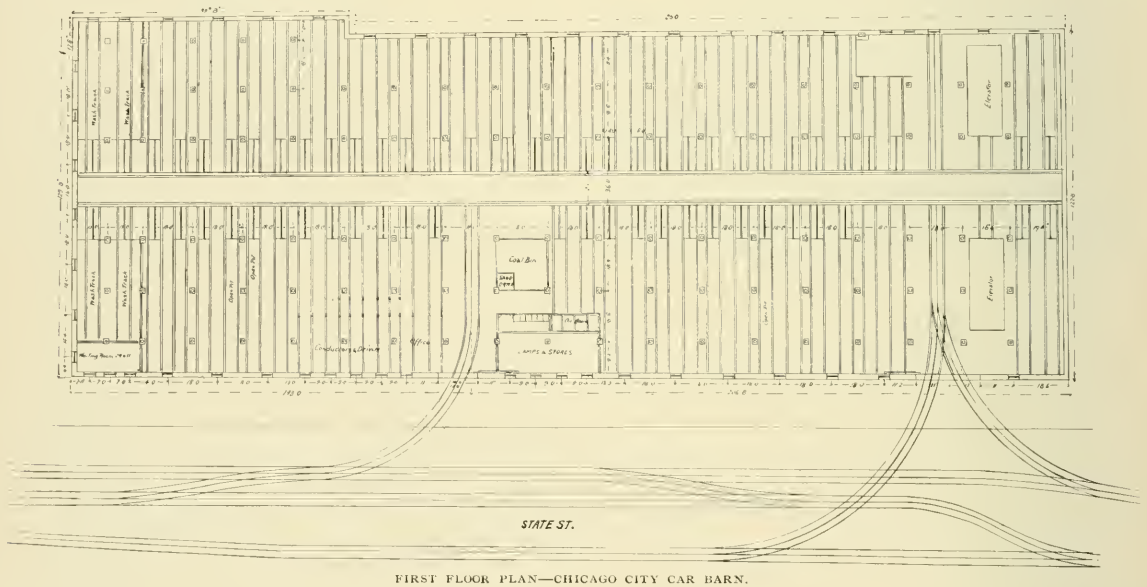
THERE is now almost completed by L. L. Leach & Son, contractors, 161 LaSalle street, for the Chicago City Railway Company, one of the most complete car barns in the country and the most modern in the city.

The barn stands at the corner of Thirty-ninth and State streets, on the south east corner, and will thus be a convenient waiting place for east and west bound passengers, especially accommodating to transfer traffic to and from the stock yards, which amounts ordinarily to 4,000 per day. The other lines centering here and connections do not do so large a traffic, but are still heavy feeders.

The building itself is a three story brick structure, 206 feet long by 123 feet in depth, with two doors for entrance and exit of cars on the State or west front and an entrance on Thirty-ninth street, which will be utilized by the trans-

ing, and is 12 feet wide from floor to floor, where they are received on the shunting table and taken to the desired location. The table is so arranged that it is unnecessary to lift the grip, and the utmost convenience and economy is also conducted by the arrangement of the pits, which permit of repairs being made, and are lined with cement, so that the entire basement is one great washing pit, with direct connections to the contiguous sewer mains. This means of washing, permits of easy and cheap, and consequently more frequent cleaning, with the train of advantages dependent on neat cars. The washing pit is four feet deep.

The crowning feature of this barn, however, is one which is eminently the idea of Superintendent M. K. Bowen, and relates to the transfer of the cars from the State street tracks to their respective stalls. The principle involved is that of gravity, and to this end the first floor is elevated 14 inches above the street grade. A



fer passengers. An entrance to the waiting room is also found on the State street front.

The top story, besides giving storage for 87 cars, has a complete repair shop, with competent labor in charge. The second, or middle floor, has tracks running north and south for the storage of non-seasonable equipments, and it might be well to mention that the 87 on the top floor are in this category. There is room for 120 cars on the second floor.

The first, or ground floor, for the storage of 120 cars, is the center of the most interest and to the end of fully explaining its peculiarities, we show a ground plan from the architect's tracings, which will be of great benefit to any contemplating similar enterprises.

The engravings on this page shows clearly the idea involved. The cars are run from the street to the central runway, which extends the whole length of the build-

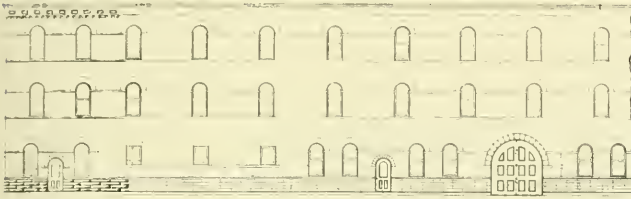
ing, and is 12 feet wide from floor to floor, where they are received on the shunting table and taken to the desired location. The table is so arranged that it is unnecessary to lift the grip, and the utmost convenience and economy is also conducted by the arrangement of the pits, which permit of repairs being made, and are lined with cement, so that the entire basement is one great washing pit, with direct connections to the contiguous sewer mains. This means of washing, permits of easy and cheap, and consequently more frequent cleaning, with the train of advantages dependent on neat cars. The washing pit is four feet deep.

This method has been successfully introduced by Mr. Bowen, in the Kansas City, Mo., car barns, and this is the third of the kind to be erected. It goes without saying that a horseless method is the best.

Two elevators, 32 by 10 feet in dimensions, and furnished by Eaton & Prince, are used to elevate the cars to the regions above. These elevators, the electric light, and the heating plant are run by one engine, and the transfer table is geared to the same, so that one man can operate it. There will be two men required to manage the transfer of cars, two for cleaning, and others for the necessary repairs, with a total of four men required for handling the transfers of the entire barn. The cost of the entire barn, when completed, will be about \$50,000,

SAN FRANCISCO METROPOLITAN'S NEW LINE.

THE baptismal trip of the new Metropolitan electric line, made recently at San Francisco, attracted much local attention, and is indeed a line that is creditable to this peculiarly rapid-transit-blessed city. The run was made from the Van Ners avenue and O'Farrell street junction to the power house, a distance of five and a half mile, in 25 minutes, with officers of the road as



SIDE ELEVATION—CHICAGO CITY CAR BARN, STATE STREET FRONT.

and, as it is of pressed brick, with stone foundations, it makes a neat and substantial appearance. It is of the slow-burning construction, but the oil-room is fully protected and absolutely fire proof. Lavatories, water closets and store rooms are conveniently situated and well appointed. The ceilings are 16, 15 and 15 feet high, respectively; and the work shops in the third story are lighted by 16 sky-lights.

AN OLD ENGINE.

WHAT is perhaps the most remarkable engine in the world is now doing service in the Corliss Engine Works, of Providence, R. I. This engine is now on its second half century of usefulness. It is one of the earliest designs of the late George H. Corliss. It was built at the old shops but subsequently removed to the new. The beam engine had a 14 inch cylinder with five foot stroke, condensing, but afterwards the condenser was removed and the machine run high-pressure.

It originally had two pulley fly-wheels on the same shaft, the diameter of each being 16 feet, with a face of 24 inches. About twenty years ago one of the wheels was removed and in place of the cylinder having the inclined valve gear, the present cylinder, built at the works and run at the world's fair in 1852, was substituted.

The old engine drove the machinery that turned the turret ring for the Monitor iron-clad, yankee cheese box, that met the Merrimac, and fathered the great Centennial engine now running at Pullman, and the six-cylinder, triple-expansion engine of the Fall River Iron Works.

THE Des Moines, Ia., street Railway company will renew its offer of \$5 to every crew who go through state fair week without accident.

passengers. The load included President Easton, C. A. Fletcher, (secretary of the company), Electrician Willard, Superintendent A. J. Iddings, F. P. Hooper, S. W. Levy, W. C. Murdock, Alex Culver, Otto Blankhart and R. B. Hockstadter. But one track was in operation at that time but the entire road was opened for traffic on the 1st of September.

The service at present requires 12 cars but the number will be doubled soon.

Everything, except the car trucks, is reported to be of San Francisco manufacture. The engine, of 500-horsepower, was made by the Risdon Iron Works, driving three dynamos and the power house is a model of convenience, being fitted with offices, director's room, handsomely furnished, and a library and reading-room for the employes. Less than one year ago the enterprise was placed on foot and worked to a successful issue by Mr. Easton, who has been the head and front in every direction.

ENGLISH TRAMWAY EMPLOYES AND EXPENSES.

THE secretary of the London, Deptford & Greenwich tramways, in his semi-annual report says, in relation to the employes, that, while the tramways had carried 51,000,000 passengers in their ten years of franchise, at a little more than 1 penny per passenger and earned £227,000, or \$1,135,000, no less than £77,387, or \$386,935, have been paid out in wages, £3,000, or \$15,000, have been paid out in rates and taxes, which, the secretary said, "ought never to have been assessed," and £7,000, or \$35,000, went to repair paving, which the general public wear out far more than the tramway service, thus leaving only £5,400, or \$27,000, in dividends, or \$2,700 per year for ten years. The secretary deplored this tax-robbery.

GEORGE H. WHEELER.

ONE of the most prominent railway men in the country, by reason of standing at the head of one of the oldest and largest systems, is President George Henry Wheeler, of the Chicago City Railway. Mr. Wheeler was born at La Porte, Indiana, in 1841 and came with his parents to the future metropolis of the country in 1849; so that, while still a young man he rejoices in the distinction of being classed among one of the "old settlers" of Chicago. His education was acquired in the public schools of this city and completed with a business course to Racine College, Wisconsin.

In 1860 he went in to the grain elevator business with his father. In 1887 he was admitted into the partnership of Munger, Wheeler & Co., who were among the wealthiest and largest receivers of grain in Chicago.

Mr. Wheeler was connected with the active management of this firm until 1889, when the business was sold to an English syndicate.

At the annual meeting of the Chicago City Railway Company, in January, 1881, he was elected President of the corporation, and also for greater part of 1891, assumed the duties of superintendent, with its multifarious details, which were successfully mastered.

He has been president of the Washington Park Club for the last three years, and is a member of the Chicago Calumet, and other clubs, and is also a director of the Continental National Bank of Chicago, and the World's Columbian Exposition.

Mr. Wheeler has very decided ideas as to organization of departments, and believes in putting a thoroughly competent man in charge of each, and then holding him strictly responsible for what is done, or fails to be done. In this way his time is left in a much larger degree than otherwise possible, to guide the policy of affairs and study the needs, present and future of the road. Since Mr. Wheeler's occupancy of the presidency in 1891, a new building has been erected for the general offices of the company, at a cost of \$40,000, and which is the finest home possessed by any street railway in the country. The value of the stock has also risen from 250 to 440 dollars per hundred dollar shares, and the earnings are larger than ever before in the history of the road.

Personally, Mr. Wheeler is a most pleasant gentleman and very popular among his large acquaintance, which esteem also extends to the several thousand employes under his supervision, by whom he is highly appreciated.

Mr. Wheeler regrets his inability to attend the annual convention at Cleveland and meet the members, owing to his presence being required here at the dedication ceremonies of the World's Columbian Exposition, but expresses a desire to have street railway managers call while passing through the city and we can assure them all a cordial and pleasant reception.

THE street car syndicate has given a handsome drinking fountain, costing \$200, to Garnsey Square in lower Rock Island.

DAN DOUGHERTY AT THE PHILADELPHIA BANQUET.

ALTHOUGH most of us saw the man but once, no one who was present at the street railway convention in Philadelphia but will recall with a thrill of pleasure the splendid after dinner speech of the silver tongued Dan Dougherty, and feel a sense of sadness in the news of his death which occurred last week. At the Philadelphia banquet he had been assigned to a toast a few days previous and prepared accordingly. The day before the feast some one failed up, and the committee had no hesitancy in notifying Mr. Dougherty that they had changed his subject to accommodate affairs, so he prepared on a second toast. When he appeared at the dinner it was discovered a mistake had been made, and he was down for a still different response. As the committee did not feel at liberty to ask a stranger to change subjects at so late a moment, orator Dan was forced to get out his thinking cap and speechify on about one hour's notice.

When he arose at the call of the toastmaster he explained the assignment first made him, and stated that as the toast had already been responded to, of course he should not, but that he had intended to say—and then followed a fine effort on toast number one. After a few minutes he apparently recollected himself and further explained that until arriving he had fully expected to respond to another subject, on which had he spoken he would have said—and then came a racy reply to toast number two. Again breaking off abruptly at the end of these remarks he proceeded to take up the toast assigned him at the last moment. It was the "Corporation Lawyer." Apparently misreading his test he applied himself with every effort to convince his hearers, whom he addressed as a jury, that his client, a poor man with a large family, should have large damages for an alleged accident on a street car. So magnetically did he make the claim, in such pathetic pictures were the points presented, not a man in the whole assemblage but felt like awarding the "meagre twenty-five thousand" for which he pleaded. Just at the climax and when the case seemed unanswerable, Mr. Dougherty made a bold dash and instantly assumed the defense, poured hot shot at his former pleading until, in words of impetuous and burning eloquence, he created such a feeling of prejudice against his former client that one would scarcely believe that miserable and unfortunate individual had any business to live. It was a giant playing with words and emotions.

No one who was privileged to attend that banquet will ever forget the unique and delightful contribution to the evening's enjoyment in the matchless oration of the silver tongued orator, whose voice is now forever hushed.

THE W. J. JOHNSTON COMPANY, LIMITED, New York, sends out a valuable contribution to electric light literature, in the form of an essay, by E. A. Merrill, called "Electric Lighting Specifications, for the use of Engineers and Architects."



GEORGE H. WHEELER,
President Chicago City Railway.

THE RAPID TRANSIT SYSTEMS OF CLEVELAND.

Pictures, Power Houses and Portraits—History of the Roads and Biographies of the Officers.
 Interesting Features of Construction—The Marvelous Progress of a Few Years.
 One Hundred and Seventy-Four Miles of Burnished Steel.

THE history of the magnificent rapid transportation systems of Cleveland cannot make a better beginning than the description of

THE CLEVELAND CITY CABLE RAILWAY

which came into existence when Superior Street and Payne Avenue horse railway was converted into mechanical power. Cars start at the Lake Shore railway depot, ascend a ten per cent grade for a distance of 300 feet and turn east on Superior, the largest business street in the city, for a distance of five miles.

At Erie street another cable line diverges, running five miles on Payne, Lexington and Hough avenues, to Wade Park and the company's pavilion, seating 14,000 people.

The power house combines a strikingly handsome exterior of pressed brick, with an unsurpassed arrangement within. The station is 100 by 200 feet, three stories in front and surmounted by a large tower. Four ropes are driven from the

being located at each end of the line shaft. Transmission is by gears; the drums are:—three pair 14 feet in diameter, and one pair 16 feet in diameter; each drum weighing $3\frac{1}{2}$ tons.

Walker's differential drums are used and the cables are wrapped three times on each drum. Every drum is a driver. The fly wheels are 24 feet in diameter and weigh 65 tons. All the immense driving machinery was built by the Walker Manufacturing Company of Cleveland. The cables are 15-16 inches in diameter and were made by Roebling's Sons. The length and speed of ropes are: three ropes averaging 24,000 feet, twelve miles per hour; one rope 25,000 feet, fourteen miles per hour. Independent of the others, each cable can be thrown out by a Walker friction clutch of 400-horse-power. The tensions are specially well arranged, having a long run. The boiler room contains three Babcock-Wilcox tubulars of 362 horse-power each, and is a model in all respects. Oil has been used as fuel for



STARTING FOR A BASE BALL GAME—CLEVELAND CITY CABLE RAILWAY.

station, power being derived from two 1,200-horse-power Wright engines 38 by 60, running 63 revolutions per minute, made by Wright & Co., New York, one engine

nearly two years, being piped from the Standard Oil Company's tanks, a distance of four miles, direct to underground reservoirs near the cable station. An electric

light outfit lights the station and offices. There is a complete iron working shop in the rear. The chief engineer is Philip Brickman.

The cars run in trains of two cars each or more, as required. Grip cars are 25 feet over all and the trailers are 30 feet over all. The trailers are mostly made by J. M. Jones' Sons. Meaker stationary registers are used. The track construction includes cast iron yokes weighing 580 pounds and set five feet apart, embedded in concrete, leaving a conduit 23 inches deep by 18 wide. Carrying pulleys are spaced to 32 feet and are 15 inches in diameter. The yokes were made by the Bass Co., Ft. Wayne, Ind., and West & Co., Cleveland. That portion of the line from the Public Square to the Lake Shore depot is an auxiliary cable.

Admirable braking facilities are secured by the use of a wheel brake operated by a lever; a track brake operated by a lever; and the Johnson momentum brake.

The 78-pound girder rails rest direct on the yokes, being laid with alternating joints. The track will be noted as specially even and smooth. Special points on the line are Wade Park, Base Ball Park and Cable Park, where a vast amphitheatre, capable of seating 14,000 people has been built by the company, and with an artificial lake 300 feet long is the scene of Payne's fire-works entertainments.

The officers are: F. De Hass Robinson, president; J. J. Shipherd, treasurer; W. Parsons, secretary; M. S. Robinson, Sr., general manager. The late W. H. Payne was constructing engineer.

THE EAST CLEVELAND RAILROAD COMPANY

and the Everetts, father and son, must necessarily be mentioned in the same connection, so closely related has been their history. It was on September 10th, 1860, that the first car was hauled over the road. It was an unpretentious affair, dragged by one horse, but represented a vast amount of perseverance and courage of the men who tied their faith to the future greatness of Cleveland. Dr. Everett was one of the leading promotors, has been connected with the company continuously ever since, and for thirty years past has been and is now president. The humble beginning was added to as years advanced, and we pass the quarter of a century which records the perfection of the road as a horse car line. The year 1888 marks the era of its radical and now complete transformation. After innumerable objections, permission was secured to electrify a portion of the line on Euclid avenue and Cedar streets, in all five miles. Eighteen months was the probationary period, at the expiration of which time the city council was to decree whether the new found power should be longer permitted, or taken up.

That its entire system of 50 miles traversing the best business and residence streets are to-day operated without the use of a single horse tersely tells the result of the test.

The motor cars are of 16 and 18 feet in length each driven by two 20-horse-power motors. The first motors

were of 7½-horse-power each, increasing to 15 and now to 20 horse-power. There are 95 motor cars and 120 trailers—open an box of 16 feet body. Edison single reduction motors are used. The track is the standard gauge paved with block stone and laid with Johnson 60 pound girder rail.



POWER HOUSE—EAST CLEVELAND RAILROAD.

The power station has been doubled in size and capacity the past year and furnishes all the current for the entire system and also a large number of stationary motors in various parts of the city ranging from 1-2 to 20-horse-power. The demand on the company for this service is rapidly increasing. The station is situated on Cedar avenue at the Cleveland & Pittsburg tracks with switch track for fuel in rear, which is 300 feet long.

Engines include two 500-horse-power C. & G. Cooper, Mt. Vernon, Ohio straight line; 28 by 48 inches, 72 revolution; and three 200-horse-power 18 1-2 by 18, 200 revolution and three 125-horse-power; 14 1-2 by 15, 260 revolution Armington & Simms giving a total of 2000 working horse-power in the plant. The smallest engines belt direct, the pair of large ones belt to line shaft 80 feet long, equipped with Hill Clutches. Generators are all Edisons: four No. 60, six No. 16. Bodifield belts are used throughout of which two are 48 inch and six 26 inch. In the boiler room are 7 C. & G. Coopers and 7 Variety Iron Works boilers, 18 feet long and 72 inches diameter. All are equipped with Murphy Automatic stokers permitting the use of a very low grade coal fuel, although almost no smoke is visible from the stacks which are two in number 136 and 175 feet high respectively. The latter, highest in the city is of quite recent construction and has a core 100 inches diameter to a height of 120 feet then broadens to 120 inches to the top. It is 15 feet square at the base, 32 feet square at the foundations which are 12 feet thick, and contain 530,000 brick. Water is supplied by an artesian well 322 feet deep, which furnishes 100,000 gallons each 24 hours, flowing through a 10 inch bore.

Two large Deane and four small Hughes pumps fill the boilers through Berryman heaters 40 inch diameter and 12 feet high. The Alliance Low Water Alarm is placed on each boiler. The chief engineer is P. A. Patterson who as engineer on the Cunard line has crossed the ocean 100 times and also visited all parts of the world.

The trolley wires are of No. 4 silicon bronze, No. 1 (o) and 2 (o) hard drawn copper and held by cross suspension, fourteen solid 4 (o) K K insulation and one flexible 6 (o) made by Roebing feeder lines lead out of the station. The track bonding is No. 4 hard drawn copper, untinned one continuous line 4 inches from the inside of each rail. The officers are, A. Everett, president; C. W. Wason, vice-president; H. A. Everett, secretary and treasurer; L. E. Balstein, assistant secretary; E. Duty, superintendent; R. Blee, general manager.

THE LAKE VIEW LINE

while organized and operated under a separate name is virtually a part of the East Cleveland system.



DR. A. EVERETT,

now for thirty-one years the guiding spirit of the East Cleveland interests, is much better known as a financial captain and street railway man than as a medical practitioner.

Any man, young or old, who can have the privilege of talking with President Everett, cannot but be a more

thorough rapid transit man by such a contact. With his trained mind, his comprehensive view and wide reaching skill in giving proper remedies to apparent evils, he stands to-day on the top rung of the ladder of success.

Dr. Everett was born in Liberty township, Trumbull county, Ohio, on Nov. 24, 1821, and has always been a patriotic inhabitant and enthusiastic lover of the Buckeye State, to which he and such men as he is are so great honors.



SECRETARY H. A. EVERETT.

In 1860 Dr. Everett became interested in street railway matters, and foreseeing the greatness of Cleveland, with his usual acumen, bought a controlling interest in the East Cleveland road. The Cleveland of 1860 was not the grand and beautiful city of to-day, nor were its facilities valued as at present, eight figures. Two miles of track on unimproved streets and four little 'bobtails' constituted the wealth of the East Cleveland, line with a value of \$49,000 including the franchise.

Dr. Everett began extensions and additions and the two miles of track have grown to forty of electric, and the four bobtails have hatched out 90 Edison-equipped cars and \$2,000,000 is the nominal price of stock that cannot be bought for three times that sum.

Dr. Everett is a friend and advisor of all young men and any such does himself an injustice if he does not meet at least to shake the hand of a man who has done so much, so well.

H. A. EVERETT,

secretary and treasurer of the company is recognized as one of the brightest men in the street railway business, and having grown up from boyhood in the work, fully understands it in every detail. His business education, which supplemented his college work, was in the actual realities of street car practice, and not received along any

theoretical lines. In addition to his duties in Cleveland, he is general manager of the Montreal lines, in the securing of which by the present syndicate leases he was most prominent. He has also recently secured control of the Toronto road; both of which latter are to be operated by electricity.

He is one of the most regular of attendants on the conventions and has served as chairman of committees appointed to prepare reports to be presented for discussion at the meetings. Mr. Everett has, while still a young man attained distinction as a railway manager of which any man could look back upon as a life's work, and with continued health his future will be watched with much expectation. He has a delightful residence on Euclid avenue, where his charming wife is a great favorite among a large circle of friends.



VICE-PRESIDENT C. W. WASON.

One of the well-known authorities on electric railways is C. W. Wason, vice-president of the East Cleveland Railroad. He is a thoroughly practical electrician, and, although counted among the wealthy men of his city, does not hesitate to don working garments and use hands and brains in working out theories in the machine shop. He has, from the first, been an ardent advocate of electric traction, and was prominent in organizing the Electric Club in Cleveland. He is a young man, but a progressive and liberal manager and rejoices in a railway experience many an older head might envy. Personally, Mr. Wason is a hospitable, genial acquaintance, and will spare no efforts to promote the pleasure and comfort of the convention guests.

L. E. Balstein, the efficient and wide awake assistant

secretary of the company, is among the youngest men in the fraternity occupying an official position of equal importance, and has been promoted to his present place from well earned efforts in the office where he has been connected for a number of years. Much of the secre-



ASSISTANT-SECRETARY L. E. BALSTEIN.

tary's work devolves on him, in the frequent absence of Secretary Everett, and he promises to take rank among the experienced railway men of the country.

THE WOODLAND AVENUE AND WEST SIDE STREET RAILROAD

has its greatest mileage in the western division of the city, but has an East Side line on Woodland avenue, from Public Square to city limits, with a branch line on Kinsman to limits.

The road is one of the earliest built, having been opened for travel in October, 1865, when one and a half miles were laid on Detroit and Pearl streets. The portion down the Detroit hill was afterwards abandoned. The present mileage is thirty miles and is being changed from horse to electric power as rapidly as possible and all will soon be entirely electric. The entire track will be relaid with 98 pound Johnson girder rail.

The new equipment includes 40 Brill cars, 21 foot bodies, 3 feet 6 inches platforms, and mounted on Brill elliptical spring trucks. Wheel base is 7 feet. The old equipments are chiefly Brownell, with some Lewis & Fowler, Brill and Jones', and are 16 foot box and 24 foot opens. They will be used as trailers. Two 25 horsepower Westinghouse single reduction motors to each motor car.

Principal lines are Woodland avenue, Pearl and Lorain, Kinsman and Fulton; Detroit street and West Cleveland and West Madison, Franklin and Bridge Square.

The company's office is in the commodious and elegantly furnished rooms in the new Western Reserve building, corner Water and Superior streets.

M. A. HANNA,

the president, is known as one of the leading and wealthy citizens and has made his way from boyhood to affluence during his residence in Cleveland. He was born in New Lisbon, Ohio, in 1837 and came to the city in 1852. After graduating at the high school he entered his father's wholesale grocery and flour establishment and rapidly made his way to a place in the firm. He then became interested in oil refining, and later, coal. Under the name of M. A. Hanna & Co. he succeeded the firm of R. R. Rhodes & Co., engaged in mining and



PRESIDENT M. A. HANNA.

shipping iron and coal. These interests are still maintained and to them may be added that of rolling mills and shipping interests at Ashtabula and Escanaba. He is also a heavy stockholder in a large number of lake steamers and director in the Globe Iron Works, whose 3,000 ton iron steamers plow the waters of all the great lakes. Mention must not be omitted of his presidency of the Union National Bank, of which he was the prime organizer and continuous president.

He became interested in street railways in 1875 and has held the presidential office during these 17 years. He is an ardent Republican and a warm, personal friend of Senator McKinley and John Sherman, having managed the canvass for the latter for both senator and president. He is also president of a lake transportation company.

Personally he is a most genial man, a magnificent speaker, and is acknowledged as one of those men to whom the city largely owes its wealth and commercial importance.

J. B. HANNA

began life August 26, 1854, on a farm in Columbiana county, Ohio. His earlier days were spent at Lisbon, Ohio, and at Cleveland, where his education was acquired. His family moved next to Morrison, Ill., where Mr. Hanna's active business career began as a salesman and book-



SECRETARY J. B. HANNA.

keeper. In 1874 he returned to Cleveland to accept a position with the house of Rhodes & Co., in the coal and ore interests, and removed to Ashtabula, O., in the same employ. In 1883 the Rhodes Company gained control of the West Side Street Railway and appointed Mr. Hanna secretary, treasurer and purchasing agent. In 1885, on the consolidation of the Woodland avenue and West Side Mr. Hanna retained his office.

In 1885 Mr. Hanna was made treasurer of the Ohio Tramway Association and in 1890 secretary also.

Mr. Hanna has been a faithful attendant upon the meetings of the Association and a frequent and forcible speaker upon current topics. He is a man of wide experience, thorough in details and liberal in policy and spends the penny that brings the pound into the dividends.

As a member of the local committee of arrangements the convention will owe much to him for labors in this direction. He is a practical, progressive railway man, a genial acquaintance and a staunch friend.

Associated with him in the active duties of his office is Mr. K. Hanna, who for the past ten years has been the

faithful assistant secretary, while Edwin Hanna, superintendent of the Western division, and A. E. Duty, of the East division, have carried out the details in a most thorough manner. At present, Thomas Shehan, of the Westinghouse company, is in charge of the new electric work as constructing engineer.

BROADWAY AND NEWBURG.

The Broadway and Newburg street railway company have a history dating back to 1872, when in December a

occurred in March, 1890, was the result of an accident from one of his own cars, recently equipped with electricity. Dr. Fowler was the first secretary and treasurer, and has remained in this capacity ever since. Dr. Fowler was born in Bainbridge, Ohio, December 29, 1835, and after completing a commercial course of study and a partial law course, he entered the Homeopathic Medical College in Cleveland and graduated in 1862. Besides his office practice and his street railway duties, Dr. Fowler has several other irons in the fire, which altogether tend to



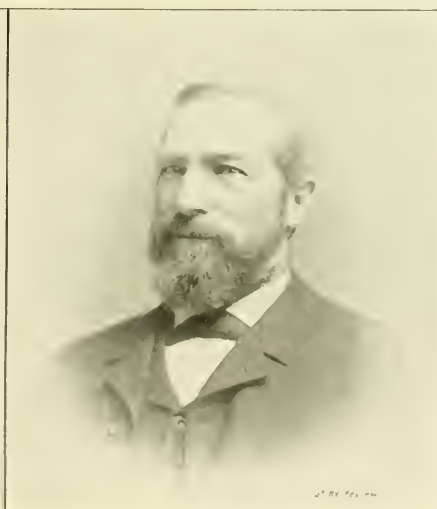
POWER HOUSE—BROADWAY AND NEWBURG.

charter was granted to Joseph Stanley, now dead, Dr. Edwin Fowler and others, to build and equip a horse car line on Broadway. Operations were begun upon the granting of franchise early in 1873. Joseph Stanley, a

make his career a very busy one, but it does not prevent his good nature from taking a general interest in the commoner affairs of the social and home life of Cleveland.



GENERAL MANAGER J. J. STANLEY.



SECRETARY EDWIN FOWLER.

well liked and unique character, was the first president. Mr. Stanley was born in Liverpool, England, in 1830 and on coming to this country a penniless boy of 20, began life as a teamster. Hard work and unflinching honesty brought him money and reputation. His death, which

The present road is commanded by H. E. Andrews, president; Dr. Fowler as secretary and treasurer, and John J. Stanley, a son of Joseph Stanley, as general manager and superintendent, while still another of the Stanley boys is the purchasing agent.

The Broadway and Newburg owns 26 miles of single track, paved with Medina stone, with concrete filling. The rail is 82 and 98-pound girder, made by the Johnson Company, laid on ties 2 and 3 feet apart. The steepest grades are 5 and 6 per cent with curves of 40 and 50 feet radius. There are 36 motor cars in use, 10 of which are 21 foot and the remainder 16 foot cars. Sixty trail cars of 16 and 21 feet also used. All the cars were made by the J. G. Brill Company using Brill trucks and Baltimore, Fulton Foundry and Dorner & Dutton wheels. The wheel bases are 6 foot six inches, 7 foot, and 7 foot 6 inches. The Edison's system and the Edison motors are used; as are also the Duplex register and the Buckeye lamp.



SWITCH BOARD—BROADWAY AND NEWBURG.

The power house, situated on Broadway is 66 by 150 feet in size and harbors four Allis-Reynolds Corlis engines, three of 250 horse-power and one of 600. The Edison dynamos, six of 125, two of 250 horse-power, are belted direct; some 1000 feet of Munson belting being the efficient transmission of the plant. The boilers are five in number and are made by the Variety Iron Works of Cleveland and have 14 feet tubes 2 1-2 inches in diameter.

The Hibernian stoker is in vogue.

The feeder wire is cut in 5 sections. The W. B. Cleveland Switch board is of slate, and a beautiful affair from any standpoint, as a glance at our engraving will show.

The Forest City Park is reached by this line, as is also the State Lunatic Asylum, where are exhibited a few moss-backed trolley-kickers with real Louis Quarorze worm holes distinctly visible.

BROOKLYN STREET RAILROAD COMPANY.

In 1862 the rapid growth of the West Side created the necessity for additional car facilities, and in 1869 the Brooklyn South Side Street Railroad came into existence, with two and one half miles on Pearl street, then Columbus street, to the West Side Market House. This market is one of the sights of Cleveland and from early light until noon is thronged with thousands purchasing their daily table supplies. In 1879 the line came into the possession of Tom L. Johnson, who extended the service by busses, from Market House to the Public Square, until he secured tracks from Lorain street to the Superior street viaduct, over which the cars are now run to the Public Square. In 1883 the line was carried out Scovill avenue and had a large business from the start. The present mileage is 35 1/2 miles, operating entirely by electricity on Pearl, Clark avenue, Jennings avenue over Centre viaduct, around the Public Square, Scovill avenue, Willson avenue and Petrie street to Beyerle's Park, a distance of 9 7-10 miles from starting point, connecting the city limits of the south with limits of the East Side and carrying for one fare. Two-thirds of the cars run through; transfer stations are five in number and one passenger in every three, transfers. Track is laid 68 pound Johnson girder rail. There are three power stations, one at the general offices, 1301 Pearl street, one at the corner of Central, Canal and Ohio streets, another at Scovill avenue and Florence. The station equipment at Pearl street includes 5 Ball engines, 125-horse-power each; 10 Thomson-Houston dynamos, of 62,500 watts each; 5 Variety boilers, 150-horse-power each. Boilers have Buttman furnaces and Jarvis settings. The central station has, at Canal street, 7 Ball engines and 7 T-H generators, of same size as above and 6 Variety boilers of 150-horse-power. At the Scovill station 5 Straight Line Engine Co., of Syracuse, N. Y., 100-horse power high speed engines, 5 T-H dynamos of 80-horse-power, and 3 Variety boilers of 150 each and equipped with Roney Automatic Stokers, made by Westinghouse, Church, Kerr & Co. This station is the last erected and is specially complete. At all plants, Bodifield, of Cleveland, belting is used and doing good work. At the Pearl station it unexpectedly became necessary to double the number of dynamos, and in order to belt from both driving pulleys of the engine, which up to this time had driven only one generator each, it was made possible by erecting the new generators in a line just behind the first series and on brick pedestals five feet high. The arrangement works very nicely and presents a novel but pleasing appearance. Back of this station, in separate buildings, are the repair shops, equipped with a fine line of lathes and planers and forging rooms; a large paint shop, where is done as artistic work as the eye could wish to rest upon; the armature winding room, and in brief, all the appliances for repairing are up to standard of a first

class road. Motors are 2 Short 25-horse-power gearless; 2 Westinghouse 20's; 5 Wightman 20's; balance Thomson-Houston 15's. All but the gearless are single reduction and most motor cars haul one trailer. Cars are divided between Brownell, of St. Louis, and Jones, of Troy.

Officers are Tom L. Johnson, President; A. L. Johnson, Vice-President; H. J. Davies, Secretary, and Samuel Harris, Superintendent. Mr. Davies is also secretary of the local committee of arrangements and is bearing a large share of the work of preparation for the convention. He is one of the brightest of the many progressive railway men in Cleveland, and has and is making a splendid record. He is thoroughly wide awake, far sighted, and withal a most pleasant and genial man to meet. He is a hard worker and turns out a vast amount of work without seeming to consider he has accomplished much. Attendants of the convention will enjoy meeting Mr. Davis.

THE SOUTH SIDE STREET RAILROAD.

is virtually a part of the Brooklyn street road, but while leased to the latter company has an individual organization with A. L. Johnson, president; H. J. Davies, secretary, and J. J. Coleman, superintendent. It operates on lines and with equipment already described in the foregoing, and became a part of the Johnson system in 1885.

TOM L. JOHNSON,

known to us as a most genial man and a good street railway manager and otherwise known of fame as an uncompromising Democrat and prominent politician, comes of the best of Southern ancestry, with fighting stock all along the line. All the heredity that an American citizen can ask for, Mr. Johnson has, with Col. James Johnson, of Kentucky, as great grandfather, Supreme Judge John T. Johnson, great uncle, and with relatives in high places of the land, from the pulpit to the vice-presidential chair. Gen. Wm. Johnson, Tom L.'s grandfather, and O. W. Johnson, his father, were both noted Kentuckians; the first gaining his title in the war of 1812, and the latter wearing the straps of Colonel, was at the front with the boys in gray throughout the late unpleasantness. The end of the war found the wealth of the family almost gone and Tom L. in the Central Pass-

enger offices, Louisville, as errand boy. So well were his duties performed that at the age of 16 he was made secretary of the company and put in charge of the office. His father was manager of the same road and the two bought an interest in it. Afterwards buying the Indianapolis roads they sold them at a profit in 1887. Ad interim Tom L. had gone to Cleveland and bought an interest in the Brooklyn road, which he changed to electric traction as above related.

Besides his interest in the Brooklyn and South Side Street Railroad Companies, of Cleveland, Mr. Johnson is a large stockholder in the Southern Railway Company, of St. Louis, and the Johnstown Passenger Railway Company, of Johnstown, Pa., of both of which companies he is president. Under his direct supervision and

management both were changed from horse to electric roads. Under his direction also the Tuscarora Electric Company built a line of electric street railway, connecting New Philadelphia and Canal Dover, Ohio.

While connected with the Louisville company, Mr. Johnson invented and patented a fare box, which was adopted and used by the Central Passenger and many other companies. He also invented and patented an automatic lever brake which is now in use on almost every cable road in the United States. Among his other inventions are a tower wagon used for stringing over-head wires and the Johnson life-guard, now well known on many roads. He is director and a large stockholder in the Johnson Company of Johnstown, Pa., which is



PRESIDENT TOM L. JOHNSON.

engaged in the manufacture of all kinds of rails for street railroad use. He is the inventor of the Johnson girder rail, which is so widely used by electric roads in the United States.

Politically, Mr. Johnson, besides his Democratic principles, is an earnest advocate of the single tax. It was in 1888 that Mr. Johnson became prominent politically, when without his consent he was nominated for Congress and defeated by 500 votes. With his eyes open, and a strong Republican opposition, defeat turned to victory in 1890, and he went to Congress from his district. Mr. Johnson is now making a fight for a second term, with every symptom of success, and all his street railway friends, regardless of party, wish him the best.

Mr. Johnson married the beautiful and accomplished daughter of Col. R. A. Johnson, of Tennessee, and his family, now with the addition of two children, a boy and girl, enjoy all of life that a generous, wealthy and honored husband and father can give.

ALBERT L. JOHNSON,

known variously as "Al" and "A. L.," is a brother of the above mentioned Tom L., with all the distinguishing marks of this remarkable family. Albert L. was born December 25, 1860, and when eleven years of age began his street railway work by acting as conductor on Saturdays and holidays, in Louisville, Ky. At fifteen he was made road officer of the Walnut street division, in which capacity he continued until the removal of the family to Indianapolis.

First as conductor and finally foreman of the Citizen's barns, he became buyer of all the horses and mules at the age of sixteen, and was well-known in St. Louis as the "Kid buyer." Later he was book keeper and secretary



VICE-PRESIDENT A. L. JOHNSON.

of the company. Three years in advance of his brother he went to Cleveland and purchased the Brooklyn, which was then a fare box road, with 4 cars and 30 mules. He was manager, superintendent, purchasing agent, book keeper, time keeper, barn foreman, and road master, and his spare time was spent in planning.

Mr. Johnson is a man of most tremendous ability and energy, with the most complete street railway education, an iron constitution and only thirty years of age. Mr. Johnson is the inventor of two brake a motor truck and an electric motor, has wide interests in other cities and in other industries, all centering about street railway work.

He is a good democrat, and, although pressed to run for office, has been satisfied with one term as an alderman. In 1891 he married Miss Kate Mitchell, of Louisville, and now resides in a beautiful home, at the corner of Euclid avenue and Perry street, Cleveland.

H. J. DAVIES

the secretary of the local committee, into the hands of which the delegates may think themselves fortunate to have fallen. is also secretary and treasurer of the Brooklyn and South Side Railway Company, better known as the Johnson lines.

Mr. Davies' eminently industrious life began in 1859, at Cleveland, where also his education was acquired in the



SECRETARY H. J. DAVIES.

excellent city schools. In 1875, Mr. Davies began to study short hand and become one of the most rapid and accurate stenographers in the West. For many years he was associated with J. G. Pomerene, in this business, with a large and lucrative practice in the courts. The firm did a very large and profitable business, but the attractions of street railway work brought him to the Johnson's line in January, 1890.

Mr. Davies is an unassuming, modest gentleman and to his untiring efforts will be due, largely, the hospitable and whole-souled reception that will be accorded the Association at Cleveland, in October.

To show the great network of the various lines in Cleveland including not only the more fortunate and more highly honored cable and electric method, but also the humble and necessary horse cars, a map of the beautiful and compact city were necessary, but as space is more precious than anything else, we must thus suffice with description. The entire system of intramecal transit for variety, novelty, speed and management will be objects of the greatest interest to every street railway man in the city on convention dates and opportunities for comparison of the various roads, all of which are under good management, will be eagerly availed of. With this brief resume of this, the greatest point, we must close by a tabulated statement of the various lines of the different roads, with the names of the intersections of streets where

they start and their objective point, the capital of these companies, and the miles of various track.

With these few words we must leave the railways of Cleveland and the men who are at the helm to speak for themselves.

THE LITTLE ROAD THAT DIED,

was a quarter of a mile on Bank street, and owned originally by the Stephensons, and built in '72, and operated until '77 with one car and one horse, which was just enough to hold the franchise. Five years then elapsed without operation and the original intention to extend was all but forgotten. About 1884 the rights and franchises were sold and nothing heard of the road until lately when A. J. Williams and J. L. Athey have made an effort to recover the franchise and build the road.

The following tabulation may be of interest:

| Road. | From. | To. | Double Track. | Single Track. | Total. | Capital Stock. |
|---|----------------------------|--|---------------|---------------|--------|----------------|
| East Cleveland R. R. | Union Depot | Lakeview Cemetery | 5.50 | | 11.00 | \$2,000,000 |
| East Cleveland, Cedar avenue. | Water and Superior Streets | Lakeview Cemetery, via Blue Rock Springs | 4.50 | | 9.00 | |
| East Cleveland, Gordon and Quincy Streets | Water and Superior Streets | Woodland Hills Avenue and Lincoln Avenue | 6.42 | | 12.84 | |
| Wade Park Avenue | Water and Superior Streets | Via Wade Park to Lake View Cemetery | 6.55 | | 13.10 | |
| Grenville | Becker Avenue | Coits' Road | 2.27 | | 4.54 | |
| Kinsman | Willson Avenue | Woodland Hills Avenue | | 1.91 | 1.91 | |
| Payne Avenue | Front Street | Ansel Avenue | 5.06 | | 10.12 | |
| Superior Street | Front Street | Doan Avenue | 5.06 | | 10.12 | |
| St. Clair Street | Water Street | Becker Avenue | 3.85 | | 7.70 | |
| Woodland Avenue and West Side | Monumental Park | Henley Street | 2.91 | 1.04 | 6.92 | \$2,000,000 |
| Woodland Avenue, Detroit Branch | Monumental Park | Highland Avenue | 3.98 | | 7.96 | |
| Woodland Avenue, Pearl Street | Viaduct | Lorain Street | .55 | | 1.10 | |
| Woodland Avenue, Fulton Street | Pearl Street | Lorain Street | .20 | .41 | .82 | |
| Woodland Avenue, Lorain Street | Pearl Street | Henley Street | 2.67 | | 5.34 | |
| Woodland Avenue, Franklin Ave. Branch | Circle | Bridge Street | | 1.58 | 1.58 | |
| East Woodland Avenue | Bank Street | Corwin Avenue | 3.49 | .64 | 7.62 | |
| South Side | Brooklyn Village | Bank Street | 5.77 | | 11.54 | |
| South Side | Jennings Avenue | Jefferson on Fairfield | .42 | | .84 | |
| South Side | Jennings Avenue | Pearl on Abbey | .62 | | 1.24 | |
| South Side | Clark Avenue | Holden on Jennings | .22 | | .44 | |
| Broadway and Newburg | Bank Street | Miles Avenue, Connaton Crossing | 5.75 | | 11.50 | \$1,000,000 |
| Broadway and Newburg | Orange Street | Davies Street | 1.50 | | 3.00 | |
| Broadway and Newburg | Broadway | Beyerle's Park | 1.15 | | 2.30 | |
| Broadway and Newburg | Petrie Street | Union Street | 4.50 | | 9.00 | |
| Brooklyn | Wood Street (Brooklyn) | Diamond Park | 7.23 | | 14.46 | \$ 600,000 |
| Brooklyn | Diamond Park | Beyerle's Park | 2.39 | | 4.78 | |
| Brooklyn | Pearl Street | Train Street | 1.45 | | 2.90 | |
| Brooklyn | Willson Street | Woodland Cemetery | .37 | | .74 | |
| Totals..... | | | 84.41 | 5.58 | 174.40 | |

WHERE SPRINGS ARE MADE.

THE Charles Scott Spring Company, of Philadelphia, have for years been one of the largest manufacturers of spiral springs in the country, but have confined themselves almost entirely to steam railroad work. During the last two years, however, they have added to their business a department for the manufacture of street car springs of all descriptions, and in this short time, have gained a reputation second to none. Their springs are already standard on all the principal trucks, and have found favor with managers. They are manufacturing, on a large scale, elliptic springs of all kinds, for fast running electric trucks. In these, as in all their springs they use crucible steel entirely. A visit to the factory is full of interest. We find there the latest and best im-

SANTA CRUZ AND ITS WATER POWER.

SOME enterprising citizens of Santa Cruz, California, have set in motion an idea that will be carefully watched by the engineering world in general, and the street railway world in particular. The scheme referred to is the harnessing the water of the San Lorenzo river to the more useful than æsthetic business of running a street railway light and power system. Legal papers are prepared, allowing the use of the water power at a point just below the "big trees," where a dam will be built. A flow of 26,000,000 gallons per diem, with a fall of 110 feet can be obtained. Power sufficient for 5,000 incandescent lights and forty cars is all that is demanded at present. The members of the company are Californians and already organized.

proved machinery for manufacturing and thoroughly testing the springs. A very large stock of selected steel, over 1,000 tons, is kept in stock, from which springs can be promptly made. In addition they have in stock, springs adapted to all the standard trucks. High grade material and care in the manufacture and inspection of all their springs insures for them success.

REMEMBER DIFFERENCE IN TIME.

DELEGATES to the Cleveland convention will bear in mind that the city or solar time is 33 minutes faster than that of the railroads running out of Cleveland. If they go by "city" time, there is no danger of getting left, but they may have a half-hour wait at the depot.

CLEVELAND MANUFACTURERS OF STREET RAILWAY SUPPLIES.

OUT of the 2,025 manufacturing plants in Cleveland, the ones manufacturing street railway supplies, are not only deserving of the most extended mention in the STREET RAILWAY REVIEW, but in any account of Cleveland's wealth. To begin in medias res, knowing that

THE WALKER MANUFACTURING COMPANY

cannot be given sufficient credit in the space allowed in our article on Cleveland's prominent interests. However, there will not, probably, be a man in the convention, who will not take a Detroit street car and whirl over the viaduct to Waverly avenue and Breakwater street to inspect the gigantic plant, there raised as a monument to the foresight and industry of the men whose portraits appear with this article.

The REVIEW, in its December number of last year, published a fully illustrated and extended account of the rise and growth of the Walker Manufacturing Company, which will be called to mind by a short recapitulation, and an account of the splendid and healthy growth of the past year. It was only ten years ago that John Walker organized the company that bears his name, with \$125,000 capital. Nine years later the stock was increased to \$350,000.

With every department of their immense business represented under one plant, the visitor will see the process of construction of shaftings, couplings, hangers, pulleys, all kinds of transmitting machinery and the special department where Walker's famous differential drums, hydraulic machinery, bloom shears, riveting plants, gear wheels, spur wheels, boiler making machinery, carbon machinery, rumbling mill and allied branches. The magnificent equipment at their plant includes also moulding looms for the largest and smallest work required. The company employs 550 men under the highest skilled supervision and the works cover six acres in extent. Every convenience makes the handling of work expeditious and besides the cranes for lifting the many tons of finished material daily, there are railroad connections with the track depressed so as to bring the cars to the level of the

shipping room floors. Visitors will also be interested in the pit lathe, capable of turning a 44-foot wheel or two wheels up to a diameter of 32 feet at the same time. Boring mills of 24, 14, 12, 10 and 7 feet respectively; a lathe of 6-foot swing and 40 foot bed with double heads, portable key seaters and shapers, gear planers, gear cutters and 5-gear moulding machines, patented by John Walker.

The cable work, which has so great a place in the establishment, is shown from start to finish, and the great number of plants built by the firm show the success which has attended every installation. Among the late cable plants in which the Walker machinery is used, may

be mentioned the new Chicago power house, of the West Division Company, the Otis Incline, of the Catskill mountains, and an enormous amount for New York. Other large work has also been shipped during the year. The officers of the plant deserve longer mention than our space allows, but the brief sketches herewith given, will, no doubt, be of the highest interest to all the known and unknown friends of the company. Beginning at the beginning we mention

JOHN WALKER,

the founder of this great enterprise, began life in Yorkshire, England, in 1847. After a thorough technical education he entered actual work in England, but, at the age of 24, came to America, and was employed by some



JOHN WALKER.

of the foremost iron manufacturers in the country, lastly with Nordyke & Marmon, of Indianapolis.

Mr. Walker's busy and successful career can not be told justly in our limited space, and to his many friends we refer a more extended account of his achievements, published in the REVIEW of August. All delegates and visitors, however, may be assured that if anyone fails to see Mr. Walker, or his magnificent plant, that one of the pleasures and profits of the Cleveland convention has not been made his, for, since the foundation of the plant in 1882, Mr. Walker has been intimately concerned with the street railway interests of this country.

The Walker Company is a monument to Mr. Walker's genius and probity.

CAPT. JACOB B. PERKINS,

The president of the Walker Manufacturing Company is one of the best and most widely known of Cleveland's sixty millionaires, and his many friends of social and business connections, will be glad to recognize his genial face in our gallery of Cleveland's celebrities.

December 26, 1854, is the day celebrated by Col. Perkins, as recalling that important event in most men's lives, his natal day. Along back in 1798, the grandfather of the present representative of the Perkins family, settled in Warren, Ohio, as agent for the Erie Land Company. He was a prominent man in all the prominent events of early Ohio history, being one of the Ohio canal commissioners, president of the first bank in the western reserve, and a general under commission of the United States in the last struggle with Great Britain. The father of the subject of our sketch was also a prime mover in all the great works that tended to make Ohio the great, influential, wealthy commonwealth which we find it to-day.

To him, perhaps, more than to any other one man, is due the honor of building the Cleveland and Mahoning



J. B. PERKINS.

Valley railroad. With these antecedents it is little matter of surprise that Mr. Perkins has achieved the success which has crowned all his efforts.

True to the educational instincts that have distinguished the people of Ohio, since the first advent into the Great West of the clever Yankees, young Perkins was sent off to school at an early age and entered his preparatory course of study at South Williston, Mass. After the thorough foundation which was here laid, Mr. Perkins entered Old Williams and was graduated in 1877, at the age of 23.

After graduation his first attention to business was the improvement of his city realty, and, on the completion of this not very easy task, his interests turned towards manufacturing.

With the inception of the Walker Manufacturing Company, Mr. Perkins was chosen a director, and in 1885 was elected president, which important office he has held con-

tinuously to date. His other large business connections include an interest in two other of Cleveland's business enterprises, the Hill Clutch Works and the Hackney Hammer Company, being president of the latter named organization.

Mr. Perkins married Miss Wilshire, of Cincinnati, in 1887.



W. H. BONE.

The principal fad of the subject of our sketch is fast horse-flesh, of which species of enjoyment he is a master. One of the principal steeds owned by Mr. Perkins is the famous "Guy," 2:10 $\frac{3}{4}$. At present, as a recreation, Mr. Perkins is devoting his attention to breeding Hackney animals, and is a director of the American Hackney Society. As a military man Mr. Perkins has earned his title of captain in command of the First Cleveland Cavalry troop, the only horse organization in the state and one of the finest in the land.

WILLIAM H. BONE

the genial, imperturbably good natured and active manager of the Walker company, occupies an important place in the councils of war, and probably needs less personal introduction than any other man in the big office. Mr. Bone's handsome face and debonaire form are indeed too well-known to require more than our excellent illustration to bring him to the mind's eye of the reader.

When approached on the subject of his terrestrial career, Mr. Bone blushingly admitted that October 6, 1857, was his natal day and that 35 summers had passed over his head. Virginia and the town of Petersburg have the honor of being Mr. Bone's first place of residence. Here his early education was acquired. Having removed to Baltimore at an early age the good German ancestry of our subject placed him in the English and German Institute of F. Knapp's, where he finished his theoretical work.

At the age of 15, the natural bent of the young man and other circumstances, brought him into the drawing

office of the well-known firm of Poole & Hunt, of Baltimore, where he served seven years. During his residence in Baltimore Mr. Bone took unto himself a wife, in the person of Miss Ella M., daughter of D. G. McCaulley, of Ellicott City, Md., and also became acquainted with his fate in a further and different form, by meeting and associating intimately with John Walker, at that time also connected with Poole & Hunt.

After the seven years in Baltimore, Mr. Bone accepted the position of superintendent of drawing in the offices of Nordyke & Marmon Company, of Indianapolis, where he resided for three years.

On the organization of the John Walker Manufacturing Company, at Cleveland, Mr. Bone's long acquaintance with Mr. Walker, led to an invitation to join the Cleveland company, which was accepted. Here, in different



H. A. DORNER.

capacities, Mr. Bone has shown the same energy that had won him distinction in his former connections, and to him and his little family the STREET RAILWAY REVIEW can not wish any better luck than that his success may be as continuous in the future as in the past, and that his shadow may never grow less.

After simply inspecting the Walker plant it will amply repay the visitors to go about 100 yards further down Waverly avenue, where

THE HILL CLUTCH COMPANY

holds forth at the old stand. The Hill Clutch Works need no introduction to the power user, who has seen their specialties time and again. The office and work are well worth a visit, and the officers of the company will be pleased to favor the street railway men with every attention.

One of the most enterprising of the 2,025 manufacturing firms in Cleveland is that of the well known firm of

DORNER & DUTTON,

who have two plants. That most accessible to the headquarters hotel is at 50, 52 Fall street, where all the gear cutting, wheel fitting and truck building is performed. A large room is completely filled with gear cutting machinery alone, and presents a most interesting sight.



W. A. DUTTON.

In another department the forging for the motor truck frames may be seen in all stages, from the crude steel to a finished frame. In another department men are setting up the trucks and getting them ready for shipment. To reach this plant, take cable car in front of hotel, or any West Side car at Public Square, and ride to the viaduct, (a great sight in itself), at Water street, turn to the left down South Water street, thence to Fall street, and there you are. Time from hotel 12 minutes.

The wheels and the gears are cast at the foundry, which is at Bessemer avenue and the Erie railroad tracks, a distance of nearly five miles from the hotel and difficult to access, involving quite a long walk.

The firm was organized five years ago, and began the manufacture of street car wheels and other metal supplies in a moderate way. They did a good business from the start and have steadily increased, until now they are among the recognized leaders in their respective lines.

The formation of the firm was specially favorable to this, as Mr. Dutton had been in street railway work, for 15 years of which he held the office of secretary of the St. Clair street railway of Cleveland; while Mr. Dorner had a thorough and practical experience in the manufacture of iron work, being connected with one of the largest establishments in the country.

Both are energetic, progressive men, and count as friends all their large number of street railway acquaintances.

THE BRIGHTMAN STROKER COMPANY,

with offices and ware rooms at 17 Michigan street, are well-known in the heavy power field of street railway work.

The company, besides its specialty, deals in steam machinery, being general contractors and engineers and furnishing boilers, boiler frames, furnace fronts, boiler settings, engines and supplies. The Brightman Stroker operates with good results and the delegate can well spend a little while investigating their operation at any of the following plants: Otis Steel Company, King Bridge Company, Union Steel Screw Company, Root & McBride Building and a number of other large plants. G. B. Henderson is president of the company and a mechanical engineer as well, and Geo. C. Shepard is secretary. The company guarantees with its furnaces to burn bituminous coal without smoke, when operated according to the directions.

MARKS & STERLING,

a firm composed of C. E. Marks, a well-known inventor and W. B. Sterling, have offices at 743 Society for Savings building. Although the firm is a new one, their rail chairs and joint bridges are rapidly coming to the front, being in use on the Lindell Railway, of St. Louis, the Erie Electric Motor Company, of Erie, Pa., and on the Woodland avenue and West Side road, of Cleveland. Their patents cover the design of the chair and the form of the clip to take the place of the fish plates.

HATHAWAY & ROBINSON,

the firm composed of Charles Hathaway and Frank DeHass Robinson, for the past seventeen years has been building street railways. They have built 150 of them in the United States and Canada, and so wide have been their operations that at any one time they had 3,000 men at work in widely separated localities.

The firm has built the original Superior Street line in Cleveland, the Payne Avenue line, the Broadway and Newburg and the Old Kinsman street line.

They have also built roads in Boston, Philadelphia, Cincinnati, Syracuse, Toledo, Akron, Lima, Canton, Des Moines, Davenport, Dubuque, Milwaukee, Racine and other places in the United States, besides lines in Toronto, Hamilton, St. Thomas, Belleville and other points in Canada.

THE CLEVELAND ENGINEERING COMPANY,

composed of C. L. Saunders, C. E.; and H. R. Palmer, M. E.; and G. D. Breck, superintendent of construction, are located at 46, 47 and 48 Mercantile Bank building. They have done some fine work in railway construction and pay attention to other lines of engineering. Mr. Palmer was formerly associated with both the Brush and Thomson-Houston Companies.

THE CLEVELAND WHEEL AND FOUNDRY COMPANY,

of which Maher & Brayton are proprietors, was instituted in 1880. The offices of the company are at 20 Carter street, besides a very extensive plant. Their equipment

includes four cupolas, with a total capacity of 150 tons, while 300 hands are employed in the business. All styles of street railway and steam railroad wheels are cast, besides turnouts and frogs.

ALFRED G. HATHAWAY,

is almost as well known to the street railway world as his father, and all indications point to the fact that the name of Hathaway will be for many years to come a household word, wherever the modern American street railway is known to fame.

Alfred G., to whom this particular space is devoted, is the manufacturer of railway specialities, the most prominent of which is his transfer table for cable and electric cars and we may state authoritatively that 140 of the most prominent railways in this country (which probably includes the most requiring such a device) know it from daily successful use.



A. G. HATHAWAY.

The concern also manufactures turn-tables, hydraulic wheel presses, automatic switches, car castings, frogs, cross-overs, the Roche car coupler and other car house specialities. Drawings and specifications for modern car houses are furnished, showing the quickest and cheapest methods of handling cars without the aid of switches or cross-overs. The wheel presses have heretofore been fully illustrated and enlarged upon by THE REVIEW. These presses weigh complete from 1,700 to 39,000 pounds and are capable of handling wheels from 18 to 72 inches, or in other words, from the smallest to the largest sizes. The power exerted in tons runs from 15 to 200. The Roche Car Coupler is intended to obviate the surging and jerking motion of the trailer, the two draw heads and coupler weigh 100 pounds.

The offices of the concern are at 14 Case Block and the works stand at Hamilton and Case avenues. Of Mr. Hathaway, personally, it may be said that he is an ener-

getic business man and a most pleasant and genial gentleman socially. He was born several years ago in Philadelphia and has lived almost everywhere from New York to Denver, as his father's contracting business required his personal supervision. The Northwestern University is Mr. Hathaway's alma mater, and on leaving the fostering wing of the University he became manager of the St. Clair Street Railway, to which business, natural adaptability and inherited tendencies drew him.

After four years of this experience, Mr. Hathaway went into the business which has proven since a success. To-day, with every mechanical convenience for manufacturing and large acquaintance with the men and needs of the street railways, he has the best wishes of his large clientele.

THE SHORT ELECTRIC RAILWAY COMPANY

is one of the youngest of the sisterhood of industries, but nevertheless a buxom lass, with a good promise for long life and numerous progeny.

The Company was organized under the laws of Michigan, in July, 1889, with an official list of Prof. Sidney H. Short, President; J. Potter, Vice-president and Wells W. Leggett, secretary and treasurer.

The capital was placed at \$5,000,000 and the new company began its career by building the Muskegon, Michigan, road in September, 1889. Then followed in quick succession roads at Pittsburg, Pa., Albany, N. Y., Cleveland, Ohio, Indianapolis, Ind., Jamestown, N. Y., Johnstown, Pa., Louisville, Ky., Pottsville, Pa., and two at Rochester, New York.

The frequent and extended notices of the rise and development of the Short Electric Company in the STREET RAILWAY REVIEW, for the past two years, will give the best history of the concern and show the wide interest evinced by all the electrical world in the growth of the young and interesting company. The single reduction motor with its great success was the next step and the first one tried in the summer of 1891. Almost immediately this was followed by the first gearless in August of the same year. The success that has met these three types is evidenced in nearly every city. The magnitude of the work accomplished is best seen by a personal visit to the manufacturing plant of the Brush Company, where two shifts of men are worked, and seven days in the week are put in to keep up with demands. In March, 1892, Mr. Potter relieved Mr. Short of the executive function in order that the Professor might be unincumbered in his rapidly perfecting plans of improvement which have from time to time been so fully described by the REVIEW and other technical journals.

The Short Company now has equipped and put in operation a total of 55 roads, 25 in 1891 and 30 so far in 1892.

The gearless motor may be seen on the Brooklyn line in Cleveland, and on the Lindell of St. Louis.

The executive and business force is not exceeded by any in the land and includes E. E. Higgins, general manager; Wm. Hazleton, 3rd. assistant general manager and J. A. McClure, Superintendent of construction and

W. B. Bolton, general counsel, besides Edward J. Wesels, New York Office, general eastern agent; Frank A. Rogers, special agent; Messrs. Russell & Officer, Denver office, general Western agents; W. S. Atchinson, Atlanta office, Southeast agents; Messrs. Allen & Bagnell, St. Louis, special agents; C. C. Curtiss, special agent.

We refrain from exceeding our bounds and shall not tell of the surprises in store for the delegates by the company: as they will have headquarters at the Hollenden and be in a sense the hosts of the occasion, our readers may imagine the rest.

Our sketch must be concluded, but not finished, by a short biography of the men. Foremost of whom is the Electrician and quondam president



SIDNEY H. SHORT.

Mr. Short was born October 8, 1858, at Columbus, Ohio, and was educated at the German University of that city. At the opening of the Ohio State University he was chosen to head the department of physics in the laboratory. His success here led to a similar position in the Denver University, whither he went in 1880 and remained until '86, when he took up practical transmission of power and came East to organize a company at Columbus, Ohio, under the name of S. H. Short & Co. After contracting for a number of roads the company joined the Brush Company, and under the name of the Short Electric Railway Company took up its headquarters in Cleveland.

Mr. Short is an enthusiast in the best sense of the word. A gentleman, an electrician and a scholar, with every theoretical accomplishment and practical experience and although yet a young man has achieved a life work.

EDWARD E. HIGGINS

the general manager of the Short Company is one of the youngest and also one of the brightest in the galaxy of electric railway stars before the public. If youth were any bar to success Mr. Higgins would be totally disabled for on April 4, 1864, he entered the arena of this mundane sphere.

His early education was acquired at the public schools of his native place, Chelsea, Mass., and at the Massachusetts School of Technology, where he graduated in 1886. On graduation he became connected with the Standard Electric Company, of Vermont. Leaving the position of assistant electrician he became New York state agent for the Sprague Company in 1888. With the Sprague he



E. E. HIGGINS.

joined Edison as the special agent of the railway department, which position he resigned in 1891 to become the general manager of the Short Company, and is now extensively visiting Europe in the interests of the company.

He is a member of the New York, Buffalo and Cleveland Electric Clubs, and of the Union League, of Cleveland.

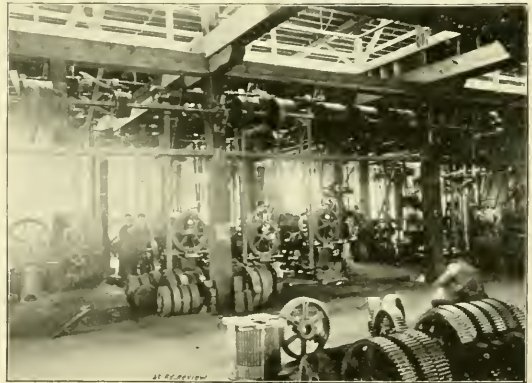
Mr. Higgins' 500-volt energy, his pleasing address, and his native ability conspire to place him at the front.

THE JOHNSON ELECTRIC COMPANY, although still young in years, is one of the notable sources of electric railway supplies, and enjoying the excellent advantage of a favored manufacturing locality and conveniently situated as to the trade it seeks to reach. The success of the company in a comparatively brief time has fully warranted the hopes of the gentlemen who are back of it. It will be unnecessary here to describe in detail the long list of supplies manufactured by this concern, as their exhibits at the convention will be very complete and in charge of representatives whom our readers

will be pleased to meet; suffice it to say their facilities are most complete for the manufacture of gears, pinions, and other parts, and armature winding and repairs. They also contract for and install complete electric plants. The office and works are at Stanton street and the C. & P. Ry. tracks, where visitors will be welcomed always.



They are constantly extending their facilities and with experienced supervision and skillful employes take every pains to turn out a satisfactory and first-class product. In the line of repairs they are doing a large amount of



work, making a specialty of attending to it promptly. The illustrations are scenes in their factory.

Of the many prominent iron works, none is better known to our readers than

THE FULTON FOUNDRY COMPANY,

whose product of street car wheels and street railway supplies constitute a large share of the output of their works. Turn-tables, transfer-tables, track castings, steel and iron work on special orders, all engage their attention, and, more recently, their new truck for electric cars, is attracting much attention and favorable mention. Their works are conveniently situated as to railroads and docks, being located at 202 Merwin street. The two gentlemen connected with the works, best known to our readers, are Mr. Langdon and Mr. Haycox.

W. E. HAYCOX.

Another member of the Fulton Foundry, was born April 5, 1856, in Monmouthshire, England, where he received a common school education, but came with his parents to America, in 1874, settling in Cleveland. For three years Mr. Haycox worked on a farm, but obtained a position of driver on an East Cleveland street car, in 1877, with a promotion to conductor within the year. Promotion to assistant superintendent followed rapidly, retaining this position until 1888, when he left to take charge of the Utica Belt line as superintendent. On leaving Cleveland, Mr. Haycox was presented with a fine gold watch by the company and employes. The Utica Belt line was brought, by Mr. Haycox's management, from a total failure to a dividend-paying road, in a remarkably short time, changing it finally to electric traction, which installation he superintended. After a short time, as traveling agent, Mr.

responsible position on the C. C. & I. railway, remaining with this company until June, 1881, when he became connected with the Fulton Foundry Company, where he soon had full opportunity to demonstrate his executive ability. He is an enterprising young business man, who, with broad-gauged ideas and a policy which reaches into the future, has built up a large business for his concern. Mr. Langdon has a long list of warm friends among the street railway fraternity, who will count on renewing his acquaintance as one of the pleasant features of the convention.

THE GILBERT CAR CO. has just received its fifth order for Anger trucks from the Paterson, N. J., City Railway and the second from the Paterson Central Railway. In fact, it is said that there is no other truck in Paterson. This is a very high compliment.



C. J. LANGDON.



W. E. HAYCOX.

Haycox decided to leave street railway work, by refusing the management of a large road, and joined the Fulton Foundry, where he soon became partner, and since his long connection with the work had so well fitted him for the task, he was put in charge of the street railway department, which he now so admirably fills.

Mr. Haycox is a self-made man, and a shining example of what men may become when probity and ability are so well united. Mr. Haycox has now a pleasant home and two children, in the first city of his adoption, and friends in all circles of society

C. J. LANGDON

dates his existence from August 20th, 1858, and at the age of six started in his life's work, by entering on a course of study which lasted nine years. At the age of fifteen he mastered telegraphy, in a short time, and was given a

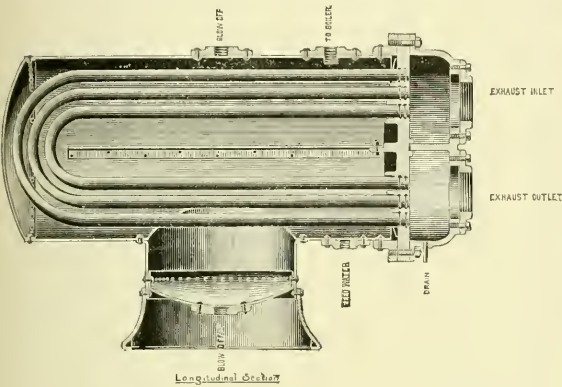
THE fact that the City Railway in Chicago will at once proceed to displace horses with electricity on several feeder lines where the business will not warrant the laying of a cable, will undoubtedly be the forerunner of others in the near future. The demonstration once made, and the public given a taste of twelve miles an hour where they formerly received about six, will speedily lead to additional changes. While the local conditions are such that overhead wires will never be raised in the contracted down town district there are ten miles of track where it can be adopted to every one where it cannot.

New York alone remains of all the great cities where no headway has been made, but she will follow Chicago in this just as she did with cable system. The only question is "How long?"

STILLWELL'S PATENT CLOSE HEATER.

FOR more than a quarter of a century the Stillwell & Bierce Manufacturing Company, of Dayton, Ohio, have made a specialty of manufacturing devices for heating and purifying the feed water for steam boilers. Their latest contribution to that branch of industry is the Stillwell Patent Close Heater, herewith illustrated, and for which the following points of superiority are claimed.

The heating tubes are seamless brass, U shape, and so fastened into the tube sheet as to be absolutely tight. The base on which the heater stands, serves also as a mud-well or settling chamber for the deposit of impuri-



ties, which can readily be blown off. Deposits of impurities in this settling chamber do not diminish the heating power of the heater. The cold feed-water enters near to the steam exit end of the tubes, thus offering the most favorable conditions for extracting the most heat from the exhaust steam. The diaphragm which separates the shell into two equal sections, compels the feed-water to traverse the entire length of the heating tubes, and its exit is made at a point in close proximity to the incoming exhaust steam, thus insuring the highest possible temperature of the feed-water. The construction of the heater admits of its being taken apart, if necessary, for cleaning the tubes, and tube sheet can be readily removed from the shell for that purpose.

Parties interested can obtain further particulars by addressing the manufacturers, as above.

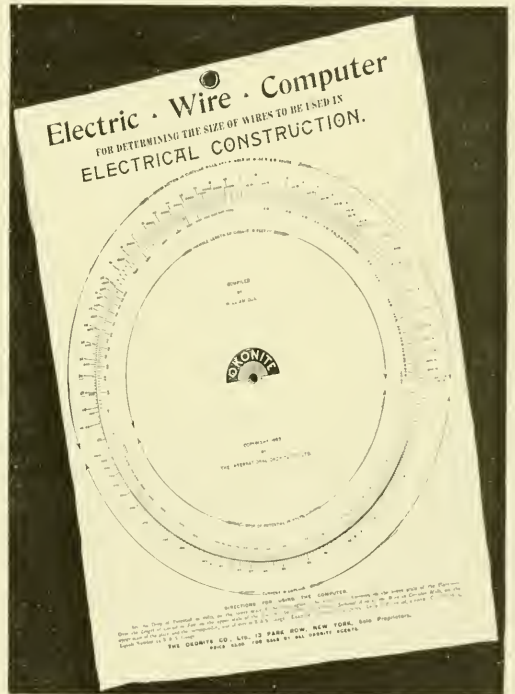
WESTINGHOUSE, CHURCH, KERR & Co., recently secured the contract for the entire steam plant of the Riverside Park Electric Company, of Sioux City, Iowa. There will be two rooms with a fire wall between. One containing the boilers, while the other is equipped with two 125-horse-power compound Westinghouse engines, with special fly wheels. The steam is used at 100 pounds pressure. Two Westinghouse compound-wound generators are driven by two of the Schieren's perforated electric belts, sixteen inches wide. Each generator has 100-horse-power capacity, with 54-inch pulleys.

A NEW ELECTRIC WIRE COMPUTER.

WE present to our readers a simple device just issued and compiled by William Cox, by means of which the sectional area and the number of wire suitable for lighting and other purposes are at once obtained. It consists of a suitable foundation plate, with a revolving circular disc about 8 inches in diameter, both graduated in accordance with the factors of the formula whose solution it gives. This is the well-known one:

$$C.M. = \frac{I \times c \times 10.8}{v}$$

in which I is whole length of circuit in feet; c is current in amperes; v is drop of potential in volts; C.M. is sec-



tional area of suitable wire in circular mils. The method of using this computer is shown by the following example in which we assume 76 feet as the whole length of circuit; current 10 amperes, and loss 2 volts. Turn the disc around until the division representing 2 volts is opposite and coincides with the one representing 10 amperes. We shall now find on the outer upper scale 4,100 circular mils, which corresponds to No. 14 wire, B. & S. gauge. This is therefore the number of wire suited to the circumstance. We understand that Mr. Cox has sold his invention to the Okonite Company, Limited, 13 Park Row, New York, to whom all inquiries should be sent.

THE young lady who graces our front cover this month is the German goddess of Fall, and not the American "summer girl," of whom so much is seen at the seashore.

BALTIMORE'S NEW CABLE LINE.

A Church with More "Power" than any other in the World—Interesting Tension Device—
Differential Rope Drive.

THE successful operation by the Baltimore Traction Company of its Druid Hill avenue cable lines had created an impatience on the part of the residents reached by the Gilmore street extension to have that line also in operation. Consequently there was great rejoicing when, a few days ago, the steel rope began its endless journey and the elegant cars glided up and down streets formerly processioned by the horse and mule, whose places in the capacity of street car motive power shall know them no more forever. And yet the parting was not made an occasion of sadness on the part of either "propellor" or propelled.

This new line branches from the main line at Paca and Fayette streets and thence northward along Gilmore street to Cumberland street to Pennsylvania avenue to Retreat street, and along Francis street by single track to Fulton avenue. This giving rapid transit to west and northwest Baltimore. The power house of this new plant possesses the unique distinction of having been at one time a church, built by the Independent Methodists. A rich philanthropist of Baltimore supplied the funds, a few years ago, for the building, and the massive brick structure was considered to be an admirable specimen of its peculiar style of architecture.

The church languished and finally becoming too weak to support itself, services were discontinued, the property passing into the hands of the Traction Company, for whose purpose it was excellently adapted. It is situated on the corner of Gilmore and Mosher streets, about midway of the line, fronting 125 feet on Gilmore street and 156 feet on Mosher street, and 125 feet on Parrish alley.

The lot was sufficient to allow a roomy boiler house to be built on the north side of the church proper, and an extension back toward the alley contains the tension run, etc. These additions are in keeping with the architecture of the church. The church was not changed, the machinery being specially designed to suit the building.

The result is a compact and faultless arrangement of cable driving, and the effect inside the building is striking. The vaulted roof that once covered a multitude of worshippers, now looks down on mighty engines, wheels and shafts. The soft light that falls through the stained glass windows is a fitting halo that crowns a successful mechanical achievement.

The two engines for the new plant were furnished by the Corliss Steam Engine Company, Providence, R. I. They are 36 by 60 inch cylinders, 1,000 nominal horse power each, 62 revolutions per minute. The fly wheels are 25 feet in diameter, weighing 100,000 pounds each. The engines are 58 feet 7½ inches from centre to centre, connected by a 15-inch line shaft, with sliding clutch couplings. The power is conveyed from the main line shaft to the cable drum shafts by cotton ropes, each drum shaft being driven separately by 11 ropes 2 inches in diameter, over rope wheels 24 feet in diameter, keyed thereon. The two rope drivers on the main line shaft are 9 feet 8½ inches in diameter with 11 grooves each, and possess some distinctly novel features. There has been much discussion among mechanical engineers as to the even distribution of power from the line shaft to cable drum shafts, with the present method of rope driving, on account of the vary-



POWER HOUSE—BALTIMORE TRACTION CO.

ing length of the ropes, so to overcome this the rope drivers instead of being made in the usual way, with 22 grooves, are made of two drums each with 11 grooves, with a compensating device interposed between each pair. To each driving drum there is also attached a powerful (Weston Capen) friction clutch, of which the Messrs. Robert Poole & Son Company are the sole licensed manufacturers, thus enabling almost any combination of driving to be done with either engine, regardless of the other. The plant operates two cables, one running from the power house south and east, connecting with the main line at Fayette and Paca streets and return, the other running from the power house north-

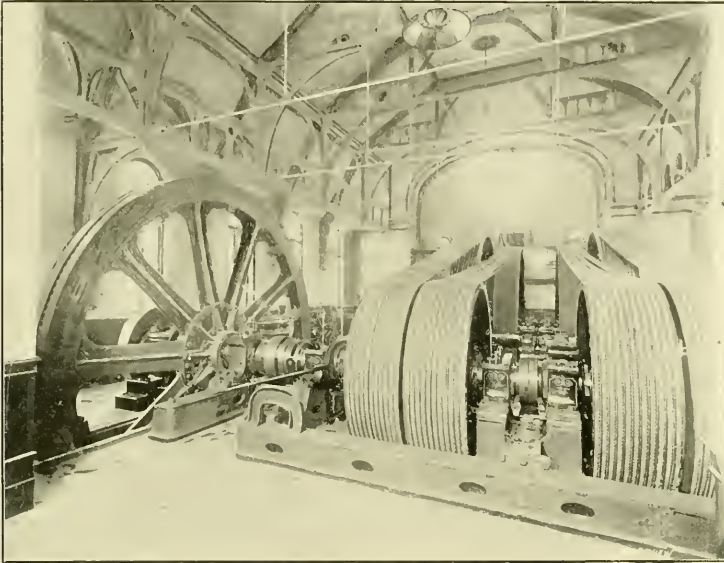
ward to Druid Hill park, and the Druid Hill avenue power house at Retreat street and return, forming a loop from Retreat street to Francis street, to Fulton avenue, to Pennsylvania avenue, to Retreat street. The

as shown by the strain diagram. At the same time, at the lowest position of the weight, and any position of the carriage, there will still be a tension on the cable of 2,500 pounds. The whole device is quite an original departure from the usual method of taking up the slack in the cables.

The steam plant consists of six horizontal tubular boilers set in three separate batteries, aggregating 900 horse power, with connections for water heater and Knowles steam pump. The steam piping is all laid under the engine room floor. The boiler house is roomy, with large doorways opening on Gilmore street in front, and Parrish alley in the rear. Space has been left for an additional battery of boilers, if it should be required hereafter. Spencer's automatic dampers are attached to each battery. The stack is 125 feet high.

Thirty new cars are in service on the line. Fourteen are heavy double truck combination grip and passenger cars, with a seating capacity of 34, similar to those now in use, while the others are open grip cars, smokers and trailers, seating 28. They are run in trains

of grip car and three trailers and single grip and passenger cars, at intervals of about three minutes. The cars are all painted a Tuscan red, with silver trimmings,

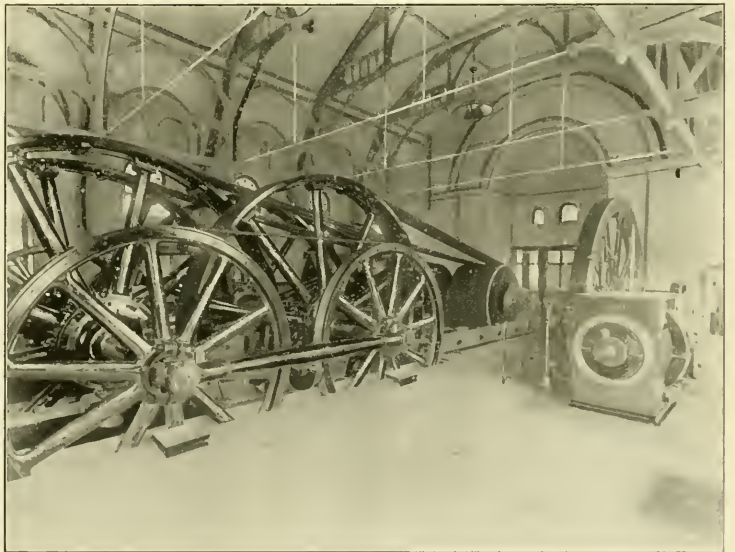


THE CHURCH THAT "GOT THE POWER."

former 21,333 feet long, the latter 4,000 feet long, total weight about 59 tons. Both run at a speed of 12 miles per hour.

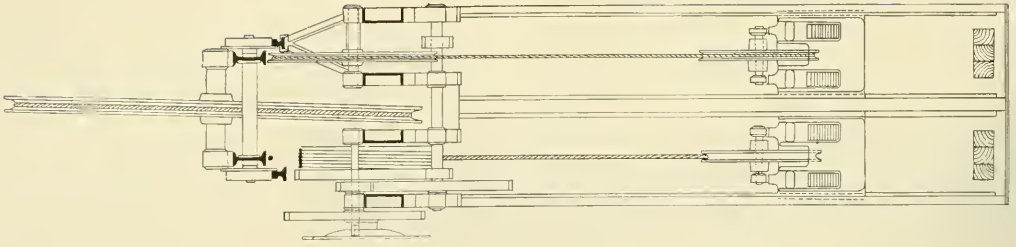
The tension device deserves special mention. On account of the short runways, the tension carriage had to be specially designed to operate over the entire length of track. After much thought this was accomplished as shown by the cut. Two $1\frac{1}{8}$ wire ropes attached to a frame made of two I beams well braced, mounted on truck axles, and carrying the tension sheave. These ropes pass over 5-foot sheaves and down into a pit around other sheaves attached to the weights which slide in perpendicular guides, and thence up and over the winding drums.

The weights are made adjustable by a simple arrangement of hand slides. The winding mechanism is all placed under the track and permits the tension carriage to run freely over it. It was deemed advisable to have a uniform tension on the cable, and at the same time to have an arrangement that would positively and gradually put an increasing tension on the same, if for any cause it was found to be necessary. By raising or lowering the weights it is possible to put any amount of tension on the cable at any position of the carriage up to 25,000 pounds,

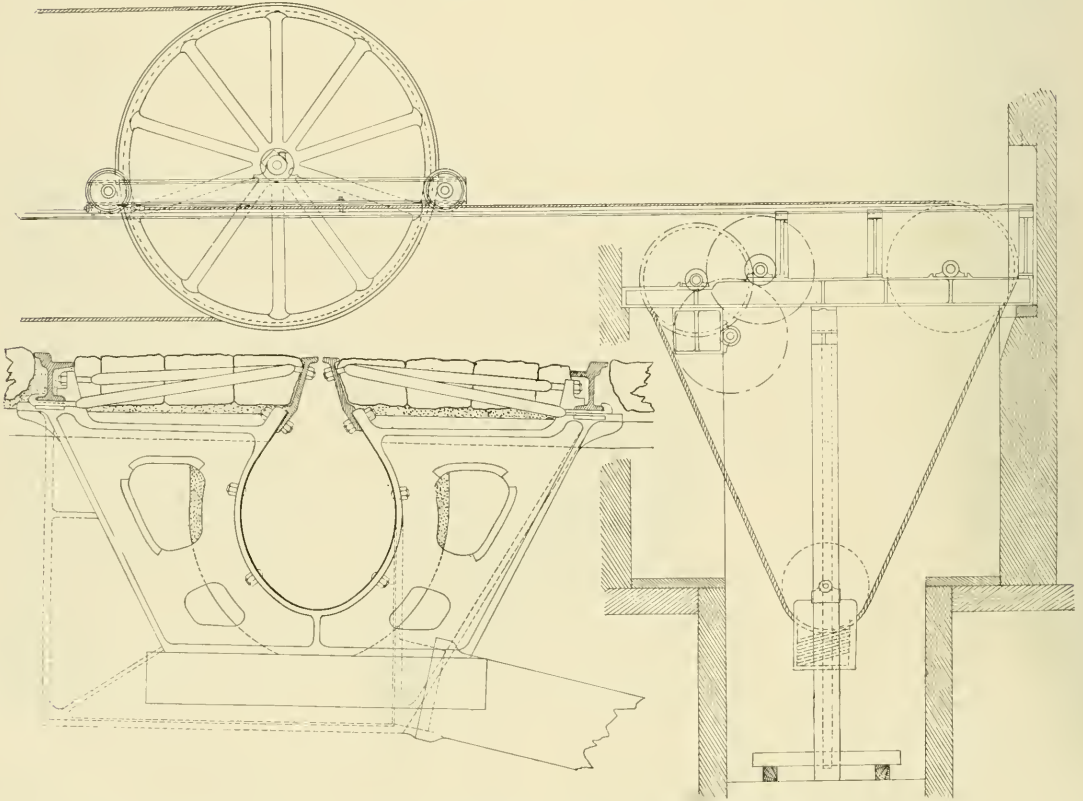
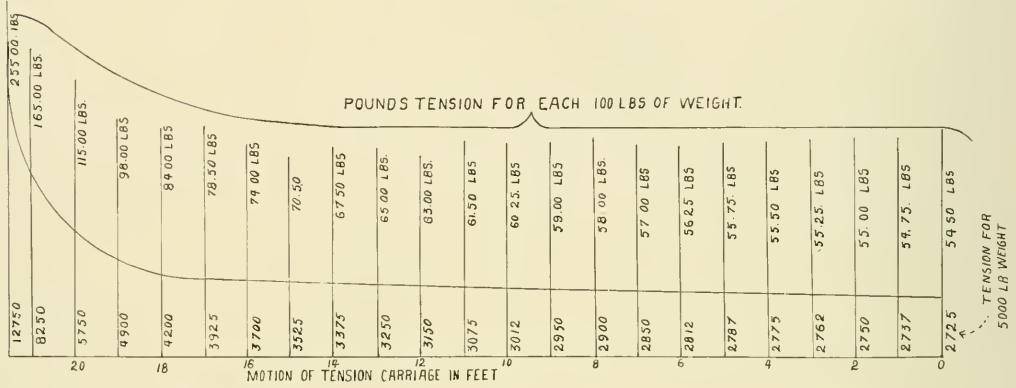


INTERIOR POWER HOUSE—BALTIMORE TRACTION CO.

and are clean and neat. The double truck cars are made by Brownell Car Company, St. Louis, and others. At Paca and Fayette streets, these cars are transferred to the old route and run down to the centre of the



PLAN VIEW OF TENSION CARRIAGE.



CROSS SECTION OF TRACK SHOWING SEWER CONNECTION.

SIDE ELEVATION TENSION DEVICE.

BALTIMORE CABLE RAILWAY.

city exchange place, where they are disconnected from the cable running east and hauled by horses around the curve from Lombard street into South street, to the west or uptown cable, and thence back to Paca and Fayette streets, connecting with the Gilmore street extension again. An ingenious arrangement of rope lifts at Paca and Fayette streets permits the transfer to be made at that point without inconvenience or delay. It was decided to cable the present line at a meeting of the board of Directors, June 5th, 1891. This action was ratified by the stockholders, August 26 following, and work was begun late in October. The work of construction was greatly delayed by bad weather during the winter. The street work was done by E. D. Smith & Son, formerly of Philadelphia, Pa., and is of the same substantial character as the work on the old line. The conduits as shown by the cross section are 18 inches wide and 30 inches deep; steel tubing connects each yoke, which are of cast iron, weighing 450 pounds, placed 4 feet 6 inches apart. The space around the steel tubing is filled with broken stone and cement. The drain pipes from the conduit are 9 inches in diameter, placed at intervals across the bed, and drain into another pipe running the entire length of the line, between the tracks, and connecting with sewers at convenient points. The carrying pulleys are of 18-inch diameter, about 30 feet apart, and are not lined.

The steel rails rest on the cast yokes and weigh 78 pounds. The car barns are large and well designed structures, on Retreat street, the northern terminus of the line.

Special credit for the excellent arrangement of the driving machinery is due the Robert Poole & Son Company, of Baltimore, who had all the designing of the plant, and who displayed the experience they have acquired in designing and building so many of the heaviest cable plants in the country. The plant was also built and installed by them, and as completed, is a most attractive and perfect piece of work. The care in small details and nicety of finish which has always characterized the work of this long established firm are noticeable in this plant, and little surprise is occasioned that the Baltimore Traction Company point with pride to the completeness of this their latest power producer.

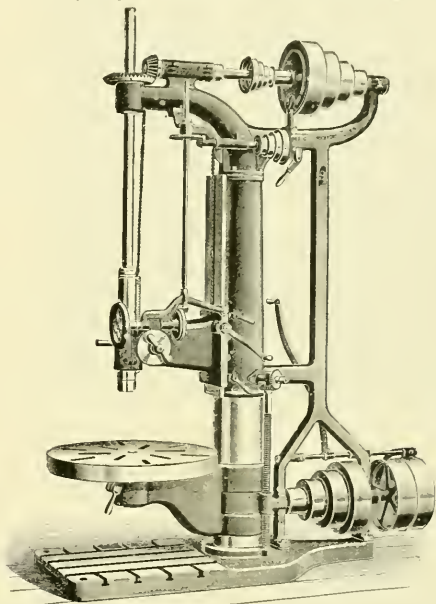
The officers of the Traction Company are T. Edward Hambleton, president; L. S. Hambleton, treasurer; N. H. Johnson, secretary; Wm. H. House, Jr., general manager; W. A. Hayward, chief engineer, and Richard E. Emory, assistant engineer.

It is reported that the South Baltimore lines will next receive the attention of the Company, although it is probable that the trolley system will be adopted there instead of the cable. If this is done, about 66 miles of single track of the Company will then have rapid transit.

SPECIAL arrangements will be made by the Lake Shore & Michigan Southern Ry to take care of delegates to the Cleveland Convention, address at once. C. K. Wilbur, W. G. P. A., Chicago.

A NEW DRILL.

IN this age of advancement the manufacturer who is not up to the times in improvements in his line finds it hard to keep up with the procession. The constant study, training and experience of the W. F. and John Barnes Company, of Rockford, Ill., is the basis of the success of the firm. Early in their existence, they adopted the policy of building only the best grade of



machinery and by strictly following that motto, they have grown until they are to-day among the largest manufacturers of iron and wood working machinery, for both steam and foot power, in this country. The accompanying illustration shows one of their latest makes of upright drills. And as nearly every street railway company can use a machine of this kind to a great advantage, our readers will be interested in knowing more of its details, which are fully set forth in a finely illustrated catalogue, which the manufacturers will mail on application.

COST OF MAINTENANCE OF WAY IN ENGLAND.

THE Manchester road tramways, of Bradford, England, has been worked by steam for the past seven years. The rails are 103-pound girder pattern, and seven inches deep, laid on concrete foundations and with the road paved from curb to curb. The line is two miles long, one mile, 789 yards being double tracked, and 987 yards single track. The lines were opened September 5, 1884, and the maintenance cost for the past six years as follows: 1884, cost of maintenance, of rails, and paving for three months only in 1884, \$13.08; 1885, full year, \$43.50; 1886, full year, \$86.00; 1887, full year, \$63.66; 1888, full year, \$204.56; 1889, full year, \$222.72; 1890, full year, \$279.54. This compares favorably with the maintenance.



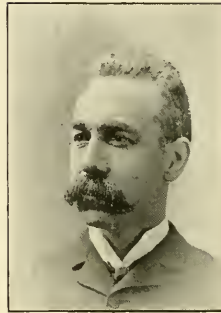
PRESIDENT JOHN G. HOLMES.



T. C. PENINGTON.



M. A. VERNER.



W. W. BEAN.



J. B. SPEED.



L. PERRINE, JR.



T. H. MCLEAN.



A. E. LANG.



H. M. WATSON.



SECRETARY W. J. RICHARDSON.

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

JOHN G. HOLMES, PRESIDENT, PITTSBURG, Pa.
 THOMAS H. McLEAN, FIRST VICE-PRESIDENT, New York, N. Y.
 JAMES B. SPEED, SECOND VICE-PRESIDENT, Louisville, Ky.
 ALBION E. LANG, THIRD VICE-PRESIDENT, Toledo, O.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE PRESIDENTS, and HENRY M. WATSON, Buffalo, N. Y.; LEWIS PERRINE, JR., Trenton, N. J.; W. WORTH BEAN, St. Joseph, Mich.; MURRY A. VERNER, Pittsburg, Pa., and THOMAS C. PENNINGTON, Chicago, Ill.

Subjects for Discussion and Committees Appointed to Report Thereon.

"Power-House Engines."

T. W. WRENNE, President United Electric Railway, Nashville, Tenn.; L. H. McINTIRE, Engineer, Harlem Bridge, M. & F. Railway, New York; P. S. PEARSON Chief Engineer, Electrical Department West End Street Railway, Boston.

"Relative Cost of Operation of Horse, Cable and Electric Roads."

WM. MO C. RAMSEY, Electrical Superintendent Federal St. & P. V. Passenger Railway, Pittsburg, Pa.; F. R. GREENE, Secretary Chicago City Railway Company, Chicago; JOHN L. HEINS, Superintendent Brooklyn City & Newton Railroad, Brooklyn.

"Standards for Electric Railways."

O. T. CHORBY, Utica, N. Y.; H. J. BETTIS, General Manager Atlanta Consolidated Railway, Atlanta, Ga.; E. E. HIGGINS, General Manager Short Electric Railway Company, Cleveland; CHAS. W. WATSON, Vice-President East Cleveland Railroad Company, Cleveland; J. E. RUGG, Superintendent Citizens' Traction Company, Pittsburg.

"Form for Street Railway Electrical Statistics."

THOS. H. McLEAN, Secretary Twenty-third Street Railway, New York; HENRY W. WATSON, President Buffalo City Railway Company, Buffalo; CHAS. E. WARREN New York.

"A Model Electric Street Railway Roadbed and Underground Wiring."

GEO. W. BAUMHOFF, Superintendent Lindell Railway Company, St. Louis.

"A Perfect Overhead Construction."

CHAS. H. SMITH, General Superintendent Troy & Lansingburg Railway, Troy, N. Y.

"Economy of Machine Shops for Electric Street Railways."

J. H. BICKFORD, Salem, Mass.

Next meeting, Cleveland, O., October 19th, 20th and 21st.

Massachusetts Street Railway Association.

President, CHAS. B. PRATT, Salem; Vice-Presidents, H. M. WHITNEY, Boston AMOS F. BREED, Lynn, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON, Lawrence.

Meets first Wednesday of each month.

Ohio State Tramway Association

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice President; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus, Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice President, THOS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee. OFFICERS and C. B. THURSTON, Jersey City; H. ROMALNE, Patterson; LEWIS PERRINE, JR., Trenton.

The Street Railway Association of the State of New York.

JOHN N. BECKLEY, PRESIDENT, Rochester, N. Y.
 THOS. H. McLEAN, VICE PRESIDENT, New York, N. Y.
 GEO. LAW, SECOND VICE PRESIDENT, New York, N. Y.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—D. F. LEWIS, Brooklyn, N. Y.; C. DENSMORE WYMAN, New York, N. Y.; CHAS. CLEMENSIAW, Troy, N. Y.
 The next meeting will be held at Saratoga, September, 20th, 1892.

Subjects for Discussion.

"Recent Improvements in Cable Traction."—GEO. W. McNULTY Engineer Broadway & Seventh Avenue Railway, New York.

"Recent Improvements in Electric Traction."—L. H. McINTIRE, Engineer Harlem Bridge, Morrisania & Fordham Railway, New York.

Arizona.

PHOENIX, ARIZ.—An electric road will be built by the following Denver capitalists: James A. Fleming, G. M. Harris, Granville Malcom, Judge Liedell and James Russell. The road will be an electric and the company will be incorporated for \$300,000. In connection with this the same gentleman proposes to build a hotel to cost \$300,000.

California.

PASADENA, CAL.—Professor Lowe is authorized by the Park Board to investigate the feasibility of an electric railway through the Yosemite using water power.

SACRAMENTO, CAL.—J. B. Edson, of Kansas, brother of J. H. Henry, of the Central Railway, has bought a controlling interest in the Sacramento Electric, and will be active manager. The owners of the road now are J. H. Henry, owning 70 per cent of the stock, J. B. Edson, owning 20 per cent (which he purchased from Henry) and L. L. Lewis, owning 10 per cent. Extensions and improvements are promised.

SAN FRANCISCO.—The Southern Heights and Visitacion Railway has been incorporated. The capital stock is to be \$1,000,000, divided into 10,000 shares. The incorporators are Charles F. Crocker, H. E. Huntington, F. S. Douty, N. T. Smith and J. L. Willcutt.

The road is to be a single or double track street railway, to be operated by all or any means known or yet to be discovered, and the entire length will be 8 miles.

SANTA CRUZ, CAL.—The Santa Cruz Electric Railway Company is organized with \$500,000, capital and the following directors: J. P. Smith, J. H. Logan, F. W. Ely, W. H. Talbot, Morris Newton, H. H. Clark and J. G. Tanner.

EUREKA, CAL.—The idea of an electric road from Elk Corners through Eureka to Arcata is under discussion. The distance is sixteen miles and calls for at least \$250,000. J. M. Thomson, W. H. Lockwood, A. E. Roe, et al., of the Westinghouse have appeared before the meeting to advocate their interests. A citizens committee of W. S. Clark, Y. M. Eddy and W. G. Bonner have been appointed.

Canada.

TORONTO, CANADA.—It is reported that the Toronto Street Railway Company has established a car factory.

Chicago.

CHICAGO.—The Union Elevated, mentioned yesterday, expect to run on Milwaukee avenue to Norwood Park, striking en route Avondale, Irving Park, Jefferson and Norwood Park.

CHICAGO.—The Chicago Union Elevated & Tunnel Railway Company has been organized to construct from the First ward to city limits, west. Capital stock, \$17,000,000, with John Tyler, James G. Cozzens, Franklin Landis, Herman Hurlbut, and George M. Eckels, incorporators.

CHICAGO.—C. E. Loss has a contract for 25 miles of road for the Calumet street railway, which has offices at 606 Tacoma building.

CHICAGO.—At a directors' meeting of the Chicago City Railway yesterday, it was voted to begin construction of electric lines on Thirty-fifth street, Forty-seventh street, Sixty-first street, and Sixty-third street. No contracts yet let. Horse lines are already operating on Forty-seventh Sixty-third, and a part of Thirty-fifth and Sixty-first.

CHICAGO.—Congressman Larry Mc'Gann appears as vice-president and general manager of the West & South Towns Street Railway Company.

A mortgage has been filed for \$500,000 to the Northern Trust Company, to insure an issue of the bonds, each bond is for \$1,000, with 6 per cent interest. Electricity, cable, compressed air, gas motors and horse power may be used. The over-head wire privileges are outright. The road to the Lawndale depot and the Wentworth Avenue line are named as the first.

CHICAGO.—The present power and generating plant of the Cicero & Proviso Electric Railway, at Ridgeland, is to be doubled. A large order for additional rolling stock has also been placed, including twenty motor cars besides trailers. Speedy extensions of the road is also contemplated.

CHICAGO.—The entire issue of 6 per cent bonds of the Calumet Electric has been taken by local parties. The amount was \$1,000,000. The bonds run 20 years redeemable at 1.05 and 1.10 after 5 and 10 years respectively.

CHICAGO.—The Chicago Merchants Elevated Railway Company, Chicago; capital stock, \$5,000,000; incorporators, Samuel A. Craig, E. F. Thompson, Royal F. Wilds and others. E. F. Thompson, attorney for the company, said that the road was already well under way, but refused to state the route. It is thought to be on the North Side, and little faith is pinned to it by the knowing ones.

CHICAGO.—The Chicago Union Railway Company was chartered yesterday by S. A. Craig, Thomas Boyle, et al. Capital \$5,000,000. Mr. Craig says the road is a separate affair and that the names mentioned are figure heads for wealthy men. The scheme, he said, was bona fide, but some doubts exist among the knowing ones. It is to be an "L."

Colorado.

DENVER, COL.—The commissioners for Jefferson County have granted a conditional franchise to Henry Lee and Oscar Reuter for a rapid transit line between Highlands and Golden. The proposed route is on Highland avenue.

DENVER, COL.—The Canon City & Cripple Creek Railway Company has filed articles. The road runs from Canon City to the town of Cripple Creek, Lawrence and vicinity. The names mentioned are: Eben Smith, Leadville; C. T. Harkison and S. H. Hastings, Denver; L. D. Roudebush, Cripple Creek; B. F. Rockafellow and N. G. Nikirk, Canon City; Charles Henkel, Robert Gibson and David Wood, Pueblo. The capital stock is \$500,000 and the principal office in Pueblo.

Connecticut.

BRIDGEPORT, CONN.—C. H. Hotchkiss has bought the Horse Railroad Company. He will probably put on electricity. The price was \$400,000 from a Rochester, N. Y., syndicate and only 30 shares are outstanding.

NEW HAVEN, CONN.—An extension of the Morris Cove road to the State street line will be made, and also a line through Water street will be built.

BRIDGEPORT, CONN.—The Bridgeport Horse Railway has applied for right to use electricity, and for charter to extend present lines on numerous streets.

NEW BRITAIN, CONN.—P. S. Dolan has applied to the state for right to use electricity on the Tramways. Referred to committee.

Delaware.

WILMINGTON, DEL.—The Wilmington & Northern Railroad Company have decided to extend the Lenape electric road to Birmingham Park. A new road bed will be built, separate from the railroad track.

WILMINGTON, DEL.—The City Electric has filed a mortgage to the Equitable Guarantee & Trust Company for \$100,000. The mortgage provides for further improvements and modifications of the road.

District of Columbia.

WASHINGTON, D. C.—Christie & Low, contractors, sue the Brightwood (Judson Pneumatic) Company for \$3,623, claimed due on construction contract; work performed in 1890. R. Rass Perry, plaintiff's attorney.

Florida.

BARTOW, FLA.—Mr. Price has been granted right to build a street railway, and has given bonds of \$500 to execute his promise. The right runs 25 years and is free from taxes for 15. Steam, horses or electricity may be used.

Georgia.

ATLANTA, GA.—T. C. Hampton, Chas. Hernan, A. C. Bruce, Henry Lanier, of Atlanta; C. E. Gill, of New York, et al., have applied for a franchise on various streets of Atlanta.

Illinois.

AURORA, ILL.—City Council August 15, gave franchise to Aurora & Chicago Inter Urban (electric) to enter this city. This practically completes right of way between the two cities. Senator H. H. Evans, Aurora, chief promoter. Line promised to operate by December '93.

EAST ST. LOUIS, ILL.—The Belleville & St. Louis Railway Company (the Thomas line) has about completed its arrangements for building an electric line between East St. Louis and Belleville, a distance of 14 miles, and will connect with the East St. Louis Electric Line on South Main street, East St. Louis, in all probability. It was rumored some time since that it would probably go through Denverside, but that seems to have been a mistake.

EDINBURG, ILL.—On August 15 site was purchased for the St. Louis-Chicago Elevated Electric. Promoters are St. Louis men and insist line will be finished in May '93.

GALESBURG, ILL.—Wm. Kellogg has been succeeded by A. Weis as superintendent of the Street Railway line.

GALESBURG, ILL.—Everything is in readiness to push the matter of the electric railway. Main and Broad streets will be first equipped, and by October, it is thought, everything will be complete.

JOLIET, ILL.—J. D. Paige has resigned as superintendent in favor of Dr. J. W. Folk.

NORMAL, ILL.—As soon as present lines are laid new track will be laid on several old ones. The Westinghouse has sold the motors and dynamos.

Indiana.

MUNCIE, IND.—The council has granted a franchise for an electric line over several of the same streets now occupied by the dummy system. The papers go to Oliver S. Kelly, W. A. Scott, and W. N. Whiteley, of Springfield, O.; J. Smith Talley, of Terry Haute; Col. A. S. Conger and K. B. Conger, of Akron, O., and James Boyce, of this city. The capital stock of the new company is \$250,000, and work will be commenced at once on the line.

Iowa.

DUBUQUE, IOWA.—The sheriff has sold the Hill street motor line recently insolvent to the Eighth street and West Dubuque Railway Company for \$50,000. The new company has a capital of \$100,000, and a permanent board of W. H. Doane and J. C. Harper, Cincinnati; L. H. Biglow, New York; E. P. Griswold and J. Todd, Chicago; J. R. Lindsay and George W. Kiesel, Dubuque. Subscriptions are invited with a view of opening the line.

KEOKUK, IOWA.—Final decree has been entered in the case of the International Trust Co., vs. Keokuk Electric Street Railway Co. and allows distribution of proceeds of mortgage sale, amounting to \$14,621, or 13.35 cents on the dollar.

MUSCATINE, IA.—The Muscatine City Railway has elected Peter Musser, president; J. Carskaddan, vice-president; J. Scott Blackwell, secretary; S. M. Hughes, treasurer; Peter Musser, J. Carskaddan, J. Scott Blackwell, Henry Jayne, Henry Bodman, J. M. Kembie, G. M. Titus, T. R. Fitzgerald and J. Linn Hoopes, directors.

SIoux CITY, IA.—The council has granted franchises for large extensions of the cable railway. The time in which to occupy the streets was extended to three years.

Idaho.

BOISE, IDAHO.—The stockholders of the Boise Rapid Transit Company after 13 months have enough to divide but prefer to improve. The following are directors for this year: Hon. George Ainshe, William Janman, John Lemp, Cy Jacobs, Mrs. M. E. McCarty, Dr. Arnold, Judson Spofford, G. D. Ellis and G. W. Russell. Judson Spofford will attend to the floating of \$100,000 in bonds offered. The equipment will be increased and extensions added.

Kansas.

LEAVENWORTH, KAS.—The compressed air people have succeeded in forestalling the overhead electric proposition, and Mr. Putnam will probably be unable to build his road until the compressed air scheme fails, as it surely will.

Kentucky.

COVINGTON, KY.—Citizens have subscribed \$26,000 to the electric extension to Ft. Thomas, and operations will begin when \$3,000 come to hand.

LOUISVILLE, KY.—B. H. Young, president of the K. & I. Bridge Company, and a director of the New Albany Railway, has submitted an ordinance to connect the New Albany & Louisville by electricity.

Louisiana.

NEW ORLEANS, LA.—R. T. McDonald, of Ft. Wayne, Ind., has closed the contracts for Duplex Steel Rail Company's rails and St. Louis Car Company's cars.

Maryland.

CUMBERLAND, MD.—The Cumberland Electric Railway Company, having decided to commence the extension of that road on the west side of Will's Creek without delay, have notified the stockholders that they can increase their investments in the stock.

MARION, MD.—The Queen City Street Railway has been sold to Lew Wallace, Jr., of New York City, thus simplifying matters and removing all difficulties into which the old company had fallen. The line will now be completed and there is \$25,000 of material already under contract to be delivered in the near future.

Massachusetts.

BOSTON, MASS.—The latest scheme is an elevated road. It is said that the men concerned in this movement are those who bought the Belt Line, the Lynn & Boston and the Naumkeag and Essex roads. One of them is a stockholder in the Manhattan Elevated of New York, and F. E. Deniston and J. P. Hsey, of Philadelphia, and Captain Griffen are named as being in the syndicate.

BOSTON.—The Lynn Belt Line street railway will move its power house from Lynn to Salem, where it will furnish also power for Naumkeag road and the new road between Lynn and Salem. The North Shore road will also build between the two cities.

HAVERTHILL, MASS.—A project is on foot for the construction of a new street railway line from this city, through Bradford and South Groveland, to Groveland village. James H. Winchell, the leading manufacturer of the city, is behind the project.

LYNN, MASS.—The sale of the Lynn & Boston, of Lynn, the Essex road, of Salem, and the Belt line, is reported. The Philadelphia Syndicate is the alleged buyer, and the price of stock is said to be \$115. The new management will double the equipment, consolidate the systems and extend the lines.

WORCESTER, MASS.—The Consolidated have accepted the franchise and electric rights granted by the council. The company will probably equip its Quinsigamund line and build on Providence and Edwards street this fall.

Michigan.

DETROIT, MICH.—The Detroit and Wyandotte Company, it is reported, will start to electrify their line as soon as the equipment can be obtained.

GRAND RAPIDS, MICH.—A. J. Bowne, James Blair, J. W. Blodgett, J. R. Chapman, of Grand Rapids; J. M. Hagar, J. J. P. Odell and S. K. Martin of Chicago, have been elected directors of the Consolidated. They will elect officers the first Saturday in September.

LANSING, MICH.—The Lansing Electric Railway has been sold for \$35,000, subject to mortgage of \$20,000. Bought locally for the Continental Trust Company, of New York.

MARQUETTE, MICH.—Right of way has been secured and survey made for a motor line between this town and Negaunee, a distance of thirteen miles. M. E. Ascire, of Marquette, is agent for outside capital in the matter. The Healy motor will probably be used.

SAGINAW, MICH.—The council has a proposition before it to allow the City of Saginaw Railway to double track and use electricity as power.

Minnesota.

MANKATO, MINN.—Reliable authority states that an electric line in Mankato would be a profitable investment. The matter will at least bear investigation.

MINNEAPOLIS, MINN.—The Leffler Electro-Magnetic Railway Company; capital \$1,000,000; the incorporators are N. F. Hawley, Freeman P. Lane, F. A. Dunsmoor, John Gruenberg, Simon Gruenberg and F. Fremont Reed. To build and manufacture electro-magnetic railways.

MINNEAPOLIS.—Thos. Lowry has organized the Minneapolis Improvement Company, at \$2,000,000 capital, and has bought 1,100 acres north of the city. The street railway will be extended to this tract.

STILLWATER, MINN.—Engineers have begun to survey a line from Four Lakes to Stillwater for an extension of the White Bear line (see REVIEW for September). This branch will not be operated until next season.

ST. PAUL, MINN.—H. M. Sloan has resigned in favor of F. M. Hoskins, brother-in-law of Willard Field. No reason for the resignation is given.

Mississippi.

VICKSBURG, MISS.—The franchise has been signed and a compromise made that assured peace and 4½ miles road. Mr. Fuller, of New York, will be here next week to make arrangements for construction.

Missouri.

CARTERSVILLE, Mo.—The Southwest Missouri Electric Railroad Company have filed articles of incorporation. Their capital stock \$500,000, their office to be at Cartersville. Their business may be to operate roads anywhere in the Southwest, and none of the parties live in this county. The incorporators are A. H. Rogers, Springfield; E. Z. Wallower, William M. Donaldson, Mandain Hamilton, R. A. Johnston and A. G. Knisely of Harrisburg, Pennsylvania.

JOPLIN, Mo.—Articles of association of the Southwestern Electric Railway Co., capital stock \$500,000, have been filed for record. The incorporators are Harrisburg, Pa., capitalists. The company is organized to buy the Joplin, Webb City and Cartersville street railways, and to build a line between Joplin and Webb City connecting them.

JOPLIN, Mo.—The Rapid Transit Company referred to yesterday has organized with the following names: E. Z. Wallower, W. M. Donaldson, N. Hamilton, R. A. Johnson, and Ed S. Herman, all of Harrisburg, Pa., and A. H. Rodgers, of Springfield. The company proposes to run an electric line from Joplin to Cartersville and Webb City, and a big power house is to be erected in Cartersville.

KANSAS CITY, Mo.—The Kansas City Elevated has elected John T. Wilbour, of Providence, R. I., president; Judge D. D. Hoag, of Kansas City, Kan., vice-president and secretary, and A. H. Talef, of New York, treasurer. The road is entirely out of the hands of the last receiver, D. M. Edgerton. The transfer was made by order of Judge Phillips, of the United States District Court, from whom Judge Hoag received the necessary documents, at Colorado Springs, a few days ago. The change of motor power from cable to electricity in the Eighth street end of the road will now be pushed to completion.

KANSAS CITY, Mo.—The West End people are fighting for an extension of the Metropolitan, and unless the Extension is granted, will fight for a new road. The franchise has been granted, but not accepted. Councilmen Keyes and Payne are the prime movers.

KANSAS CITY.—The final transfer of the Inter-State elevated has been made. The master-in-chancery and the receiver, D. M. Edgerton, conveyed all rights to the new company for \$90,000.

KANSAS CITY, Mo.—City Engineer Donnelly has certified to a petition for an electric line on Wyandotte street, from Second avenue south. The property owners have consented and the ordinance has been prepared.

ST. JOSEPH, MO.—John R. Owens is the receiver for the railway company with bonds at \$50,000.

ST. JOSEPH, MO.—Advices from Receiver J. R. Owen, of the People's City Railway, says that extensive improvements will be completed as soon as possible. The Wyatt Park line will spend \$6,000 to put it in shape for three minute service to the fair grounds.

New Jersey.

TRENTON, N. J.—The Penn City Development Company, of Jersey City, with a capital stock of \$1,000,000, has been incorporated here. Its business is to build, operate, and promote elevated railways. The incorporators are John V. Baco, of East Orange, C. B. Ludlow, of New Brunswick, A. L. Fairchild, of New York, Stuart Lyman, of Englewood, N. J., and E. M. Davidson, of New York.

New York.

ALBANY, N. Y.—The following railway companies make statements for the year ending June 30: The Central Cross town Company, of New York City—Gross earnings, \$524,150; operating expenses, \$364,728; net earnings, \$159,422; other income, \$4,211; gross income, \$163,633; interest on funded debt, \$26,300; taxes, \$42,107; rentals, \$52,000; net income, \$43,166; cash on hand, \$16,983; profit and loss (surplus), \$11,641; 7 per cent dividend declared, \$42,000. The Broadway Railway Company, of Brooklyn—Gross earnings, \$426,775; operating expenses, \$328,134; net earnings, \$98,640; other income, \$3,966; gross income, \$102,607; interest on funded debt, \$17,500; taxes, \$15,602; net income, \$69,504; cash on hand, \$35,377; profit and loss (surplus), \$59,340; betterments, \$10,766; 8 per cent dividend, \$42,000.

BINGHAMTON, N. Y.—G. Tracy Rogers and other owners of the Binghamton Electric Railroad, who purchased the Binghamton Port Dickinson Stock Railroad in the spring, have just completed the consolidation of the two lines, by purchasing the lease of the Binghamton Port Dickinson road, held by N. L. Osborn, and which expires next January. Men will be set to work at once to prepare the purchased road, from Port Dickinson to Lestershire, for trolley cars.

BINGHAMTON, N. Y.—N. L. Osborn has sold the lease and outfit of the Chenango railway to the Electric Railway Company. A. D. Osborn will be superintendent.

BROOKLYN, N. Y.—The park commission has granted Mr. Richardson permission to lay tracks and erect trolley-poles on the outer edge of the Plaza, from Fifteenth street to Ninth avenue, for his extension of the trolley system.

NEWBURY, N. Y.—W. P. Wayland, superintendent of the company says, that if the property owners will consent, a line will be built through Liberty street and on Broadway. They will also ask to use electricity on all lines.

NEW YORK CITY.—Another cable road is in prospect by the Metropolitan Traction Company. President Crminins said recently, that the consents of half the property owners had been granted between Forty-second street and 116th, on Lexington avenue.

ROME, N. Y.—The City Railway has published its statement. Gross earnings from operation, \$800.25; net earnings, \$48.80.

SCHENECTADY, N. Y.—The Schenectady Street Railway Company makes the following annual report: Gross earnings, \$45,089; operating expenses, \$28,737; fixed charges, \$13,912; surplus for year, \$2,440; passengers carried, 598,830.

Ohio.

FOSTORIA, O.—The Tiffin Fostoria line is again revived by an incorporation for \$175,000, with the names of Hon. Charles Foster, Andrew Emerine, Ross Crocker and Ira Cadwallader, of this place, and Hon. Geo. E. Seney, John McCauley, J. A. Beatty and R. W. Brown, the promoter, of Tiffin. The road will be 13 miles long.

MANSFIELD, OHIO.—The street railway people are making an effort to get the line built to the Reformatory this fall. All depends upon the Council opening up two new streets. If this line is built several others will follow.

NILES, O.—The Trumbull line has filed \$25,000 bonds with the County Commissioners.

NILES, O.—Edward Blunt has stepped out of the Niles Mineral Ridge enterprise has resigned, and H. C. White will act as secretary.

SANDUSKY, O.—\$45,000 is now subscribed to the Sandusky, Huron, & Nelan Electric Railway. Hopes are entertained that the \$100,000 may be reached. Farmers are subscribing liberally.

ZANESVILLE, O.—The present management of the street railway has been requested to make extensions, but refuses; and now a new company is projected and a merry war promised.

Oregon.

PORTLAND, OREGON.—The sale of the Portland Cable, by the sheriff, has resulted in the re-organization of the company by L. F. Grover, W. K. Smith, C. H. Woodard, J. H. Page and George P. Lent, representing the City Cable Company. The capital stock mentioned is \$50,000, and the purpose is to carry on the business of operating the Cable road in this city. Notwithstanding the misfortunes the road has undergone, the owners are satisfied that it is good property and propose to keep it going until a handsome return is paid on their investment.

Pennsylvania.

ASHLAND, PA.—The Schuylkill Traction Company, capital, \$600,000, has been formed. The plan is to connect all the towns in the Mahanoy Valley with electric railways. J. F. Baily, F. E. Baily and J. H. Crofode are the leading spirits of the enterprise.

BETHLEHEM, PA.—The Easton and Bethlehem Electric now has a charter and unlimited right of way. The route is laid out and three miles will be built this fall. The company consists of Howard Mutchler, of Easton, president and secretary; E. H. Laubach, of Stenton, vice president; and directors, N. A. Fulmer, James Smith, Charles Burcar, Charles A. Laros, of Easton, and Dr. Thomas Cope, of Nazareth.

McKEESPORT, PA.—The street railway war has broken out again by the organization of a new company, in which James S. Kuhn, president of the First National Bank; James Evans, president of the National Bank of McKeesport; Dr. Cad Evans, of Pittsburgh, and a dozen other big moneyed men of McKeesport and Pittsburgh, are interested. This new company has asked for the right of way on various streets in the city.

McKEESPORT, PA.—The cry is "still they come!" The latest is the Versailles Traction Company, which many think is a side issue of the Citizens'. The new line is billed to run as follows: Locust street from Fifth avenue southwardly to the boundary line of said city. Spring alley from Jenny Lind street to Tube Works alley; Tube Works alley from Spring alley to Shaw avenue and thence along Shaw avenue to Locust street.

PHILADELPHIA.—The Ridge avenue, according to official report, paid \$150,000, in dividends during the past year; the Thirteenth and Fifteenth streets paid \$50,000; the City Passenger paid \$150,000, on \$475,000 of stock; the Philadelphia & Darby did not give its dividends.

PHILADELPHIA.—The Quaker City Elevated has broken ground and two bonds of \$100,000, one for street protection and one for bridge protection are given. The American Security Company and August Belmont and Company gave the bonds. The road will run from Front and Market, out Market to Lancaster avenue, thence to 44th and thence to Fairmont Park. The outcome is not certainly known and some claim that work is begun to save the franchise.

PHILADELPHIA, PA.—The Philadelphia, Cheltenham and Jenkintown Passenger Railway Company has been chartered, with a capital of \$60,000. John H. Fow is president, and the company will proceed immediately to build an electric road along the old York road, from Jenkintown to its intersection with Erie avenue, in this city. It will then cut across to Fifteenth street, and by an elevated structure, run down Fifteenth street to Indiana avenue where connection will be made with the lines of the Traction Company.

PITTSBURG.—The Grandview Traction Co. has increased its capital to \$95,000. It is intended to run a cable on the Brownsville Pike to the top of the hill. The road is expected to be ready for business in twelve months.

A charter has been issued the Aspinwall Street Railway Company, of Pittsburgh; the capital is \$120,000. The company are to build an electric line two miles long, beginning at a convenient point on the Freeport road and ending at Ross' Grove.

PHILADELPHIA, PA.—The Philadelphia & Ardmore Passenger Railway Company has been chartered. Capital, \$10,000. The road runs from Philadelphia at Fourth street and Belmont avenue to Ardmore, with a loop, back. The directors are D. S. Lindsey, William Marks, Frank P. French and James Smith, of Philadelphia.

PITTSBURGH, PA.—D. F. Henry has said that the terms of consolidation of the Pleasant Valley Traction Company with the Manchester road had been agreed upon, and that the active steps would be taken about November 1. By this agreement the Manchester Company will absorb the Pleasant Valley, the Transverse and the Exchange Companies, and the capital will be increased from \$3,000,000 to \$5,000,000. The new issue of Manchester stocks will be exchanged at par for the stock in other companies. The Pleasant Valley is capitalized at \$1,400,000, for which \$1,600,000 of new Manchester will be paid. The rest of the \$400,000 of new stock will be exchanged for stock of the Transverse line, of which Geo. B. Hill is president; and for the stock in the Exchange Street Railway, which recently received franchise on Market street and Liberty avenue in Pittsburgh.

PITTSBURGH, PA.—The Tramway Railway Company, of Pittsburgh, Pa., have been granted a charter of incorporation under the laws of West Virginia, with a capital stock of \$1,000,000. The incorporators are Charles H. Read, J. C. Read, H. C. Morrison, Harry Higginbotham and Charles McKee, all of Pittsburgh.

Rhode Island.

PROVIDENCE, R. I.—The Pawtucket Street Railway Company has been given right to operate their cars by electricity.

South Dakota.

ABERDEEN, S. D.—J. L. W. Zietlow, of Aberdeen, has just returned from the Black Hills, where he has organized the Black Hills Mineral Belt Electric Railway Company. New York and Aberdeen parties are backing the enterprise with \$200,000. The road will connect flourishing points of Deadwood, Central, Terraville, Lead and Bald Mountain. The franchise and quite a little of the right-of-way have been secured and, as the company is under bonds to commence work in 30 days, it can be seen that no delay is contemplated or possible. This makes 15 miles of road. It is rumored that the Westinghouse is behind the scheme.

DEADWOOD, S. D.—A. E. Wallace, of Pierre, S. D., is in the city to organize a street railway. In case the interurban falls through this proposition is next in time.

Tennessee.

CHATTANOOGA, TENN.—A. J. Baird is now general manager of the San Antonio, Tex., railway.

CHATTANOOGA, TENN.—A. J. Baird has resigned as auditor of the street railway, and Willard Roots elected in his stead.

MEMPHIS, TENN.—Raphael Semms has resigned as general manager and secretary, and President Ruddock will take his place pro tem. Incompatibility of policy assigned cause of rupture.

Texas.

SAN ANTONIO, TEXAS.—It is said that the company has, in view of an offer from a rival company's offering to build it, consented to build an extension to run through Beaville. Citizens have raised \$10,000 to assist.

Utah.

SALT LAKE CITY, UTAH.—Senior City is a new suburb, and an electric is to be run out to it, a distance of seven miles. The men at the helm are all well-known business men, and numbered among them are S. F. Walker, R. C. Chambers, W. S. McCormick, Frank Harris, J. A. Jacobs, M. K. Parsons, William H. Shearman, J. J. Snyder, F. Beyle, Charles S. Wilkes.

SALT LAKE CITY, UTAH.—Messrs Jarvis & Conklin of Kansas City, Mo., have disposed of their entire interest in the Salt Lake City railroad to R. C. Chambers and Alfred W. McCune. The amount paid for the Jarvis-Conklin interest reaches a total of \$300,000. The bonded indebtedness of the road is understood to be \$343,000, while the line is valued at \$1,000,000.

Virginia.

NORFOLK, VA.—Local capitalists and men about town say that a line from Norfolk to Willoughby Spit, connecting by ferry with Old Point, would be a very rich territory. The movement is now on foot and will bear watching.

It is reported that the Erie Electric Motor Company will build a line out East Sixth street and along the Lake road to Four-Mile Creek, and then build a branch up to Wesleyville.

Washington.

VAN COUVER, WASH.—The electric built by G. B. Markle has been opened for traffic. The road, one mile long, power-house and all, was built in three weeks.

West Virginia.

WHEELING, W. VA.—The Citizens' Company has gone out of existence by lease to the Wheeling Company. The lease runs 99 years. The Citizens' owed \$160,000 which the Wheeling people will pay. Several extensions and improvements will be made. Cars now run to Marlin's Ferry.

It is also reported that the Erie Electric Motor Company will build a line out East Sixth street and along the Lake road to Four-Mile Creek, and then build a branch up to Wesleyville.

WHEELING, W. VA.—Three Ball high speed, 150-horse-power engines have been ordered. Five T-H. dynamos, aggregating 750-horse power are also ordered.

Wisconsin.

MILWAUKEE, WIS.—The Cudahy Bros. have taken the matter in hand and working for the extension of the city's electric railway service, to Cudahy's station early next spring. Arrangements have been made to extend the line to St. Francis this season.

MILWAUKEE.—A petition is about asking for an extension on the Chicago road of the Russell Avenue line. Right-of-way is given.

OSHKOSH, WIS.—The council has finally given the franchise to the Oshkosh Street Railway Company. Mr. DeCelle of the Westinghouse, is at the head of the movement.

SUPERIOR, WIS.—The Douglas County Railway, has changed its name to the Superior Rapids Transit Company. No changes in management are contemplated.

The National Capital.

The City of Washington is an object of perennial interest to all patriotic Americans. Not alone because it is the great throbbing heart of the mightiest and grandest Republic the earth has ever known, but also on account of its material magnificence. All Americans take pride in its beautiful avenues, majestic architecture, stately homes, and well stored galleries and museums, as things of grandeur and beauty in themselves, apart from the historic interest with which they are invested. It is a hope and aspiration of all "YOUNG AMERICA," at least, to some time or other visit the Capitol of his country.

The Baltimore & Ohio R. R. offers unequalled facilities in aid of this desire. All its through trains between New York, Philadelphia and Baltimore on the east, and Pittsburg, Cincinnati, St. Louis and Chicago on the west, pass through Washington. Its fast Express trains are vestibuled from end to end and heated with steam. Pullman's latest and best productions in the way of sumptuous Drawing Room Sleeping Cars are attached to all its through trains. The present management of the B. & O. have made vast improvements in the last two years, and the road is to-day one of the foremost passenger carrying lines in the country. Through tickets via B. & O. can be procured at all the principal ticket offices throughout the United States.

DORNER & DUTTON, Cleveland, report a strong fall trade with large orders for their patent track cleaner, and their No. 20 motor truck. Mr. Dutton is in the East booking orders and Mr. Dorner has just returned from a short but successful trip in Ohio and Pennsylvania. Both gentlemen report unusual preparations are being made to prepare for a big snow fight next winter.

PERSONALS.

O. R. HUEY, of Menasha, Wis., was a Chicago visitor during the month.

CLIFT WISE, the well-known engineer, is now with the Philadelphia Traction Company.

H. HOLTON WOOD, of Birmingham, president of the Derby street railway, is a candidate for Congress on the Democratic ticket, with good prospects. Mr. Wood is a wealthy manufacturer, and a popular gentleman.

PRESIDENT YERKES denies the rumor that he is building a residence in New York City. He says Chicago is good enough for him.

PHILO WELLS, superintendent of the Whitney avenue line, New Haven, has resigned.

JAMES UHL, of St. Louis, has been appointed superintendent of the Toledo, Ohio, electric.

HENRY M. WHITNEY, president of the West End, Boston, has donated \$500 to the electrical Laboratory of his alma mater, Williston Seminary.

C. C. KEEN, is the Chicago appointee of the Ball Engine Company, and has an office at 509 Rookery.

HENRY FULLENWIDER, of the Edgemoor Iron Company, of Edgemoor, Delaware, passed some time in Chicago, last month, as superintendent of the boiler installation of the Chicago Illuminating Company's new plant.

PRESIDENT C. A. COFFIN, of the General Electric, fearless of cholera, has sailed for Europe.

C. L. PULLMAN is in Europe.

W. A. SMITH, general manager of the Omaha system, was in the city several days last week.

ABE COOK, secretary of the Laclede Car Company, St. Louis, made us a pleasant call a few days ago.

C. L. CHAPMAN, ex-superintendent of the Holyoke, Mass., was recently presented with a beautiful diamond ring by his employes.

T. C. PENINGTON, treasurer Chicago City Railway, has returned from an extended pleasure trip East.

W. H. GESNER, New Orleans, spent several days in Chicago and favored us with a pleasant call.

CAPT. ROBT. McCULLOCH, general manager of the St. Louis syndicate lines, one of the most genial and hardest working men in the railway business, saved a few minutes while in Chicago to visit the REVIEW.

JOHN TAYLOR, of the Taylor Electric Truck, Troy, called a few days since.

R. A. SEMMES, for several years general manager of the Memphis line, has resigned. Mr. Semmer has been in poor health for some time, recently terminating in a serious illness, from which he is now recovering. His many friends in the fraternity will wish him speedy restoration to former good health.

The Bountiful Northwest.

The bountiful crops in the Northwest last season have directed the attention of everybody interested to this section of our country, and the indications are that the volume of travel in this direction the present summer will be the largest ever known. Those intending to visit any portion of the Northwest should be particular to see that their tickets read over the Chicago, St. Paul & Kansas City Railway, the quickest best and most popular line. Its equipment is new and elegant, and accommodations offered in high-back sofa seats, only obtained via this route, without any extra charge whatever, are far preferable to the old style of chair car seats. Its trains arrive at and depart from the Grand Central Passenger Station, Chicago, the handsomest station in the world, and Union Depot connections are also made at St. Paul with through express trains for the Great Northwest and the granaries of the world.

This is the only line in the Northwest running Vestibuled Compartment Pullman Sleeping Cars, also standard form of Pullman Sleepers the price for the exclusive use of a drawing-room in the former being no more than the cost of a section in the ordinary style of sleeping cars. Its dining car service is unsurpassed and its trains are run on the fastest schedule time.

Ticket agents will tell you all about this popular railway.

TWO MORE OPPORTUNITIES FOR CHEAP RATES TO THE WEST.

HOMESEEKERS' EXCURSIONS.

Two Grand Excursions via Union Pacific, on August 30th and September 27th, 1892, to points in Kansas, Nebraska, Colorado, Texas, Wyoming, Utah, Idaho, New Mexico and Montana. This is a great opportunity to see the magnificent tracts of land offered for sale by the Union Pacific at low prices and on ten years' time. For this occasion the Union Pacific will sell tickets at the rate of one fare for the round

HARVEST EXCURSIONS—HALF RATES.

AUGUST 30TH AND SEPTEMBER 27TH.

The Burlington Route will sell round trip tickets at half rates, good 20 days, to the cities and farming regions of the West, Northwest and Southwest. Eastern Ticket Agents will sell through tickets on the same plan. See that they read over the Burlington Route, the best line from Chicago, Peoria, Quincy and St. Louis. For further information write P. S. EUSTIS, General Passenger Agent, Chicago.

MONON ROUTE.

The equipment of this line is not surpassed by that of any road in the land. All trains are vestibuled, from the engine to the parlor and sleeping cars. They are run through solid, without change of any character between Chicago, Indianapolis and Cincinnati; heated by steam, lighted by electricity, and fitted with every device that adds to the comfort or convenience of passengers.

The day train, known as the "Velvet," consists of a Parlor Car, Ladies' Car, Smoking Car and Dining Car. This train leaves Dearborn Station at 10:30 A. M. daily and "Sundays too," arrives at Indianapolis at 4:20 P. M., and at Cincinnati at 7:45 P. M.

The constantly increasing travel via the Monon demands additional accommodation. Hereafter the night train, known as "The Electric," will consist of a Compartment Sleeping Car, a regular Sleeper, a Ladies' Car, with an additional Sleeper for use of Indianapolis passengers. The entire outfit has been built by Pullman expressly for this line, and is simply the best. The addition of a Compartment Sleeping Car to the equipment, fills the bill. Families traveling together will appreciate this special accommodation, while those preferring the regular Sleeping Car can have their choice. This train leaves Dearborn Station daily, "as well as Sundays," at 8:05 P. M., reaches Indianapolis at 3:25 A. M. and arrives at Cincinnati at 7:20 A. M. Passengers in Indianapolis Sleeper can occupy their berths until 7:00 A. M.

Seats in Parlor Cars, berths in Sleepers and compartments in Parlor Cars can be secured at City Ticket Office, No. 232 Clark street.

Double lower berth in Sleeping Car or Compartment Car \$2.00; section in Sleeping Car, or compartment in Compartment Car, \$4.00.

JANES BARKER,
General Passenger Agent, Monon Route,
Chicago, Ill.

PUGET SOUND NOTES.

(From Our Own Correspondent.)

SEATTLE, Wash., Sept. 10th, 1892.

The Madison Street Cable Railway Company has begun proceedings to obtain possession of the Madison street pavilion, near Lake Washington, which has been leased to James F. McCay. The company claims that on May 1 it leased the property to McCay, at a monthly rental of \$200, but afterward reduced this to \$125. The rent for July has not been paid, and McCay has refused either to pay it or to give possession of the premises. The court is asked to grant a writ of restitution.

A contract has been let by the Union Trunk Lines to Rohlf & Schoder, for the construction of three closed dummies, to run in the winter on the James street cable road. They will be arranged so that the sides can be taken out, and thus they can be transformed into summer cars. They will have bronze trimmings and plate glass windows.

A new Thomson-Houston generator is being placed at the Union Trunk Lines power-house. It has 310 horse-power, and has a capacity of 500 volts.

The employes of the Consolidated Street Railway Company have presented L. H. Griffith, the retiring manager, with a diamond pin and watch chain. Mr. Griffith had been president and general manager of the consolidated lines for three years, until he recently resigned to take charge of the Tacoma Railway & Motor Company's lines. He has greatly extended and improved the electric railway system. One of the employes paid a high tribute to him for his treatment of them by saying: "We never had a kick against him."

The Seattle City Council is still considering the question of forcing the electric street railway companies to light the suburban streets through which their lines run. At a recent meeting of the Council, E. C. Kilbourne, president of the Consolidated lines, said that when the franchise was granted to his road, the conditions were such that it made money, but now, with so many competing electric lines, they were all losing, and would, until the city was built up along the lines. His road had been spending \$39,000 a month, and taking in \$15,000, and even that had been reduced to \$12,000. He explained that it had been hoped to light the streets with the same power as that used for car propulsion, but that had been found utterly impracticable, as the variation in the movement of the cars caused an irregular light and made it very expensive to control, and to be compelled to put in an entirely new plant at present would be almost ruinous. There were roads compelled to run five and six miles at a five cent fare, and it was impossible to do it with the present sparse population at that price without loss. It is only very recently that New York, with its enormous population, had five-cent fares such distances as in Seattle. The roads here have spent \$750,000 in hard coin, and had not taken out a dollar. D. T. Denny, president of the Rainier Power & Railway Company, declared that as soon as the storage battery system was perfected, he should put it in his line, and take down the overhead wires.

The Rainier Power & Railway Company is finishing its line to the heart of the city. Six new cars have been ordered, and are expected to be here by the time the track is completed. A freight car will also be run. The power plant is already in place at the Western mill, which supplies sawdust and slabs for fuel to it. The lighting plant is to be increased by the addition of a 100-arc light machine, which has already arrived, and a 1,000 incandescent light machine, which is now on the way here. The company has secured a franchise for a new branch in the north end of the city, where it is already operating a line.

The Seattle City Council recently held a session to open bids for a street car franchise through the north end of the city, over a route asked for by John P. Fay, Herman Chapin and others. Even the people who had made special application for the franchise did not bid. They explained that the men behind the application were Minneapolis parties, forming the Northwest Land Company, of which L. Menage is the head. When the application was made it was accompanied by a draft of an ordinance embodying the plans proposed to be carried out. Since then, however, the City Corporation Council had drawn up an ordinance, which did not at all agree with theirs. The chief difference was that the Northwest Land Company desired the privilege of using a steam motor in the thinly populated parts of the northern district, while the ordinance drawn had restricted the motive power to electricity. The company will try to arrive at a compromise with the city council.

Fred E. Sander, president of the Grant Street Electric railway, has received from the County Commissioners a franchise for an electric

line along the county road two miles beyond the present terminus of the railway. Mr. Sander says he proposes to double track his line. He declares that after completing his two-mile extension he will strike out up the valley in a bee line for Tacoma, running through private property. He thinks that running along the perfectly level bottom lands of the White and Puyallup rivers, and using the latest electrical improvements on his cars, he can make as good time as the steam cars between the two cities. He will run both freight and passenger cars, and carry dairy and farm produce and fruit from the valley to the cities. The idea of connecting the two cities by an electric line has often been discussed, and several attempts have been made to carry it out.

The Grant Street Electric Railway is now furnished with power by the Union Trunk lines instead of the Consolidated Street Railway Company. The Union Trunk power house being closer to the road than that of the Consolidated, it is expected that better voltage will be secured. Meanwhile, the machinery is being set up in the power-house of the Grant street line at the race track, and the road will soon be operated with its own power.

Chester Dolph, a son of United States Senator Dolph, of Oregon, formerly connected with the Tacoma Railway & Motor Company, has distinguished himself by eloping with a Miss Gussie Armstrong, of Seattle.

Since the first of August the conductors and motormen of the Tacoma Railway & Motor Company have been getting three cents a mile, the company figuring that the men can put in seventy-nine and four-fifths miles a day, earning \$75 a month. It will not be necessary for the men to register as heretofore. So far no complaint has been made. Another feature of the change, making it more in conformity with the running schedule time of a railroad, is that each man receives a schedule book with the leaving and arriving time of every car in the city in it. Thus systematized it is expected better service can be had. The street car men are now well organized and are represented in the Trades Council.

The members of the Union Railway and Electric Company, of Everett, have organized by electing Colonel J. B. Hawley president, M. Swartout vice-president; George S. Brown secretary; W. G. Swolwell, treasurer. The capital stock is \$200,000, and work will begin immediately to construct electric railway lines from the river to the bay, from the paper mill to the Boyl works and smelter, and probably a belt around the peninsula and to Snohomish. The Colbys, of New York, are large stockholders in the company.

The building of an electric line from Whatcom to Lynden, for which a franchise was granted by the county commissioners, must begin within three weeks, that the company may hold their line subsidies. It is thought the road will surely be built.

Two Daily Trains to Montana and Pacific Coast.

On and after April 3d, trains on the Northern Pacific Railroad will run as follows: Train Number Three will leave St. Paul 9 a. m. daily, running through to Spokane, Seattle, Tacoma and Portland, via Butte, Montana. Train Number one will leave St. Paul 4:15 p. m. daily, running through to Spokane, Seattle, Tacoma and Portland, via Helena, Montana. Both trains carry complete equipment of Pullman first-class sleepers, tourist sleeping cars, free colonist sleepers, day coaches and dining cars.

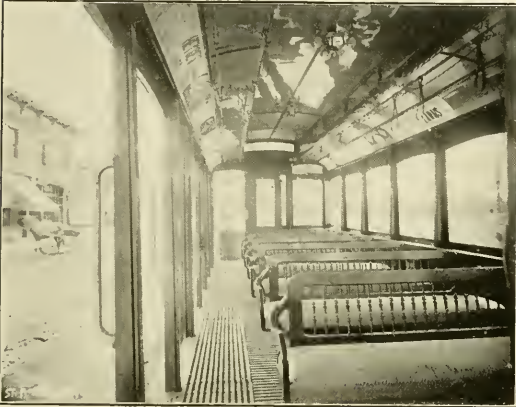
Through Pullman and tourist sleeping cars will leave Chicago 10:45 p. m. daily, via Wisconsin Central Line, for Montana and the Pacific Northwest. First-class vestibule sleeper will leave Chicago 6 p. m. daily, via C. M. & St. P. Ry., for Butte, Spokane, Tacoma and Portland. These through sleeping cars afford the best of accommodations, and enable travelers to avoid all trouble or delays from change of cars en route.

The dining cars on the Northern Pacific Line continue to meet with favor with the traveling public. No efforts are spared by the company to make this an attractive part of the service. With the superior accommodations now offered, tourists, business men or settlers will find the Northern Pacific Line the best route to Minnesota, North Dakota, Manitoba, Montana, Idaho, Oregon, Washington, British Columbia, Alaska and California.

Montana, Eastern and Western Washington folders "Wonderland" book, Sportsmen's Guide, Yellowstone Park, Broadwater, Hot Springs and Alaska folders for the season of 1892 are now out of press. Any of these publications will be mailed free on application to General or District Passenger Agents, Northern Pacific Railroad, or to Chas. S. Fee, G. P. & T. A., N. P. R. R., St. Paul, Minn.

A NEW OPEN-CLOSED CAR.

VISITORS to Cleveland will be interested in a new type of convertible car, built by and running on the East Cleveland Road, the invention of John A. Mehling, of that city. The seating capacity is 30 and with a standing load carries 100 passengers. As shown



in the cut, a side aisle leads to a door at each end of the car. When the open side is replaced with panels for winter use an additional door at the side and sliding lengthwise, provides extra means of exit. The panels can be taken out or replaced readily.

A NEW CIRCUIT BREAKER.

IT is often desirable to have the trolley wire divided into sections, or "blocks" of convenient length, each section being fed separately. In case of a heavy "ground" or "break down", the trouble is confined to that particular section and does not interfere with traffic over the



entire line. Several devices for this purpose have been placed on the market, and we illustrate one which seems to be simple and durable. It is the design of M. M. Wood. The insulating section is made of hard maple, and is securely fastened at each end into suitable



terminals for holding the trolley wire. The illustration in fig. 1 shows the construction so clearly that an extended description is unnecessary. The two thumb screws are provided for the use of a suitable fuse link when desired.

Figure 2 shows the circuit breaker complete, with a light hood, which is lined inside with a sheet of insulating

fiber. Wood's circuit breaker can be used in connection with any of the ordinary insulating "bells." It is manufactured and for sale by The Electrical Supply Co., cor. Michigan Ave. and Randolph St., Chicago.

North Star Points.

Is the title of a book of reference for all points between Chicago and Lake Superior, on the line of the Milwaukee & Northern R. R., and is a valuable publication for business men and tourists, who may be interested in the development of the agricultural, mineral and timber resources of Northern Wisconsin and the upper peninsula of Michigan. This book, together with an illustrated pamphlet telling "Where the Trout Hide," will be sent free, upon application to Geo. H. Heafford, General Passenger Agent, "North Star Route," Chicago, Ill.

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days, reported especially for the STREET RAILWAY REVIEW, by Munn & Co, Patent Attorneys, 361 Broadway, New York, N. Y.

ISSUE OF AUGUST 9, 1892.

| | |
|---|---------|
| Closed Conduit for Electric Railways, A. L. Lineff, London, England..... | 480,469 |
| Cable Gripper, W. A. Butler, New York, N. Y..... | 480,489 |
| Circuit Closing and Breaking Device for Railways, T. H. Patenall Railway, N. J..... | 480,507 |
| Cable Railway, S. D. Root and G. C. Vineyard, Anaconda, Mont..... | 480,519 |
| Electric Railway, F. B. Badt, Chicago, Ills..... | 480,543 |

ISSUE OF AUGUST 16, 1892.

| | |
|---|---------|
| Operating Device for Fare-Registers, J. W. Meaker, Chicago, Ills..... | 480,732 |
| Guide for Replacing Electric Trolleys, C. Fortin, Florissant, Mo..... | 480,766 |
| Electric Railway, R. M. Hunter, Philadelphia, Pa..... | 480,850 |
| Electric Locomotive, R. Eickemeyer, Yonkers, N. Y..... | 480,918 |

ISSUE OF AUGUST 23, 1892.

| | |
|--|---------|
| Trolley for Electric Railways, W. F. Jenkins, Richmond, Va..... | 481,401 |
| Trolley for Electric Railways, W. F. Jenkins, Richmond, Va..... | 481,401 |
| Conduit for Electric Railways, W. F. Jenkins, Richmond, Va..... | 481,403 |
| Cable Railway Curve, George Muller, Hoboken, N. J..... | 481,412 |
| Cable Traction System, George Muller, Hoboken, N. J..... | 481,413 |
| Auto. Release for Cable Grippers, A. J. Smith, St. Louis, Mo..... | 481,431 |
| Street Car, F. B. Brownell, St. Louis, Mo..... | 481,467 |
| Street Car, F. B. Brownell, St. Louis, Mo..... | 481,468 |
| Trolley Switch, J. S. Merkins, Highlands, Colo..... | 481,503 |
| Grip for Cable Railways, G. Schorpp, and L. Schorpp, Philadelphia, Pa..... | 481,512 |
| Trolley Projector, J. Walsh, Cleveland, Ohio..... | 481,517 |

ISSUE OF AUGUST 30, 1892.

| | |
|--|---------|
| Motor for Street Cars, J. G. Lightford, Indianapolis, Ind..... | 481,715 |
| Street Car, J. A. Mehling, Cleveland, Ohio..... | 481,800 |
| Trolley Carriage for Conduits, S. L. Platt, Elgin, Ills..... | 481,817 |
| Electric Railway, R. M. Hunter, Philadelphia, Pa..... | 481,905 |

ISSUE OF SEPTEMBER 6, 1892.

| | |
|---|---------|
| Automatic Trolley-Disconnecter, G. A. Kimball, Seattle, Wash..... | 481,956 |
| Conduit System for Electric Railways, R. Lawrence, St Joseph, Mo..... | 481,959 |
| Crossing for Underground Cable Railways, W. H. Page, Philadelphia, Pa..... | 481,966 |
| Trolley for Electric Railways, C. A. Adams and T. J. Thorp, Lincoln, Nebr..... | 482,031 |
| Auto. Gipsy for Cable Railways, A. J. Smith, St. Louis, Mo..... | 482,279 |
| Trolley for Electric Railways, J. M. C. Tyner, and S. S. Irving, Minneapolis, Minn..... | 482,322 |

CAR STARTING BY TELEPHONE.

The Complete Telephone System in use at Denver—Uniform Headway Maintained—Blockades Broken. Improved Service with Satisfaction to Patrons, and Economy to the Company.

BY C. K. DURBIN, SUPERINTENDENT DENVER TRAMWAY COMPANY.

A FREQUENT and regular car service is manifestly one of the most essential requisites for the successful operation of a street railway. It is very evident that the traveling public will not cheerfully patronize an inferior or an irregular car service; and inasmuch as the Company's dividends are dependent upon such liberal patronage, it behooves it to exercise every means in its power to cater to the wants and tastes of its patrons.

How to run the cars on even intervals of time is one

of electric and thirteen miles of cable tracks, consisting of sixteen distinct routes, nine of which terminate at a loop in the central business portion of the city. On these lines an average of 103 trains were operated daily during the past eight months. The cars are all operated by a dispatcher at the central station C, by means of twelve telephones on four separate circuits.

Circuit number 1 comprises telephones A, B, D and E.

Circuit number 2, telephones F, G and H.

Circuit number 3, telephones K and L.



CAR DISPATCHER'S OFFICE.—DENVER TRAMWAY COMPANY.

of the hardest problems for many street railway managers. The conditions vary much in different localities and are much more complex in some cities than in others; surface crossings of steam railways, draw-bridges and heavy street traffic of wagons and drays are some of the more trying impediments.

The common methods employed are the "time card" and the "starter." Without stopping at this time to comment on either of the above, the writer will endeavor to briefly describe the system as used by his company, showing, if possible, some of its desirable features.

The system consists simply of a number of telephones at the terminal of the various routes, connected with a central station where an operator or car dispatcher directs the running of every car on the entire street railway system.

The lines of the Denver Tramway Company, as shown on the accompanying map, embrace seventy-four miles

Circuit number 4, telephones M, N and R.

The ordinary central station telephone apparatus is used and consists of a system of drops indicating which circuit is calling.

Every conductor immediately upon arriving at the terminus of his route, reports to the dispatcher the number of his car, and receives in reply his proper leaving time.

The operator sits at an elevated desk, having an ear-piece fastened to his head by means of an adjustable metallic helmet. The transmitter is suspended directly in front and above the desk.

With pen and ink the operator carefully notes on a blank prepared for the purpose, the leaving time of each car.

The figures at the various telephone stations on the map indicate the regular calls received per hour by the dispatcher at this writing, or a total of 156. This does

not include the extra cars which are put out during the day. At certain times the number of calls received will aggregate about 250 per hour, or an average of more than one every quarter of a minute.

To take so many calls in so short a space of time requires very rapid as well as correct work on the part of the dispatcher, and it is surprising what a little practice will enable a bright young man to do in this direction, and only such men need apply.

Our operators have become so accustomed to the work that they can give a man his leaving time almost the instant he reports and without any appreciable loss of time.

We have two operators who work nine hours each—one from 6 a. m. until 3 p. m.: the other from 3 p. m. until midnight.

On very busy days we sometimes use three operators, working them six hours each. The work, of course, is very trying, and commands good pay.

Every conductor is obliged to carry a good watch and to keep his time exactly with that of the dispatcher, who in turn goes by the regulator directly in front of him. Frequent comparisons of time are made between conductors and dispatcher during the day.

The principal advantages as we have found them over the methods of "time table" and "starters" which we formerly used, are:

First. A saving of expense—Were starters stationed at all the points where we now have telephones, the expense would be nearly five times as great as it is now.

Second. A better service—The whereabouts of every car being at all times known, any spaces caused by blockade or any other cause, can be easily filled up by lengthening out the intervals on which the cars run, from the end of the route. Delays from railroad trains broken down vehicles, disabled cars, processions and the

like, are of frequent occurrence and are very apt to interfere with the schedule time of the cars. We have often filled up a space of from 30 to 60 minutes, caused by a parade, so that very shortly after the blockade was raised, the cars were again running in their regular order. Cars are not permitted to lie at the end of the route for any length of time, but are kept on the move as much as possible.

Third. A check on conductors—With our system conductors must run their cars on time or they will soon be detected. Most of the routes are short and conductors are obliged to report to the dispatcher at intervals not exceeding 40 minutes. The system is also advantageous to the conductors, as it relieves them of a great deal of responsibility.

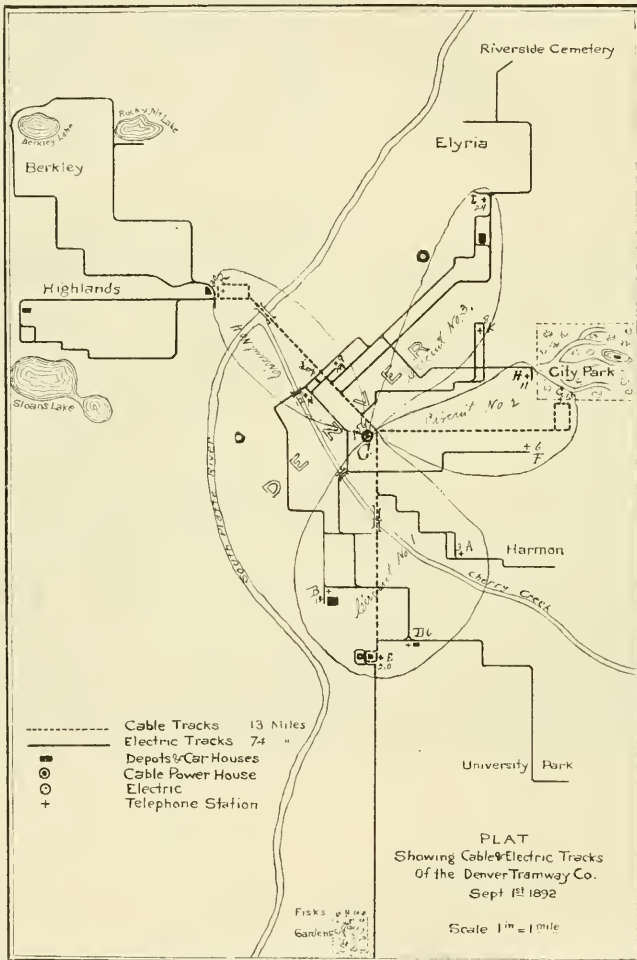
With the old system of time cards the men were forced to use their own judgment to a great extent, and our experience has been that the less a street car conductor is obliged to use his own judgment the better it is for all parties concerned.

We were first led to experiment with telephones because of many annoying delays occasioned by blockaded steam railway crossings. Being satisfied with the operation of the system, we have gradually extended it until it has reached its present proportions.

It has now been in successful operation for about three years.

THE official reference book of the New England Electric Club contains the names of the two-hundred-odd members, and the constitution and by-laws. The club is vividly in a flourishing condition and has a number of non-resident members.

THE electric railway from north Washington City to the Rock Creek section will try the conduit system at least so the builders, Senator Stewart, F. G. Newlands et al., of California, have determined.



CAR STARTING BY TELEPHONE—THE MAP OF THE ROUTES.

ECHOES FROM THE TRADE.

THE COLUMBIA INCANDESCENT LAMP COMPANY, 1912 Olive Street, St. Louis, favored their friends with a package of superior blotters, which like the Columbia lamps are celebrated for their long life.

THE INTERNATIONAL REGISTER COMPANY, Chicago, is making gratifying progress. Manager Englund reports a list of over 30 excellent roads on which their register now adorns the collector of fares, and with satisfactory results.

THE BROWNELL CAR COMPANY, St. Louis, have just shipped 20 accelerator cars to Columbus, Ohio, and 20 to the Covington & Cincinnati Street Railway. All are mounted on Brownell improved truck, and make very handsome and easy-riding rolling stock.

J. A. ROEBLING'S SONS & Co., of Trenton, N. J., will not exhibit in the hall at Cleveland, but specimens of their handiwork may be found outside on the poles of the railways and in the conduits of the Underground Telephone Company. Orders are crowding in for railway work.

I. H. RANDALL, Boston, has just received orders to build with all possible despatch 10 electric snow plows for the syndicate at Allentown, Penn., to be distributed among their various roads. Mr. Randall has been specially successful with his plows, which have given excellent results during heavy storms of last year.

THE BABCOCK & WILCOX COMPANY with their present capacity can turn out any size boiler on short notice. They are now working a double force of men, running their factory day and night. The company recently closed an order for the Canton (Ohio) Electric Light and Power Company, for over 350 H. P. double deck water tube safety boilers.

GEORGE CUTTER is pushing the Pattee Lamp-Hour Recorder as a meter for use with motors working on a fairly steady load, and already has some in use on 500-volt circuits. He has also received large consignments of the Simplex Braided Caoutchouc wire used for railway block signals. The local roads will use over 400 miles of it in protecting the World's Fair traffic.

MANY of the visitors to the Street Railway Convention, at Cleveland, will doubtless examine the equipment of the several electric street railroads of that city. They will find a number of familiar high-class appliances, among them four of the celebrated Goubert feed water heaters, which are installed in the plant of the electric road operated by the Brooklyn Street Railroad Company.

THE RAILWAY EQUIPMENT COMPANY, Chicago, have had a most prosperous season and large shipments are being made daily to all parts of the country and Canada of their new line equipment. The facilities of the com-

pany have been taxed to the utmost in filling the large orders received for the new material, which is being insisted on by contractors and managers of electric railways. Manager Mason is naturally pleased and states that the use of the new material will result in a perfect overhead line.

THE GENERAL ELECTRIC COMPANY has recently secured a contract, against keen competition, whereby they are to supply to the Cass Avenue Street Railway Company, of St. Louis, eighty-five cars, each equipped with twenty-five horse power motors, of the well-known standard W. P. type, three 800 horse power direct-coupled railway generators at a speed of about ninety revolutions. By this purchase by the Cass Avenue Company, the entire system of electrical railroads in St. Louis is now solely equipped with apparatus manufactured by the General Electric Company.

M. C. BULLOCK MANUFACTURING COMPANY are busily at work on a dozen large Corliss engines, for customers in seven different states. They are working nights and report a handsome increase in their sales of Corliss engines this year over 1891. Recent orders include a 250 horse power for a Chicago firm, a 200 horse power to Illinois Central railroad, for their new shops at Burnside, Ill., and a 300 horse power tandem compound condensing engine for Alpena, Mich., besides a pair of heavy Corliss engines for a big mine in Colorado.

LAMOKIN CAR WORKS, took orders during the past two weeks for two sixteen-foot vestibule cars for Paterson, N. J., six eighteen-foot palace cars for Mahoney City, Shenandoah, Girardsville & Ashland railway, one sixteen-foot closed motor on McGuire truck, for Gallipolis, Ohio, two sixteen-foot closed motor cars on Robinson trucks, for the Philadelphia Traction Company, and two sixteen foot closed cars for the Pennsylvania General Electric Company. September deliveries will include some thirty cars for various points.

THE DUPLEX STREET RAILWAY TRACK COMPANY, New York, are meeting with continued good success, and have recently largely increased their lines, having now 28 weights and styles of rails. Among latest orders may be mentioned 20 miles for McDonald & Hart, Electric Railway Company, who will lay the rails in New Orleans for the new electric road there. Also 10 miles for the Elevated road in Kansas City. Baltimore and the Atlantic Avenue Company in Brooklyn have also placed large orders; while the small orders from all parts of the country amount in the aggregate to a large business.

THE R. D. NUTTALL COMPANY, Allegheny, surprised themselves and all others with the amount of business handled and its rapid and steady increase. Their large plant is working both night and day, with a force of 135

men. The armature department is becoming one of the leading branches of their work, and has far exceeded expectations. The commutator department is full of work. The standard steel trolley pole, placed on the market a year ago, has secured a large amount of business, being very generally adopted by large roads all over the country. The output of trolley wheels, on which the price was recently reduced, amounts to 150 wheels daily.

HARRISON & CAREY, is the title of the new railway supply house which is opening in this city. Their main lines at first will be the agency of the R. D. Nuttall Company's products, whose goods they will carry in stock. Other departments will be added later on. The gentlemen named are active, progressive business men with many friends, who will wish them every success in the new undertaking; and confidently expect to see them make a record which will place them in possession of a large share of the rapidly growing business in this great western territory.

THE PABST BREWING COMPANY, of Milwaukee, Wis., have placed their order with the Siemens & Halske Electric Company, of America, for their new 10,000-light incandescent central station. This installation will consist at first of two 250-H. P. dynamos and one 90-H. P. dynamo, of the well-known Siemens & Halske direct coupled type, the armature being placed on the end of the shaft. The Lake Erie Engineering Works have the order for the engines. The ultimate capacity of this plant will be in the neighborhood of 40,000 lights, and by means of the Siemens & Halske generators and Lake Erie engines the space occupied will be very small. The electrical work is being done under the supervision of Mr. Geo. W. Gibbs, M. E., and the steam engineering under the supervision of the Osborn Engineering Company.

THE HALE & KILBURN MANUFACTURING COMPANY, Philadelphia, have a larger amount of street railway work in hand than at any time in the long history of this successful firm. Seating for 700 cars are being made, chiefly for cable and electric lines, both east and west. Styles include patent canvass-lined rattan, mohair plush, Wilton carpet and flexible wood material. Their latest, "No. 71 Reversible Seat," is "taking like hot cakes." A large number of western roads have adopted this seat, which is furnished in plush, canvass-lined rattan and flexible wood. A car seated with this improved seat will seat double the number as under the old plan, and still leave usual amount standing room. The side-seating has recently been improved, by their combination elliptic spring, made in any covering, making a specially strong and durable seat.

THE TAYLOR ELECTRIC TRUCK COMPANY, Troy, N. Y., are coming rapidly to the front with their improved electric truck. Although until now no special effort has been made to push the truck, a large number of very desirable orders have been taken, and in every case testimonial letters speaking of the satisfaction the truck has

given, have been received soon after delivery and use. On one line in Albany where other trucks are also in service, many ladies make it a rule to wait for the cars carried on the Taylor truck, on account of its specially easy motion, and freedom from oscillation. Mr. Taylor, the inventor, is now devoting considerable time to its introduction in the West, and is meeting with very gratifying success. At the works in Troy it has already been necessary to increase the machinery and force of workmen, although at the start the company thought they were fully equipped for some months to come, at least.

THE STERLING COMPANY, of Chicago, write that business is rushing, their sales being 31,000 horse power of their make of boilers, between Jan. 1st and July 22nd of this year, and within the last 30 days of this time 7,800 Horse Power, being distributed as follows: Armour Packing Co., Chicago, (3rd order) 100; (4th order) 1,050; (5th order) 400; Montgomery Iron Company, Post Kennedy, Pa., 400; Toplin, Rice & Company, Akron, Ohio, 150; American Water Works, Braddock, Pa., 250; Walter A. Wood Harvesting Machine Company, St. Paul, 400; Indianapolis Light and Power Company, Indianapolis, Ind., 1,500; Clark & Windsor, Joliet, Ill., 22; Edison Electric Light Company, Altoona, Pa., 200; Grand Rapids Gas Company, 100; Goebel Brewery Company, Detroit, Mich., 256; United Salt Company, Cleveland, Ohio, 100; Land and Improvement Company, West Superior, Wis., 170; Mobile Electric Light Company, 356; Annson & Watkins, Scranton, Pa., 250; Sprague Steel Company, Pittsburg, Pa., 500; Charles Heap, Williamstown, Mass., 300.

THE DETROIT ELECTRICAL WORKS have secured the contract for the electrical equipment of the Cairo Electric Street Railway Company, which will change from horses to electricity at once. During the past few months the Detroit Company have secured many important contracts in this territory, prominent among which were Dubuque, Iowa, Sioux City, Leeds, Racine, Wis., Kankakee, Ill., Detroit, and last, but by no means least, the Calumet company's business. This is the largest electric railway in the City of Chicago, and the sale there of five lots of motors, at different times during a period of two years, speaks volumes for the Detroit motor.

The strides made by the Detroit Company during the past year show them as fast coming to the front, and are securing a more commanding position each day, due undoubtedly to the excellent results their patrons are securing with their one motor geared to both axles.

The Detroit Electrical Works have recently opened offices in Cincinnati, Louisville, St. Louis, and these together with Chattanooga, Chicago, New York and Boston, make a circuit of offices that are readily reached by prospective purchasers.

THE general street railway supply trade promises to be better than usual during the coming year.

THE Peckham Motor Truck & Wheel Company, of Kingston, New York, comes forward with an improvement on the original cantilever truck, invented by Mr. Peckham. The new truck has been christened 5 A, and the principal improvement consists in the construction of the radial gear, which is provided with double coil springs supported upon a steel ball bearing, and supports the entire weight of the truck frame. The next improvement is the arrangement of the elliptic and coil springs, which are so adjusted that a soft, accommodating motion is secured, and the spirals relieve the elliptics of their heavy burden. The radial motor hangs so suspended to the heel of the motor as to obviate all side strains and ensure a true mesh of gears.

The truck is beautiful and graceful, and, will, without doubt, meet with the large success it deserves, inheriting, as it does the good name and wide experience of the predecessor.

THE GRIFFIN WHEEL & FOUNDRY COMPANY is now in the best of running order, with a new two-story building 60x200 in dimensions, which has arisen from the ashes of the old. This building contained their elevators, fans, core ovens, cupelos, separating machines and smaller devices. Notwithstanding this serious impediment all orders already in were filled from stock and the new buildings put to rights in three weeks: thus illustrating the resources and managing finesse of the managers of the company.

The company wishes to thank its friends and customers old and new, for their leniency, and are now able to take care of any amount of orders. A number of changes and improvements have been made in the arrangement of the works. Their street car wheel traffic has amounted to 3,000 wheels per month and is growing satisfactorily. The company will be represented with space and men at Cleveland.

THE MCGUIRE MANUFACTURING COMPANY, Chicago, inform us that they have received orders from the following roads for trucks during the last thirty days: South Chicago City Railway Company, 25 trucks; Crescent City Street Railway Company, New Orleans, 150; Cuyadutta Street Railway Company, Gloversville, N. Y., 19; Citizens' Street Railway Company, Springfield, Ohio, 9; City electric Railway, LaSalle, Ill.; Ottumwa, Ia., Electric Railway Company; Lima, O., Electric Railway; Cicero and Proviso Railway, Chicago; Cincinnati Railway Company; Sandusky, O., Street Railway Company; Ft. Wayne Street Railway Company; Toronto Street Railway Company, Toronto, Canada; Calumet Electric Street Railway Company, Chicago; J. P. Colman Construction Company, Clinton, Iowa; Joliet Street Railway Company, Joliet; South Bend and Milwaukee Street Railway Company, South Bend, Ind.; Youngstown Street Railway Company, Youngstown, Ohio; Toledo, O., Consolidated Street Railway Company; Gallipolis Street Railway Company, Gallipolis, Ohio; Wheeling Street Railway Company, Wheeling, W. Va.; Lincoln, Neb., Street Railway Company; Madison Street Railway Company,

Madison, Wis.; Marshalltown, Ia., Street Railway Company; Tacoma Railway and Motor Company; Galesburg Electric and Motor Company, Galesburg, Ill.; Brooklyn City Railway Company; Chillicothe Electric Railway and Lighting Company, Chillicothe, Ohio; Pittsburg and West End Passenger Railway Company, Pittsburg, O.; Terre Haute Street Railway Company, Terre Haute, Kankakee Electric Street Railway Company; Pueblo City Railway Company; Union Depot Railway Company, St. Louis; Chicago City Railway Company; West End Street Railway Company, Rockford, Ill.; Lake Roland Electric Railway Company, Baltimore.

THE EXHIBIT HALL.

AMONG the prominent exhibits which will be made and representatives who will be present at the convention, are the following:—

LA CLEDE CAR CO., St. Louis, will send representatives.

THE OKONITE COMPANY may not exhibit but will be represented.

ECLIPSE CLUTCH WORKS, Beloit, expect to send a representative.

AMERICAN DISTRICT STEAM CO., Lockport, will send a representative.

HALE & KILBORN, Philadelphia, to be represented by Edwin S. Carnon.

DORNER & DUTTON, Cleveland, will exhibit at the hall and at their works.

Q. & C. COMPANY, Chicago, will exhibit the Bryant metal sawing machine.

J. M. JONES' SONS, West Troy.—John H. Jones will be present throughout the meeting.

NEW DEPARTURE BELL CO., will give an exhibition of bell-ringing by Prof. C. A. Hoagland.

BABCOCK & WILCOX, will be represented by W. C. Temple, manager of the Pittsburg office.

ELLIOTT FROG & SWITCH CO., East St. Louis, expect to send H. Elliot, Jr., vice-president and secretary.

ROBINSON MACHINE CO., Altoona.—Trucks for electric motors in charge of Albert E. Hay, president.

JOHN A. ROEBLING'S SONS CO., will be represented by George C. Bailey, manager of the Chicago office.

R. D. NUTTALL CO., Allegheny.—Complete exhibit of their specialties: R. D. Nuttall and Mr. Mayer.

THE MEAKER MANUFACTURING CO., Chicago, will have something of interest and be fully represented.

FULTON FOUNDRY, Cleveland.—Trucks, wheels, axles and specialties. C. J. Langdon and W. E. Haycox.

J. G. BRILL CAR CO. will have on exhibition—just wait until you see what. They will be fully represented.

CHAS. A. SHIEREN & CO., will be represented by Chas. A. Shieren, Jr., New York; E. L. Burrell, Chicago.

PECKHAM MOTOR, TRUCK & WHEEL CO., will make a nice display and President Peckham and others will attend.

SIEMENS & HALSKE ELECTRIC CO., Chicago. Augustine W. Wright, vice-president, and Mr. Gates expect to attend.

STANDARD RAILWAY EQUIPMENT CO., Chicago, will exhibit their standard heater. Garson Myers, manager, in charge.

BALL ENGINE CO., Erie, will probably be represented by President McBrier, Vice-president Carter, and Secretary McBrier.

BROWNELL CAR CO., St. Louis, will have something to show and President Brownell and assistants something interesting to say.

GILBERT CAR COMPANY, Troy.—Palace car built for Short Electric Company, mounted on Anger trucks. J. E. Whittlesey will attend.

CUSHION CAR WHEEL CO., will exhibit some wheels with astonishing records. P. F. Leach, vice-president, and H. A. Mathews.

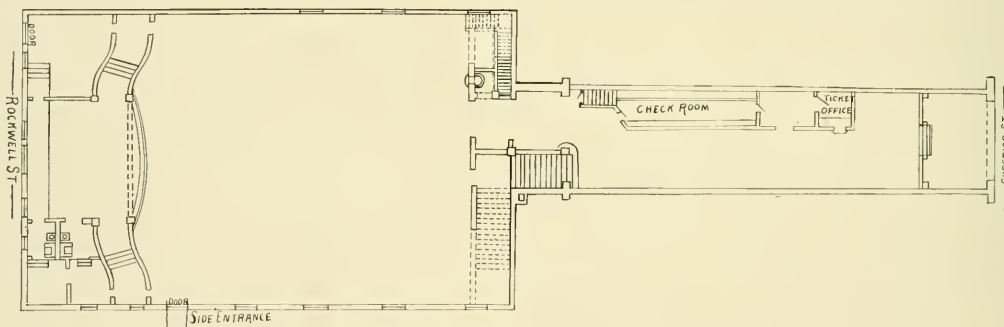
LEWIS & FOWLER, Brooklyn, will, as usual, be fully represented, and make a display which will have to be seen to be appreciated.

THE SHORT ELECTRIC CO., will put on exhibition their entire works and have a special exhibit planned which we predict no one will miss.

AMERICAN CAR CO., St. Louis. President Sutton would sooner walk than miss a convention. Others from his company may attend.

EDDY ELECTRIC MANUFACTURING CO., Windsor, Conn., will be looked after by A. D. Newton, treasurer, and M. E. Rand, general agent.

THE RAILWAY EQUIPMENT CO., Chicago, will be there and march in the music end of the procession.



THE EXHIBIT HALL.—ARMY AND NAVY BUILDING.

THE JOHNSON CO., will have a display of rail sections and special work. A. S. Littlefield will attend from the Chicago office.

AMERICAN CASUALTY INSURANCE & SECURITY CO., will be represented by Willard D. Brown, in charge of railroad department.

The exhibits will be shown in the Army and Navy Hall, on Superior street, and nearly opposite the Hollenden headquarters hotel. The location could not be improved, and the hall is well adapted to the display, being 60x110 feet on the ground floor, with an additional 33x56 feet immediately above. If necessary, a third room, opening into the second, can be had. The main entrance is 20x80 feet. The heavy exhibits will be found on the ground floor and the lighter supplies on the second floor. A large vacant lot adjoins the building and here the cars, sweepers, trucks, wheels, etc., will be placed.

DETROIT ELECTRICAL WORKS. General Manager Warfield and Messrs. Wilkes, Hodges, Scott, Walter, Van Housen, Lockwood and Myers will all be there.

THE NEW PROCESS RAWHIDE CO., Syracuse, will make an exhibit. T. W. Meachem, president; J. C. Kenyon, treasurer; and A. C. Vosburg, secretary, expect to be present.

CHARLES SCOTT SPRING CO., Philadelphia, will display all the different classes of springs used in horse, cable and electric cars. Chas. Scott, Jr., and H. C. Johnson will attend.

THE GENERAL ELECTRIC CO., will give a generous display, in charge of W. J. Clark, general agent of the railway department, assisted by Theodore P. Bailey and E. K. Wheeler, of the Chicago office; E. P. Morris, Theodore Stebbins, Geo. W. Mansfield, from Boston, Capt. Eugene Griffin, first vice president, O. T. Crosby, general manager of the railway department and W. H. Knight, chief engineer, will be present.



WINDSOR & KENFIELD,

PUBLISHERS AND PROPRIETORS,

334 DEARBORN ST., - - - CHICAGO.

Published on the 15th of each month.

SUBSCRIPTION, - - - TWO DOLLARS.

FOREIGN SUBSCRIPTION, - - - 20 SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW,
Caxton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR,
Editor.

F. L. KENFIELD,
Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW,
334 Dearborn Street, Chicago

Entered at the Post Office at Chicago as Second Class Matter.

This paper member Chicago Publishers' Association.

VOL. 2. OCTOBER, 1892. NO. 10

THE eleventh annual convention of the Ohio State Tramway Association will meet in Zanesville, on Wednesday, November 9th. These gatherings have been well attended since the organization and this year's meeting promises a good attendance and an enjoyable occasion.

A FULL report of the New York state street railway convention, which occurred September 20th at Saratoga, was telegraphed the REVIEW, which had a ten-page extra out at nine o'clock the next morning and came in very handy for other alleged "first reports" which appeared several days later.

A TELEPHONE company has been knocked out. as everybody probably knew would be the case, in its suit against the Watervliet Electric for daring to rest upon the same earth. The telephone companies have pretty much of the earth in their control, but thanks be to Allah, they don't quite own it yet.

THE awakening of Asiatic commerce means, among other things, a reviving of transportation, and besides projected railroads, a number of tramways are paying dividends. Particularly we notice that the Bangkok, Siam, company, for the present year, shows a profit of 6 per cent. Present prospects are favorable to a greater earning, as previously legislative action was unfavorable.

OVER three million dollars in authorized bonds remain unsold in the possession of the thirteen street railway companies at Seattle. Their present franchises have yet an average of twenty years to run. To make the bonds salable, they petition the city for a further extension of rights for an additional twenty-five years, and in return promise a percentage of gross earnings, payment to begin in ten years from date.

WE take this occasion to express our sincere appreciation of the hundreds of letters from readers in all parts of the country, complimenting the souvenir September number of the REVIEW, and desire our friends to accept this as an acknowledgement. That our efforts to produce what resulted in the finest number ever issued for street railway readers have been so fully appreciated is very gratifying to the REVIEW management.

MAYOR GRANT, of New York, has vetoed the trolley granted by the Board of Aldermen to the Ninth Avenue road. In this connection the Mayor squarely goes on record as opposed to the trolley system in any overhead form. Like other things it will work out its own salvation, and as soon as the extensive lines across the river shall have by actual demonstration convinced the people of its merits, the public will be heard and "do the rest."

THE illustrated article in this issue on the extensive system of the City & Suburban Railway in Portland, Oregon, will be of special interest in its account of the street car express service, and the telephone system of car despatching. We have from the first advocated an express service where conditions are at all favorable and congratulate our Portland friends on its success. The dispatching system is operated on the Denver plan, which was fully described in these columns last month.

THOSE who have not already done so should at once have a careful track inspection and a thorough raising of bad joints before the ground freezes, after which such work becomes additionally expensive. Where block paving is in use, all protruding blocks should be taken out and put back where they will keep out of the way of snow plows, should, as many predict, there be a great need of them this winter. On unpaved horse lines, a little crushed stone or cinders for the holes in the horse path will prove a timely economy.

ON October 15, the subscription price of this journal was raised from one to two dollars per annum, at which figure, considering its character and quality, it is the cheapest technical paper published. The circulation, prestige and standing which the REVIEW has attained in only twenty-two months has been equalled by but few magazines after many years. To the endorsement given it by all the leading advertisers in our field, we might add several pages each month of voluntary testimonials from our several thousand readers. Every issue of the REVIEW speaks for itself, however.

THE largest individual gift ever made for scientific equipment is that of President Charles T. Yerkes, of the North and West Chicago Street Railroads, to our new University. His instructions are to secure the largest and best telescope in the world, regardless of expense, and send the bill to him. This involves a donation of not less than half a million dollars, and will procure an instrument with a forty-five inch lens. The famous Lick lens is nine inches smaller in diameter.

Street railway men cannot but feel a just pride in being associated with a business which can produce so generous and public-spirited a representative.

THE conditions which affect the revenue of street railways seem to be much the same the world over. Almost no business feels financial depression quicker than this. The chairman of the Melbourne, Australia, Tramway Company, in his annual report a few weeks ago, stated: "The traffic returns of this company seem to indicate the relative spending power of the community as correctly as the barometer indicates the changes of the weather."

As we have previously remarked, the large increase in receipts on lines in all parts of this country, even after making proper allowance for improved service in rapid transit, declare the general business prosperity enjoyed during the past year throughout the land.

WE have frequent occasion to refer to the many objectionable features growing out of the custom in some few cities of disposing of street car franchises by public auction. In New York the Canton Act provides for the sale at auction of all franchises granted by the local authorities, the bidders competing on the basis of percentages to be paid on gross receipts. Mayor Grant said recently; "The law has in one respect operated unfavorably. Irresponsible parties have been enabled to compete at the sale and to purchase franchises on road which have not been built, but have, nevertheless, held the streets against needed improvements."

The greater argument, however, will always be that the amount paid into the city treasury had far better have been spent by the company in betterments and increased service, in which the public would have received direct and appreciated returns.

OF the many unique schemes concocted by enterprising managers of daily papers to increase the circulation of their journals, one of the best is that offered by the Augusta, Georgia, Chronicle, which occasionally prints a coupon good for a one-trip ride on the electric cars of that city. The coupon must be used on the day of issue, and in this special case was made good for all day. For the roads in smaller cities, where the manager is working to educate the public up to the duty and pleasure of frequent riding, the plan may be tried with whatever modifications seem desirable to suit the necessities of each case. Where a road enjoys all the business

it can take care of there would be little object in it, but we know many places where the supply of rides is largely in excess of the demand, and to such the suggestion may prove of value. Where the fare is five cents, the company might allow the newspaper a two-and-a-half cent rate on each coupon used, as the road would collect a full cash fare for the return trip of the pleasure ride taken on the coupon.

There is more in educating the public to the riding habit than many have supposed, as was demonstrated in the able paper by President Owen, of Reading, before the Association at the Buffalo meeting.

THE Cleveland Convention will go down to succeeding gatherings as one of and in many respects the best ever held. While it should have been larger, it is doubtful if the attendance of street railway officers proper was quite as large as last year, owing to the unfortunate conflict of the selected date with that of Columbus celebrations in all parts of the country, and particularly in the West. The supply men were out in full force, however, and by an exhibit of street railway appliances wholly unprecedented, made a display, interesting, instructive and highly attractive. A much larger per cent of exhibits were of merit than in previous years, while several were so extensive as to have been made only at an expense of several thousand dollars each. Little wonder that thousands of Cleveland people poured in to witness the display.

While the crowding from this source did not take on the nature of the "jam" which occurred the year previous, we cannot refrain from repeating our suggestion already several times made, that the local committee provide either passes for non-street railway people, these passes to be issued by exhibitors, delegates, or local committee; or better still, publish in daily papers the announcement that citizens will be welcomed to the exhibition during those hours when convention is sitting in session, at which time few street railway men care to visit the display. This would accommodate all parties without crowding.

Without individualizing, it may be said the reports presented were all good, uniformly better than for several years, and indicate the ability of the members to keep pace with the progress and change so rapidly making.

Cleveland is a beautiful city; its citizens hospitable in the extreme; its facilities for accommodating the convention admirable; and every one carries away most delightful memories of a sojourn all too short.

IT was a pleasant convention-session-study to watch the different speakers and select those who would make successful presiding officers. One who has never counted the available material of this kind would be surprised to discover how really large a supply the association possesses; men of considerable executive and parliamentary ability, and who from constant daily experience do not get easily unbalanced in their thinking apartment.

IT was a thoroughly electrical convention. The cable received a few crumbs in President Holmes' able address, and several speakers who had had experience in both cable and electricity acknowledged the field which is pre-eminently the cable's under conditions of very heavy traffic; but the horse never got a bite: Attendance on the sessions would clearly indicate the noble animal was considered as having outlived his usefulness, and never a word was dropped as to the amount of salt required to satisfy the cravings of the inner horse, or whether he should be blanketed this winter. In fact, no one seemed to care a blank whether there was any horse or any winter; somewhat of a change over the anxieties of a few years ago.

The complexion of delegates composing the sessions has been radically changed in the last two years. A member of three years ago would feel more like a stranger than one of the family of old. The older faces are rapidly dropping out from one cause and another. New and younger men have been born to the association through the necessities of electric operation, which have been obliged to call in those familiar with the subtle art, and these have all been young men.

There is still very much of value in these conventions to operators of horse roads, of which there will doubtless remain a large number for some years yet, and which are still, in point of numbers, in the large majority. Because new ideas seem to occupy exclusively the convention time, the horse-road man should not feel slighted or as one expressed himself, as "not in it." All will find abundant suggestions in the report of the meeting.

THE Cleveland convention was characterized by sensible reforms in several directions over previous similar gatherings. At Pittsburg and Buffalo the delegates waded almost knee deep in advertising literature handed and thrown about by the various exhibitors with an utter disregard of expense or utility. It became not only an impossibility for anyone to carry home one each of all the pamphlets and circulars, but so common did they thus become that what virtue they ever possessed was lost. The money thus worse than wasted, if expended through the medium of trade papers of recognized standing would have borne fruit during a whole year.

In the question of souvenirs there has also been a decided as well as much needed reformation. It is a graceful, pleasant thing, to give the manager something to take home with him, but the rivalry grew to such an extent that nothing short of a really expensive souvenir was considered worth receiving and even such suffered with the others in being under-estimated.

In our judgement there is far more efficacy in sending out at any other time of year the souvenirs usually used at such conventions than to distribute them at such times. It is very nice to have some little inexpensive reminder of the donor, but we believe in the simple and useful, for every sort of useable article has greater virtue in proportion to the expense than its more pretentious rivals. Dealers this

year, more than ever before since the exhibit assumed large proportions, have used good common sense in their entertainment, printed matter and for the few there were, souvenirs. We believe the precedent thus established will continue. It certainly should.

D. F. LONGSTREET.

THE president-elect of the American Street Railway Association, way born at Killingby, Connecticut, in 1846. His education was acquired in the East, where the most of his life was spent. At the age of sixteen, or, in 1862, he entered the federal army as a private, serving until the end of the war. At the time of discharge he was nineteen years of age and without any visible means of support. Nothing daunted, however, he applied for the first position that came to hand, which was that of a conductorship of the Providence, R. I. street railway, in which capacity he served seven months.

His superiors, however, recognizing in young Longstreet, ability and probity, gave him the position of clerk in the general offices, where he spent four years. After which he became successively secretary, treasurer, vice-president and general manager.

This was the history of his life for nineteen years.

In 1888 Mr. Longstreet removed to Boston and became connected with railway interests there. Besides, as mentioned in another page of this magazine, he organized the American Street Railway Association, on account of which and on account of his general ability, he has been honored by being made its executive head.

For the past few years Mr. Longstreet has resided in Denver, Colorado, where he built the West End road about two years ago and of which he is now president.

He resides in his beautiful Boston home part of the time, while the rest of the year is spent in the shadow of the great Rocky mountains.

The reader must see between the lines of this incomplete sketch of Mr. Longstreet's life, the hard work, business tact and ability that has raised him to his present position; and must imagine the opinion of his contemporaries in the street railway world by the incident of his election to the highest honor within their power to bestow.

The new president, with a quarter century experience in street railway work, during which time he has always kept up with the progress of the day, and a genial gentleman with a large acquaintance of warm friends, is fitted to grace the chair, as he will do, with dignity and acceptability.

A WOMAN put her son on the front platform of a car with the bundle. "Madame," said the conductor, "your child is crying in front." "Where else should he cry?" she retorted. "He is no revolving lighthouse."

A CLOUDBURST at Brunswick, Ga., recently, accompanied by an electric storm, damaged \$20,000 of property and floated off two street cars together with the tracks on several streets.

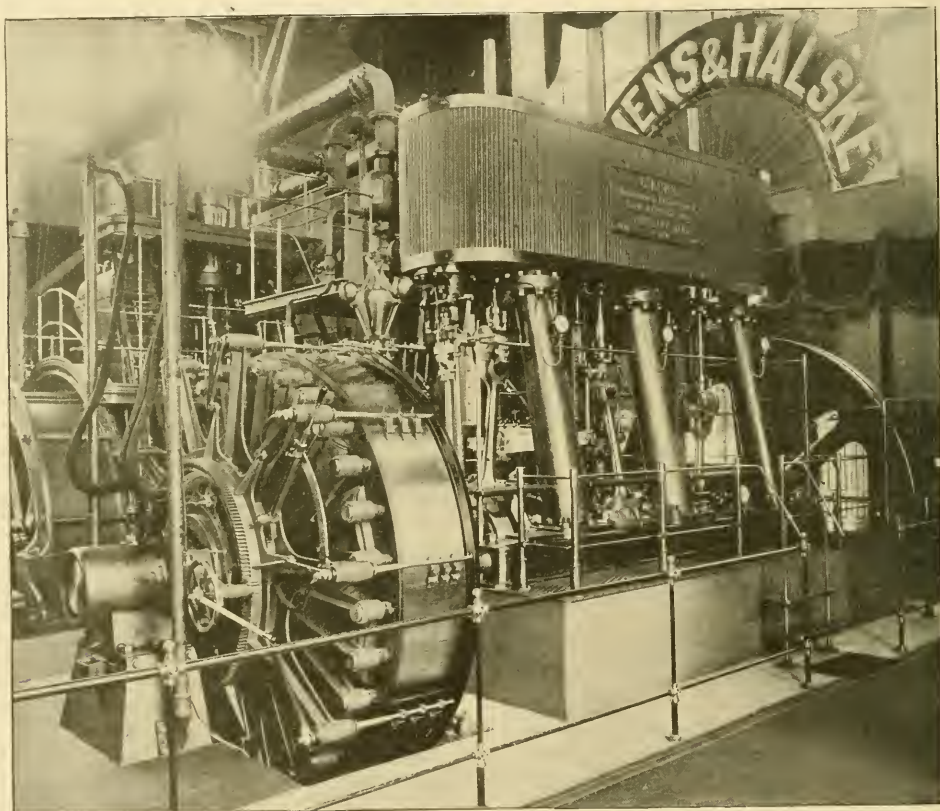
SIEMENS-HALSKE OF AMERICA.

NO electrical news since the great consolidation has aroused as wide and intense an interest in the street railway world as the proposition of Siemens & Halske, the great German electrical manufacturers, to establish in the new world a manufacturing branch of their plant.

Without doubt the trade in America will be benefitted by competition with the careful, systematic and broad gauge German manufacturers, and with one accord they should be accredited a place in the plans of America. their adopted base of operations.

Thus with a record of continual invention, of the upbuilding of several of the largest manufacturing plants in Europe, the magnitude of which is not eclipsed by the famous Krupp establishment for the more warlike purpose of making great guns, the Siemens-Halske Company has every point in its favor for the prosecution of a magnificent career in the United States.

The Siemens-Halske Company, in selecting Chicago as their base of American operations, showed the same foresight as is evinced in the choice of O. W. Meysenberg as their manager, J. Holt Gates as sales agent, and



SIEMENS-HALSKE 746 KILO-WATT DIRECT-COUPLED RAILWAY GENERATOR.

The name of Siemens & Halske for many years has been intimately associated with electrical development on the continent as those of Mr. Edison and Professors Thompson and Houston have been in the occident.

The Siemens family in particular has, besides so large a share in the growth of electrical science, a grand record in other branches of commercial science. George W. Siemens, a brother of Baron Warner von Siemens, whose invention of a dynamo bears his name, was the originator of the celebrated and universally-used open-hearth steel process, while Frederick, another brother, is the inventor of the regenerative furnace.

Alexander von Babo as electrician. Their extensive factory located at the corner of Blue Island avenue and Paulina street, is a two-story structure 200x250 feet, covering fifteen acres with foundry and complete machine shops.

We take pleasure in this number in showing a few views of the Siemens-Halske equipment, and begin with an engraving of a 746 kilo-watt direct-coupled street railway generator.

"It is of the inside pole ring type, which class has from four to twelve poles. They are placed in the form of a star inside the rotating armature. The brushes,

which are always of the same number as the field magnets, take off the current from the outside of the armature winding.

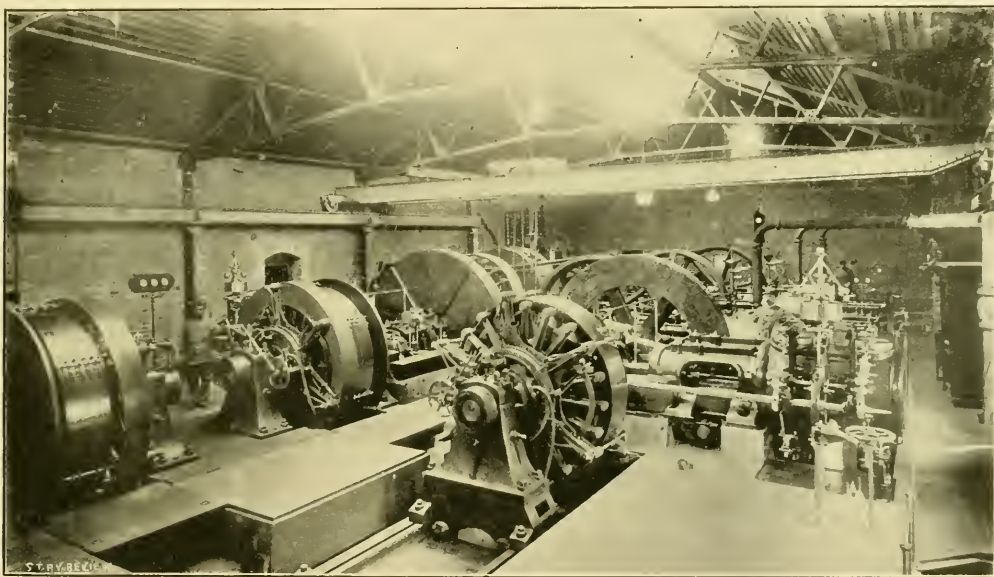
The armature itself consists of an iron core wound with copper segments. The special machine herewith illustrated has ten poles, and is designed for an output of 716,000 watts. This machine can be built without special commutator from 100 to 700 volts, and can be used for lighting and power. The loss of voltage in the armature is only two per cent with maximum load. For exciting the field magnets, only one and one-half per cent is required. Therefore the electrical efficiency of this machine is about 96½ per cent. It is shunt wound and has a surface velocity of fifty feet per second."

The above quotation is from the *Electrical World* of New York.

in the foreground weighs nine tons. The commutator of the first of these machines has now lasted three years without renewal, or appreciable wear. The four different lines of electric street railway in Budapest are all operated from this central power house.

In a building adjoining the one shown in the above cut, storage batteries are located and in a subsequent issue, we hope to give some figures showing the large experience in Europe of storage batteries as a reserve power. This system is operated at 300 volts. The capacity of the smaller generators is 225 amperes, and the large generators 600 amperes.

Regarding the street construction of the Budapest electric railways, a little historical digression may be permitted. In the early days of electric railway construction it was recognized in America that with the bitter



DRIVING PLANT BUDAPESTH ELECTRIC RAILWAY.

Another illustration is of the driving plant of the Budapest electric railway and is now published for the first time in America, and in view of the interest centering upon the future of the Siemens-Halske Company in this country will have unusual interest, as indicating the character of work installed by this world known firm. Our readers will best understand the machinery shown in the engraving by an acquaintance with the following data:

The generators are coupled direct to the engines, of which there are two 200-horse-power each and three 100-horse-power. The engines are compound condensing and make 185 revolutions per minute. The generators are known technically as "I-93," with six poles. Steam is used at 120 pounds pressure. The 200-horse-power engine and dynamo occupy a floor space of 16 feet square. In the ordinary use of the roads, 300-horse-power suffices to operate forty-two motor cars. The fly-wheel shown

feeling against the location of wires overhead, that a conduit construction would best meet the views of the public.

Siemens-Halske opened the first overhead electric line in the world for commercial purposes, in 1879. In 1883 the first road was opened in the United States at Cleveland, which was built under the Bentley-Knight patents and consisted of conduit construction. One car worked successfully, but the addition of more cars entailed difficulties and the line was abandoned.

From that date to this probably a million dollars has been spent in the United States in an attempt to build a successful electric conduit road and all except the Love system have already been abandoned. The difficulties surrounding their construction and operation and the failures attendant thereupon enabled the street railway officials to obtain franchises for overhead construction. This they greatly preferred, as the cost of conduit construction is much greater,

Siemens & Halske turned their attention to conduit construction, and on July 30, 1889, opened the first road in Budapest. This line operated so successfully from an electrical, mechanical and a financial standpoint, that within a short time three other lines of road were opened, and they would only be too glad to build additional lines if the necessary legal permission could be obtained.

Our readers will ask wherein the Budapest construction differs from the previous attempts made in America. First and foremost, they used only 300 volts, as above described, which renders insulation more easily obtained. In the second place, the conductors consist of lines of angle bars. The shape of these bars is quite important, as the contact is much more perfect between what we call the trolley, and they designate the "ship". These angle bars are supported on iron brackets at suitable intervals, which are insulated from porcelain cups by means of the Siemens' cement, and then the porcelain has the same cement outside of it and between the cast iron of the yoke.

These lines are operated for about 40 per cent of their gross receipts. While wages are about twice as high in the United States as they are in Budapest, still, the rate of fare is only one-half, namely, two and one-half cents per passenger, while the price of coal is from three to four times as great as in Chicago or St. Louis, so that the comparative expense should not vary greatly between the two countries.

THE AHEARN ELECTRIC HEATER.

THE electrical trade is well acquainted with the reputation of the Railway Equipment Company, Chicago, for energetically pushing the sale of the material it handles. This activity has in no department been more noticeable than in that of electric heating. Clearly seeing the tendency of the awaking interest in that subject, it obtained two years ago the control of an electric heater, at the time, was the only practical device of that description made. Having placed hundreds of these heaters in all parts of the country, and having constant calls for an improved heater, and also heaters for other than car use, they investigated for nearly a year the merits of the Ahearn Electric Heater, and finding it an almost perfect device, they have obtained the entire rights for its manufacture and sale for the entire world. The company is about to issue an illustrated catalogue, showing the Ahearn Heater in actual use, and in the meantime they are prepared to give facts and figures or actual results obtained by the use of their convenient and efficient heater. Samples of these heaters will be shown, at the convention and are also in operation at the office of the company, Pullman Building.

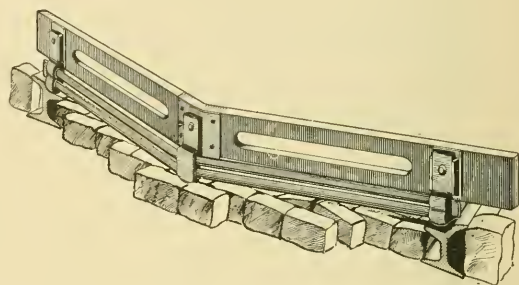
The Columbia Railway Lamps have nothing but the best to report. Their sales are largely increased for the railway as for the commercial lamps and the factions are running day and night to keep up with the orders.

THE BOSTON FENDER.

IN the City of Boston, for the past few months, no subject has so taken up the interest of the street railway men and inventors as that of fenders. From eleven to fifteen devices for saving the careless newsboys and the worthless pug dog, have been tried before an aldermanic commission, with various results. Among the candidates is one that bids fair to be an eminent success, the invention of M. S. Starkweather, who for 25 years was connected with the West End in nearly all capacities, and thus is the best fitted to know the necessities of the case and the dangers and obstacles to be overcome.

We represent, through our Boston representative, an engraving of the Starkweather, or as it is called, the Boston fender.

The fender is made principally of wood, thus allowing



as great accommodation as possible in giving resistance and is readily adjusted to motor trucks, trailers, or other cars, without interference with existing arrangements. The middle of the fender is sufficiently in advance of the ends as to push an obstacle off the track instead of shoving it in front. On the exposed side are metal hangers as illustrated, holding a set of two rollers each, which extend from the centre of the truck to the rails. These rollers have iron rods passing through them with ends held securely by the hangers, which work in a vertical slot.

These rollers are to reduce friction when solid objects engage with them, but not when the weight comes from above or when an object is to be carried or pushed from the track. The principle involved is one accentuated by Mr. Starkweather, in that fenders should work in a perpendicular position, as a person in front of the wheels needs all the space he or she can get in order to save his or herself. The rollers ride one inch above rail, and have an additional rise of three inches. The wooden portion of fender remains in position at all times, all the vertical motion being made by one or both sets of rollers. The Boston papers speak very favorably of the invention.

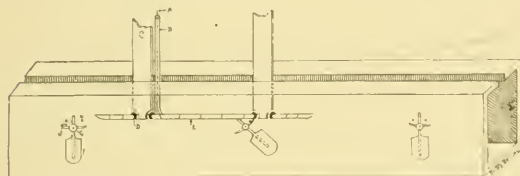
The compressed air system which was put in some time ago at Birmingham, England, has been abandoned, and is now proposed to utilize the underground main for the distribution of fuel gas for heating and steam making purposes.

TWO ELECTRIC RAILWAY CONDUIT SYSTEMS.

TWO attempts to solve the question of an underground trolley have come under the notice of the REVIEW lately. The first here represented is the idea of D. E. Kimball, of Topeka, Kansas, and is taken in hand by C. H. Talmadge, who has an office at 517 Unity building, Chicago.

The system as the engraving readily shows demands two conduits, one for the trolley shoe, and another for the insulated feed wire.

The conduits both together occupy little space and are very shallow. At convenient intervals the insulated wire is brought through the partition wall of the conduit and makes a live point. Through the other conduit is pivoted a connector which remains dead until the shoe presses it down, making a connection.



On the diagram the letters correspond as follows :

A, insulated wire carrying to the motor : B, its insulation : C, bar attached to car and carrying shoe in the conduit ; D, insulation of bar from shoe ; E, snake jointed shoe ; F, weight on rocking shaft ; H, point of contact ; J, radial wing ; K, conduit.

The contact points may be spaced at any distance, but the shoe must rest always upon two contacts.

The company organized to push the invention is called the Kimball Electric Company and has a capital stock of \$5,000,000, organized in Illinois.

The company is proposing to try the device on a suburban road near Chicago.

THE BRADLEY RAILWAY CONDUIT.

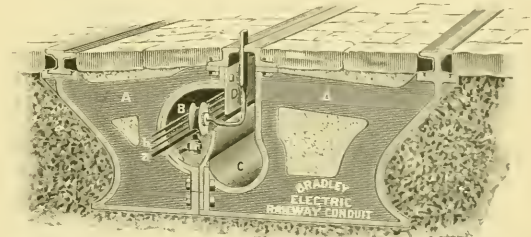
This construction is somewhat similar to that of the ordinary cable conduit system, but is claimed by the inventor to be less expensive; and the expenses for the power plant, and the cost of the power propulsion and the wear and tear or maintenance, is also proportionately cheap. The cost for the power or generating plant, or for propulsion or maintenance is not greater of course than for the overhead system, but is claimed that there is a saving of electrical power, also, by reason of the more thorough protection of the trolley wires from non-insulating forces, falling water, dust, ice and other substances. The accompanying engraving shows the plan, the yoke, as with the cable system, must be of sufficient strength to carry and safely protect the slot rails and the main rails. These being secure, the conduit and drain are secure. The slot is similar to that in the cable system. The slot connection with the drain is covered by the Bradley patent.

The slot : This leads directly from the street surface to the drain below ; and the viaduct is so constructed as to prevent the ingress to the electrical apparatus, of all street debris, dirt, street water, and mud, or other substances deterrent to economical electrical conduction. The drain connects with the catch-basins and sewers are required.

The conduit : B. This contains the electrical apparatus, as in use with the overhead system. It is perfectly insulated ; acts as the return for the electrical current ; may be open for examination or repair by removing a slot rail and a front plate or deflector D., without materially disturbing the street surface : or by man-holes, as desired or required ; and into the conduit water, mud, etc., cannot enter to disturb the force of the electrical current.

The drain : C. No other system of electrical railway conduit can apply this absolutely necessary method of carrying off the debris from the street, without infringing this patent, Mr. Bradley says.

The deflector plate : D, acts as a drip. It protects in front of the trolley plate of the conduit, and thereby acts as a shed, directing all foreign material from above to the drain below, preventing its introduction to the conduit proper.



A—The Yoke, placed at intervals, for support of Conduit, Slot Rails, and Main Rails.

B—The Conduit for Electrical Apparatus,—trolley wire, trolley, feeding wires, etc.

C—The Drain, connected with sewerage system, through catch-basins.

D—Deflector Plate, forming a drip, whereby water and dirt are excluded from entering the Electrical Circuit. By removing the Slot Rail and this Plate, the apparatus in the Conduit is accessible.

a—The Trolley Wire, or Tube.

b—Feeding Wires, enclosed in lead-covered cable or otherwise.

The trolley wire : A, or conductor. This may be a wire, as in the overhead system, an angle-iron, or a wire in a steel tube, as by a patent issued to Mr. Bradley, or otherwise, as economy in construction, and expense for operating may be deemed best.

Feeding wires : These are contained within the conduit, no excavation being required. The conduit may also contain wires for electric street lighting, if desired.

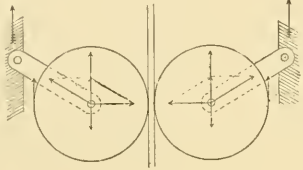
The Trolley : Is of the usual kind and the electric current is carried through wires within an arm from the trolley to the motor within the car.

A NATIVE company at Constantinople has asked the Minister of Public Works to grant a concession for a tramway in Bagdad.

VAN ZILE'S TRACTION CAR.

WE illustrate herewith a device particularly applicable for the assistance of electric cars on heavy grades, although it may be of use for steam roads as well.

H. L. Van Zile, of Albany, New York, is the inventor and the idea is clearly shown by the accompanying diagrams.

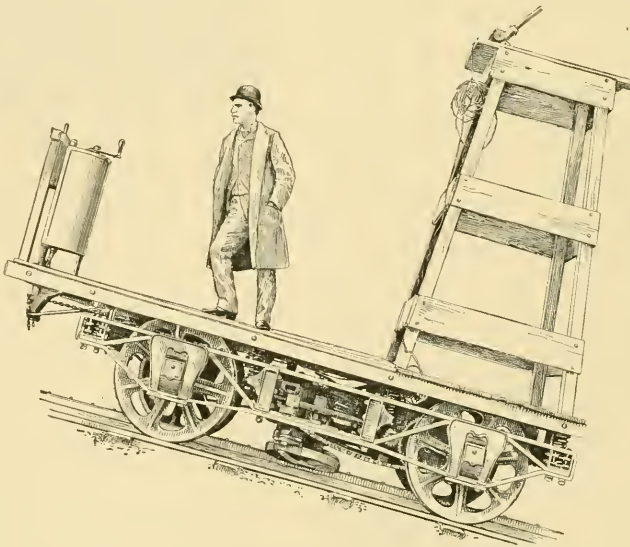


A friction rail is placed and securely spiked in the center of the track (see figure 1) and on either side traction wheels are applied, to which power is given, one end of the arms supporting which is pivoted to the car body. When the car is driven in the direction of the arrow (figure 1) the tractive force presses the traction wheels against the center rail with a force that increases in proportion to the tractive effort. The relation between the pressure of the wheel on the rail and the tractive force exerted depends upon the angle which the pivoted arms make with a perpendicular to the rail.

The wheels are kept against the center rail by a light spring which gives them an initial grip enough to prevent slipping at the start, but as the tractive effort increases slipping becomes an impossibility.

By two pairs of wheels inclined in opposite directions grades in either direction can be overcome. With one or two picked men to operate the "helper" on heavy grades and inclines, the greatest safety may be attained.

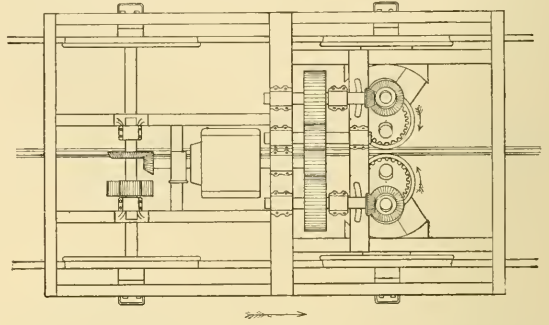
In the first machines built, grades of 5 per cent, 15 per cent and 30 per cent were overcome in the presence of a number of street railway men. Several improvements in gears are made in a new machine, and difficulties of the old gearing will be obviated, no sprocket wheel and chain being used, as is illustrated in figure 2.



SWINDLING SCHEMES.

FOR new turns in beating the management, the conductors of the Cincinnati roads show the most inventive genius.

Recently, on suspicion caused by small returns, a detective was given a place as conductor on the Cincinnati & Covington, with instructions to watch. Being a companionable and agreeable fellow, he was soon approached



by a fellow conductor and asked if he was not "short". He replied that he was, and was handed a bundle of punched tickets. Observing that one was scorched it was an easy matter to trace it back to its origin, where it was found that the receiving clerk was accustomed to stack the punched tickets in a flour sack and deliver them to the fireman for cremation. This worthy, however, raked them out of the furnace as soon as the clerk's back was

turned, and sold them to the economical conductors at \$2 per hundred. When a conductor received a ticket, he would ring and register, each time keeping tab as to how many were received on each trip, and then turn in the resurcted and already punched ones to the office. The good tickets were sold at a profit of seven cents apiece on the car for the benefit of the conductor. It is estimated that about \$20,000 have been lost to the company by this deal. Six conductors are now

looking for new jobs.

E. W. OLDS, master mechanic of the Denver Tramway Company paid the REVIEW a call.

FRED S. WARDWELL, manager of the Duluth Street Railway Company, visited the REVIEW while on his way to Cleveland.

ENGLISH ELECTRIC RAILWAY.

THE Royal assent was given, June 28, for an underground construction electrical railway between Moorgate and Finsbury Park. The engineers are Sir Douglas Fox, Mr. Francis Fox and J. H. Greathead, C. E. The land valuation is estimated at £100,000 and the whole cost of construction in the neighborhood of £1,200,000. The authorized capital is £1,500,000 and the official name is the Great Northern and City Railway with Lords Camboj and Lauderdale, Roger Richards, Daniel Bayley and J. H. Boney, as directors. The length of the line will be three miles, and it will take ten minutes to make a trip. The Greathead method will be used, sinking two tunnels to a depth of fifty feet. Elevators accommodating 100 people will be built at each station. Trains on the rush trips will have a headway of three minutes.

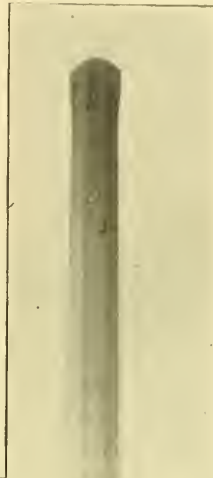
THE Minneapolis electric line recently hauled 20,000 school children to a picnic, at the company's pleasure grounds, at Lake Harriet.

LAKE ROLAND ROAD.

THE traction boom in Baltimore is being rapidly followed up by the building of the Lake Roland Elevated Electric which will be put in commission

about January 1. The new Duplex side bearing rail, three and a half inches in width, has been adopted as best for the purpose and every effort is strained toward the completion of the equipment. The power at Stony Run will soon be in readiness and track laying will begin shortly. Joseph P. Smith has been appointed general manager of the road and L. N. Frederick, superintendent. S. M. Jarvis is the president.

Trains will be run at high speed, and equipment will be fine.



POWER HOUSE—BROOKLYN STREET RAILROAD—CLEVELAND.

CLEVELAND'S STREET RAILWAY TAX.

THE board of equalization and assessment added a total of \$279,070.86 to the street railway personal property for the past year, giving a present total assessed value of \$885,129.66. The present valuations are distributed as follows:

| Road, | Returned, | Assessed. |
|--------------------------|--------------|--------------|
| East Cleveland, | \$150,540.00 | \$250,730.00 |
| Cable Company, | 161,796.80 | 187,314.10 |
| Brooklyn Company, | 119,916.00 | 142,404.00 |
| Broadway and Newberg, | 72,295.00 | 135,741.40 |
| Woodland Ave. and W. S., | 75,835.00 | 109,922.96 |
| South Side. | 25,676.00 | 59,017.20 |

THE board of surveyors, at Philadelphia, have approved plans for three small parks, to be called the Pleasant Hill, the Ontario and the E. E. Knight.

DULUTH AMPERE CLUB.

THE Ampere Club is the name of the social and scientific association of electrical workers at Duluth. The club has over 100 members. President Mendenhall recently addressed the members and paid the club and General Manager Wardwell high compliments. Among other things he said: "That any man who had enough sense to take proper care of either end of an electric car had every opportunity to rise in the world."

THE latest report is that a Washington doctor has compiled a list of seventy cases of sudden death induced by running after cars. These ought to be charged up to the trolley, because if the trolley was in use there would be a "next car," and thus avoid the slaughter.

THE CITY AND SUBURBAN RAILWAY OF PORTLAND, OREGON.

A Superb Railway Property with Forty Miles Operating Electrically — Car Dispatching by Telephone — Successful Management of the Campbell Brothers.

THE advance of the electric street railway in western cities has been very rapid, from the fact that in many of the smaller towns, horse car lines, have never been built, and those same places are now enjoying rapid transit, without having wrestled with the "bobtail" and mule bell. Towns of a few thousand inhabitants are supplied with the latest improved electric cars, well built tracks, fine road beds, and in some places lacking nothing in elegance and management, except the required number of people to ride and thus be able to

The East Side, or that portion of the city east of the Willamette River, formerly known as East Portland and Albina, but now included in the city limits of Portland, dates its awakening from the establishment about four years ago of the car lines of the Willamette Bridge Railway Company. The equipment consisted of three horse cars, that ran from the foot of Morrison street across the Morrison street bridge into East Portland, a distance of about one mile, and was later on increased to one more car, making four in all. The following summer a steam



STEEL RAILROAD BRIDGE OVER WILLAMETTE RIVER—UPPER STORY USED BY CITY AND SUBURBAN LINES, PORTLAND, ORE.

meet the pay roll and expense account at the end of the month; and even these are fast increasing in numbers, with the rapid growth of the far west.

Portland, Oregon, is no doubt better equipped with electric street railways than any city on the Pacific Coast, in fact, than any city west of Denver, her mileage reaching 100 miles and with equipments of the latest and most improved patterns.

The City and Suburban Railway Company controls about 55 miles, 40 of them being electric and 15 steam. This line operates from Third and Morrison streets, in Portland, and diverges to eleven different points, the longest being nine miles from this center. Each electric car, sixty-five in all, passes this point at intervals during the day, and the Company's office being located here, the supervision by the management is complete.

motor line two miles long was built, connecting with the horse cars for Portland. In three years this motor line has increased from a small steam motor and a bobtail car for passengers, to an equipment of six Baldwin motors and nine coaches, and to six miles trackage. The line opened up some of the finest suburban residences around Portland, Mt. Tabor, the terminus, being largely settled since the advent of rapid transit.

The first electric line in Oregon was built by the Willamette Bridge Railway Company, opening November 9, 1889, and ran from Third and G streets in Portland across the Union Pacific steel bridge into Albina. The equipment consisted of five cars with Brill trucks and Edison No. 6 motors. A transfer was made at the Portland terminus with the lines of the Transcontinental Street Railway Company, which carried passengers to

any part of Portland. In 1890, this line was extended by a steam motor to a point down the river, about seven miles, which is now being successfully operated.

When this motor line was built, the right of way was cut through heavy forests that are now growing villages, with their churches, electric lights, water works, and last year were annexed to Portland. In connection with this line the company has inaugurated a freight and express service that has grown into much popularity. A flat car was fitted up with a body, modeled after the broad gauge express cars, but to conform with their coaches, and is run four trips daily. Small packages, freight of all kinds and parcels are carried on these trips, being delivered by

continental was necessary, and steps were taken to that end. Twenty-five cars were ordered, each equipped with two 30-horse-power T-11 water proof motors, on maximum traction Brill trucks. The cars are 30 feet long, painted white and built with straight sides, making a handsome and novel appearance. The entire length of this road, twenty-one miles, was rebuilt and double-tracked, a new 50-pound girder rail being laid in many places. Through the principal parts of the city, on Third, Morrison and Glisan streets, the service is three minutes and on other streets seven minutes. The suburban travel is a fifteen and thirty minute service, which will be reduced when travel warrants.



TRACKS OF CITY AND SUBURBAN RAILWAY OVER THE BIG BRIDGE, PORTLAND, ORE.

the conductor of the train at the different stations. The company issues a receipt for all packages, and takes the consignors receipt, releasing the company from all liability after the goods leave the car door at the different stations. The charges are made regarding weight and size and range from 10 cents to 25 cents. The business is increasing and shows that express cars can be operated successfully in connection with street railways, as so frequently advocated in these columns.

The growth of the Willamette Bridge Company's lines, having all been changed to electric on the East Side, with no direct connection in Portland, led the officers to look to either the purchase of, or consolidation with some other line. The result was the consolidation of the Transcontinental Street Railway Company with the Willamette Bridge Railway Company and the formation of the City & Suburban Railway Company, with a capital stock of \$1,000,000. A new equipment of the Transcon-

There are five car houses, three of them being for the storage of electric cars and two for steam motors and coaches on the suburban lines. Those on the east side of the river are located at Woodstock, Mt. Tabor, Albina and St. Johns, and will average about fifteen cars storage capacity each. The principal car house is at Twenty-fourth and S streets in Portland, where 25 cars are stored. This house is built of brick, 176 feet front and 135 feet deep, and is shown in the accompanying engraving. Opening from this house is the blacksmith shop, machine shop, repair and paint shop and armature room. A new lathe, wheel press, drills and other machinery have been added, operated by an electric motor, and all repair work is done at this point. The company is now engaged in building fifteen cars, 28 feet long over all, with Brill maximum trucks. This is accomplished by putting two horse cars together and has proven a success.

There are three power houses, the one at Woodstock

operating the East Portland lines has two 80-horse-power Russell engines, slow speed, and boiler capacity of 250-horse-power. The Albina power house has one Bal-

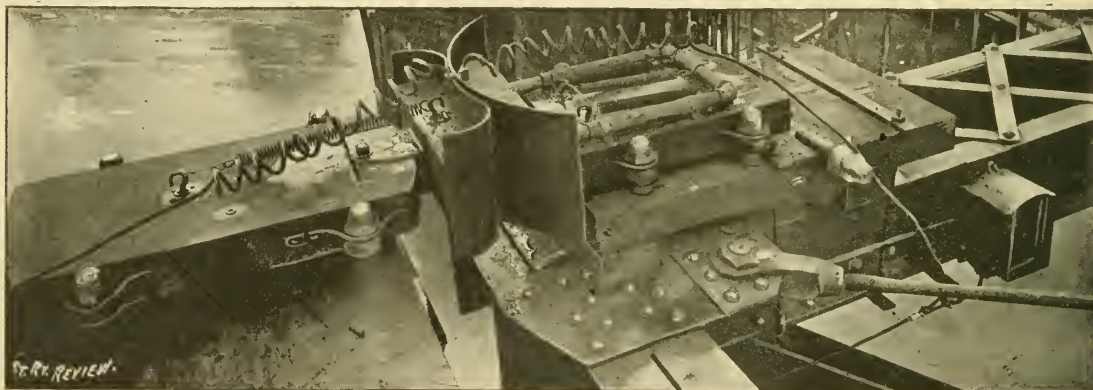


EXPRESS CAR—CITY AND SUBURBAN.

engine, high speed, 150 horse power and two 70-horse-power Edison generators. A new brick power-house has been completed on the east side, 75 feet in width and 83

anything has gone wrong informs him, and is then given his time to start. In case of any obstruction on the lines this will enable the dispatcher to keep up a uniform space between the cars and thus prevent them from getting bunched, as often happens on some lines, which will be a great improvement. In case of a car being disabled, or a fire on the line causing obstruction to travel, the conductor will go to the nearest telephone box and communicate with the dispatcher, and prompt steps will be taken to overcome the difficulty. The dispatcher is furnished with blanks which he fills out with the time, place and cause of any delay or accident to a car, name of conductor, etc., which is submitted to the superintendent, who is thus enabled, while sitting at his desk, to have an eye on the whole fifty-five miles of road under his charge and know just how things are going on.

The system is patterned after that of the Denver Tramway Company, which is considered the most complete in the United States, and the City & Suburban Company is the second to adopt this system. It was put in operation by J. L. McLean, dispatcher from the Denver Tramway Company.



TROLLEY WIRE CONTACT DEVICE CONNECTING DRAW WITH STATIONARY PORTION OF BRIDGE—CITY AND SUBURBAN RAILWAY, PORTLAND, ORE.

in length. It contains, 400-horse-power multipolar generator, of T-H pattern, operated by a Hoffman & Billings 450-horse-power engine. The belt used for the transmission is 120 feet long and 36 inches wide. Saw dust and slab wood will be used as fuel.

It is the intention to operate the entire system from this plant, being centrally located, and convenient for fuel.

All the cars are dispatched by a telephone system from the general office, two dispatchers doing duty during the eighteen hours.

At each end of the lines telephones are placed in iron boxes, to which each conductor on the line has a key, and all these telephones are furnished with metallic circuit. The synchronous clock in the dispatcher's office gives the time for the whole system, and the conductors' watches are set by this time every morning when they start out. On any car reaching the end of its line the conductor unlocks the telephone box there and communicates with the dispatcher, and if he has been delayed or

The Willamette river, wide and deep, separates Pullman and East Pullman, and electric cars are operated on both sides the stream, from the main power house in



THIRTY FOOT CAR—STRAIGHT SIDES.

Roseland. The feed wires are carried across in a large submarine cable, which insures an ample supply of power

on the farther side, whether the draw is open or closed. The contact plates for the section of trolley wires on the bridge, is best explained by reference to the illustration, and by which it will be seen, are placed at the ends of one set of upper chords, where they are out of danger from being harmed or tampered with. The steel plates are bent to slide past each other as the draw swings, but present a firm, tight fitting contact when closed, being kept together by strong springs.

This company has been building lines during the present year, extending them to the suburbs and keeping ahead of the demands of the fast growing city of Portland. The equipment is of the latest patterns and most improved designs in all cars and electrical appliances and fully up to any of the eastern cities.

The officers of the company are as follows: Henry

J. M. MOAN.

ON October 4, John M. Moan died in the city of Chicago, of heart failure. Mr. Moan's long connection with street railway work deserves a longer account than our space allows, but a few incidents from his busy life of 33 years will suffice to show what a self-made man with ability, energy, and honesty may accomplish. J. M. Moan was born on a farm near Belvidere, Ill., and gained what he knew of books in a country school, coming to Chicago he entered the employ of the West Chicago Railway in a humble position, but left for better prospects, to join the fortunes of the Robinson omnibus and street car factory in Minneapolis. The young man readily showed his ability and was made a member of the firm.



THE OLD AND THE NEW, OR, BEFORE AND AFTER TAKING ELECTRICITY.

Failing, president; Tyler Woodward, vice-president; C. F. Swigert, secretary and treasurer; H. C. Campbell, general manager; J. W. Campbell, superintendent; L. Wheeler, electrician.

The active management is almost wholly in the hands of the two Campbell Brothers, and the citizens of Portland have nothing left to ask in their administration. A few years ago, when a ferry boat was the only connection over the great river, they came to Portland, saw its pressing need, returned east, raised the money and built the bridge under the name of the Willamette Bridge Railway Company. As an accommodation to the residents of East Portland they built the line there and this has grown in their hands to the dimensions already cited. They are both young, active, progressive, and very popular, and have now long occupied a position among the leading citizens of that rich and strikingly beautiful city.

From Minneapolis Mr. Moan removed to Nebraska, where he successively built roads at Kearney, Columbus, Nebraska City, York and other places. Mr. Moan was also a prominent figure in Nebraska politics, serving in the legislature and refusing but recently the nominations for governorship and congressional honors. Mr. Moan removed to Chicago about a year ago, as a dealer in real estate where he has since resided.

THE Manhattan "L" road New York, carries more passengers than any other road in the world. During the first six months of this year they handled 105,753,101 passengers; \$5,287,655; burned 2.2 pounds coal per passenger; used a total of over 118,000 tons of coal; run 4,288,548 train miles at a cost of 64 cents per train mile.

It is reported that a storage battery line is to be instituted at Christiana, Sweden.

STREET RAILWAY LAW.

EDITED BY MR. FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Injury resulting from Fright.

If the negligence of a carrier place a passenger in such imminent peril as to cause fright, resulting in illness, the negligence is the proximate cause of the injury, for which an action may be sustained.

Such passenger is entitled to recover to the full extent of the injury so caused, without regard to whether, owing to his previous condition of health, he is more or less liable to injury.

From the complaint it appears that the plaintiff was a passenger on one of defendant's cars running upon its line on Jackson street, St. Paul; that when the car reached the intersection of that line with the defendant's cable-car line, running on East Seventh street, the persons in charge of it negligently attempted to cross, and did cross the cable line in front of a then near and rapidly approaching cable train thereon; that a collision seemed so imminent and was so nearly caused, that the incident and attending confusion of ringing alarm-bells and passengers rushing out of the car, caused to plaintiff sudden fright and reasonable fear of immediate death or great bodily injury, and that the shock thus caused threw her into violent convulsions, and subsequent illness. The complaint shows a duty on the part of defendant to exercise the highest degree of care to carry the plaintiff safely. It also shows negligence in respect to that duty, and, if the negligence caused what the law regards as actionable injury, the action is well brought. Of course, negligence without injury gives no right of action. On the argument there was much discussion of the question whether fright and mental distress alone constitute such injury that the law will allow a recovery for it. This question is not involved in the case. Here is a physical injury as serious, certainly, as the breaking of an arm or leg. If the fright was the natural consequence of the circumstances of peril and alarm, in which defendant's negligence placed plaintiff, and the fright caused the nervous shock and convulsions and subsequent illness, the negligence was the proximate cause of those injuries. That a mental condition or operation on the part of the one injured comes between the negligence and injury does not necessarily break the required sequence of intermediate causes. If a passenger be placed, by the carrier's negligence, in apparent imminent peril, and, obeying the natural instinct of self-preservation, endeavor to escape it by leaping from the car or coach, and in doing so is injured, he may, if there be no contributory negligence on his part, recover for the injury, although had he remained in the car or coach, he would not have been injured. The endeavor to escape is not of itself contributory negligence. *Wilson v. Northern Pac. R. Co.*, 26 Minn. 278. In such case, though there come, as an intermediate cause between the negligence and injury, a condition or operation of mind on the part of the injured passenger, the negligence is nevertheless the proximate cause of the injury. The defendant suggested that plaintiff's pregnancy rendered her more susceptible to groundless alarm, and accounts more naturally and fairly

than defendant's negligence for the injurious consequences. Certainly a woman in her condition has as good a right to be carried as anyone, and is entitled to at least as high a degree of care on the part of the carrier. It may be that, where a passenger, without the knowledge of the driver, is sick, feeble, or disabled, the latter does not owe to him a higher degree of care than he owes to passengers generally, and that the carrier would not be liable to him for an injury caused by an act or omission not negligent as to an ordinary passenger. But when the act or omission is negligence as to any and all passengers, well or ill, anyone injured by the negligence must be entitled to recover to the full extent of the injury so caused, without regard to whether, owing to his previous condition of health, he is more or less liable to injury. If the recovery of a passenger in feeble health were to be limited to what he would have been entitled to had he been sound, then, in case of a destruction by fire or wrecking of a railroad car through the negligence of those in charge of it, if all the passengers but one were able to leave it in time to escape injury, and that one could not, because sick or lame, he could not recover at all. The suggestion mentioned would, if carried to its logical consequences, lead to such a conclusion.

Sup. Ct. Minn. *Purcell v. St. Paul City R. Co.* 16 L. R. A. 203.

Assault by Car Driver—Provocation—Suit by Passenger.

This is an action to recover for personal injuries inflicted upon the plaintiff by one of the defendant's employes, who at the time was in charge of one of its cars as driver or conductor, and upon which car the plaintiff had taken a seat as a passenger, his fare having been paid by a fellow passenger. After the plaintiff had so taken a seat in defendant's car, and after his fare was so paid, the driver demanded of plaintiff that he personally pay a fare, over which demand some words were had between them, and the plaintiff threatened to report the driver's conduct to the superintendent of the railway. Thereupon the driver made an assault upon the plaintiff, striking him with great force while plaintiff was so seated in the car, and at the same time shoving plaintiff's head through the glass of one of the windows of the car. During the assault the plaintiff undertook to and did leave the car, and the driver followed him quite a distance from the car, pounding plaintiff with a club until he was stopped by some laborers near by. And he says that the assault so made upon him, and the injuries inflicted, caused him great pain of body and mind, and disgrace and humiliation, for which he asks judgement and damages.

All the authorities agree that words of provocation alone will not justify an assault. Where, however, the provocation is recent, it may be shown in mitigation of damages. But even if the driver had been justified in

removing the plaintiff from the car, he would not be protected in using a greater degree of force than was apparently reasonably necessary, and if he did so, the company would be liable. In this case, the driver's own testimony shows his own conduct was brutal in the extreme, and is not justified by anything that appears in the record. There is no doubt of the liability of the company in a case of this kind.

Sup. Ct. Neb. *Hamen v. Omaha Horse Railway Company*, 7 N. Y. L. Jour. 1270.

Independent Contractor—Negligence in making Excavation.

A company employing contractors to make excavations for a building, but whose engineer is to indicate the depth of the excavation, to have charge of the work, and to discharge men who disobey their orders, is liable for damage to adjoining property caused by the negligent manner in which the excavation is made.

Sup. Ct. Mo. *Larson v. Metropolitan Street R. Co.* 19 S. W. Rep. 416.

Street Railway—Renewal of Franchise—Notice and Consent of Property Owners.

A statutory provision that cities may renew any franchise granted to a street railway company at its expiration, upon conditions considered conducive to the public interests, does not prevent such renewal before the expiration of the full time for which such franchise was granted, by agreement between the company and city.

A city ordinance renewing, under Ohio Revised Statutes, Secs. 2,501 and 2,502, a grant of a franchise to maintain a street railway on other streets than those specified in the company's original franchise, is not invalidated by the fact that notice was not given and the consent of the property owners was not obtained previous to its passage, as required by those sections previous to the granting of the original franchise.

Cir. Ct. O. *State vs. East Cleveland R. Co.*, 6 Ohio, C. C. Rep., 318.

Compelling Street Railways to Use Same Track—City Charter—Different Motive Power.

The City of New Orleans has power under its charter authorizing it to compel all railways in any one street to use one and the same track, to grant to a street railway company the right to run its cars over the tracks of another company, though such cars are of a different character and propelled by a different motor than the one in use.

Sup. Ct. La., *Canal & C. R. Co. vs Crescent City R. Co.*, 10 So. Rep. 888.

Contributory Negligence—Deaf Person Crossing Track—Failure to Look.

A driver of a horse car has right to believe that a person about to cross the track is sound of hearing and will exercise her senses by stopping in time to let the car pass her freely.

A person afflicted with deafness and wearing a sun-bonnet protruding so as to obstruct her sight, who attempts

to cross a street railway track without looking to the right or left, is guilty of contributory negligence, and cannot recover for injuries sustained by collision with an approaching car.

Sup. Ct. La. *Schulte vs New Orleans C. & L. R. Co.*, 10 So., Rep. 811.

Rails Projecting Above Cross Walk—Injury to Pedestrian.

Where a street railway company allowed one of its rails to project above the surface of the cross walk so that a pedestrian stumbled against it, fell, and was injured, the jury are warranted in finding that the company was negligent.

The fact that the evidence does not show that any complaint was ever made to the company of the condition of the track, does not relieve it from liability, though it may be considered by the jury in rendering a verdict, since many may have fallen by reason of the condition of the track without being injured, or if injured, without complaining or suing.

N. Y. Ct. App. *Schild vs Central Park, N. & E. R. Co.*, 31 N. E. Rep. 327.

Appliances—Breaking of Grip-shank—Cable Car Running Away—Injury to Passenger.

In an action against a cable railway for personal injuries, caused by the running away of the car on which plaintiff was a passenger, the result of the breakage of a grip-shank, plaintiff cannot complain that he was compelled to bear the burden of proof on the trial, when the court charged that "the burden of proof is upon the defendant to show to the reasonable satisfaction of the jury that it could not discover any insufficiency of the grip-shanks or rail-brakes by the exercise of the utmost skill and foresight." In such a case, the fact that the brakes proved insufficient to hold the cars when the grip-shank broke, raises a presumption that they were defective in construction.

It is the duty of a cable railway company, in supplying grips and brakes and keeping them in repair, to anticipate all such weather and conditions as might reasonably be expected in such a climate.

Sup. Ct. Mo., *Sharp vs Kansas City Cable Ry. Co.*, 20 S. W. Rep. 721.

Car Running at Unlawful Speed—Unsuitable Driver—Injury to Person Crossing Street.

A street car company is liable for injuries to one who, while exercising reasonable care and caution in crossing a street, is struck by a car running at a speed prohibited by a city ordinance and in charge of an unsuitable driver.

Sup. Ct. Mont., *Wall vs Helena Street R. Co.*, 29 Pac. Rep. 721.

THE compressed air system which was put in some time ago at Birmingham, England, has been abandoned, and is now proposed to utilize the underground main for the distribution of fuel gas for heating and steam making purposes.

BRAIN SYSTEM OF ELECTRIC TRACTION.

THE discussion for many months of "closed conduit" system of electric traction has been productive of no definite good, although the name of inventors is legion.

The latest applicant for public notice is C. T. B. Brain of Bell's Building, South Johns street, Liverpool, England, who has devised the Brain System, postulating the three requisites, viz.: cheapness, a wide slot, and a small

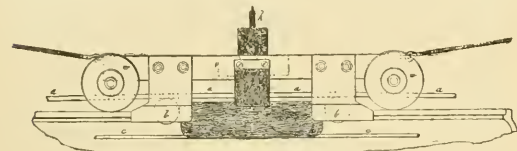


FIG. 1.—SIDE VIEW OF TROLLEY.

conduit, with freedom from foreign substances short circuiting the current. His system is reported to have been successfully tested for the past two years.

A reference to the engraving shows the construction which is a simple cast iron trough. To obtain access for the connection between the car and the line conductor in the conduit, the cover rail is held up about 1 1/2 inches by rollers. The great feature of this system is the cover rail, which is 2 inches wide and 7-16 of an inch thick, and has but little deflection, returning to its seat at a distance of 4 or 5 feet on each side of the raised position.

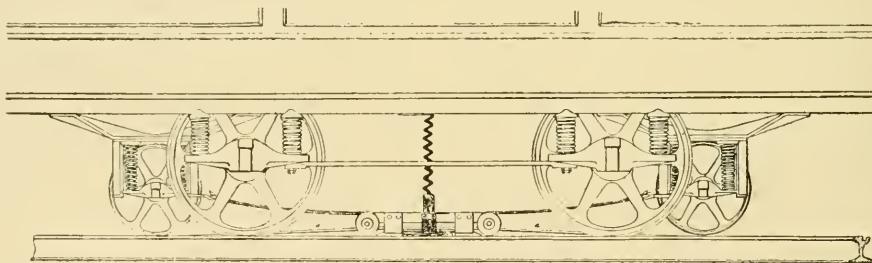


FIG. 2.—COLLECTOR SYSTEM AND TRUCK.

The traveling connection with its sliding contact in the conduit, is called the collector, and is fixed to the brackets which carry the lifting rollers, there being two of these

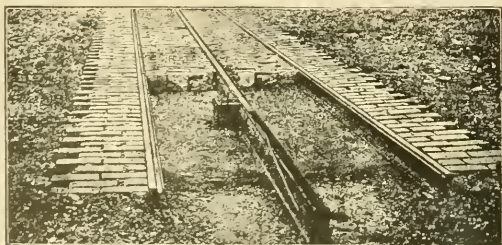


FIG. 3.—CONDUIT CONSTRUCTION.

one at each end of the collector supporting the cover rail. The whole collector frame is supported on a wheeled trolley, which runs up the top edges of the conduit sides.

In figures 1 and 2 will be found details of the collecting trolley in which a, a, is the cover rail; b, the lifting or carrier wheels; c, the conductor and d, a flat conducting strip passing into the slot; f is a contact grip; g, the grip

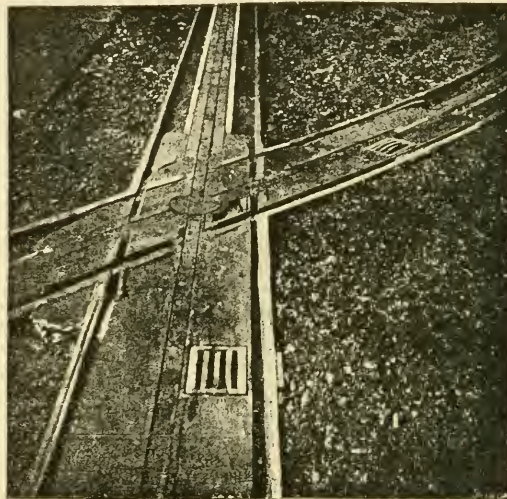


FIG. 4.—CROSSING.

contact piece; h, the insulating block; k, flexible cable attached to the car; w, trolley wheels. The trolley is drawn by ropes hooked to each end. The grip contact

is an insulated connecting plug. The method of crossing is very interesting but space forbids detail.

The experimental track built by Mr. Brain was a straight-away, terminating in a 25-foot curve.

The figures advanced show £4,500 or \$22,500 per mile for construction.

The English technical press and the Electrical Review, to whom we are particularly indebted, consider the system satisfactory from a technical point of view.

In an eastern city recently a lady claimant for damages sets forth as a part of her injuries resulting from stepping from a car to the street and falling over a heap of broken stones, that "where she was abandoned to her fall by the smiling, reckless conductor unconcernedly speeding on and away from the scene, a rapidly dissolving view to his indifferent gaze!"

Heartrending beyond question.



D. F. LONGSTREET,

Denver, Colo.

President-Elect American Street Railway Association.

POPOCATEPETL ELECTRIC RAILWAY.



UNADULTERATED utilitarianism of the American railway promoter stops at nothing. Not content with elevating the weary passenger to the fastnesses of the Kaaterskill and desecrating the profound quiet of Philadelphia, with the business-booming trolley, a

syndicate of American capitalists, represented by Mauricio Rahden, has secured an option on the volcano Popocatepetl, which they propose to operate as a sulphur mine. General S. Ochoa owns the mountain.

The Americans propose to run an electric railway up the mountain and bring down sulphur, which will be mined on a large scale by the most modern machinery, and also to utilize the railway by bringing down natural ice to compete with the artificial ice factories there.

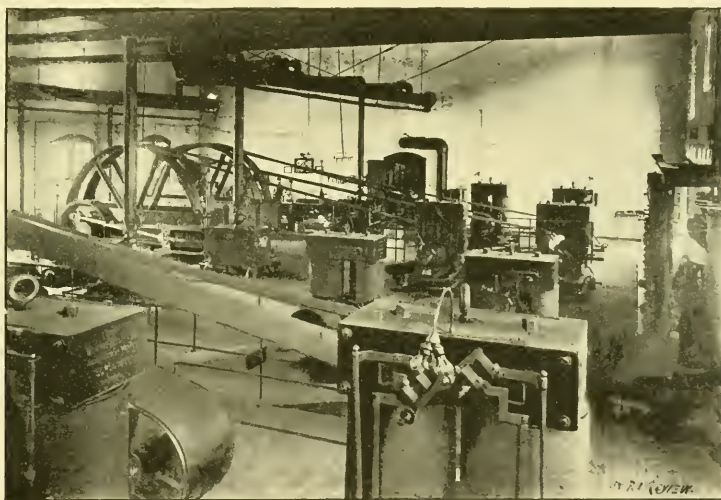
The sulphur is of excellent quality, and is now only used for making powder for the Mexican Army.

now finds use for 2,513 horses, in place of 1,500 ten years before.

The North Chicago still owns 1,300 horses, which are used on the State street, the Dearborn street, the Larabee street, the Sedgewick street and other branch lines connecting with the cable or holding separate patronage.

The last West Chicago horse is numbered 7,900. There are 250 animals on the wrecking service. The Ogden avenue and Twelfth street lines require 1,250 hay-motors, the Blue Island 1,200, and the various other lines from 400 to 600 animals.

The car horses in Chicago have an easy life compared with the restless, feedless existence of some hack and dray horses, and it is not infrequent that lots of real good pity is wasted on the poor street car horse that would be better bestowed on some other lines of horse employment. Streeters are usually bought from Missouri, Iowa and Illinois, and bring from \$100 to \$125 in a good market. Their life is from four to five years, but some old timers have seen Chicago rise from its ashes.



INTERIOR POWER HOUSE—BROADWAY & NEWBURG RAILWAY—CLEVELAND.

CAR HORSES IN CHICAGO.

THERE is room, place and convenience for every system of transportation ever yet devised. The wheel did not put walking out of fashion and steam roads have not divested horses of their place in the world's economy. The trolley will probably never be superseded for long distance transmission, and the underground electric and the storage battery in their most utopian excellence will only have their place and make their field. So, too, horses have still a niche in the methods of transportation, and it may yet be many years before the last car horse in the small towns has been lost in the history of the past. For instance, the great number of horses displaced ten years ago by the Chicago City have not been sold, except for other reasons than displacement, but have been made useful on extensive feeder lines of this great system. The company

MARRIED ON A STREET CAR.

A NEW Lochnivar story from Indianapolis relates that R. B. M. Smith and Florence Abury had resolved to run the same car on the life-trip and engaged the services of a minister who was on the time card to make the coupling at the brides' parents' home. The assembled guests and the coupler waited in suspense for almost two hours when the latter jumped on a down town car and kept an eye out for the couple who had gone down town ostensibly to shop, some hours before. On passing the last car out the minister espied his charge and entering the car spliced them there where they stood. They had missed their car and had to wait for a much later one, and the only trouble with this tale is that the romance would have been improved by making it a run-a-way match, but the REVIEW's policy is *fiat justitia, ruat cælum*.

A NEW ELECTRICAL SUPPLY HOUSE IN CHICAGO.

THE three moving spirits, bound together in the young and vigorous firm of Taylor, Goodhue & Ames, have already made such a stir in the supply men's world, that to save them embarrassment and loss of time, the STREET RAILWAY REVIEW takes pleasure in introducing them jointly and severally to our railway world, in which as a firm they are already prominent.

WM. TAYLOR,

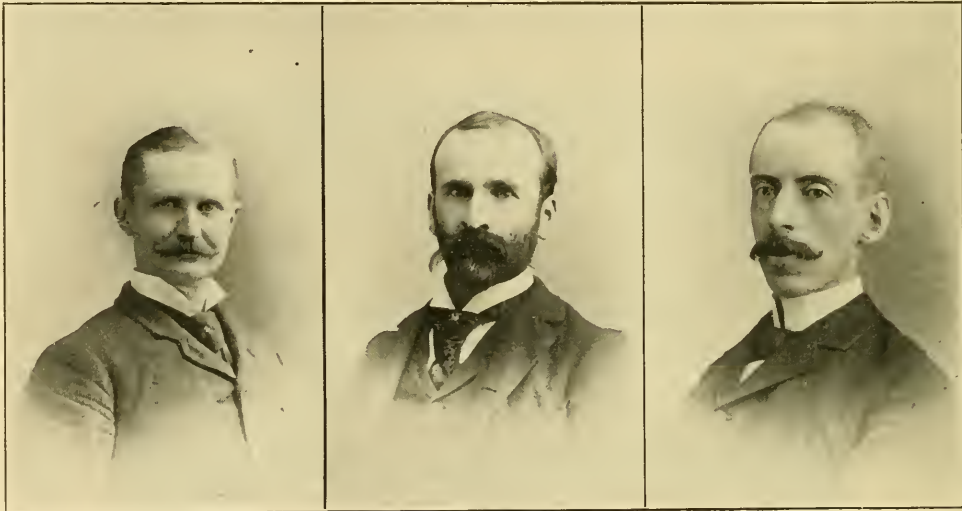
the president of the company, made his debut in Quebec, Canada, November 30, 1859, and passed his school days in this historic city. In 1875 Mr. Taylor removed with his parents to Ottawa, where he entered the excellent high school, and gained his first business experience as proof reader for the Ottawa Citizen, a daily paper of

he remained until a few weeks ago, when a love of more of the "root of all evil," prompted the firm of Taylor, Goodhue & Ames to come into existence. Mr. Taylor's looks speak for themselves in our excellent engraving. Mr. Taylor is also a Benedict, having married Miss C. W. Dee, of South Evanston, Ill., in 1888.

The middle one of the trio is

WELLS GOODHUE,

the vice-president, who began his existence in New York City, on November 6, 1859. His school days were passed in the city of his nativity and his first business experiences was gained as syndicate press correspondent and general newspaper work, and in this latter he remained until his twenty-fourth year. The



WELLS GOODHUE.

HENRY D. AMES.

WM. TAYLOR.

repute. After holding several positions on the staff and being offered the management of the funny column, he judiciously left newspaper work, before he got into Bob Burdette's place and "couldn't quit," to accept a position with the Dominion Telegraph Company, where he remained until six months before the absorption of the Dominion Company. Going back to his first love he re-entered newspaper work until the western fever caught him, and he went to Winnipeg in the spring of 1882, just in time to witness the collapse of the land boom. Here he began railroad work in the freight department of the Canadian Pacific, holding various positions of trust, finally being appointed chief clerk of the Port Arthur division, some 500 miles of road.

Leaving this employ with strong letters, he started for new adventures in railway lines, and, but for an offer from the Electrical Supply Company, would probably have been lost to our electrical world. His connection with the Supply Company is well known, and in this concern

training of his early youth has given Mr. Goodhue his retiring disposition and an idea of not getting "scooped" that will probably not be eradicated in his present avocation. After his twenty-fourth year Mr. Goodhue connected his services with Hopkins & Dickinson, of New York. For four years as western manager he made a record that was appreciated by his principals; but the Electrical Supply Company, on the lookout for bright young men, took him into their fold as special salesman and manager of the household goods and power departments, and also having a special salesman's duties with the Sunbeam lamp and Stanley transformers.

Mr. Goodhue married Miss Louise Graf, of New Orleans, and their home is graced besides by a youth, just old enough to crow for Taylor, Goodhue & Ames.

HENRY D. AMES,

the secretary and treasurer of the company, was born November 11, 1857, and by the same token is two years older than the others in the firm. Mt. Morris, N. Y.,

saw the birth, boyhood and education of Mr. Ames, and from Mt. Morris Academy he went to Hamilton College, where he was graduated in 1879.

His first experience was teaching the young idea at Clinton Academy, East Hampton, N. Y., where he was the successful principal for several years, but left pedagogy for business, joining the firm of Mershon & Bancroft, as book-keeper. He became familiar with wire and wire ropes thus for six years, when the Electrical Supply Company commanded his services as financial and credit manager, where his five years' apprenticeship has been of the utmost use to him.

Mr. Ames married Miss Mary T. Mershon, of Evanston, in 1888 and has one child.

Mr. Ames' varied experience, trained faculties and extensive business acquaintance, as well as his pleasant address, makes him a most truly valuable member of the firm, and the different accomplishments combined in Taylor, Goodhue & Ames will be brought to bear in a telling manner upon the supply trade of the west.

These young men start in with their eyes open and with a determination that is already half the battle.

Seattle Roads Offer Percentage for a Twenty-five-year Extension from 1912.

The various cable and electric street railway companies of Seattle, have united in a petition to the city council for an extension of their franchises for 25 years, the franchises now having an average of 20 years yet to run. They offer in return for this concession to pay to the city a percentage of their earnings, beginning ten years from the present time. For the first five years they offer to pay one per cent, estimated to amount to \$100 per day; for the next five years, one and one-half per cent, estimated to produce \$237.50 per day; and for the remaining 15 years, two per cent, estimated to produce \$400 per day. As a reason for making this offer, the companies state that, owing to the terms of their present franchises, they have been able to sell only a part of their bonds, and that in consequence, a large amount of capital is locked up which might under better conditions be released for other investment in the city. As proof of this statement, they submit the following table:

| NAME. | BONDS. | SOLD. | HELD. |
|--------------------------|------------|-------------|---|
| Front St. Cable..... | \$ 300,000 | \$ 300,000 | ..... |
| Madison St. Cable..... | 450,000 | ..... | \$ 450,000 |
| Green Lake..... | 50,000 | ..... | 50,000 |
| Rainier Electric..... | 200,000 | ..... | 200,000 |
| Union Trunk..... | 350,000 | 16,000 | 334,000 |
| Rainier R. & P. Co..... | 500,000 | ..... | 500,000 |
| Seattle City Ry..... | 1,000,000 | 449,000 | 451,000 |
| Seattle Electric Ry..... | 1,000,000 | 381,000 | 619,000 |
| West St. & N. End..... | 300,000 | ..... | 300,000 |
| Grant St. Electric..... | 125,000 | ..... | 125,000 |
| Woodland Park..... | 50,000 | ..... | 50,000 |
| *North Seattle..... | 100,000 | ..... | 100,000 |
| *South Seattle..... | 100,000 | ..... | 100,000 |
| Total..... | ..... | \$1,146,000 | \$3,270,000 1,146,000 \$2,124,000 |

*Not bonded, but the amounts shown are about what these lines could be bonded for with favorable franchises.

FOREIGN FACTS.

GANZ and COMPANY, of Buda Pesth, submitted proposals for an electric between that place and Vienna.

THE Allgemeine Strassenbahn Gesellschaft, Berlin, has obtained concessions for an electric railway in Chemnitz.

BROWN and BERRY, of Baden, Canton Argau, Switzerland, are building an electric locomotive of 1,200-horse-power.

THE questionable report is going the rounds that an electric railway is projected to connect Riva and Tinzale in Tyrol.

THE Stockholm town council has granted concessions for a storage battery system from the city to Djursholm, a fashionable suburb.

THE Societe des Chemins, de fer Vicinaux, Brussels, has arranged with the Thomson-Houston for an overhead system on their line between the city and La Petite Espurette.

PROPOSED electric tramway in Nordhausen.—The general electricity company of Berlin, has laid before a meeting of the Nordhausen municipality, details of the scheme for the construction of an electric tramway in that town. The project has been favorably received.

THE French paper, Sciences, says that the company of tramways of Paris has announced in its late report that a system of electric traction will be tried and that it is thought will be satisfactory as an investment.

THE Madras electric tramways company announced in its last meeting that W. M. Digby, the president should go to Madras on the fourteenth of October and that work would begin early next year. No contracts have as yet been let. The offices are at Trafalgar Buildings, 1, Northumberland avenue, London.

THE managing director of the Birmingham tramway, Mr. Carruthers Wain, says that if the committee of public works is favorable, that the cable road will be extended along the Stratford road. Mr. Carruthers Wain also states that he has hopes for electric traction, and says that the directors favor a reduction of capital but will abide by stockholders decision.

ANOTHER trolley-sin. A New Haven liveryman left town and a lot of debts. Said nobody cared for "rigs" since the electric cars have been running.

THE article last month, on the Woodland avenue and West Side railway of Cleveland, was incomplete, in that that the name of Superintendent Mulhern was unintentionally omitted. Mr. Mulhern has been connected with his company for a number of years past and has made a record worthy a much more extended notice.

AN ELECTRIC FREIGHT LINE.

THE inhabitants of Chicago generally and especially those in the down-town districts, are often not aware of the tremendous industry that covers a section of valuable land between Fortieth and Forty-seventh street and stretching from Center street to Ashland avenue, and known as the Stock Yards. Here 30,000 men spend the day turning hogs into hams and bullocks to beef, year in and year out.

There is just now a new institution at the stock yards that is attracting men there who would perhaps not visit it on other accounts and which is the forerunner of many other like labor and money savers.

This is the electric tramway which connects all the warehouses, slaughter-houses and shipping points within the small city called the Armour Company's Works.

A stand at the entrance of the offices of the shipping department will reveal an elevated railway track, flush with the second story doors of the buildings and twenty-three feet above the tangle of tracks, teams and toilers which throng the thoroughfare below.

To the south, through an open door may be observed the stark, stiff and ghostly forms of the porkers which erst so gayly grunted, traveling their last chute to the refrigerators, or hams enough to send a theatrical manager to the insane asylum.

But weep not, friend; turn your eyes and thoughts from sudden and violent death to the latest

facility for handling the immense output of these abattoirs, for here comes the shadow of coming events, the first elevated electric tram car for dispatching freight from one to another of the departments.

The motor cars carry no freight. They will be six in number when the full equipment is ready and will handle from 150 to 200 cars daily.

The present equipment usually runs in trains of six cars, a locomotive and five trailers. The locomotives are eight feet long and are equipped with 15-horse-power Thompson-Houston motors. Current is taken from an overhead trolley wire, held sufficiently high to avoid touching when

a tall man stands upright on the car, by a trolley stand of the Mening type. The locomotive weighs two tons.

The wheels on the new cars will be ten inches in diameter and the new freight or trail cars will be seven to ten feet in length, according to the purposes of the traffic and size of the elevators, and will weigh from 250 to 300 pounds. They will be of the flat or rack type with a capacity of eight or ten tons per train load. The new road handles 700,000 pounds per diem.

As the tracks of the tramway proper are on the outside of the building at the second story, in order to more readily bring the cars to their ultimate destination, a series of tracks inside of the house will be slightly inclined so that gravity will distribute the loads to their places, or

land them upon the elevators for distribution on the higher or lower floors. To facilitate this internal traffic about five miles of inside track will be laid flush with the floor so as not to interrupt hand-trucking from one department to another. About three-and-one-half miles of three-foot gauge track will connect the buildings and be laid with 45-pound T rail. The line work and track work were rendered very difficult by the short curves and necessity of anchoring the poles to the side of the wooden superstructure, but the work has been well done and is a great credit to the builder, John Bouchard, master mechanic. Otherwise, the road operates under ideal conditions, i. e., an elevated structure with electrical equipment, frequent stops, ease of loading and unloading and the small number of men required.



ELECTRIC FREIGHT LOCOMOTIVE.

The power station contains one Thompson-Houston generator of 135-horse-power, a National generator of 100-horse-power, one Hamilton-Corliss and a Brown engine. Besides this electrical equipment, there is a light plant of an output of eleven thousand 16-candle-power incandescent lights, and two hundred and fifty 2,000-candle-power arcs, besides 50 or 60-horse-power supplied to stationary motors, which will be increased to 300 or 400-horse-power more.

Mr. Armour is a firm believer in electric power and aims to substitute it as much as possible for steam power.

An interesting arrangement is the swinging bridge

that stops the procession of scalded porkers in order to allow the electric trains to pass.

A pressure of 500 volts is used for the cars and after saturation only from three to fifteen amperes are required, although no reliable cards have yet been taken. This traction is very trying to the motors, as the heating of the motor is very frequent. The motors are run altogether on the rheostat, on this account.



VIEW OF CATTLE PENS.

It is stated that, by the employment of the tramway, six motor men, one to each car and two helpers, to load and unload, on each train, can do the work of from three to four hundred men, who formerly moved all the goods by hand trucks.

The idea of the undertaking is that of Mr. Armour, Geo. Sunderland and A. Conway, who had infinite faith

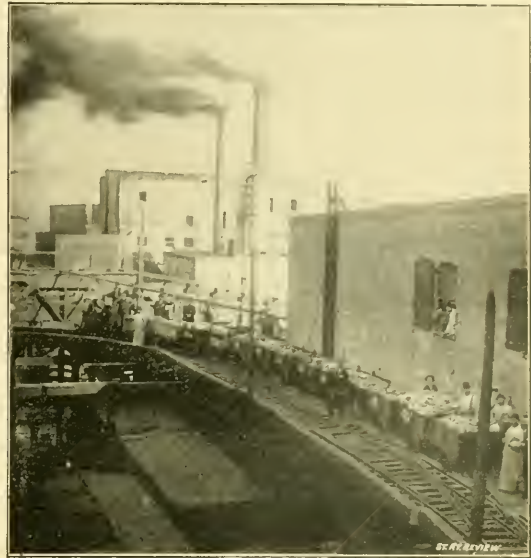


FLOOR OF ELEVATED STRUCTURE—41ST ST. AND PACKER'S AVE.

in the enterprise so successfully consummated. A. Shillinglaw, Mr. Armour's electrician, has charge of the details and technicalities of the arrangement and has traveled over most of the United States to gain ideas and precedents for this unique line.

Manager Geo. P. Nichols, of the motor department of the General Electric company, had the contract for

installing the plant and the eminently satisfactory working of the line is the best compliment that can be paid to Mr. Nichols and his assistants. It is understood that a con-



ELECTRIC TRAIN OF THIRTEEN LOADED CARS.

tract is also in hand for a like equipment at Kansas City for the Armour Packing Company.

THE AHEARN HEATER AND THE CAKES.

WHEN the manager of the Railway Equipment Company was sojourning among our Canadian brethren, considerable excitement was caused by the exhibition of an Ahearn heater. To show the calorific properties of the device, Mr. Mason caused an oven to be constructed, in which the most prominent baker of Ottawa was given the privilege to bake and sell cakes for the delectation of visitors. The thrifty pastryman soon found out that his electrically baked products rose in value from one to five cents a piece, and as the excitement grew more intense the price increased 100 per cent more. Finding that the oven would not supply the demand, the managers of the affair were in a quandary, until the yankee end of the combination hit upon a scheme that discounts Barnum's best. With all expedition cakes were nicely baked at the baker's shop oven down town, and the electric heater oven filled therewith from behind to overflowing, and the innocent multitude was fed with electrically warmed cakes until every man, woman and child in Ottawa was filled to the brim at 15 cents per cake; and of the fragments there was very little to gather up.

Selah!

It is reported that Jefferson Chandler, of St. Louis, has been appointed attorney-general for the Philadelphia syndicate, and the salary is stated at \$25,000.

THE DODGE FRICTION CLUTCHES.

ON the one subject of friction clutches there has been probably more mechanical science exerted and more careful research made than in almost any other department of power transmission and it may be said also that many of these attempts have been fruitless where one has been successful. The more extended use of late years has been the incentive of almost every mechanic to exert his ingenuity to perfect these

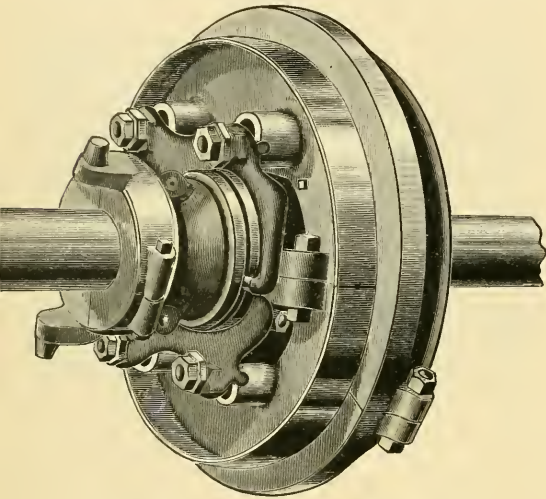


FIG. 1—FRICTION CLUTCH AS A CUT-OFF COUPLING.

appliances and the patent reports bring one after another of them to the public notice. The elements that are peculiarly the virtues of a device of this kind are simplicity, durability of working parts and the greatest power at the least weight, and as all machines are ideally imperfect, the one combining the most approximates the nearest this ideal.

The few successful clutches have been reinforced lately by an addition from the shops of the Dodge Manufacturing Company of Mishawaka, Indiana, which company is the owner of the patents covering most of the features.

The makers claim the clutch to be the most durable now on the market, while proportions have been elaborated by the most painstaking machinists.

The simplicity in the method of obtaining any compression recommends itself most strongly, these being but four points on continuous friction rings with two levers, only. The adjusting arrangement is particularly convenient and can be quickly set. The shaft is easily operated as the leverage is ample for any requirement.

We show in figure 1, the clutches of the cut-off coupl-

ing with levers in position for clutch in gear. This illustration also exhibits the four adjusting bolts, sliding collar, terminus for shifts and other points of detail.

The sectional view in figure 2, shows the cut-off coupling where the shaft is separated, also giving details of parts.

One section is made fast to the end of the shaft, and another part of the other shaft, the connections being made through the friction gear at the outside portion of rim where two iron friction surfaces are clamped against a corresponding rim filled with wood. The pulley application to the clutch is represented in figure, 3.

Either wood or iron pulleys, rope sheaves, sprocket wheels or gears may be applied to the extended sleeve, or the hubs of the power parts may be so finished as to be attached to the clutch, using the interior of bore for loose shaft bearing when out of gear.

A glance at figure 4, will show the convenience in removing the sleeve for repairs, as it can be taken out without disturbing the clutch. The larger patterns of clutches are designed with arms instead of web in all sizes above 30 inches, while the web is obtained in all below this size.

All parts of the clutch may be separated, which fact commends itself to the observer and the clutch can be

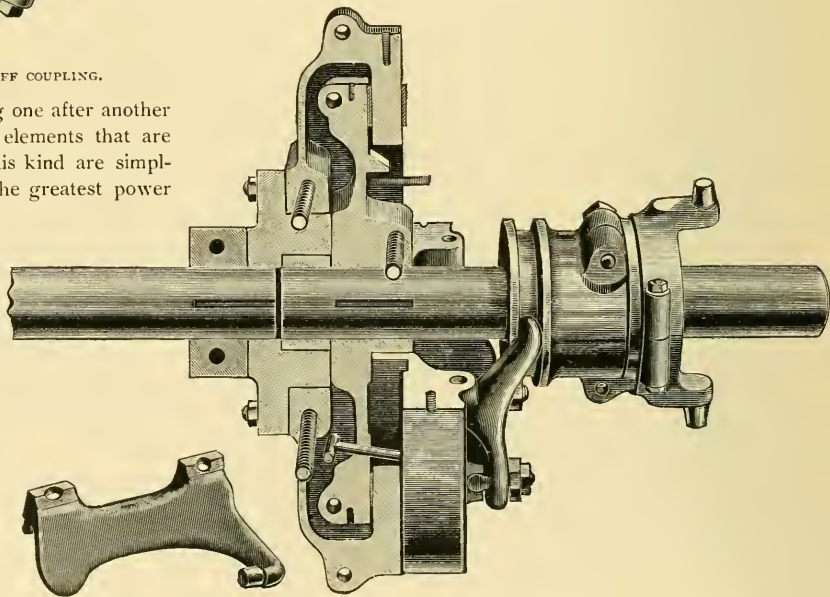


FIG. II—SECTIONAL VIEW OF CUT-OFF COUPLING.

placed or displaced without taking down the shaft and as all parts are in duplicate, repairs are easy.

The clutch bring many recommendations to the practical mechanic and without doubt is worthy of confidence and trial.

The Rice Machine Company, 168 South Clinton street, Chicago, are the general selling agents.

GOOD BUSINESS ON THE BALTIMORE ELECTRICS.

THE new electric line at Baltimore, known as the Central Passenger Railway, has opened under the best auspices, and one day in September carried 18,000 passengers. The number of cars in service was 15, at six minutes headway. The cars are of the John Stephenson make, 16 feet in length mounted on McGuire trucks. W. C. Kelly is general manager and says the equipment is entirely satisfactory.

THE HABIT OF WHOA.

A MULE DRIVER suddenly promoted to a motor car often carries with him for some time the idea that his new steed is animate, and to this is attributed the cries of "whoa" and "git up" unconsciously used. A Madison, Wis., motorman recently forgot to carry his lever to the front of his car, and a member of the company rogoueshly turned on the power. The poor motorman was almost crazy for a moment, and the wild cries of whoa that filled the vehicle brought back by-gone days with a swirl.

STEAM ROADS EXPECT ELECTRICITY.

THE presidential report of the New Haven, New York & Hartford Railroad Company says: If electricity as a motive power becomes commercially practicable, the two interior tracks of the four now in process of construction between New York and New Haven, with their improved grades and alignment and absolute freedom from grade crossings, will prove especially adapted for its use.

President Clark seems to be a firm believer in the future of electric traction.

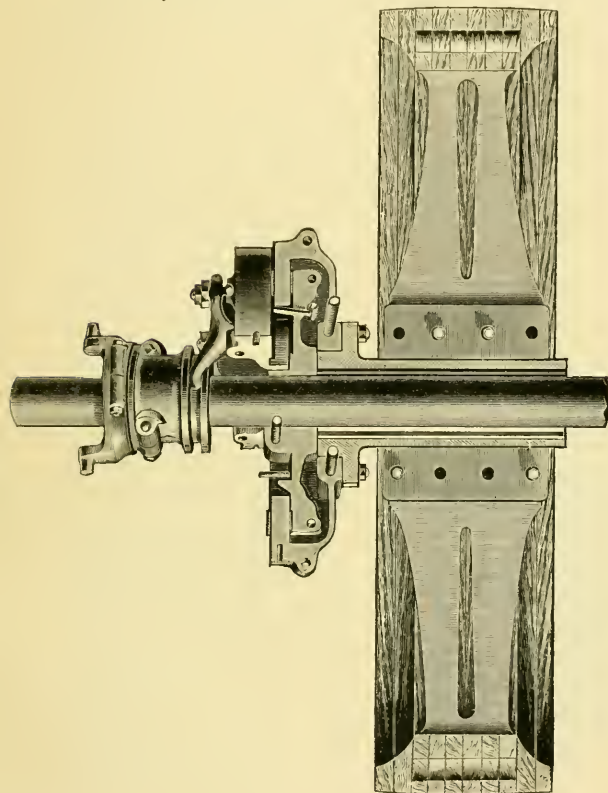


FIG. III—PULLEY APPLIED TO CLUTCH.

RICHARD BEGGS, who was sentenced to five years imprisonment for the embezzlement of \$10,000 of the Oakland Consolidated's money, was recently released from confinement long enough to testify against B. F. Gallagher, his aider and abettor. Beggs looked worn and disheartened. He is in the photographic department of the prison and lives in hope of a pardon. Gallagher is making a hard fight for liberty.

MERCHANTS in Alexandria, D. C., are purchasing from \$2.50 to \$10 worth of the new electric railway tickets and presenting them to customers. The road is starting out well. Six cars are run to Mount Vernon every half hour. The distance is nine miles and the round trip is 20 cents. The road has opened up a lively interest in real estate and manufacturing. L. W. Spear is secretary and treasurer.

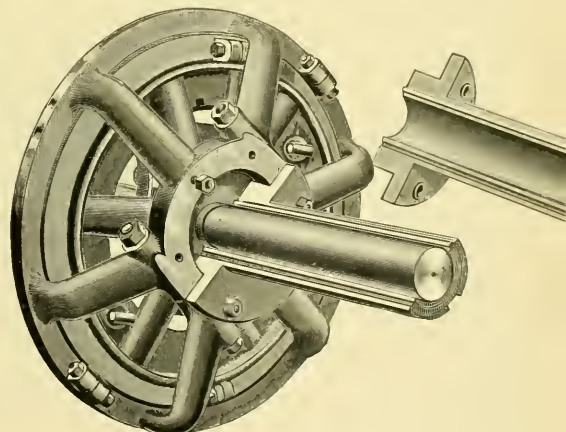


FIG. IV—VIEW WITH PART OF SLEEVE REMOVED.

SIR J. WHITTAKER ELLIS, ex-Lord Mayor of London, accompanied by Lady Ellis and Erastus Wiman, are making an extensive tour of the United States and Canada for the purpose of investigating the systems of electric traction in the various cities. It is reported that the visit is semi-official.

AMONG the noted street car conductors, F. A. Parker, of Oakland, California, deserves mention as the possessor of two medals. One presented by Queen Victoria for bravery in the Egyptian invasion, and the other by the Khedive of Egypt. He is a survivor of Wolseley's expedition for the relief of Gordon and fought at Abu-Klea.

THE NEW cable in commission at Kansas City was made by T. Wilson Sons & Company, of Hull, England, and is 1 1/4 inches steel, with tarred hemp core, and is 14,200 feet long, and weighed 40,000 pounds.

DULUTH'S BEACON HILL PAVILION.

IN the year 1880 the village of Duluth claimed 838 souls, who were trying their best to escape a death of ennui, but the census of 1890 makes the same



DULUTH STREET RAILWAY "ZOO."

village a city of 33,115 inhabitants, with a beautifully constructed electric railway under the management of men of ideas.

The Duluth Street Railway Company, of which Fred. S. Wardwell is general manager, has quite recently opened up a handsome resort on Beacon Hill, at the top of the incline, for the purpose of inducing traffic, and it draws like unto a 25-cent dentist. The building is at the summit of Beacon Hill, at Ninth street and Seventh avenue, about 560 feet above Superior street and 600 feet



DULUTH STREET RAILWAY "ZOO."

above the mean level of the lake. The building is of no particular style of architecture unless it be the Wardwellian, which means useful, comfortable and capacious. It is also graceful in outline and a credit to its architects. The floor space is 80 by 100 feet, founded on posts reaching bedrock. The columns are of white pine 12 by 12 inches, with oak keys and bracings. There are two floors under cover, the upper being reached by a broad staircase branching in both directions, giving an ample exit and entrance. The tower rises 100 feet from the ground and the scenic attractions cannot be equalled.

At the foot of the visitor stretches the beautiful city of Duluth, new, clean and modern. Across the St. Louis river and the bay of Superior rises the sturdy young town of West Superior, while to the north stretches away the mighty inland sea, meeting Minnesota and Wisconsin shores. Toward Wisconsin the eye can distinguish on a clear day the outer islands of the Apostles group.

In warm weather the temperature is from 12 to 15 degrees lower than at the bottom of the incline and the constant lake breeze makes summer life on the incline a very comfortable one. Just beneath the pavilion and only about 300 feet distant the famous "boulevard drive" winds away along the hills, giving the visitor a panoramic view of the grace, beauty and chivalry of Duluth almost any warm evening.

Single-handed and alone the railroad company took up the matter of beautifying the hill and have succeeded in a high degree, although the city should go ahead now and make a resort that would eclipse anything on the lake shore; notwithstanding this the company expect to do much in the coming season.

As a resort the most sanguine did not expect the large success that has attended the opening of the resort, for on July 4, there were 30,000 persons who took advantage of the place and on the two inclined plane cars (described in a previous article on Duluth), 15,000 were carried. A cluster of three arc lamps have recently been placed on the tower and these may be seen for a distance of many miles, from steamers approaching the harbor.

As to the matter of attractions the city band was engaged for the season, as the judgment of the management is that the public is better pleased with light attractions than with theatricals which require more formality and closer attention.

The "Zoo" instituted by the company already has an excellent start, and will be added to next year.

THE REVIEW advocates the paying qualities of created travel and is pleased to announce the success of the Duluth road, in its dividends and satisfaction of the public.



SAWING PAVING BLOCKS BY ELECTRICITY—DULUTH.

THE CLEVELAND CONVENTION.

Eleventh Annual Gathering of the American Street Railway Association—Nearly 1000 in Attendance—
Supply Exhibits Larger and Finer than Ever—Cleveland a Happy
Hostess to the Gathered Guests.

THE advance guard of attendants was larger this year than ever before, not only those arranging the exhibits, but street railway men, arriving one and two days in advance to more fully inspect the electric and cable lines and see the city. By Tuesday noon the Hollenden hotel was completely filled, and the throngs which filled the corridors easily conveyed the impression that the convention was well under way. Tuesday evening rain began to fall heavily, and promised a bad spell of weather.

Wednesday morning, however, opened clear and cool, an ideal day, with every one in excellent spirits. The early trains brought in additional delegates from all directions, including the special STREET RAILWAY REVIEW party, which occupied two sleepers coming over the Lake Shore. Everybody was shaking hands with everybody else, very many meeting for the first time since the convention last year. The accommodations were excellent, and the arrangements so fully made by the local committee avoided confusion and delay. After breakfast followed a stroll through the exhibits, and then it was time to gather for the opening session. Promptly at 10:30 Wednesday morning, President Holmes, Secretary Richardson and Mayor Rose, of Cleveland, ascended the rostrum of the spacious auditorium of the handsome Y. M. C. A. building, and were greeted with hearty applause. President Holmes quickly tapped the gavel and opened the first session, introducing Cleveland's mayor, who welcomed guests, extending the freedom of the city whose hospitality is so well known and so fully proved to the street railway delegates, this year. He also read extracts from New York papers, maligning the trolley in Cleveland and pointedly denying the unjust reports. His remarks were applauded and received a vote of thanks. The minutes of last meeting were then approved, followed by the president's address.

PRESIDENT'S ADDRESS.

GENTLEMEN OF THE CONVENTION: This is a patriotic year, and its culminating point is close at hand. Friday of this week has been designated by Congress as a national holiday in commemoration of the discovery of America. Happily for us, since we cannot be in Chicago on that day to take part in the opening of the World's Fair, it is our privilege to meet together as the representatives of one of the foremost American industries, in the state whose capital is Columbus. In this way at least we are permitted to pay our tribute of respect to the memory of the bold and intrepid navigator who 400 years ago turned the prow of his vessel westward, and sailed forth into the unknown seas on the most fruitful voyage of discovery in the history of mankind.

It is a felicity to meet in Ohio this year, and it is a pleasure and privilege to come to Cleveland. We have heard much of the Forest City, with its far-famed Euclid avenue, its viaducts of massive masonry, its splendid arcade, and its beautiful Lake View Cemetery whose crowning feature is the mausoleum which holds all that is mortal of the martyred Garfield.

But a deeper interest than any of the sights of the city, and more closely bound to us by the ties of common interest, are the street railway companies of Cleveland. Their officers have greeted us with generous hospitality, and have made such excellent arrangements for our comfort and convenience, that we feel like reversing the usual order of business, and to extend to them a vote of thanks at the very outset. The city offers a fine opportunity to study practical street railroading. Here we see the most advanced ideas of construction, the highest development of the electric system, and a splendid new cable plant, as near perfect as capital, invention and engineering skill have been able to make it. And by the way of contrast and historical interest, we find a few horse car lines to remind us of the meeting a decade ago when we used to grow excited over discussions of the relative merits of the horse and mule as a street railway motor.

The street railway interests of the United States are assuming wonderful proportions. Every day some new company is born, and every morning paper brings us rumors of consolidations, absorptions and syndicate purchases, until the statistician lays aside his pencil and sheet in despair, utterly bewildered by the mass of accumulating and shifting figures. Definite data is out of the question, and I shall not attempt to tell you how great we are, even in round numbers. But while the street railways are legion, there is but one American Street Railway Association, and I know you will be glad to learn that Mr. D. F. Longstreet, one of the founders of this body, in compliance with the request of the executive committee, has prepared a historical paper, detailing the motives which led to the formation of the Association, and giving the credit to the gentlemen who associated with him in the movement. We shall be favored with this paper a little later.

This is pre-eminently an electrical age, and most of us believe that as yet we are only standing on the threshold. The horse and his half-brother, the mule, are destined to disappear. The cable system, from its very nature and cost, must be confined to the thickly populated districts of large cities, but there seems to be no limitations to the electric railway. It leaps over the city lines wherever there is a large suburban town calling for rapid transit, it girds the summer lakes, it is forcing its way through the scenic splendors of the Niagara gorge, close beside the

water's edge, and when the convention goes to California, as no doubt it will some day, we may expect to ride around the Yosemite on a train of trolley cars. And how rapidly it has all come about!

It was just ten years ago that the president of this Association, at the Chicago meeting, with a foresight which must have been born of intuition, ventured to predict that the lightning would some day be harnessed to the horse car. We laughed at his visionary prophecy, and dismissed it from our minds as a piece of optimistic nonsense. But the prophet of a decade ago is with us to-day, and can take revenge by saying, "I told you so."

So accustomed have we become to rapid strides and the complete overturning of the existing order of things, in our business, that I do not believe that one among you would venture a doubtful smile were I to assert that before the close of the nineteenth century, the three successive convention cities, Buffalo, Pittsburg and Cleveland, will be joined together by a triangular electric belt line, with an immense power house at Niagara Falls, where they are even now just on the point of developing 160,000 horse power.

But this is an assembly of practical men who have come together not to vie with each other in making extravagant predictions, but rather to contribute each, to a common fund, the results of his observation and experience. The congestion of traffic in our business centers, the increasing throngs of passengers of the working classes, nights and mornings, as the day of tenement houses gives way to the age of suburban cottages, the safeguards against accidents required by the exigencies of rapid transit, the labor question, the unjust and burdensome taxation of corporations, the ways and means of increasing traffic and reducing the cost of maintenance, and operating expenses, give us plenty of things to talk about. The principal subjects for discussion cover a wide range of practical matter having an important bearing upon street railroading, as a business conducted for profit rather than for philanthropy, and the reports of the special committees will be worthy of your closest attention and most careful consideration.

While there are many other things which it would be a pleasure to say, I must not now trespass further on the time of the meeting. I thank you once more for the honor conferred and for your kind attention.

Very respectfully yours,

JNO. G. HOLMES.

When the applause which followed this address had ceased, Secretary Richardson presented the report of the executive committee.

EXECUTIVE COMMITTEE REPORT.

TO THE AMERICAN STREET RAILWAY ASSOCIATION:

Gentlemen:—Your Executive Committee respectfully submits the following report:

MEMBERSHIP.

At the opening of the meeting in the city of Pittsburg, the membership numbered one hundred and eighty-four companies.

At that meeting and during the year, thirty companies have become members:

Akron, O., Akron Street Railway Company; Allentown, Pa., Allentown and Bethlehem Rapid Transit Company; Amsterdam, N. Y., Amsterdam Street Railroad Company; Birmingham, Ala., Birmingham Electric Street Railway Company; Boston, Mass., Boston and Revere Electric Street Railway Company; Bristol Belt Line Railway Company; Carbondale, Pa., Carbondale Traction Company; Colorado Springs, Colo., Colorado Springs Rapid Transit Railway Company; Denver, Colo., West End Street Railroad Company; Detroit, Mich., Wyandotte and Detroit River Railway Company; Fort Wayne, Ind., Fort Wayne Street Railway Company; Haverhill, Mass., Haverhill and Groveland Street Railway Company; Johnstown, Pa., Johnstown Passenger Railway Company; Mansfield, O., Citizens' Electric Railway, Light and Power Company; McKeesport, Pa., McKeesport and Reynoldton Passenger Railway Company; Nashua, N. H., Nashua Street Railway Company; Newark, N. J., Newark and South Orange Horse Railroad Company; Norwich, Conn., Norwich Street Railway Company; Oil City, Pa., Oil City Street Railway Company; Paterson, N. J., Paterson Central Electric Railway Company; Pawtucket, R. I., Pawtucket Street Railway Company; Petersburg, Va., Petersburg and Asylum Railroad Company; Portland, Ore., Metropolitan Electric Railway Company; Pottsville, Pa., Schuylkill Electric Railway Company; Scranton, Pa., Scranton Street Railway Company; Springfield, O., Springfield Electric Railway Company; Steelton, Pa., Middletown, Highspire and Steelton Street Railway Company; Syracuse, N. Y., Syracuse Consolidated Street Railway Company; Vincennes, Ind., Vincennes Citizens' Street Railway Company; Yonkers, N. Y., Yonkers Street Railway Company; Youngstown, O., Youngstown Street Railway Company.

The following changes by consolidation have taken place:

Portland, Ore., The City and Suburban Railway Company in place of the Willamette Bridge Railway Company and the Transcontinental Street Railway Company; the former company having been a member.

The following companies, now being controlled and operated by member-companies, have withdrawn:

Passaic, N. J., Passaic, Garfield and Clifton Street Railway Company; Philadelphia, Pa., The Thirteenth and Fifteenth Street Passenger Street Railway Company.

The following changes of names of members have taken place:

Baltimore, Md., City and Suburban Railway Company in place of the Baltimore Union Passenger Railway Company; Davenport, Ia., Davenport and Rock Island Railway Company in place of the Davenport Central Railway Company; Detroit, Mich., The Fort Wayne and Belle Isle Railway Company in place of the Fort Wayne and Elmwood Railway Company; Easton, Pa., Easton Transit Company in place of the Easton, South Easton

and West End Passenger Railway Company; Little Rock, Ark., The City Electric Railway Company in place of the Capital Street Railway Company; Lowell, Mass., The Lowell and Suburban Railway Company in place of the Lowell Horse Railroad Company; New York City, Union Railway Company in place of the Harlem Bridge, Morrisania and Fordham Railway Company; West Superior, Wis., Superior Rapid Transit Company in place of the Douglas County Street Railway Company; Wilkes-Barre, Pa., Wilkes-Barre and Wyoming Valley Traction Company in place of Wilkes-Barre and Kingston Passenger Railway Company.

The following members have withdrawn:

Cedar Rapids, Ia., Cedar Rapids and Marion Railway Company; Galesburg, Ill., College City Street Railway Company; Harrisburg, Pa., Harrisburg City Passenger Railway Company; La Fayette, Ind., La Fayette Street Railway Company; Newton, Mass., Newton Street Railway Company; Sioux City, Ia., Riverside Park Railway Company.

As a result of these changes, the membership is now two hundred and four companies, being a net increase of twenty companies since the opening of the season of 1891.

MINUTES OF EXECUTIVE COMMITTEE.

Inasmuch as it was impossible for the executive committee to meet directly following the last meeting of the Association, it was decided to hold a meeting of the committee in the city of Cleveland. This was arranged for, and the minutes of that meeting form a part of this report, as follows:

Minutes of special meeting of the executive committee, held at the Hotel Hollenden, Cleveland, O., on Wednesday, February 10, 1892, at 12 o'clock, noon.

They were present, the president, Mr. John G. Holmes, and Messrs. McLean, Lang, Watson, Perrine, Bean, Penington and the secretary.

The president announced that he had made the following appointments in accordance with the authority conferred on him by the Association at the annual meeting at Pittsburg.

STANDARDS FOR ELECTRIC STREET RAILWAYS.

Thompson-Houston—O. T. Crosby, President Utica Belt Line Railway Company, Utica, N. Y.

Accountant—H. I. Bettis, assistant treasurer Atlanta Construction Street Railroad Company, Atlanta, Ga.

Electrician and Short—E. E. Higgins, general manager Short Electric Railway Company, Cleveland, O.

Mechanic and Edison—C. W. Wason, general manager East Cleveland Railroad Company, Cleveland, O.

Westinghouse—R. W. Rippetoe, president Terre Haute Street Railway Company, Terre Haute, Ind.

POWER HOUSE ENGINES.

T. W. Wrenne, president United Electric Railway, Nashville, Tenn.

L. H. McIntire, engineer Union Railway, New York.

P. S. Pearson, chief engineer West End Railway Company, Boston, Mass.

RELATIVE COST OF OPERATION OF HORSE, CABLE AND ELECTRIC ROADS.

Wm. McC. Ramsey, electric superintendent Federal Street & Pleasant Valley Passenger Railway Company, Pittsburg, Pa.

F. R. Green, secretary Chicago City Railway Company, Chicago, Ill.

John L. Heins, superintendent Brooklyn City and Newtown Railroad, Brooklyn, N. Y.

The question of subjects for reports of special committees was next considered.

On motion of Mr. Watson, the following subject was designated: "A Perfect Overhead Electric Construction." On motion of Mr. Bean, the following subject was selected: "A Model Electric Street Railway Roadbed and Underground Wiring." On motion of Mr. Watson, the following subject was named: "Economy of Machine Shops for Electric Railways." The committee then took a recess until 6 o'clock. The committee reconvened at 6 o'clock. The secretary stated that Mr. Allen R. Foote, special United States census agent for the investigation of the electrical industry had been in correspondence with him as to the formulation of a schedule for obtaining a uniform system of accounts, in accordance with resolutions which were adopted at the last annual meeting.

Mr. Perrine moved that a special committee, consisting of Messrs. McLean, Watson, Bestis and Warren, be appointed to prepare a form for obtaining electrical statistics from the street railway companies of the United States for the Census Bureau, and that they submit the same to the executive committee. Carried.

The letter of Mr. J. H. Bickford, chief engineer of the Naumkeag Street Railway Company, of Salem, Mass., in regard to the formation of an "Engineers' Auxiliary" of the American Street Railway Association, which was presented at the last meeting of the association, and referred to the executive committee, was read.

Mr. Lang moved that it is the judgment of the committee, after having duly considered the question of the formation of an Auxiliary Association of Engineers, that it would be unwise to form such an association at present. Carried.

A recess was taken until ten o'clock Thursday morning. Thursday: The committee met at the time named. The question of the selection of a place for the twelfth annual meeting was considered.

Mr. Penington moved that Mr. H. C. Payne, vice-president of the Milwaukee Street Railway Company be corresponded with by the secretary in regard to the selection of Milwaukee as the place for holding the twelfth annual meeting, and that the correspondence be submitted to the executive committee.

A personal letter from Mr. D. F. Longstreet, of Denver, Col., to the secretary, sketching the ante-natal history of the Association, was read.

Mr. Watson moved that Mr. Longstreet be requested to prepare a history of the events which led up to the

formation of the American Street Railway Association, and present the same at the next annual meeting. Carried.

On motion, adjourned.

Wm. J. RICHARDSON,

Secretary.

SPECIAL REPORTS.

It will be seen that it was the judgment of your committee that electricity, having come to stay, should be carefully and largely considered at this meeting; and we therefore provide for the preparation of reports on a number of subjects of vital interest to the members of the Association, in regard to electrical construction, equipment and operation.

The subjects were selected with great care and assigned to gentlemen in every way competent to treat them understandingly and profitably. It is the desire of the committee that all the subjects shall be thoroughly discussed; in order that the fullest and best information relating to the operation of street railways by electrical power may be obtained by all present.

ADVANCE COPIES.

The decision of the Association, at its last meeting, authorized the printing of advance copies of special committee reports; and the distribution of the same amongst the member companies. Only two reports were received in time to be printed and distributed before this meeting. Since then, four reports have been received in time to be printed and distributed at the outset of the meeting; but not in time, of course, to be carefully read and digested before being read to the convention.

This being the first time in the history of the Association that advance copies have been prepared, it was thought that it would be almost impossible to have all the reports distributed in advance of the meeting. We trust that hereafter all the reports will be received in time to be sent out in advance of the annual meeting.

THE TECHNICAL PRESS.

We take occasion to express our earnest appreciation of the hearty expressions of good will and manifest interest in the welfare of the association that have been made from time to time during the year by the street railway and electrical press of the country.

THE NEXT REGULAR MEETING.

In conformity with the action of the Association at its last annual meeting, which empowered the executive committee to select the place for the next annual session; the Association having been very cordially invited by the city of Milwaukee, and satisfactory arrangements having been made through Mr. H. C. Payne, general manager of the Milwaukee Street Railway Company, your committee has selected that city as the place for holding the meeting of the Association in 1893. Its nearness to Chicago makes Milwaukee an especially desirable city in which to hold our convention; because of the advantage

it offers to delegates by making it possible for them to attend both the World's Fair and the meeting of the Association on the same trip.

PROPOSED AMENDMENTS TO BY-LAWS.

Based upon a motion adopted at the last annual meeting, referring the selection of the place of meeting to the executive committee, the following resolution relative to the amendment of Article VII, of the By-Laws, is submitted:

RESOLVED, That Article VII. of the By-Laws, be amended by the insertion of the words "by the executive committee," immediately following the word "designated" on the third line as printed.

When the third week in the month of October was chosen as the time for holding the annual meeting of the Association, we believe those who made the choice of that time of the year, bielded better than they knew; for during the ten meetings already held in all parts of the country, covering usually three days, the weather both as to temperature and humidity, has been delightful, with but two exceptions; one being when the weather was rather too cool for comfort, and the other when rain disturbed the convention for one session only.

This year, by reason of the inaugural exercises of the World's Fair, in the city of Chicago, occurring during the same week of the meeting of this Association, the question of changing the time of meeting was seriously considered by the executive committee. It was decided, however, after careful consideration, that it would be unwise to change the date of meeting; a prominent reason being that it would require a special meeting of the Association for the purpose. In order that the executive committee may hereafter have power to change the date of meeting, in case sufficient reason should in its judgment arise, the following resolution is offered for adoption:

RESOLVED, That Article VII, of the By-laws be amended by the addition to the first sentence of the following words: "unless otherwise ordered by the executive committee."

OBITUARY.

Your committee is called upon to record the death of the presidents of two member-companies during the associational year.

Lewis Lyon died in the city of New York, October 29, 1891, of heart failure, after a short confinement to his home. He was the president of the Third Avenue Railroad Company, of New York City, for the last thirteen years, and was known as the pioneer cable railway man of that city; having been instrumental in introducing cable traction there. He was faithful to the great business interests devolving upon him, and his friends were warmly attached to him.

John H. Bonn was president of the North Hudson County Railway Company, of Hoboken, New Jersey, at the time of his death from apoplexy, November 16, 1891. He conceived the idea of developing the street railway

traffic of Hoboken; and was for many years president of the company organized by him. He left the property in a most flourishing condition. He was a genial nature. He was beloved by all who knew him intimately, and highly esteemed in the community in which he lived so long.

Again we are called to mourn the loss of an ex-president of the Association. Calvin A. Richards departed this life February 15, 1892, after a brief illness, the result of an attack of the grip. He was for many years president of the Metropolitan Railroad Company, of Boston, and for a short time general manager of the West End Street Railway Company. He was president of this Association for the year 1881-85. We shall miss his joyous presence at our annual gatherings, which he was always anxious to attend.

OUR BUSINESS FUTURE.

The outlook for our business was never better. With scarcely an exception the pleasant and harmonious relations between the employes and the managers in the street railway business in America have been undisturbed. The community of interest of both parties has been fully appreciated; and with the desire to work together harmoniously, with the purpose of furthering the best interests of the companies with which we are connected, but little friction has developed. May this state of affairs long continue. The financial outlook is the best. With peace at home and abroad; the people prosperous and happy; with the best country in the world, we look forward to the future with the brightest hope.

Respectfully submitted.

Committee.

As an addendum to the executive committee's report the report of

THE WORLD'S FAIR COMMITTEE

was received.

TO THE AMERICAN STREET RAILWAY ASSOCIATION:

Gentlemen:—The World's Columbian Exposition Committee respectfully reports:

That under date of May 25th, 1892, a circular letter, was sent to every dealer in street railway supplies whose address was obtainable, as well as to every member company, arguing action in regard to an exhibit at the Columbian Exposition.

[This letter was published in the June number of the STREET RAILWAY REVIEW.—EDITOR.]

Our committee has been advised by Mr. Willard A. Smith, Chief of the Department of Transportation Exhibits, that the circular met with a hearty response, and that the exhibit of manufactures and inventions, under the auspices of this association, at the World's Columbian Exposition to be held in Chicago, in the year 1893, will be altogether creditable to the street railway industry.

We earnestly request all intending exhibitors, who have not yet attended to the preliminary arrangements necessary to secure admission of their novelties and products at the Exposition, to do so forthwith, in order that the

exhibit shall be systematically arranged, as well as perfect in the ground covered.

Respectfully submitted,

GEORGE W. PEARSON,

Chairman.

Then, as usual, report was accepted, and placed on record. The treasurer's report showed the year's receipts to have been \$7,500; expenses, \$6,000, leaving a balance in treasury of \$1,500. Much interest having been occasioned by the history of the association, as published in the STREET RAILWAY REVIEW, the committee had invited D. F. Longstreet, of the West End Road, Denver, to contribute a special paper, giving the history of events which lead to the organization, and in which Mr. Longstreet had the most prominent part.

He said, in a lengthy, but interesting account of his own experiences, when, as a conductor, he began work on the Providence road, in 1866, and later as an officer of that company, in later years that there was a need of improved appliances. This led him to visit other cities and roads. He urged, at various places, the promotion of an association. In New York, Philadelphia and Baltimore he met with discouragements. Later, visiting the west, Jas. K. Lake and C. B. Holmes urged him to again push the matter, which he did in company with Walter A. Jones and J. E. Rugg, the three taking a trip for the purpose, and reaching Louisville, had a call sent out by H. H. Littell. Five weeks later the association was formed in Boston. The paper was heartily applauded and ordered on the minutes. Mrs. Cleminshaw, of Troy, who was also one of the first organizers, rose to relate that when the committee on constitution and by-laws met, the draft made by Mr. Longstreet was adopted with almost no changes, then or since. The next paper called was the

Report of Committee on "A Model Electric Street Railway Roadbed and Underground Wiring."

TO THE AMERICAN STREET RAILWAY ASSOCIATION.

Gentlemen:—Your committee on track construction and underground wiring respectfully submit the following:

In no other branch of the business does the motto, "The best is none too good," apply more than to this. No other mistake is more frequent in changing from horse to mechanical traction than that of neglecting the track and roadbed.

In no other branch of our business do the ends meet oftener than at rail-joints, and when these joints are improperly constructed, it results in meeting the bills for repairs to the same with monthly regularity; consequently, your committee has decided in submitting this report, to dwell chiefly on the merits of various types of rail known as the girder system, and in order to place the same before you in an intelligent manner, will proceed with an itemized report in the order in which the construction is proceeded with.

FIRST—SURVEY.

Having decided on the style and weight of rail to be used, and the chairs, fastenings and joints for the same, the first step, in order, is to properly survey the route, if a new road; to estimate the quantity of cut and fill where grading is necessary, and the most advantageous manner in which to provide for the same; and to locate all curves, switches and turnouts. In doing so, care should be exercised to provide for all curves the longest possible radius at points of entering and leaving the same, and to provide for the proper elevation of the outer rail of all curves, which should be elevated from one inch to two inches higher than the inner rail, where the condition of the street will permit; particularly in any curve of short radius, and more especially when such curve is situated on a down grade.

The switches, or cross covers, should be located at such points along the route as will best provide for the following contingencies: bunching

cars for large gatherings; and to insure the constant operation of cars during fires, parades and all other blockades when, from any cause, the terminus of the road cannot be reached. They should never be placed with the switch point against the traffic; and preferable, on up grades, thus enabling cars to cross to the opposite track by gravity.

"In ordering cross-overs, care should be taken to specify that the straight track rail be continuous, for in most work of this kind the reverse is the rule." The aim should be to favor the track most used.

Second.—EXCAVATION.

The depth of excavation must be determined by the thickness of the cross-tie, height of rail, and height of chair, if chairs are used, plus the space allowed for tamping. The condition of the soil must govern the latter exclusively, but in the reconstruction of the roadbed, where the operation of cars will permit, and in all new work, unless the soil is of a sandy character, the following plan will not only provide a suitable sub-drainage, but insure permanence; remove all earth to a depth of 8 inches below the bottom of the cross-tie the full width of the trench; then roll thoroughly with a heavy four-horse or steam roller; then spread with a layer of cinders, crushed rock, gravel or furnace slag, from 6 inches to 8 inches in thickness, and again roll until the same is well bedded and leveled. A trench 7 feet in width, with a layer of 8 inches, will require for one mile in length 21,640 cubic feet of material, estimated at 3½ cents—\$862.40, and will require the removal of 912 yards of earth, estimated at 25 cents = \$228; add for rolling, \$50. Total, \$1,140 per mile of single track.



GEO. W. BAUMHOFF, ST. LOUIS.

The fact that the material so placed provides a splendid sub-drainage is the best argument in its favor, and one that will commend its adoption where soil demands it; for it must be remembered that it is far more expensive to open up and re-tamp poorly constructed track than to properly construct and provide with sub-drainage at the outset.

For surfacing, care should be taken to procure machine-crushed rock or gravel, as it insures a more even bed under the tie than coarser material.

Third.—CROSS TIES.

Under this heading we have the metallic tie and various kinds of wood. The committee's remarks will be confined to the latter exclusively, for it will be seen by reference to the former reports on track repairs and construction, made to this Convention, that the life of a wood tie when buried to a depth of 8 inches or more is the best argument in favor of its adoption, as against the former. The various kinds of wood, and discussion of durability of the same, have also been submitted in former reports, and it is generally conceded that in the selection of the particular kind and quality of timber, the purchaser is influenced by his own knowledge of the timber best adapted for various climates and sections of the country, exclusively.

The fact should, however, be borne in mind in the selection of cross-ties, not only to keep in view the selection of such timber as is calculated to insure the longest life, but due consideration should be given to the particular kind that will best hold the spike; and for this reason, the white oak possesses advantages that should merit its consideration.

The size should never be less than 5x8 inches for rail 56 pounds and over, and if laid close as good tamping will permit—say 27 inches from centers—will materially strengthen the roadbed and assist in holding up the joints.

If the above size is decreased, it should be in thickness rather than in width, to insure the tie from splitting, which is often caused by the spike being driven too close to the edge.

Fourth.—RAIL.

In the selection of the rail depends largely the success of perfect construction; and a road, whether built for speculative purposes or as a permanent investment by the projectors, should not be slighted in this respect.

The requirements of a rail for electric traction are strength, joint connections, durability. In some localities there are municipal requirements specifying what the head of the rails shall be.

For strength we rely chiefly on the weight of the rail, and the thickness and depth of the web.

For joint connections, the rail which affords the best method of keeping both ends of the rail in perfect alignment is the best, and as the girder rail possesses peculiar advantages in this respect, its almost universal adoption is due to that fact.

For durability, we depend on the height of the head of the rail at the gauge line over the lower flange, and the quality of the metal. The former is invariably considered by the purchaser, but your committee is not aware of a single instance in which the quality of the metal has been specified, other than the mere mention of whether the same shall be of iron or steel.

In former years, when the old time stringer construction was in vogue, when a strong stringer and cross-tie would outlast two or more flat rails, iron was chiefly used, owing to its higher market as scrap. In the construction of an electric railway, where the higher girder system has superseded the flat rail, steel is more extensively, if not exclusively employed; therefore, when we have closed our contract, having duly specified steel, we feel assured that the best possible rail has been provided for.

That there is a very great variance in the mixture of the metal before being rolled, is beyond contradiction. That there is also a difference of opinion among the various manufacturers as to the limit of percentage of carbon and other elements, particularly carbon, to be employed in attaining the most satisfactory results as to wearing qualities of the head of the rail, and yet prevent brittleness, is attested by replies to communication on this subject from a number of inquiries; and whilst the matter is of sufficient importance to warrant its introduction into this report, yet we do not deem it advisable from the data now before us, to assume what constitute the best composition for a rail. There are other elements to be considered besides carbon, as witnessed in the report of Dr. C. B. Dudley, from the proceedings of the New York meeting of the Iron and Steel Institute, October, 1890.

The subject relative to the quantity of the various elements entering into the manufacture of steel, which shall produce the rail calculated to give the most wear, and yet avoid brittleness, is one in which there is a great divergence of opinion, and the most expressive method of summing up the numerous replies received, is, that it appears to be a case wherein "doctors disagree."

The rail over which electric motors are operated through thoroughfares in various cities throughout the country is certainly subject to as much, if not more wear, than that of many of the trunk lines; and as we have patterned closely after their method of construction, we may, perhaps, profit by following their example in other details.

Of the various forms of the head, the center-bearing rail is the most desirable, because, with a lower tram on each side, the head is kept free from dirt, and consequently offers less resistance to the car wheels.

In many localities the use of this form of head is prohibited. This was at a period, however, when cars were operated by animal traction, when at least seventy-five per cent of all vehicle traffic along streets where cars were run were accustomed to use the track. If there ever was any valid objection from this source, the introduction of rapid transit has certainly overcome it; for drivers of vehicles generally shun the tracks of roads operated by rapid transit. We claim that it does not impede vehicle traffic, nor would it be objected to by owners and drivers of vehicles when properly laid, to the extent of prohibiting its adoption.

Next to the center-bearing form of head, the side-bearing head is by far the most desirable, from the operator's standpoint; for the only other form made, of the girder type, is that with a groove, instead of a lower flange. The latter form of head is suitable only for curves and cross-overs, when rolled with a wide groove, and should never be adopted for straight track, owing to the tendency of the groove to hold dirt, snow and ice.

In the selection of a girder rail of any form of head, and more particularly the style known as side-bearing, it would be well to remember that the rail having the widest base offers the greatest resistance to turn over; and care should therefore be exercised in the selection of the rail, to secure the widest possible foot. This subject requires no argument to demonstrate its necessity, and your committee, knowing the desire of

various manufacturers of rails not only to keep abreast of our wants, but who are constantly employed at large expense in devising new, and perfecting existing styles, would urgently advise enlarging the rolls at the base of the rail, in order that the same shall at least equal in width the combined width of the tread and lower flange.

Fifth.—CHAIRS.

The less number of parts about the construction of a roadbed the more economically is it laid and maintained, and the use of a chair, the only purpose of which is to provide for the required height to the top of the rail for paving purposes, is not recommended. It is much better to secure this height by the adoption of a rail having a higher web, thus enabling the rail to be spiked directly to the cross-tie by means of a tie-plate, which tie-plate should be provided with a brace extending upwards to the bottom of the outer head of the rail, to prevent the rail from turning. Where a plain tie-plate is adopted, a cast iron brace should be spiked to each tie. No girder rail should be laid without making provision to prevent it from tipping, and the above plan, being more economical than the use of a tie-rod, is preferable, as its bearing at the upper portion of the rail is more serviceable in checking the strain, than a tie-rod secured through the web of rail.

If chairs are required, care should be exercised in selecting such as will insure the greatest possible bearing on the tie, and such only as will not spring under heavy loads. A chair with a narrow base is apt to cut into the cross-tie, and in time work loose or cause the rail to cant. All intermediate chairs should be provided with a brace extending well up under the outer head of rail, which is the best safe-guard against the rail turning or canting.

Sixth.—JOINT SUPPORTS.

There are a large number of joint supports now in the market, and in use, some of which are offered by the manufacturers of rail, and some devised and manufactured by others, and it would be unfair to dwell on the merits of those of any particular manufacturer; but your committee would very urgently recommend the adoption only, of such joint supports as are of sufficient length to cover at least two ties, but we consider such as secure a bearing on three ties preferable. The holes in the web of the rail should be not less than 1 inch in diameter, to admit the use of a bolt having a large size nut, which should be tightly secured by the use of a hammer and wrench. A six-hole fish-plate of sufficient height to reach from the foot of the rail to the bottom of the head, 26 inches or over in length, securely fastened with large size bolts, is considered by many who have used the same to be superior to all other joint fastenings.

We must bear in mind that cars, as now operated by electricity, are not only heavier than horse cars, but are operated at a much higher rate of speed, and require the most thorough construction. The slightest spring or looseness, will gradually result in a low joint, which if not soon attended to, will ruin the end of the rail beyond repair. It would, therefore, be well to relieve the fish plate of much of this strain, by providing a support for the bottom of the rail extending over two or more cross-ties.

The rails, when laid in hot water, may be closely joined, but if laid in low temperature, proper allowance should be made for expansion.

There exists among railway managers a difference of opinion as to the choice between a supported or suspended joint. Your committee, however, earnestly recommends the supported joint, with a support for the bottom of the rail extending to the adjacent ties, and does not deem it advisable to adopt the suspended joint construction, unless the joint support has a firm bearing on the adjacent ties. There are a number of such joint chairs of various manufacture now in use, which your committee are reliably informed are giving entire satisfaction.

There is also a diversity of opinion as to the location of rail joints with respect to each other, and on this subject we do not hesitate to take a firm stand in support of the joints being laid directly opposite each other, when constructed for electric traction, as the tendency where laid with broken joints is to cause the cars to sway sideways, particularly at a high rate of speed, if the joints are not kept extremely perfect.

The former plan renders it also more economical to repair joints, especially in paved streets.

Seventh.—PAVING.

In the construction of a perfect street railway this item, whilst it comes last, is by no means least, and in many instances solves the problem of economic management in electric traction.

Of the various kinds of paving now in use, the following are chiefly adopted, and about in the order in which they are named: granite, telford, asphaltum, wood and brick. The former being by far the most durable, cheapest maintained, and less expensive to remove and replace,

for the necessary track repairs, justifies the adoption of the same over that of asphaltum, wood, or brick, and warrants the additional firmness which accounts for its almost general adoption by street railway companies where paving is required, and by municipal authorities on streets where railway tracks exist, or are contemplated. In some localities asphaltum paving is adopted on streets where railway tracks are laid; but owing to the tendence of vehicular traffic to wear ruts alongside of the rail and the spring of the rail to loosen the paving material, together with the increased cost of repairing the same, it is not as favorably considered, for track paving, as some of the other systems.

To overcome the first named objection in some localities where this paving is adopted, a double row of granite blocks is laid, adjoining the rail, which also provides for the vibration of the rail, and renders it more accessible to get at the foundation of the road-bed for necessary repairs.

Telford paving is laid by placing stone, known by quarrymen as rip-rap, as close together as the same can be laid, and filling the interstices with macadam, or broken stone, which is laid for a depth of about three inches over their rip, all of which is thoroughly rolled, and covered with a thin coating of sand and gravel. This system of paving, if it can be designated by that name, is, however, not suitable for thoroughfares subjected to heavy vehicular traffic, and should only be adopted for street railway tracks on suburban divisions, where, owing to its cheapness, it is quite extensively adopted.

The first cost of paving a street is always the greatest obstacle to overcome owing to the necessity of providing a suitable sub-foundation. This once done, the street is maintained in good repair by simply renewing the upper roadway, and on account of its cheapness in some localities, as compared to other paving material, wood is quite extensively employed; but on account of its perishableness, caused by wear from heavy vehicular traffic, and decay, caused by atmospheric changes, and the further fact, that owing to the expansion of the wood when absorbing moisture, the blocks bulge upward in places, and in some instances, have caused the closing of slots in cable railways, and the breakage of various portions of the running gear of both cable and electric cars, this system is not so generally adopted.

With girder rail construction, it is advisable to fill in the web of the rail with moist clay just before paving, in order to prevent the paving blocks from working loose, caused by the sand surrounding the same, filling up the said space, thus leaving the blocks unprotected, and tending to cause the row of blocks adjacent to the track to settle unevenly. In some localities an iron frame is constructed at each joint for the purpose of providing for repairs to the same, without disturbing the paving, but with the latest girder rail joint construction, ties well tamped and bolts securely fastened, the necessity for such construction does not exist.

Eighth.—UNDERGROUND WIRING.

This subject is one that is usually entrusted to the contractor securing the electrical equipment, and by him sometimes subtlet, together with the overhead line work. As all this work is underground, out of sight, and with paved streets made inaccessible without incurring large expense to repair and renew, the most practical method of workmanship and material should be adopted.

The object to be accomplished is to form a perfect connection from each rail along the road to the poles of the generator at the power house; the ground wire being connected to the negative poles, and the overhead wire to the positive poles of the machine, although we have read of the reverse being the rule on some lines, but, as the matter is foreign to the subject now under consideration, we will not further digress therefrom.

A large-size insulated copper wire is generally adopted to form the connection between the generators and such points along the track as it is deemed advisable to reach. The return circuit, for by that name it is known, may be completed either by connecting said wire to the rail, or to a supplementary wire extending the entire distance of the track. The latter is, in all cases, recommended, and should invariably be soft copper wire, not smaller in size than number 6. In either event, however, all rail joints should be bonded with a soft copper wire not less in size than number 6, and if the supplementary wire is laid, a connection thereto should be made to at least every fifth rail; and it will also be of great advantage as a safeguard against any possible break in the circuit, to connect both sides of the track with a number 6 wire, and if a double track, to cross to the opposite track, and to the supplementary wire in said track at least every thousand feet.

We have heard of instances being cited where copper wire laid underground was more susceptible to electrolysis than that of galvanized iron or steel; but, after a thorough trial of upwards of three years, during which time we have used both, the conclusion reached is, that copper

being not only a better conductor, but less liable to corrode and break, is therefore the best wire to use for underground work. Galvanized soft steel, or iron wire, used for this purpose, has not proved durable, and we have found the same to be entirely eaten away by electrolysis where it had come in contact with the cross-tie, and in perfect condition elsewhere.

The only theory that we can advance for this is, that a chemical action takes place between the gases of the earth, precipitated by the sap contained in the timber and salt water—the latter from the use of salt for the purpose of melting snow and ice; although such results have not been noticeable in the use of copper wire. In addition to cross-wiring, as above mentioned, as a precautionary matter, to insure a complete circuit, it will be found advantageous to the economical operation of an electric railway, to excavate or bore in the earth, to a sufficient depth, to secure continual moisture, and whilst iron is usually adopted, owing to its cheapness, yet we believe the use of copper will, in time, prove the most economical metal to adopt for this purpose—for we beg leave to repeat: "The Best is None too Good."

Where such grounds are located, care should be taken to make the best possible connection to the supplementary wire and the track.

By a careful examination of the amperé meter at the power-house, during dry weather, compared with that of rainy weather, it will be noticed that there is a marked decrease in the amount of current used, in favor of the latter; hence, it follows that the more connections to the rail and the opposite poles of the generator, with the moist earth, the more economically is the system operated. It must also be remembered that the increased saving in current in wet weather, over that of dry weather, is not attributable to the increased moisture of the earth alone, but to the fact that the dust and dirt, which readily finds lodgement on the rail, is washed off, and many roads now in operation by electricity have found the use of a car equipped with a tank having one down-spout, about $\frac{5}{8}$ inch in diameter, on each side, so arranged as to permit a stream to flow over the head of each rail, most advantageous. These down spouts should be located as near the wheel as possible, in order to insure the same being directly over the rail at all curves, as well as the straight track.

In conclusion, we have only to say, as to the construction of "A Model Electric Street Railway Roadbed and Underground Wiring," its successful accomplishment will involve the comparison and investigation of a wide range of personal experiences, coupled with the patient study of those engaged in the manufacture of rail and track supplies, who are constantly endeavoring at great expense to improve the material and method of construction.

Respectfully submitted,

GEORGE W. BAUMHOFF,

Committee

A vote of thanks was tendered, then another report ordered printed. The meeting then adjourned to visit the Short Electric Railway Works for inspection and lunch, a full account of which appears elsewhere.

WEDNESDAY EVENING SESSION.

The evening session was called to order at 8 o'clock, with a good attendance, and was devoted entirely to the discussion of Mr. Baumhoff's paper and points suggested by it. While a large number of gentlemen occupied the floor during the discussion, which was chiefly in the form of questions and answers, no great amount of new demonstrated facts was elicited, although at times the remarks were quite racy. Brief comments were made by H. C. Payne, Milwaukee. H. H. Littell, Buffalo. and Wm. Richardson, Brooklyn, the latter advocating as close fitting rail joint as possible, with joints broken and resting on a 6 by 12 inch by 7 foot tie. D. F. Longstreet, Denver, F. S. Wardwell, Duluth, F. W. Epply, New York, each spoke. President Henry, Pittsburg, believed relief was to come largely in axle journal boxes resting on springs, or by adopting other cushion methods to take the blow. Mr. Kerr, Baltimore, spoke, as did E. J. Lawless, Patterson, N. J., who favored a deep girder

rail resting direct on ties where paving is required, and recommended a wide tie specially well tamped under each joint. Bolts and splice bars to be set up with a final blow from sledge hammer. Wm. Wharton, Jr., Philadelphia, recommended a careful examination of new track after, say, three months use, when little unevenness will have worn down, and joints showing signs of weakness may be corrected before damaged. Rails for electric cars require as close inspection as a steam road. A. L. Johnson, Cleveland, believed a track should have plenty of good ballast, with double amount at joints: without this heavy ties and joints will be a disappointment. John N. Beckley, Rochester, said the success of the T rail was largely due to its slight depth in proportion to its weight, giving thickness and firmness. A ten inch high rail places a premium on short lived alignment, the extra weight being in depth and where it is not needed for strength. His best rails have proved to be those fifty-two and sixty pound girders, four and one-half to five inches deep, placed on stringers where paving is used, the whole resting on cross ties, six inches wide, two and one-half feet from centre to centre.

He reported twenty miles of this construction and promising long life. Also has some 78 pound girder laid on ties spaced to 30 inches between centres, plates at joints, and paved with five-inch blocks. Has been down two years and no repairs made yet on account usual causes. For a ten minutes headway considers fifty-two better than seventy-five pound rail. Some time ago "experts" advised crushed stone under ties. The company bought a stone quarry, a crusher, engine boiler and a lot of things. They laid twenty miles on this crushed stone, size ordinary macadam. Reports said nothing about tamping which was not done. Track soon sank at joints and between, the stone seeming to work up and around the ties. Have gone out of the crushing stone manufacture and now use coarse gravel, well tamped with satisfactory results.

C. W. Wason, Cleveland, reported having laid one thousand feet with 56-pound girder, and after bolting up all the joints removed one bolt at a time and riveting while red hot. Track was laid last march, and summer heat had not affected it. Did not think cold weather would either. Mr. Pearson, of the West End, Boston, described the iron boxes with removable covers at joints had not found any saving in their use, as so frequently the tie needed raising at the time joint required attention, so that pavement had to come up just the same as though boxes were not there. He believes the sub-structure of tracks is the place to begin the reform.

On the question of a return circuit, Mr. Wm. Richardson inquired why old steel rails might not be connected with riveted copper plates and buried, forming a medium for return of negative current. Mr. Pearson replied that heating would result at such joints in a short time utterly destroying the conductor. He had even seen in winter steam rising from similar arranged conductors, indicating the poor conduction at such joints. If the rails could be

welded it might answer; also stated that old wire cables were sometimes used in this way for the return current, but in four months they gave out. In moist, or salty soil, as on sea coast, their life was short, but might last some what longer in dry soil. At best, it was poor policy to use such material as conductors. He believes that as more cars are used, and on shorter headway, a better method than now in use would become necessary to take care of the return current. The discussion failed in establishing any important exception to the report of the committee. The secretary then read the report of committee on "A perfect overhead electric construction."

Report of Committee on "A Perfect Overhead Electric Construction."

TO THE AMERICAN STREET RAILWAY ASSOCIATION.

Gentlemen:—The president has appointed me a committee on "A Perfect Overhead Electric Construction."

In thus selecting me to prepare a paper on this subject, he evidently intended to pay a passing compliment to my imaginative or inventive powers. He asks me to describe something that does not exist, something that I have never seen, although I have searched diligently for it, I can therefore only give my ideas of how an electric overhead line should be constructed, based upon facts and information derived from personal experience and observation.

Iron or steel poles have proved to be the most desirable. I would therefore recommend the following: the poles to be of tubular iron, thirty-two feet in length, and made in three sections, in the usual way. The lower section should be at least seven inches in diameter, and the other two sections six inches, and five inches, respectively. The poles should be set in concrete, and at least six feet in the ground, and should not be more than 125 feet apart. The top of the pole should have about two per cent of rake away from the curb, and should be fitted with a suitable pole clamp, so that the span wire can be easily adjusted to the required height, which should be twenty-two feet above the track. On top of the pole should be a malleable iron cross-arm to carry the feeder wires, and guard wire spans. This cross-arm should be insulated from the pole by means of a wooden plug inserted in the top of the pole. The insertions of the joints of the pole should be at least eighteen inches, and the joints should be made solid throughout their entire length by shims, or other contrivances.

If these joints are not properly made, the poles will not stand the strain. For curves, or extra strain, there should be larger poles of the same make.

Span-wires should be of No. 4 "B. W. G." silicon bronze wire, and should be fastened to pole clamps by means of insulated turn-buckles. Great care should be taken in insulating these turn-buckles from the poles.

All well-built lines should be sectional, and the trolley wires should not be of too great a size, as it would then call for clumsy supports. As it is not the main current wire, it can be of smaller size. I would therefore recommend No 4 "B. W. G." silicon bronze wire, which affords sufficient carrying capacity, and has great strength and durability.

Sections should not be of a greater length than two miles, and should be separated by trolley-breakers, of which there are a number of good ones in the market. In cities and villages, where there is a great liability of fires, it would be advisable to put trolley-breakers at shorter intervals. Trolley-wire hangers and pull-off brackets should be of the lightest make possible, and still have the required strength and the very best insulation. There is a variety of such hangers and brackets now in the market.

As it is important to have as small a number of joints as possible in the trolley-wire, it should be put up in mile lengths, and twisted spliced joints should be made, and brass cone-shaped tubes slipped over the wire before the splice is made. After completing the splice, the larger ends of the tubes should be brought together over the splice and a little solder dropped through a small hole made in the tubes for that purpose in order to keep the joint in place.

Overhead switches, or switch-pans, should be avoided if possible, as they become a source of great annoyance. I would strongly recommend a double trolley wire for a single track road.

Great care should be taken in erecting the guard wire spans. They should be properly insulated from the cross-arms by means of a strain

insulator, or something equally as good, and should be of at least No. 6 best galvanized iron wire. There should be two guard wires over each trolley wire at least three feet apart and four feet above the trolley-wire. The guard wire must be well insulated from the guard spans; in case of other wires falling, this would be of great importance.

Pull-off and anchor guy wires, or other wires for the same purpose, must be of the very best material, and of at least No. 8 galvanized iron wire.

Feed-in taps must be not more than five poles apart and should take the place of the trolley span-wire at that point. They should be of at least No. 6 insulated wire.

The trolley wire being sectional, it is necessary to run a feeder wire to each section. I would therefore recommend that the feeder-wire be at least thirty per cent larger than the occasion demands. It will be found that this is money well invested. The insulation on the feeder wire should be the best that can be procured, and I would advise using locust or iron pins with mica insulators or something equally as good, for the purpose of fastening the feeder wire to each pole, and great care must be taken to protect it from trees and other obstructions.

A cut-out box should be located on the pole at each trolley-breaker, and should not carry a fuse. It should have the same wire running through it as there is on the outside. The fuses should be at the station, with ampere meter and cut-out switch for each section; then, in case of trouble on any section, the location can be easily seen, and that section cut out, if necessary, until repaired.

Lightning arresters are of great importance on the line, and I would strongly recommend using them every thousand feet. They can easily be attached to the poles, and can be protected by means of a box.

In conclusion, I would say that no matter what expense is incurred for material, or care used in construction, a good line cannot be insured without a thorough daily inspection.

It is to be hoped that in the near future a perfect overhead electric construction will be realized in some of our large cities, for the example or fact will be of much more value and interest than any paper on the subject.

Respectfully submitted,

CHARLES H. SMITH,
Committee.

This was adopted without discussion, and as the city clocks were striking eleven the convention adjourned until ten Thursday morning.

THE THURSDAY MORNING SESSION

opened with a decreased attendance many having left the city to attend celebrations at home or in Chicago. Secretary Richardson called the meeting to order and announced that President Holmes had been summoned home during the night, owing to the death by apoplexy of his father-in-law. General regret and sympathy was expressed. Vice-president McLain took the chair. There was no discussion on the paper on overhead construction. The chair appointed a nominating committee with W. W. Bean chairman, Messrs. Watson, Clemenishaw, A. L. Johnson, Rugg and Baumhoff. The report was then read on machine shops.

Report of Committee on "Economy of Machine Shops for Electric Street Railways."

TO THE AMERICAN STREET-RAILWAY ASSOCIATION.

Gentlemen:—It is with some hesitation that I present this paper. Everyone here is well aware that it is a subject on which only a meager amount of practical information can be gathered. The evolution of the electric motor has been so rapid that no definite methods have yet been established for its care and maintenance.

There is a great lack of uniformity in the operation of roads, and one can find hardly two which are following the same course, as regards repairs and renewals to motor equipment.

Theoretically, it seems but a simple matter to prescribe rules by which this part of the work can be governed, but such will not find favor with the majority of the membership of this Association. *Practical information is what we want.* Street-railway men are practical; they have gained their knowledge by long years of experience, and have come to believe that practice is the most reliable guide to follow, and that true

theory becomes so only after having been verified by practice. As I have just said, there is a very small amount of practical data from which to deduce rules, therefore, it becomes necessary, to a certain extent, to present the subject both ways; first, by looking at what seems to be reasonable, by means of which we will arrive at certain conclusions; second, by presenting such practical knowledge as I have been able to gather.

It would hardly be fair for me to give an account of only what we have done on the roads with which I am connected, and recommend only our methods, as a guide to others; therefore, I have taken the means to gather from other roads as much data as possible, and this, together with my own experience, forms the basis of what is to follow.

The one thing to prove is, whether there is economy in maintaining a machine-shop when there are so many manufacturing and supply companies which can furnish us with every conceivable thing we want (and many more we don't want) at short notice; and the local machinist stands ready to do our work at a price varying from fifty to seventy-five cents per hour for first-class workmen (and double price for apprentices).

"Economy is wealth," so we are taught, but the expounder of this doctrine forgets to point out the particular method of economy which paves the way to fortune. Sometimes extravagance masquerades as economy. This is especially true when one buys cheap goods to place upon a street-railway. Economy has two sides, with the transaction between. At first thought one believes that true economy consists in saving all you can at the beginning of the transaction. While this may be, and undoubtedly is, a good rule to pursue, yet in the majority of



J. H. BICKFORD.

cases true economy consists in the elimination of all elements of weakness, and the providing of such apparatus as will give the best service with the least amount of repairs. Now such apparatus cannot always be gotten cheaply, neither can it be well taken care of afterwards, without the proper means for so doing, which also should be considered as part and parcel of the transaction.

After having bought the best apparatus, we must provide means to take care of and repair it, and the first thing to do is to provide competent help. On this last point hangs the key to success.

Heretofore, on our horse lines, economy has been practiced in its severest sense, and now when we change from animal to mechanical power, it is hard to break away from the old methods and broaden out to the extent which is necessary to properly conduct the affairs of a well-equipped electric system.

Outside of conductors, drivers and subordinate officers, the help on a horse line can be of a class which does not command a high rate of wages. Stablemen and trackmen are, as a general thing, employed for their muscle; therefore, I am not far from the truth when I say that previous to the introduction of electricity, our street railroads were conducted with inexpensive help, and we have come to look upon this method as the only truly economical one. I do not present this as a criticism, only as a comparison. It was not necessary to employ high priced men, the class of work did not demand it; therefore, there is no censure due the management, nor can we say that this view of economy was not correct.

Let us look for a moment at the change which has taken place in the last five years, and, if possible, discern whether according to good reasoning it is wise to pursue the long established method, of which I have just spoken. We have equipped our cars with delicate machinery, and have put complicated mechanism in our power stations, and have obstructed (so the public say) our highways with a multiplicity of wires.

What shall we do now? Still employ the same class of help? Is it wise to place this apparatus in the hands of men who do not understand the first law of mechanics? No; emphatically, no; it would be the height of folly, yet I am sorry to say that such was the case with some of our roads in the early days of electric. The laboring man is all right in his place, and is a necessary adjunct to a railroad, but until he educates himself to the level of the mechanic, he should not be allowed to handle, much less repair, the delicate mechanism of an electric motor. Heretofore then we have been dealing with muscle, now we must have brains, hence we must turn our attention to the mechanic and the engineer.

Let us take one step more and look at the mechanic, and see if we should discriminate between men of this calling. We have two classes of mechanics: the thoroughly skilled class, and the partially skilled class; the latter more commonly called handy-men.

You have heard the old adage, "Jack of all trades and good at none," and do you not think that there is a grain of truth in it? However, there are exceptions in this class; some men are born mechanics, and could they have had the proper training, would have become even more skilled than their brethren of the other class. Such men are worth employing for some purposes, but the man who can, in his own estimation, do anything, from the building of a motor to the framing of a house, seldom proves to be capable of doing either, and the electric road is better off without him. He never gains in knowledge, because he is satisfied in his own mind that he knows it all now.

Therefore, I say, we must look still higher, for a class of men to care for and repair our electric machinery, and in doing so can only fall back upon the skilled mechanic. By the term "skilled mechanic," I do not necessarily mean a machinist. We have many kinds of mechanics: I mean a man who has learned a trade—has mastered some particular branch of the business, and applied himself to that exclusively. An armature winder is a skilled mechanic; so is a first-class lineman; that is his trade, he has mastered it, and knows every condition that enters into it; the same with the machinist and the carpenter. Hence, I say again, these are the men we must employ if we want to run our roads properly and economically, and right here we see, as stated a moment ago, that true economy does not consist in what we save at the start; it comes on the other end of the transaction; it is what we save on repairs and break-downs, which can be very materially lessened by the employment of the right means.

Having thus arrived at the conclusion that skilled help is necessary to success, let us look still farther into the subject and ascertain what else is needed to bring about true economy. Just here is where opinion will divide, and is what renders this subject difficult of elucidation. Whether it is economical to maintain an equipment of machinery will still remain as a doubt in the minds of many, notwithstanding what I may say, or what others, more experienced than myself, may write upon the subject. Nevertheless, we are all here to get information, and as this is brought about by discussion, perhaps what I am about to say will bear fruit later on.

2. There is no denying the fact that to do a piece of work of any kind properly we must have proper tools; a make-shift, in such a case, only leads to the abominable temporary hitch. We would be much better off if this word "temporary," and all its modifications, were left out of the English language. To do a thing half-way results in gross extravagance in the end. There is no denying this; we have examples of it already on the electric railway. If this be true, what conclusion follows, in view of our previous conclusion?—that we must employ the skilled mechanic—simply that we must provide him with the requisite tools and machinery to do the work in a skilled manner.

Now that we have arrived at this latter conclusion, there is yet another step, the last, but by no means, the least. It is this: How far shall we carry this equipment of the machine shop? Shall we make it a manufacturing establishment? There is surely a point here where we must draw the line. There is a distinction between repairs and renewals, but for all this, the question arises whether, if we go so far as to establish a shop for repairs, is it best to go a little farther and manufacture supply parts.

It will be useless for me to attempt to prove by theoretical reasoning that it is economical to maintain a manufacturing establishment, or even an additional equipment to that required for repairs, therefore I am simply going to present to you a few facts.

In the first place, I wish to call your attention to the methods and practices of the steam railroads. It seems to me that we ought to a certain extent to be guided by these people. They have spent over half a century in probing and sounding this matter of repairs and renewals and even though we may not wish to follow their example in some things, it will surely be worth our while to consider what they are doing.

We find here what we have arrived at through our conclusions, viz.: complete repair shops equipped with all the necessary machinery for doing the work in a thorough and economical manner and manned by competent help; furthermore, a thoroughly competent master mechanic at the head of the whole.

We find them manufacturing a great many supply parts, even complete cars and locomotives, and everything necessary for the maintenance of the road.

They have learned by experience that it is economical to manufacture in this way. This is shown by their still continuing to do so, and, so far as certain repairs are concerned, they know positively that such can be done in their own shops, more satisfactorily than in a local machine shop. Their own men having become familiar with all the requirements of the work, they know every condition under which the apparatus has to work, consequently, the successful and economical operation of the road, so far as this department is concerned, is assured. In some instances it may cost a trifle more to make the article than it could be bought for. Suppose it does. If it will give better service and wear longer, it is more economical. As I said at the beginning, economy does not always consist in buying a thing cheap. Happily, however, in the experience of the steam roads they have found that it costs no more, and in many cases not so much, as to buy of supply companies, which is surely a conclusive proof that it is economical to maintain shops.

After viewing the experience of the steam roads, let us turn our attention to the substantial practical data which I have gathered from the more prominent electric roads. In attempting to write upon this subject, I found that in order to prevent unbiased information, it would be necessary to gather as much practical knowledge as possible from roads other than those with which I am connected, therefore, I prepared a list of questions covering the most important points of this branch of the business, and sent them to over two hundred and fifty of the more prominent electric street-railways, asking them to co operate with me in the preparation of this paper, by answering as many of the questions as pertained to their respective methods of operation and maintenance of line and car equipment. I am sorry to say that I received answers from but sixty-six roads, notwithstanding I prepared the circular so that it was only necessary to write *yes* or *no* after many of the questions, besides enclosing stamp and envelope for return.

It occurred to me that perhaps many thought that this information was for me personally, or else reasoned that if I was to present this subject, I ought to know enough about it without their help. However, the sixty-six answers that I did receive gave me valuable data to substantiate my own experience and enable me to write much more intelligently; and I wish to extend my thanks to those who did interest themselves in the matter sufficiently to give me the information asked for.

Among the answers received, I have found many things to strengthen my belief that it is economical to maintain a machine shop, not only for repairs but for the manufacture of supply parts. It turns out to be a fact that no less than twenty-four roads are maintaining machine shops, doing all their repairs and manufacturing many supply parts. They say unhesitatingly that there is economy in so doing. They give as their reasons: First, that they can *make* better material than they can *buy*; that they are perfectly familiar with the requirements and conditions of the business; they are operating the roads and are in a position to know just what is needed, and are better able to judge of the strength and durability of the apparatus than those who have never been in a similar position. Is not this a natural consequence?

In presenting this I do not intend to cast a reflection on the earnest efforts of my good friends in the manufacturing business, but I must say from personal experience that there is much material on the market to-day not up to the standard. Why? Simply because the makers of it do not understand thoroughly the requirements of the business. Some may be unscrupulous enough to put goods upon the market just for what there is in them for awhile, regardless of their stability; but I hope this is not the case, for surely we had rather believe to the contrary.

A second reason given is, that there is a saving of 25 to 50 per cent by manufacturing the majority of parts.

What further, then, can we say? Is not this, coupled with the experience of the steam roads, sufficient to enable us to conclude that there must be economy in machine shops for electric street railways?

I have shown you then, first, by reasoning, and second, by actual fact, that this subject must be treated affirmatively; therefore, it will be wasting time to dwell longer upon it except, perhaps, to give a few examples taken from information gathered, and add a few recommendations which naturally arise from a study of the whole.

I have made a sort of classification of the answers received, and the result is as follows:

TEN CARS OR LESS.

Received answers from sixteen roads; fourteen of these buy all supplies and repair parts, and have not a machine of any kind; the other two have a drill press, small lathe and blacksmithing outfit.

TEN TO TWENTY CARS.

Received answers from thirteen roads; seven of these have partially equipped machine-shops, do all ordinary repairs, and manufacture many parts for renewals; the other six have not a machine of any kind.

TWENTY TO THIRTY CARS.

Received answers from ten roads; six of these have well equipped machine shops, do all repairs, and manufacture most parts for renewals; the other four have not a machine of any kind.

THIRTY TO FIFTY CARS.

Received answers from six roads; of these one has not a machine of any kind; one has a wheel press; two have a drill press, lathe and blacksmithing outfit; the other two have fully equipped shops and do all repairs and make nearly all supply parts.

FIFTY OR MORE CARS.

Received answers from 12; two of these have only a drill press, lathe and blacksmithing outfit; nine have complete shops equipped with machines of all kinds and manufacture about everything necessary to maintain the equipment; one has a very extensive manufacturing establishment, outside of a complete repair shop, and also maintains a brass foundry.

The remaining roads from which I received answers had no definite information to give. One or two said that they were getting ready to establish shops, and others were undecided what they would do.

Out of the 66 roads heard from, 36 were winding their own motor armatures and field coils, and the cost of armatures varied from \$17 the lowest, to \$75 the highest; the average was about \$35, including all labor and material.

Fifteen roads had wood-working machinery, consisting principally of saw-table, band-saw, surface-planer, and mortising machine.

Seventeen roads are cutting their gears, but some of them find it no cheaper than to buy. They think, however that the work and material are better, and for that reason it pays them. Others make all gears and think there is a saving in cost.

Eight roads are building their cars, while several are rebuilding old cars, but make no new ones.

I will give now a few of the prices for which supply parts are being made in the shops of the different roads. These figures are an average taken from 11 roads which are using Sprague, T. H., and Westinghouse, double reduction motors.

| | |
|--|---------|
| Refilling commutator (copper bars)..... | \$18 50 |
| Two halves armature bearing, T. & H., \$3 96, single | |
| Sprague..... | 1 85 |
| Two halves axle bearing..... | 3 50 |
| Brush holder..... | 1 35 |
| Rocker arm, T. & H., \$1.00, Sprague..... | 3 00 |
| Int. shaft (steel), T. & H., \$10, Sprague..... | 3 00 |
| Int. pinion (steel)..... | 4 20 |
| Int. gear..... | 3 88 |
| Axle gear..... | 5 66 |
| Armature pinion (steel)..... | 3 58 |
| Trolley wheel (brass)..... | 1 06 |
| Line frog..... | 1 90 |
| Clips for line hangers (brass)..... | 15 |
| To bore and press on 30-inch wheel..... | 95 |

The average price for which roads sell scrap car wheels is \$13 65 per gross ton; the lowest being \$8, and the highest \$20.

Some roads have kept no account of cost of making repair parts, and therefore, could give no prices. It is unnecessary to say that it would be wise to do so.

Being anxious to know, myself, and thinking it might be of benefit to many others, I asked the roads to give an opinion as to which of the different types of motors gave them the most trouble. With but two exceptions, the single reduction costs less to maintain.

Nineteen roads are employing an electrical engineer, and four have a superintendent and an electrical engineer combined.

In regard to my own experience, I will say simply that it coincides with the information just presented to you. I have no doubt, whatever, that there is economy in maintaining repair-shops, and even manufacturing supply parts. Of course, what will apply to some roads, will not to others. Some roads are too small to think of its being profitable, but many others will find it to their advantage if they will look at the matter in all its parts.

I will not attempt to recommend the number and kind of machines a road ought to have, as it will depend largely upon the number of cars they operate, but I have made up a list of machines, which I find the majority of those having machine-shops are using, and should judge that it covers those most necessary for the work.

One 20 inch swing, 10 foot bed, Engine Lathe.

One 16 " " 6 " " " "

One 16 " " 6 " " Speed Lathe.

One 24 inch x 24 inch Iron Planer.

One No. 3 or No. 4 Universal Milling Machine.

One 45 inch Upright Boring Mill.

One 24 " " Drill Press.

One 12 " " " "

One 100 ton Hydraulic Wheel Press.

One Open Die Bolt Cutter and Nut Tapper.

One medium size Shaper.

One Tool Grinder.

Two Forges with Power Blower.

One set of Emery Grinders.

One Grindstone.

Necessary bench tools and fittings for machines.

One 10 H. P. Motor to run machinery.

Of course, roads with a great number of cars would need to duplicate some of these machines, and add some others not mentioned.

After having considered this subject and shown you what conclusions have been arrived at, both theoretically and practically, I want to add that in order to make a success of running a machine shop in connection with an electric road, it will be necessary to employ an electrical engineer. By this I do not mean a handy-man, or a man who styles himself an electrician, just because he has had a few months' experience in the electrical business, but one who has a theoretical, as well as a practical, knowledge of mechanical and electrical engineering.

In conclusion, I wish to say that I have endeavored to be as impartial as possible in what I have said and have tried to present the subject in a comprehensive manner. I hope that discussion will follow the reading of this paper, for although some of us are fully persuaded that machine shops are economical, ye, I think, none of us are so prejudiced that we could not be convinced, should it be proven to the contrary. Let us get at the truth, whatever it is.

Very respectfully submitted,

JOHN H. BICKFORD,

Committee

S. W. Wardwell, Duluth, believed in reducing need of machine shops by protecting motors from dust. Three motors were all one man could overhaul in one night. E. J. Lawless, Patterson, believes in the machine shop, but it must be kept under close surveillance, don't try to cut bolts and similar work. Buy them ready made. The shop should be carefully proportioned to size of road. Mr. Ramsey, Pittsburg, related their experience in fitting out a shop, including brass foundry; does not believe home-made gears effect any saving. He can buy it cheaper than he can make, especially since prices have fallen nearly 50 per cent on many supplies during past three years. For instance, commutators which formerly cost \$76 now sell at \$18.

C. W. Wason, Cleveland, recommended short pits in repair shops. Long pits gather too many cars and the one finished first must often wait until the end one is done and lets it out. He uses hydraulic lifts in each pit for removal of armatures, etc. Has taken a motor off and replaced it with another in 30 minutes with only two men. Have changed armatures in five minutes. His shop paid

for itself in three years. Mr. Baumhoff, St. Louis, was forced into machine shop, owing to high prices three years ago, still presses on wheels and cuts gears, but doesn't try to do all he did three years ago. Mr. Laing, Toledo, spoke on the number of the extra armatures needed on hand. Followed by Capt. McCulloch, St. Louis, who cautioned the closest watch on machine shops to prevent its running away with expenses. He has two and finds them useful and economical, but when delegated to a master mechanic at one previous time, they filled up with new machines and high-priced help until he had to close up the shop and reorganize. This ended the discussion.

Win. Richardson offered a resolution extending the sympathy of the association to President J. G. Holmes, which was adopted and telegraphed at once.

The next paper called for was that on comparative cost of cable and electric traction.

Report of Committee on "Relative Cost of Operation of Horse, Cable and Electric Roads."

TO THE AMERICAN STREET-RAILWAY ASSOCIATION.

Gentlemen:—"The comparative cost of operation of Horse, Cable and Electric Railways," is the title of the paper for which your consideration is solicited for the next few minutes.

The subject is, it is needless to say, a fruitful one, and one on which a wordy speaker might discourse by the hour and leave his hearers no wiser. Your committee desire to present to you the results of their efforts, with only such comments as shall be necessary to its clear understanding.

The work which the committee had to perform was to ascertain from leading horse roads, cable roads and electric roads, such information regarding the cost of operation of each, as the existing methods of accounting in each case made possible. They recognized in the early stages of their work that any attempt on their part to shape the accounts of the companies to suit the purpose of the committee would be fruitless, for reasons which must be obvious to all. A series of questions were framed comprehending the information desired, and with such subdivisions of operating expenses, as it was thought would meet with most ready reply. Our experience has proved that the subdivisions were well selected, for many of the replies were as full and concise as could be desired.

As to the greatest difficulty encountered—the lack of uniformity in methods of keeping accounts—enough has been said at former conventions. The difficulty, however, still exists; and, it might be observed another difficulty was brought prominently to the notice of the committee, that is, the woeful lack of acquaintance with facts, and the need of scientific study and research into the economics of one's own road.

Correspondence was opened with every cable road in the United States by Mr. Greene, and by myself with the representative electric and horse roads. It is with regret that the committee announces that the information received from horse roads, for various causes, is meager and unsatisfactory. It was not the intention of the committee to pass superficially over the horse roads, as our report would seem to indicate.

Many of the replies sent to the committee were given for the personal consideration of the committee alone, and not for publication or public reference in any way. We have, however, chosen a few of the representative roads of each class, and have tabulated the replies in such a way that reference can be made to them by number if desired. Name, location, amount of stock and bonds, and other marks by which a road might be identified, are necessarily omitted.

A comparison of the reports from these roads does not reveal the characteristics which we should expect to find. We see results which are as varied as could be imagined. Why should Cable road No. 1 earning only 18 cents per car mile, have within 8 cents per car mile as much to divide among its stockholders as Road No. 3, having nearly 12 cents per car mile more receipts? Let us refer to the reports of these two roads and make a few comparisons.

The first noticeable difference in the condition under which the two roads operate lies in the fact that Road No. 1 operates daily an average of 295 trail or tow ears, while road No. 3 operates only grip cars. Road

No. 1 operates 1.54 tow cars for every grip car operated, or a daily mileage of 203.2 for every train of one grip car and 1.54 tow cars to every 100 miles made by a train of one grip car only, which road No. 3 operates. Now if the expense of operating increased directly as the mileage, whether made by grip or by tow cars, a direct comparison of these two roads would be possible; but such is not the case. Road No. 3 is evidently at a disadvantage. The same difficulty occurs in the comparison of certain electric roads with one another.

A very excellent method of correcting this error has been formulated by Dr. Cary T. Hutchinson, and is here presented by his kind permission. It is evident that what is wanted is a formula which will represent the ratio of cost per car mile, as ordinarily counted, to cost per motor car mile, for an item of expense.

Dr. Hutchinson's method is as follows:

Let "t" = No. of miles a train of two cars run per day.
 "m" = " " motor car alone runs "
 "a" = cost per train mile for any special item, *e. g.*, cost of fuel.
 "b" = cost per motor car mile—the same item.
 "N" = $t + m$ equals "Car Miles" as ordinarily counted.
 "r" = a/b equals ratio of cost per train mile to cost per motor car mile for any given item.
 "c" = cost per car mile, counting trailers same as motor cars. This is the figure ordinarily given.
 "CN" total cost of operating line per day—for that item.
 Then $a t + b m$ equals CN for any item of expense.
 but $a = b r$
 $\therefore b (tr + m)$ " CN
 b equals $\frac{CN}{tr + m}$
 b equals $\frac{C}{r + \frac{t}{n}}$
 $\frac{t}{n} + \frac{m}{n}$
 a equals $\frac{r}{b}$ (1)
 (2)

Now $\frac{t}{n}$ and $\frac{m}{n}$, the ratios of train and motor to total mileage, are known.

Then r must be determined for each item of expense.

I take for "r" the following values:

First.—Maintenance of roadbed and track, $r=1.5$; although there are two cars instead of one, yet the trail car is by no means as hard on the rails as is the motor car.

Second.—Maintenance of Line, $r=1$. It is the same whether there is or is not a trail car.

Third.—Maintenance of Power Plant, $r=1.4$. Because I have found by experience that under average conditions a train requires about 1.4 times the power of a motor car, and maintenance should be assumed proportional to power developed.

Fourth.—Cost of Power.

(a) and (b) Fuel and Supplies, $r=1.4$, as above.

(c) and (d) Attendants $r=1$. Because for a good size plant no more men would have to be employed in the power house if all the cars hauled trailers; the force required is not proportional to the output, but is constant within pretty wide limits.

Fifth.—Maintenance of Rolling Stock.

(a) and (b) Repairs to Motors, $r=1$.

(c) " " Cars and Trucks, $r=1.25$.

Repairs to trail cars are very much less than to motor cars.

Sixth.—Transportation Expenses.

(a) Carmen, $r=1.5$; 3 men on a train and 2 on a motor car.

(b), (c), (d), (e) and (f) may all be bunched at $r=1.25$.

Seventh.—General Expenses. $r=1$.

Referring again to our table of statistics:

No. 1 roads expend .925c. per car mile for the item of cost of power, and No. 3 road expends for the same item, 1.07c. and this, notwithstanding the fact that road No. 3 only pays \$1.21½ per ton for fuel, while road No. 1 pays \$1.47 per ton.

Using for r the value assigned above for cost of power, 1.4, our equation reduces to $b=1.07c$, or in other words .925c. should be multiplied by 1.07 to bring it on a basis of comparison with No. 3 road. This gives us .99c. for No. 1 road as against 1.07c. for No. 3.

The difference which still exists may be accounted for either by reason of a possible difference in the efficiencies of the two power plants, or by the possibility that one road may operate more cars to do the same amount of business than the other road.

This method of comparison can be used satisfactorily for any roads, cable or electric, providing the necessary data has been obtained as to motor car miles and train miles, and provided an experience and careful

observation have enabled the investigator to assign approximately correct values for "c," which will differ in different cases. But there are yet many discrepancies to explain, for which we must seek other reasons. Why should the gross operating expenses of No. 3 electric road exceed the gross receipts per car mile of No. 4 electric road by nearly 100 per cent, and yet both roads still have a fair percentage of their receipts left for dividends? No. 4 road is a small road, and No. 3 is a large one, but we cannot argue that small electric roads have a better chance for profits than large ones. It is fair to assert that study of No. 3 report would lead to the conclusion that there is more in the road than is brought out of it, or that the only thing that justifies the outlay of 25½c. per car mile (trail car mileage included), is the receipt of over 40c. per car mile, to do it with.

The quality of the management which any of our roads receives is an uncertain quantity, but must be assumed to be good, in our arguments. The management of roads Nos. 1 and 3 in the cable list are known to the writer to be excellent. The other conditions under which the two roads operate are nearly the same. Yet a "figure of merit"—obtained by multiplying the total daily mileage by net earnings per car mile, and dividing by the amount of Capital Stock paid in, shows vastly in favor of No. 3 road, and this, notwithstanding the gross operating expenses of No. 3 road, are about fifty per cent higher than the operating expenses of No. 1 road—both being placed on an equal basis of grip car miles. We see, therefore, that still another method of comparison must be resorted to in order to give an intelligent idea of the comparative earning power of two roads—namely: the comparative earning power per day of each dollar invested in each road. This ratio, when stated, comprehends all of the conditions under which the two roads operate; it is the final result of a compound proportion of which the ingredients are the investment, the outlay, and the income—"outlay" comprehending the management and efficiency of the road, and "income" comprehending, among other things, the comparative value of the territories through which the roads pass.

Operating expenses per motor car mile, or per grip car mile, afford a satisfactory basis on which to compare expense of operation, but net earnings per motor or grip car mile tell us nothing of the value of a road as an investment, unless we know also the total investment necessary to carry so much per car mile; and we take occasion to remark here that future committees on this important topic will find it discouraging work to follow the usual lines of investigation into receipts, cost of operation and net earnings of street railways, and may find it necessary to look to some method of comparison by arbitrary "figures of merit," as has been suggested by several of our thinking engineers.

For a comparison of an average cable road with an average electric road let us take this same No. 3 cable road, and compare it with No. 7 electric road. The cable road has been shown to be something better than the average, and the electric road is known to the writer to be at least up to the average. These two roads afford us a better opportunity than any other two which we might select, for the following reasons:

1st. Both are located in the same city, where climatic and other local conditions are the same.

2d. Both roads are of the same magnitude.

3d. Fuel and labor cost the same in both cases.

4th. Neither road operates trail cars.

The cable road has the advantage in route as to grades and curves; otherwise, the roads offer excellent opportunities for comparison. It might be added that the investment in each case is up to the average, that is, not extravagantly large, and yet is ample for the business transacted. Each road may be regarded as typical of its class. We see, upon examination, that the cable road has the greater fixed charges by 1.7c. There is a difference of 1c. in the gross receipts in favor of the cable road; one cent of which may be said to be due to the larger gross receipts; but resorting again to the comparison by "figure of merit," we find a ratio of .00015 to .00020, or nearly three to four in favor of the electric road. This simply means that each dollar invested in the cable road will earn .00015 in one day, whereas each dollar invested in the electric road will earn .00020 in one day. The total investment in the case of the cable road in this case is 2.18 times the total investment in the case of the electric road. The capital stock alone, exclusive of bonds of the cable road, is 2.4 times the capital stock of the electric road. What is our conclusion from these facts, or can we draw a conclusion on which we can stand? We have not been conservative in our statements thus far, but are, of course, not infallible. "One swallow does not make a summer"—nor do the examples we cite determine the whole matter once for all. The cable road has its place firmly established in the transportation business of the Pacific slope and we, who are unacquainted with the conditions met with there, can

not presume to say that the electric railway would do the same work better and more efficiently. We are tempted to say so, but the interests concerned are too great to be trifled with in so dogmatic a manner. We recognize that the greatest value will be obtained from this report by members taking it home with them and studying the figures analytically. Another year may develop such improvements in methods of accounting, that definite conclusions can be formed; but to do more than merely produce figures from typical roads, the committee is not prepared at this early stage of electric railroad practice. The cable roads have their methods pretty well digested, and their figures are, as a rule, reliable. The electric roads are as yet, with few exceptions published in this paper, in the dark as to what they are doing—except that they have enough left to satisfy stockholders—in fact 89 per cent of the electric roads heard from report dividends of from 5 to 12 per cent.

We believe that cable road practice has reached the stage where but little room is left for improvement. They have been developed, improved and operated by the best engineering skill which the country affords. Nearly all are on a good dividend paying basis; but whatever the past experience of the two systems has been, or whatever the present status may be we are only voicing the convictions of well informed engineers, when we say that electric systems will continue to increase in efficiency (by which is meant earning capacity), until all rivals are distanced, and only one method of rapid transit is recognized—the electric car.

Respectfully submitted,
 WILLIAM M. RAMSEY,
 FRANK R. GREENE,
 JOHN L. HEINS,
Committee.

TABLES ACCOMPANYING REPORT OF COMMITTEE ON "RELATIVE COST OF OPERATION OF HORSE, CABLE AND ELECTRIC RAILWAYS."

TABLE NO. 1.
 OPERATING EXPENSES, ETC., OF EIGHT CABLE ROADS.

| No. | Average No. of Grip Cars operated daily. | Average No. of Trail Cars operated daily. | Daily Mileage of Grip and Trail Cars. | | Receipts per Car Mile, including Mileage of Trail Cars. | Fixed Charges per Car Mile. | Interest on Funded Debt. | Faxes, Tolls—State, County and Municipal Taxes, except Water Taxes. | Gross Operating Expenses per Car Mile, exclusive of Fixed Charges | Maintenance of Road-bed and Track. | Maintenance of Cable Rope and Underground Machinery. |
|-----|--|---|---------------------------------------|--------|---|-----------------------------|--------------------------|---|---|------------------------------------|--|
| | | | Grip. | Trail. | | | | | | | |
| 1 | 103 | 298 | 80 | 80 | 18 054 | 1.624 | 1.060 | .555 | 8.810 | .401 | .686 |
| 2 | 30½ | ... | 127 | ... | 18.300 | 4.700 | 4.200 | 500 | 13.700 | .500 | 2.300 |
| 3 | 54 | ... | 100 | ... | 20.840 | 5.44 | 3.200 | 2.240 | 16 000 | .010 | 1.720 |
| 4 | 6 | 6 | 90 | 90 | 15.10 | ... | ... | ... | 11 000 | ... | ... |
| 5 | 7 | 7 | 70 | 70 | 10.80 | ... | .059 | 1.210 | ... | ... | ... |
| 6 | 29 | 58 | 104 | 104 | ... | 1.230 | .990 | ... | 6.750 | ... | ... |
| 7 | 8 | 5 | 90.40 | 105 65 | ... | 1 884 | 1.532 | 0.352 | 10 715 | .448 | .734 |
| 8 | 70 | 70 | 123.54 | 123.54 | ... | 6.610 | 5.700 | 0.910 | 20.050 | .400 | 3.000 |

TABLE NO. 1.—Continued.
 OPERATING EXPENSES ETC., OF EIGHT CABLE ROADS.

| Maintenance of Power Plant, including repairs to engines, boilers, etc. | Maintenance of Plant in general, Buildings, etc. | Maintenance of Rolling Stock. | Maintenance of Grips, including inspection and shop work | Cost of Power—Fuel, water, oil, waste, and wages of employees | Cost of Transportation—Conductors and Motormen, lighting and heating cars, etc. | General Expenses—Salaries, Legal, Accidents, etc | Net Earnings per Car mile. | Wages of Conductors and Gripsmen per hour. | Kind of Fuel used. | Cost per ton. |
|---|--|-------------------------------|--|---|---|--|----------------------------|--|--------------------|---------------|
| 530 | .132 | .504 | .084 | 925 | 4.702 | 750 | 7.620 | 28c. | Screenings. | 1.47 |
| 100 | .030 | .500 | 100 | 1.700 | 0.400 | 2.000 | 4.000 | 17c | Slack & Nut. | 2.02 |
| 100 | .580 | 1.030 | .570 | 1.070 | 7.450 | 1.480 | 8.400 | 18½c. | Coal. | 1.21½ |
| ... | ... | ... | ... | ... | 7.000 | 3 000 | ... | 17½c. | R. O. M. | 2.00 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ... | ... | ... | ... | ... | ... | ... | ... | 19½ and 20½ | ... | ... |
| 055 | ... | .480 | .262 | 2.530 | 4 084 | 1.221 | ... | 22½c. | Petroleum. | 5½c. per gal. |
| 120 | 100 | 860 | .540 | 3.240 | 0.800 | 1.000 | ... | 22c. | Soft Coal. | 6.20 net ton. |

TABLE No. 2.

OPERATING EXPENSES, ETC., OF SEVEN ELECTRIC ROADS.

| No. | Average No. of Motor Cars operated daily. | Average No. of Trail Cars operated daily. | Average Daily Mileage of Motor Cars. | Average Daily Mileage of Trail Cars. | Receipts per Mile, including Mileage of Trail Cars. | Fixed Charges per Car Mile. | Interest on Funded Debt. | Taxes—State, County, Municipal, except Water Taxes. | Gross Operating Expenses per Car Mile, exclusive of Fixed Charges. | Maintenance of Roadbed and Track. | Maintenance of Line work, including underground wiring. |
|------|---|---|--------------------------------------|--------------------------------------|---|-----------------------------|--------------------------|---|--|-----------------------------------|---|
| 1... | 34½ | ... | 127 | ... | 10.360 | ... | ... | ... | 6.600 | ... | ... |
| 2... | 17 | ... | 99½ | ... | 25.203 | 7.222 | 6.861 | .301 | 17.974 | .773 | .203 |
| 3... | 280 | 5 | 70 | 56 | 40.280 | 3.366 | 1.000 | 2.300 | 25.440 | 2,520 | .720 |
| 4... | 10 | 4 | 120 | 120 | 13.500 | 9.000 | ... | ... | 9.000 | ... | ... |
| 5... | 10 | ... | 100 | ... | 15,000 | 6.480 | ... | ... | ... | ... | ... |
| 6... | 5 | ... | 96 0 | ... | ... | ... | ... | ... | 10,000 | .110 | .070 |
| 7... | 37 | ... | 100 | ... | 28,850 | ... | 2,500 | ... | 13,530 | 2,500 | .520 |

TABLE No. 2.—Continued.

OPERATING EXPENSES, ETC., OF SEVEN ELECTRIC ROADS.

| Maintenance of Plant, repairs on engines, boilers, etc. | Maintenance of Rolling Stock, Car bodies, Trucks, etc. | Maintenance of Motors, inspection work, electrical, mechanical. | Cost of Fuel, oil, waste, etc. | Cost of Transportation—Wages of Conductors, Motormen, Dispatchers, etc. | General expenses—Salaries, Legal, Accidents, etc. | Net earnings per Car Mile. | Wages of Conductors and Motormen per hour. | Kind of Fuel used. | Cost per ton. |
|---|--|---|--------------------------------|---|---|----------------------------|--|--------------------|------------------------|
| Cents. ... | Cents ... | Cents ... | Cents ... | Cents ... | Cents ... | Cents ... | Cents ... | Slack at 1.00 | Lump 3.00, by the year |
| ... | ... | ... | ... | ... | ... | ... | 15½ | Wood | 3.02 |
| ... | ... | ... | ... | ... | ... | ... | 24 | Lump Coal | 1.22 |
| ... | ... | ... | ... | ... | ... | ... | 22½ | Soft Coal | 1.32 |
| ... | ... | ... | ... | ... | ... | ... | 13 | R. O. M. | 3.00 |
| ... | ... | ... | ... | ... | ... | ... | 20½ | Slack. | 4.21 |

TABLE SHOWING STATISTICS OF SEVEN ELECTRIC AND ONE CABLE ROAD.

By permission of DR. CARY T. HUTCHINSON.

| OPERATING EXPENSES. | 4,750,000 No. 1. | | Motor miles No. 2. | | 704,913. No. 3. | | 1,345,149 No. 4. | | 1,500,000 | | 2,744,000 No. 6. | | 1,095,000 No. 7. | | 2,725,000 No. 8. | |
|--|------------------|-------|--------------------|-------|-----------------|-------|------------------|-------|-----------|-------|------------------|-------|------------------|-------|------------------|-------|
| | Cents | % | Cents | % | Cents | % | Cents | % | Cents | % | Cents | % | Cents | % | Cents | % |
| 1. MAINTENANCE OF ROADBED AND TRACK..... | | | | | 1.040 | 8.45 | 2.511 | 12.66 | | | | | 1.516 | 10.80 | .505 | 4.60 |
| 2. MAINTENANCE OF LINE..... | | | | | .100 | .81 | .53 | 2.67 | .145 | .204 | | | .516 | 3.82 | | |
| Total..... | .159 | 2.05 | .200 | 2.10 | 1.140 | 9.76 | | 15.33 | | | .300 | 2.80 | | 14.62 | | |
| 3. MAINTENANCE OF POWER PLANT: | | | | | | | | | | | | | | | | |
| (a) Repairs of engines and boilers..... | | | | | .050 | .40 | | | | | | | | | | |
| (b) Repairs of dynamos..... | | | | | .007 | .01 | | | | | | | | | | |
| (c) Miscellaneous repairs..... | | | | | | | | | | | | | | | | |
| Total..... | | | | | .057 | .41 | | | | | | | | | | |
| 4. COST OF POWER: | | | | | | | | | | | | | | | | |
| (a) Fuel..... | | | | | .830 | 6.75 | | | .675 | 9.40 | 1.280 | 11.90 | | | | |
| (b) Oils, waste, water and other supplies..... | .331 | 4.26 | .391 | 4.12 | .200 | 1.63 | | | .412 | 5.64 | .440 | 4.10 | | | | |
| (c) Wages of engineers and firemen..... | .162 | 2.09 | .223 | 2.35 | .700 | 5.70 | | | .168 | 2.35 | | | | | | |
| (d) Wages of dynamo tenders, etc..... | | | | | | | | | | | | | 500 | 4.65 | | |
| Total..... | .493 | 6.35 | .614 | 6.47 | 1.730 | 14.08 | 2.84 | 14.80 | 1.255 | 17.39 | 2.220 | 20.65 | 1,304 | 8.72 | 2.63 | 25.80 |
| 5. MAINTENANCE OF ROLLING STOCK: | | | | | | | | | | | | | | | | |
| (a) Repairs on motors, except gearing..... | | | | | | .905 | 7.35 | | .244 | 3.40 | | | 1,402 | 9.40 | | |
| (b) Repairs on gearing and troleys..... | 1.040 | 13.40 | 1.430 | 15.10 | .234 | 1.90 | 2.35 | 12.00 | | | | | | | | |
| (c) Repairs on car bodies and trucks..... | .435 | 5.60 | .542 | 5.70 | .525 | 4.30 | 2.35 | 12.00 | .315 | 4.40 | | | | | | |
| Total..... | 1.475 | 19.00 | 1.972 | 20.80 | 1.667 | 13.55 | 4.73 | 24.00 | .559 | 7.80 | 1,800 | 16.80 | | .715 | 5.50 | |

| | | | | | | | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|
| 6. TRANSPORTATION EXPENSES: | | | | | | | | | | | | | | | | |
| (a) Wages of conductors and motormen..... | | | | | 4.560 | 37.14 | 6.98 | 35.30 | 4.678 | 65.50 | 4.650 | 43.20 | 4.815 | 32.00 | 4.00 | 36.40 |
| (b) Wages of starters, switch men, track sweepers, etc. | 4.330 | 56.00 | 4.030 | 52.00 | .485 | 3.95 | | | .103 | 1.44 | .515 | 4.80 | | | | |
| (c) Cleaning and inspecting cars and motors..... | | | | | .290 | 2.35 | | | .383 | 5.35 | | | | | | |
| (d) Oil, waste and other supplies..... | | | | | .485 | 3.05 | | | .036 | .50 | | | 2.693 | 18.00 | | |
| (e) Accidents to persons and property..... | | | | | .007 | .01 | | | | | | | | | | |
| (f) Miscellaneous..... | .172 | 2.05 | .215 | 2.26 | .477 | 3.90 | | | | | | .100 | .93 | | | |
| Total..... | 4.502 | 58.05 | 5.145 | | 6.304 | 51.30 | | | 5.200 | 7.29 | 5.265 | | 7.508 | | 5.62 | 51.36 |
| GENERAL EXPENSES: | | | | | | | | | | | | | | | | |
| (a) Salaries of officers and clerks..... | .437 | 5.05 | .600 | 6.34 | | | | | | | .132 | 1.23 | 1.051 | 7.00 | | |
| (b) Office expenses..... | .132 | 1.70 | .182 | 1.92 | | | | | | | | | | | | |
| (c) Advertising and printing..... | | | | | | | | | | .250 | 2.32 | | | | | |
| (d) Legal expenses and damages..... | .174 | 2.25 | .240 | 2.54 | | | | | | .102 | .95 | .201 | 1.95 | | | |
| (e) Insurance and taxes..... | .384 | 4.96 | .530 | 5.60 | | | | | | .153 | 1.43 | .184 | 1.23 | | | |
| (f) Miscellaneous..... | | | | | | | | | | .523 | 4.90 | 1.090 | 7.30 | | | |
| Total..... | 1.127 | 14.55 | 1.552 | 16.40 | 1.402 | 11.40 | 2.21 | 11.2 | | 1.160 | 19.83 | 2.616 | 17.48 | 1.30 | 11.80 | |
| Grand total..... | 7.756 | 100 | 9.483 | 100 | 12.30 | 100 | 19.60 | 100 | 7.159 | 100 | 10.75 | 100 | 14.915 | 100 | 11.00 | 100 |

APPENDED TO DR. HUTCHINSON'S TABLE.

Therefore, for

1. b=1.14 c, r=1.5
2. b=1.36 c, r=1.
3. b=1.18 c, r=1.4
- 4 (a) and (b), b=1.18 c, r=1.4
(c) and (d), b=1.38 c, r=1.
- 5 (a) and (b), b=1.38 c, r=1.
(c) b=1.25 c r=1.25
6. (c) b=1.14 c, r=1.5
(b) (c) (d) (f) and (e), b=1.25 c, r=1.25
7. b=1.38 c, r=1.

These are the figures used in computing cost per motor car mile in the case of the No. 2 railway. No other line used trailers.

E. J. Lawless, Paterson, in speaking on the paper said there is a field for the electricity and a field for the cable, the latter distinctly its own. When the speaker was manager of a cable road in Kansas City, he had one grade of 18 per cent, on which nothing else could have done the work. (The cable road in San Francisco has a grade of 21 per cent, and one in Portland, Ore., of 24 per cent.—EDITOR.) When it comes to grades there is no question as to the superiority of the cable, but adding to this the local conditions which furnish a great volume of traffic, making the cable system profitable, its sphere is more limited than that of electricity. On the speaker's road he has just put in an electric line, which, had he put in a cable, would have considered himself a fit subject for a lunatic asylum, on account of the tortuous route, frequent sharp curves and sparsely settled district to draw on. Mr. Lawless had great faith in the future of the gearless, and believes reduction in repairs can be effected soon which will press the cable's low cost per mile operated, pretty hard.

A letter was then read from Mr. Wrenn regretting the unfinished condition of his report, which he promised to send in within a few weeks.

ELECTION OF OFFICERS.

The honor of casting the accustomed vote of the associations for the nominated officers fell this year to A. L. Johnson, who with befitting dignity marched down the aisle and dropped in an old hat a scrap of paper, torn from a gospel hymns, and bearing the names of the elect, who are as follows:

D. F. Longstreet, president, Denver: Dr. A. Everett, first vice president: Joel Hurt, second vice president,

Atlanta; W. Worth Bean, third vice president, St. Joseph, Mich.: W. J. Richardson, secretary and treasurer, Brooklyn.

EXECUTIVE COMMITTEE.

The above and John G. Holmes, Pittsburg; J. D. Cummins, New York; Thomas Minary, Louisville; Jas. R. Chapman, Grand Rapids; Benj. E. Charlton, Hamilton, Ont.

The official register is a good one, giving the association a strong and experienced executive.

The association then spent two hours in discussing the proper authority which should be delegated to the executive committee, finally leaving off where they began. Adjournment was made until 10 a. m. Friday. What would otherwise have been the Thursday evening session was passed to attend

THE BANQUET.

The massive doors of the elegant dining room of the Hotel Hollenden swung open at eight o'clock, revealing a most charming sight. The tables had been arranged to the best possible advantage and were laid according to the latest in table and floral decoration. The orchestra was good, and all entered with the utmost zest into the full enjoyment of the occasion. The menu was a credit to the house and its selection was largely the result of the personal attention of Mr. Brobst, the proprietor, who throughout the meeting took special pains to let nothing be undone. Over 400 sat down, including a large number of ladies.

The toasts and speakers were as follows:

"The City of Cleveland," Gen. Ed. S. Meyer.

"Some Phases of the Legal Liability of Street Railroad Companies," Andrew Squire.

"The Ideal Street Railway: A Prophecy," L. A. Russell.

"The Carrier, from the Standpoint of the Carried," James H. Hoyt.

"Benefits of Street Railroads to Cities and Citizens," Richard Bacon.

Tom Johnson was loudly called for and made the speech of the evening, to which Wm. Richardson appended a few remarks.

All the toasts were unusually well presented, however, and as a whole the speeches were among the best in the history of these occasions. It was not until half past one that the last echo died away, the cigars were in ashes, and the lights went down on an in every respect delightful banquet.

THE FRIDAY MORNING SESSION

Was purely a routine one, barely a baker's dozen being present. The report by O. T. Crosby and the special paper by Arthur J. Moxham were read by title only and adopted without discussion.

A resolution suggested by Editor Cicott of the Railway World, London, was adopted, inviting all foreign tramway managers to take occasion to attend the next convention while visiting the World's Fair.

Mr. Crosby's paper is as follows:

Report of the Committee on Standards for Electric Street Railways.

THE AMERICAN STREET RAILWAY ASSOCIATION:

Gentlemen:—The committee, of which as chairman I now desire to render the report, was named in the president's letter of January 4th, 1892, and addressed to the undersigned. The scope of the committee's work as set forth in that letter and in the resolutions bearing on the subject adopted by the Association last October, is to report on the standardizing of rating, nomenclature, dimensions and accounts.

The committee, as first determined, consisted of the following members: O. T. Crosby, chairman; H. I. Bettis, who, as per your letter, was to give special attention to the matter of accounts; E. E. Higgins; Chas. W. Wason, named as mechanical member, and R. W. Rippetoe. The last-named gentleman resigned from the committee work shortly after his inception, and Mr. J. E. Rugg, of Pittsburgh was appointed in his stead.

The first meeting of the committee was called to take place in New York, February 9th, 1892. The minutes of that meeting indicate quite clearly how the work was viewed by the members of the committee, and what subdivision of work was determined upon. I extract from these minutes the following statements:

"Present: O. T. Crosby, chairman; Charles W. Wason, representing the East Cleveland Street Railway Co., and H. I. Bettis, representing the Atlanta Consolidated Street Railway Company."

The discussions in committee resulted in the following conclusions: The thing on which definite recommendations were to be made to the Association were as follows:

"—Accounting methods. Concerning this the object of the committee will be to emphasize the three headings—transportation, maintenance and construction, under which expenditures are to be kept.

It was also concluded to present the car mile as the unit of operating expenses, especially in regard to the item of motive power. For the purpose of comparing motive power expenditures, double truck cars shall be distinguished from single truck cars, while double truck cars shall be classed with trains of two cars.

It was also intended to urge the necessity of proper monthly returns. The whole matter of accounting methods was referred to Mr. Bettis as sub-committee.

In regard to specific dimensions to be standardized, it was concluded that recommendation should be made concerning standard diameter

of axles, of wheels, of trolley wheels, of trolley poles and trolley pole sockets; also the width of trolley wheels and the depth of their grooves, also key-ways for axle gears, and the distance between hubs of wheels measured along the axle. The report on their standard dimensions was referred to Mr. Wason, as sub-committee. It was concluded that the diameter of the trolley wire should be referred to Mr. Crosby, he to correspond with the various electrical manufacturing companies and other persons as he might deem suitable. The same conclusion was had in regard to the rating of motors for railway use, this being referred to Mr. Crosby.

The standardizing of the nomenclature of the various parts used in railway apparatus was referred to Mr. Higgins as sub-committee, with the suggestion that he correspond with the electrical companies and railway companies.

It was also determined that each member of the committee should report as soon as possible to the chairman of the committee, his views upon what plan should be recommended to the association as adequate for carrying on in a permanent way the work of standardizing, which work can scarcely be more than begun by the present committee.

STANDARDIZING OF SPECIFIC DIMENSIONS.

In regard to this heading, I take pleasure in inserting herewith the report of Mr. C. N. Wason, sub-committee on this subject.

"In order to better determine the sizes of the several parts given me, as a member of the Standardizing Committee, I sent out circular letters to two hundred of the leading electric roads, requesting them to give their opinions as to the sizes of the several dimensions.

"I would state right here that from the small number returned, namely, about thirty out of two hundred, that the street railroad companies do not realize the benefit to be derived from such a movement, else they would take the trouble of answering such questions of general information, thus enabling the committee to much better arrive at a satisfactory conclusion. I know myself, as an officer of a street railroad company, my first inclination upon opening a letter containing questions, is to throw it into the waste basket, but upon a second consideration, I conclude it best to send what little information I may be able to give to the party making the inquiry, thinking possibly that the general result therefrom obtained will be of benefit to the whole street railway fraternity.

"One of the objects, as I understand it, of the Street-Railway Convention, is to enable the street-railway men from different parts of the country to get together and exchange their views relative to various matters, with the idea of the mutual benefit to be derived from the discussion, and which would be impossible for the individuals to obtain, did they not come together in this manner. Members of a committee like the Standardizing Committee have much work attending the bringing together of the matter desired, and it surely seems to me that each individual company should do all in its power to assist the committee by answering to the best of its ability, any inquiries put to it by the members of such a committee through the mail.

"In order to obtain the dimensions of the car journals, such as this committee may think best to recommend, I corresponded with the several truck manufacturers, who kindly gave me blue prints and drawings of their journal boxes. If the electrical manufacturers continue to increase the weight of their motors, these dimensions should be increased. The data I here present has been gathered from railroads using possibly a lighter equipment than that which is now being put upon the market. It is absolutely impossible to standardize an appropriate size, considering the change of weight, but the following seems to be the best in the opinion of those from whom I had answers to my inquiries:

"Diameter of axle, $3\frac{1}{2}$ inches; diameter of car axle journal, 3 inches; diameter of axle wheel seat, $3\frac{3}{8}$ inches; length of car axle journal, $8\frac{1}{2}$ inches; diameter of car wheel, 33 inches; diameter of trolley wheel, $4\frac{1}{2}$ inches; width of trolley wheel, $1\frac{1}{2}$ inches; depth of groove in trolley wheel when new, $1\frac{1}{2}$ inches; size of key way for axle gear, $\frac{3}{4}$ inch by 6 inches; distance between hubs of wheels measured along the axle, 48 inches.

It is essential that the groove and depth of trolley wheel be the same if the cars run over the same style of switches, as it is almost impossible to put up an overhead construction that will carry all sorts of trolley wheels. This remark may at first look a little absurd, but when one has had much experience with several different size trolley wheels he will at once appreciate the necessity of all being alike."

The dimensions recommended above as standard have been approved by the other members of the committee to whom they have been submitted, except that Mr. Rugg prefers a 30 inch wheel instead of a 33 inch to be considered as standard. It will be seen in studying the arti-

cles above referred to that those have been chosen which, if of varying dimensions, interfere most with the interchangeability of parts in an electric railway equipment. The object held in view was so to standardize dimensions as to produce as little inconvenience as possible when apparatus such as trucks, trolleys, motors, etc., are obtained for use on the same railway from different manufacturers.

We have endeavored not to forget the principle referred to in the papers presented last year, namely: "that the standardization of parts should be so directed as not to interfere with the progress of invention." There must, of course, in the matters interesting to this association, as in every other evolutionary development, be, on the one hand, a constant struggle to ossify into fixed forms, and on the other, a tendency to restlessly change in the development of new forms. Complete ossification is justifiable only after the attainment of perfection. Constant change in every detail is on, the other hand, justifiable only on the ground that nothing valuable has yet been reached. The adoption of any standard whatever constitutes a compromise between the two considerations named. We trust you will find those standards recommended by us to be a reasonable compromise.

The dimensions of wheels and trolleys above given are intended to be applicable alike to single truck and double truck cars.

Concerning another mechanical dimension, consideration of which was referred especially to the writer. I am able to report that a large majority of the numerous persons addressed by me upon the subject, recommended No. 0 B. & S. gauge as the best size for standard trolley wire. It is further understood that such trolley wire shall be of hard drawn copper; its conductivity to be 95 per cent of the standard in the usual tables used; its tensile strength close to 55,000 pounds per square inch.

Perhaps the desirability of standard dimensions can be as readily shown by referring to this trolley wire as well as in any other way, although at first it may seem to be of very small importance that there



O. T. CROSBY.

should be any agreement on such an article. If, however, it were shown throughout the country that No. 0 trolley wire was always in contemplation, unless very plainly expressed to the contrary, there would be fewer mistakes than have occurred in the past in regard to the size of the channel in the overhead device to which to which the trolley wire is attached.

More than this, manufacturers of these devices could carry stocks more safely, and purchasers could correspondingly obtain more readily those articles which are especially desired to be shipped in a hurry.

NOMENCLATURE.

The list of names suggested by the writer in the paper last year has been submitted to a number of railway officials, railway contractors and manufacturers of electrical goods. Some corrections of the list, as presented last year, have been recommended by various persons, and are herewith incorporated. The name now recommended appears first, and after it, in parenthesis, is the one heretofore used for some articles.

Concerning this list of names, the following letter was received from the Westinghouse Electric and Manufacturing Company.

"PITTSBURG, PA., September 17th, 1892.

'MR. O. T. CROSBY,

130 Summer St, Boston, Mass.

"DEAR SIR—Referring to your favor of the 6th inst., and to the copy of the extract from the last report of the Committee on Standards of the American Street Railway Association, would state that motors,

or parts as designated on the first sheet of the extract appear to us to be termed properly. We do not, however, with our motors, use standards for supports on bearings or side arms.

"The second sheet of the extract pertains entirely to details required in the construction of the overhead work. As we do not make a specialty of this work, we prefer to refrain from expressing an opinion as to what terms should apply in this connection.

Yours truly

(Signed) W. C. CLARK,
General Agent."

NOMENCLATURE OF ELECTRIC RAILWAY TERMS.

Generator—(Generator, dynamo)—Machine in which the electric current is generated.

Motor—(Motor)—Machine in which the electric current is transformed into mechanical power.

Frame—(Frame)—Iron body of machine, including pole pieces and standards or side arms, if any, but not including base plates and bearings.

Standards—(Standard bracket)—Supports of the bearings of generator. Side Arms—(Side arms, check pieces, armature bracket)—Supports of bearings of railway motors.

Pole Pieces—(Pole pieces)—That part of the frame from whose surface lines of force may pass directly to the armature.

Field Coil—(Field coil, spool)—Coils of wires wound on frame in such a way that a current passing through these coils makes magnets of the frame and pole pieces.

Brush Holder—Device for holding the brushes in contact with the commutator, including the insulation used in its support.

Rocker Arm—(Yoke, rocker arm)—Device for holding brush holders in position on commutator while attaching it directly or indirectly to the same.

Fuse—(Fuse, fusible plug)—A metal device for opening circuits when the current becomes abnormally large, the soft metal being melted by a current of fixed quantity.

Switch—A device for closing or opening a circuit at one or more points.

Rheostat—(Resistance box, rheostat)—Wire or other material, suitably protected and conveniently arranged to be introduced in more or less proportion into the circuit.

Trolley—(Trolley contact bar)—A device used to transmit the electric current from the overhead wire to the cars, consisting usually of a

Trolley Wheel—A small metal wheel making rolling contact with the overhead wire.

Trolley Fork—Mechanically connecting trolley wheel to

Trolley Pole—Supporting the trolley fork and wheel and resting in a socket, which is part of the

Trolley Base Frame.

Trolley Wire—Wire from which the trolley wheel directly receives current.

Standard Trolley Switch—(Trolley frog, frog, overhead switch)—A device used to fasten or hold together the trolley wires at a point where the trolley wire branches, and to guide, ordinarily automatically, the trolley wheel along the wire over the track taken by the car.

Trolley Switch—A switch designed for use at a point where two branch lines make equal convergent angles with the main line.

Right Hand Trolley Switch—A trolley switch designed for use at a point where a branch trolley wire leaves the main line to the right in the going direction.

Left Hand Trolley Switch—A trolley switch designed for use at a point where a branch trolley wire leaves the main line to the left in the going direction.

Three-way Trolley Switch—A trolley switch for use at a point where the line branches in three directions.

Drawbridge Crossover—A device permitting the easy passage of a trolley wheel from one to the other of two adjacent wires in a continuous direction.

Trolley Frog—(Trolley crossing, crossing frog, crossover)—A device placed at the crossing of two trolley wires, by which the trolley wheel running on one wire may cross the other, the device also holding the two trolley wires together.

Insulated Trolley Frog—(Insulated trolley crossing)—A device placed at the crossing of two trolley wires, by which the two wires are insulated from each other, and by which the trolley wheel running on one line may cross the other.

Hanger—(Line insulator, line suspension, trolley insulator)—A device for supporting and insulating the trolley wire.

Straight Line Hanger—The hanger used on a straight line and supported from a span wire, the strain on same being essentially vertical.

Single Curve Pull Off—(Single curve hanger)—The hanger supported by a lateral strain in one direction and, ordinarily, on single curve track curves, except at ends and the inside curve of double track.

Double Curve Pull Off—(Double curve hanger)—The hanger supported by a lateral strain in opposite directions, used ordinarily at ends of both single and double curves and at intermediate points and on double track curves.

Feeder Clip—(Feeder clamp)—Clamp with a device by which a feed wire may be connected to the trolley wire.

Feeder—A wire usually insulated, used for transmitting current from the power station to the mains or the trolley wire descent.

Mains—Wire usually insulated, serving for the distributing of current from the feeders to the trolley wire through tap wires.

Tap Wires—Wires to convey current from feeders or mains at the pole to a near point of the trolley wire.

Trolley Wire Section—(Trolley section)—A length of one trolley wire with or without branches, but continuous electrically.

Line Section—A part of the overhead conducting system, so insulated from other parts as to permit the supply of power to be separately controlled.

Section Box—A box containing section switches and fuses used for control of a trolley section or line section.

This subject, which was referred at the first meeting to Mr. E. E. Higgins, has latterly been taken up by the chairman, Mr. Higgins having been for some months abroad.

RATING OF MOTORS.

In all the correspondence and conversation which the undersigned has had concerning the matter, none have been found who did not agree that the present loosely used rating by horse-power is objectionable, but it has been much more difficult to find agreement on any substitute. All feel the difficulty of putting into the mouths of the many who must refer to the capacity of motors any unfamiliar expression, yet no advance can be made without meeting that difficulty. At the risk of unduly lengthening this report, I desire to repeat in considerable part the considerations presented by me last year. I quote from the paper referred to as follows:

"It must be borne in mind that an electric motor, like any other machine, a man, for instance, is capable of performing work at widely varying rates and widely varying efficiencies, and with widely varying factors of safety with respect to indefinite continuance of such a rate of work. It should further be borne in mind that an electric motor in particular is known to do its maximum rate of work when its efficiency is only fifty per cent; that is, if twenty horse power represents the maximum rate of work, then forty electric horse power will be required to perform this work. A series motor, such as is commonly used for railway work, also must vary very widely in its speed while varying the quantity of work it performs per second. Now, this maximum quantity of work, and the efficiency at which it is performed, and the speed of the car connected with it, are all matters of importance when we endeavor to get a really serviceable idea of what the machine can do: that is, of how nearly it can meet the conditions required by the particular service to which we wish to put it.

"Will it serve the purpose best if we rate the machine according to its maximum capacity when its efficiency is fifty per cent, or according to some lower capacity at high efficiency, and at some speed, as nearly as possible that at which the motor must be run during the greater part of its time at service? Should we use the maximum rating, we have the advantage of knowing at once very nearly what is the limit of service which the motor can perform; but, on the other hand, we fail to be told by such rating what the capacity of the machine is when doing the average work of our service.

"There is at present no conventional uniformity controlling either the manufacturer or purchaser of electrical machinery in regard to these matters, which can be determined only by the custom of the trade, as it may grow up through years of uncertainty, or as it may be directed to more rapid maturity by the action of such an association as this."

The first condition, which, in my opinion, should be connected by implication with any rating whatever, is this: that the machine in question shall be able to perform its rated work indefinitely and under any condition of atmospheric temperature. There is, of course, room for honest differences of opinion in regard to this point. It is well known that the maximum demands for power in street railway service are not those which last for a considerable length of time. A certain manufacturer may thus argue to himself: "This machine which I am about to

advertise is able to do twenty horse-power of work for half an hour when the atmospheric temperature is ninety degrees. In my opinion this rate and time and temperature will not be exceeded in the conditions of regular service. Why, then, may I not call this a twenty horse-power motor? It is true, if I were building it for stationary work, in which generally the load to be carried is much more constant, I should adopt a different rating."

It would be possible to express this condition: that whatever the rate, it shall be possible to maintain that rate indefinitely under all conditions of atmospheric temperature, by stating that the windings of the armature shall never show more than a given excess of heat over atmospheric temperature.

There is again room for honest differences of opinion in regard to the efficiency with which a motor can do its rated work. Suppose the manufacturer has produced a machine which can do its maximum work for an indefinite time without undue rise of temperature. There is today no custom of the trade distinctly understood which would prevent him from rating the machine by this maximum capacity. And, again, in stating that the machine is of fifteen horse-power capacity, even if there be agreement concerning efficiency and durability, there might be disagreement of much importance in regard to the speed at which work can be performed by the motor. If it has been so constructed that it can do fifteen horse-power of work only at some armature speed corresponding to a linear speed of the car, either much above or much below the average speed of the car, then the information and motor may both be of little value for street railway service. Indeed, the use of the term "horse power" then has necessarily this uncertainty in it: the total number of foot pounds per minute, namely, 33,000, may be made up in an indefinite number of ways by an infinite number of combinations of feet of travel and of pounds pull; but for hour service we should have some known relation between these two.

It seems to me that that which the purchaser has in mind to obtain is such horizontal effort exerted at such a speed and at such an efficiency as will do the work in view. Now, the work in view varies very widely and we cannot, therefore, obtain a convenient rating which will express this relation throughout the range of the total capacity of the motor. We may, however, select some particular condition, say that approaching as nearly as possible to the average, and tell by a method of rating, which I will propose, what the machine can do for such condition.

Let us first consider the speed at which it is desirable to know the capacity of the motor. I think ten miles per hour is not far from the speed at which cars will be found most frequently running. If, then, we state concerning a motor that it can develop so much horizontal effort at that speed, we at once have a pretty close approximation as to what load of a car and passengers it can handle at that speed, since we know that twenty-five pounds per ton is a fair approximation to the average traction co-efficient. Suppose, then, we are told that a motor can produce a horizontal effort of 500 pounds at ten miles an hour. It is, then, a quick inference that a car weighing twenty tons can be carried by such a motor at the rate of ten miles per hour on a level. We may then conscientiously call this motor a "500x10."

It may, of course, at once be objected that such a method does not distinguish between efficiency of motor proper and the efficiency of its gearing. For a great many reasons this is not very objectionable. We buy the motor with its gearing, and I can see no particular reason why the manufacturer should not get the benefit or the blame of the good or bad gearing which he may use with his efficient or inefficient motor. Furthermore, in the single reduction motors, now so widely used for ordinary street railway work, the loss by gearing transmission is very small, and probably not widely variant as between the different manufacturers; and again, in whatever high speed work which it may be feasible to do by gearless motors, the question of the efficiency or inefficiency of the gear is eliminated.

Again, it may be objected that such a method supposes uniform diameter of wheel which must be known to the manufacturer, in order that he may calculate what his motor is doing for a given car speed. Should there be no considerable variation from the thirty-inch wheel now so largely used, such a diameter might be taken for granted as having entered the calculation; and if a different wheel, say thirty-three inch, becomes general, then that diameter may be assumed in the rating.

It would, of course, in any such rating, be assumed that the machine is working under a pressure of 450 volts, which is not far from that found on most of the lines throughout this country. In the necessary regulation to which these motors are subjected, a part of this pressure is practically applied to some resistance, external or internal, with respect to the motor; but I can see no convenient way of taking this into account in determining upon a rating. Indeed, the action of a series motor in

street railway service is very complex, and it is much more difficult than is sometimes supposed to determine upon a rating which shall give the greatest amount of available information. The very difficulty, however, is warrant for approaching the subject seriously and industriously.

In spite of the fact that many objections may be urged against any suggested method of rating, that which is preferred by your committee and by many persons consulted in regard to the question is this: that a motor shall be known as to its capacity by the horizontal effort which it can apply to a car at a speed of 10 miles per hour, the standard 33-inch wheels above recommended being used on the car, and whatever gearing may be preferred by the manufacturer. It is plain that the horizontal effort that may thus be produced from a given motor whose armature is running at a given speed, may be made to vary by this change of gearing, but for the reasons above stated it has been thought best to consider the motor and its gearing as one piece of mechanism. While this recommendation would at first involve the use of two terms in the name of a motor, namely, horizontal effort, and speed, the term for speed would soon disappear after it has become generally understood to be 10 miles per hour.

Thus for the present, calling a given motor 600x10; this meaning that at a speed of 10 miles per hour the motor in question will develop a horizontal effort of 600 pounds. Later, however, the same machine would be satisfactorily designated as a 600 pound motor, the standard speed being taken for granted. At the same time as street-railway men begin to go into suburban enterprises, in which higher speeds than those now familiar must be attempted, it will be easy to revive the expression for the speed at which a motor is rated, and we may thus expect to see motors described as 600x20, 600x30, etc. This high speed extension of electrical motor work, and especially its extension in the same hands as those now directing ordinary street traffic, makes it especially important that some rating should be adopted which will take speed into account, as otherwise confusion will inevitably result. It goes without saying that much remains to be told concerning a motor after its horizontal effort at a given speed shall be expressed, and a part of the recommendation of your committee is that an implied part of the rating of a motor lies in this, that it shall be able to perform its rated work continuously without a rise in temperature exceeding 75 degrees C. over the atmospheric temperature.

In regard to the efficiency, desirable as it is to be informed on that point, it seems too difficult to be involved in any rating which shall be frequently and properly used.

Another method of rating motors, which is presented as the second choice of your committee, is as follows: that two terms should be used, one giving the horse-power of the motor at which it can work continuously at a safe temperature, the other its maximum horse-power. As has been explained, it is a feature of all electric motors that their maximum rate of work is done at a 50 per cent efficiency. Nothing is more essential to be established, therefore, than the maximum work the motor will do. Following this method, which was suggested by Mr. Chas. A. Lieb, a given motor might be known as 15x35 or as 20x40, etc., concerning the first machine named, it being understood that it could do 15 horse-power of work all day long without undue heating, but under stress it could perform work at the rate of 35 horse-power, the efficiency being at once known to be down to 50 per cent. It would also be understood, and go almost without saying, that the motor would be unable to do 35 horse-power of work continuously; indeed it would be expected to perform such rate of work safely for only a very short time, say from two to five minutes.

Uninviting as is the discussion of such a subject in a large assembly like this, your committee urges that serious consideration be given to this matter, and that one or the other of the methods here recommended be adopted.

In conclusion, while urging that all definite action possible shall be taken on the recommendations now made, we further urge most strongly that steps be taken to carry on permanently the work of standardizing, especially the work of standardizing the nomenclature and dimensions, since in regard to these there can never be any cessation of demand. To further this object, we recommend that this Association employ a salaried official, to be known as the Statistical Secretary or Clerk; that such employe shall give his whole time to the obtaining of data bearing on the work of the Association, direction to be given him in obtaining and collecting such data by the permanent executive officers of the Association at their discretion, and especially by the standardizing committee, which we further recommend shall be made one of the permanent committees of this Association.

Another important work which could be assisted by such an official, and, by such a permanent committee as that which has been much

before us; namely, the furthering of the actual use of whatever standards this Association may adopt. Little has been gained in what we believe all recognize as a useful work, if we stop at a formal adoption of names and dimensions.

The cure for the insufficient report is, we feel, perhaps to be had in the in the appointment of some official as above suggested, more than by any other means.

Respectfully submitted,

O. T. CROSBY,
Chairman.

STANDARDIZING OF ACCOUNTS—ACCOUNTING METHODS AND STATISTICS.

TO THE AMERICAN STREET RAILWAY ASSOCIATION:

Gentlemen:—The subject of formulating a standard system of accounting and forms for statistical information is of great importance to this Association, and I appreciate the weight and value of the undertaking as much as anyone, and perhaps more than the majority of the members of this Association, having given the subject considerable study.

The prodigious strides which the street-railway business has made in the last few years, now causes this subject to come to the front. The meetings of this Association for the discussion of the knotty problems which are continually perplexing our managers, has also impressed upon us the necessity of more reliable statistics for comparative study.

The ultimate object of all accounting is to ascertain with accuracy the amount of net income, after all operating expenses and fixed charges have been paid.

With this object in view, and no other, the art would be reduced to a very simple profit and loss account, debited with all expenses and credited with the entire income; but the owners and managers of our street-railway properties for many reasons desire some further information than this.

It is not sufficient for them to know that their road has a certain income, or that the expense has reached a certain amount.

They desire to know many things in addition to these: what was the source of income; how many miles of track have they; how many cars; how many trips those cars make; how many passengers they carry. What other sources of income are there; what was the expense of operating the road; what portion was simply for the transportation of the passengers; how much was paid for motive power; for repair of cars; of apparatus; of track; buildings, etc., etc.; has anything been expended in construction, improvements, or betterments.

Having all these things well in hand, the owners and managers can determine more readily wherein the expenses have been too large, and have thereafter a basis upon which to calculate their future operations.

Moreover, what is of incalculable benefit, they can compare the cost of operating expenses of other lines, throughout the country.

Heretofore, the great difference of opinion on the part of street-railway officials, as to the necessity or value of any reports, or statistical information, has rendered it almost impossible to get any reliable information, and above all to make any comparisons, one road with another.

In order to get any beneficial results by comparison, it is necessary that we have statistics compiled from some standard basis.

We cannot compare wheat with potatoes, neither can we compare the cost of operation of one road with the operation of another, unless like expense accounts are included in each case, and the data compiled under the same rules.

In the case of Steam Roads of the United States the Interstate Commerce Commission has caused to be compiled a Classification of Expenditures and certain rules for their guidance in making the Annual Reports to the Government.

Most of the Railroad Commissions of the several States have adopted this classification and nearly all the Railroad Companies use the same in their accounts.

It is quite probable that in the near future the Interstate Commission may extend its jurisdiction over the Street Railway Companies, and in that case would compel them to adopt a uniform system of accounting as a basis.

Such a system of accounting, to be accepted by all the Railroad Companies in this Association, can only be adopted after due consideration, and the co-operative endeavors of our accounting officers.

This committee will not attempt to prescribe a set of rules and reports, but only to suggest certain distinctive lines which we believe should be followed in the future, when deciding upon a basis for accounting statistics.

DIVISIONS OF EXPENSES.

We are all agreed that it is essential for the expenses which add to the present or future value of a property to be separated from those which do not, and that the three great divisions should be.

1. Transportation Expenses.
2. Maintenance "
3. Construction "

This established, the various subdivisions may be few, or carried to infinity, but the final results are necessarily the same.

The differences between these divisions are as follows:

1. Transportation expense is simply the expense of transporting the passengers, and includes nothing whatever expended upon the property. Under this heading we should find wages of conductors, drivers, gripmen, motormen (engineers and firemen on dummy lines), fuel, provender, lubricants, wrecking, etc., etc.
2. Maintenance expense is the expense of keeping the properties in their original condition and consists of the amount expended upon repairs of track, buildings, cars, power plant, engines, etc., etc.
3. Construction expense is such as adds to the value of the original plant, such as additional buildings and machinery, new tracks laid, less the value of old ones taken up, etc., etc.

Improvements and betterments should also be included under the head of construction, that is, for such portion as the property is improved over the first cost.

One question deserving your consideration is that of taxes, and whether it should be included in the operating expenses or not. I have noticed that the majority of roads do now include it, while a few deduct it from the net income after operating expenses.

In comparative statements this is an important item, and it would be well to decide this question. Our road deducts taxes after the operating expenses as one of the fixed charges, which I think is correct.

MATERIAL.

Another point we would suggest is to recommend the accounting for material as closely as possible. It is the practice upon many roads to keep an account of material purchased and kept in stock for future use but to charge all material purchased to expense, whether used at once or not.

It must be perfectly clear to this Convention, that when material is purchased, there is no decrease in the assets of the company, and consequently no expense. There has been simply an exchange of cash for material. The expense does not occur until the material is used.

When we can impress upon our accounting officers the necessity of accounting for material as closely as for the paltry nickel, we shall have advanced one important step in the right direction; and until this is accomplished, our monthly returns will not show us what they are intended to show, i. e., the business done and the expenses incurred during the month.

It is absurd to charge to the expenses of one month all the bills paid in that month, or the bills contracted in that month, when the material

covered by the same may have been used long ago, or may be in stock and for future use.

Material used represents from 30 to 40 per cent of the expenses of operation, and yet on the majority of our roads it receives no attention whatever.

I would like to say something concerning the care of material, the method of handling supplies, method of keeping stock accounts, of the care of tools and old material, but fear to take too much of your valuable time upon subjects of minor importance.

UNIT FOR COMPARISON.

It has been suggested that we adopt as a unit for comparison the car mile, especially in regard to motive power, and consider the single truck with double motor car as the standard; double truck cars to be equal to two trains of two cars each.

It is difficult to say what should be the unit, whether it should be the car mile, the passenger or neither.

When we consider the vastly different conditions to be contended with, on the various roads, in the shape of grades, distances from power house, amount of traffic, etc., we can hardly settle upon any factor for a unit.

It may be decided that the best results for comparison will be found by comparing the percentage which operation bears to gross income.

FUTURE WORK.

I would advise for the continuance of this work that a committee, selected from the accounting officers of roads in this Association, be appointed to prepare a Standard Classification of Expenditures, with blanks for Statistical Reports, to be referred to the next annual Convention; the same to be previously circulated among the members of the Association, in order to obtain the fullest possible criticism and examination at the Convention.

Very respectfully yours,

H. I. BETTIS,
Sub Committee.

The adjournment which followed ended the Eleventh Annual Meeting, which was declared by all to be a grand success.

The only fitting after-piece was the visit to the Walker plant.

At 10 o'clock a large party left the hotel in carriages provided by the Walker Manufacturing Company, and drove to their immense works, which were inspected and lunch served, all of which was done in the liberal and genial manner, in which the Walker Company always do things.

DUPLEX HOSPITALITY.

ONE of the most enjoyable features of the convention was the series of dinners given at the Hotel Stillman by the Duplex Street Railway Track Company, of New York. These entertainments were given each afternoon and evening in the beautiful white and gold banquet room and were attended by fifteen guests on each occasion. John D. Elwell, general manager and H. L. Cargill, assistant general manager, divided the duties of host and no attention was wanting to make the happiness of every guest complete. S. Russell, Jr., also represented the company. The generous hospitality of the managers of the Duplex Rail Company will be long remembered as a very happily executed feature of the big convention.

GENERAL WALKER.

JOHN WALKER, of the Walker Manufacturing Company, Cleveland, seemed unusually smiling as he greeted his railway friends the last two convention days. He had just returned from Detroit, where, at the annual meeting of the Uniformed Order of the Knights of the Sons of St. George, he was elected Lieutenant General, commanding the entire order in the United States, and being the highest honor conferable on an Englishman by his countrymen in this country.

"Gen. John Walker" sounds well, and the general is big and jolly enough to wear the title in a becoming manner.

All of General Walker's friends in the order regard the honor as well placed.

THE STREET RAILWAY EXHIBITS.

Largest and most Expensive Display of Street Railway Supplies ever Made—Exhibits show the Advantage of Sufficient Room—Falling off of Crank Inventions.

THE exhibition of street railway appliances at Cleveland demonstrated several things: That a marked improvement can be noted from one year to another: that the railway manager finds the display of appliances quite as attractive, instructive and useful as reading and discussing of papers; that when adequate facilities are afforded for arrangement, the exhibit is made far more satisfactory; and that the crank-inventor, who has, in days past, made himself and his pet patent, neither of which are of any use, so "mighty prevalent" have experienced a very marked falling off, to the great relief of everybody. Nearly all exhibitors this year presented practical, valuable goods, deserving the time of the delegates and mention here.

The Army and Navy Building, where the main display was made, is opposite the Hollenden. The entrance, corridor and first floor, and the banquet room on the second floor were completely filled. On a vacant lot next adjoining, a floor and roof were erected, making an annex, and in all affording a floor space of about 10,000 square feet. The advantages of classification, for the first time attempted, were apparent. So extensive was the display and such extra endeavors had been made by manufacturers to make the display a credit to the association, that a whole book might be easily written to do justice. The exhibit, an exposition, certainly illustrates more forcibly, and as can be done in no other way, the advance and progress which marks the flight of time from one convention to another.

IN THE EXHIBIT BUILDING.

J. FISCHER had two models of underground trolley systems, and two models of car brakes.

THE JOHNSON SAFE AUTOMATIC ELECTRIC COMPANY, Richmond, Va., showed their electric current disconnector.

THE EDISON COMPANY, New York, displayed electrostatic voltmeters in charge of E. M. Smiles, who looked happy as people joined him in some reading matter.

THE STERLING COMPANY came next with some large and handsome photographs of plants installed with their famous water tube boilers. F. E. Bruce, their Cleveland manager, did the honors and made friends in a most pleasing manner.

In the adjoining exhibit was found the Schultz Belting Company, of St. Louis, with samples of woven leather and other leading types of their celebrated manufacture. Their leather pulley covering was also the center of much interest and all was in charge of their Mr. J. A. Ferguson.

It was well worth climbing the stairs to have Garson Myers, of the Standard Railway Equipment Company, show you his heater which don't require any cutting of the seat. It was handsomely nickle-plated; one of those "things of beauty and a joy forever" you read about.

A CONSTANT, merry jingle of bells, attracted passers by to a ringing up of imaginary fares which, if actual registrations, would have enabled Manager Englund, of the International Register Company, Chicago, to make all his friends a present of a register apiece. The display was confined to their portables.

THE HAMILTON-CORLISS ENGINE still further contributed to the art display with an adjoining space filled with choice photographs of railway plants installed, it being slightly inconvenient to put a 1,000 horse-power engine on exhibition. P. L. and Charles Sword represented the company in an able manner.

THE fastest thing in Philadelphia, is the "Philadelphia Trolley," manufactured by the Technic Electrical Works, the makers claiming it can be dismantled in nine seconds and assembled in twenty-two seconds without a wrench. Their exhibit of parts and complete trolleys was one of the prominent displays in the hall.

THE BRADLEY GENERAL ELECTRIC, described elsewhere in this issue, had a full-sized wooden model of track construction in handsome light wood. It was much examined. Capt. Bradley and H. C. Hartman recited the catechism to the multitude, in which the chief end of man was shown to be to ride on roads of the Bradley build.

WITH that genial smile which always makes a man feel as if he had been waiting particularly for you to come along, stood President J. W. Meaker, of the Meaker Register Company, Chicago, near his exhibit of portable and stationary registers. And when the delegates came along and saw Mr. Meaker they were glad they came and some went away so they might come again.

THE WALKER MANUFACTURING COMPANY had an attractive display of photos and small gears in the entrance; in the annex, huge wooden patterns of gears and clutches for the New York cable roads and other moulding patterns. Manager Bone looked after the visitors.

THE ILLINOIS STEEL COMPANY, Chicago, was ably represented by Mr. Brown, in charge of the large street railway department of the company's business.

THE ESMOND STREET RAIL COMPANY, New York, had track sections and the Esmond Rocker Link cantilever truck.

THE POSITIVE NUT LOCK WASHER COMPANY, Newark, N. J., had an assortment of nut locks, for iron, wood and rail purposes, the only exhibit of its kind.

THE NEW PROCESS RAWHIDE COMPANY, Syracuse, displayed their celebrated rawhide pinions, and distributed a neat pamphlet. T. W. Meachem, A. C. Vosburgh and J. C. Kenyon explained the advantages of the New Process, and the story of its remarkable success.

THE Q. & C. COMPANY, which might, with good reason, be interpreted "quick and cheap," was the sign that decorated the west walls, the annex, while below G. H. Bryant put in his time sawing up rails into thin cross sections with a Bryant rail saw, which automatically feeds. It made a most favorable impression, and this month's shipments will be larger than ever.

THE large crowd that gathered from several blocks around to see the fire were at first disappointed to find it was only C. A. Hoagland starting up his chimes of New Departure Bells. That they take a front seat for alarm bells for all motor cars is not to be wondered at, when their strength and simplicity are seen as they appear at a single glance. It was another clear case of pressing the button and the bell doing the rest.

THE RAILWAY EQUIPMENT COMPANY, Chicago, had a choice space on first floor of exhibit hall (Mason says they always get in on the ground floor) and displayed a nice line of overhead fixtures, including the well-known specialties pushed by this house. Also the Ahearn Electric heater, under full headway and rolling up great bunches of heat, attracted everybody. President W. R. Mason and J. F. Macartney presided.

CHAS. A. SCHIEREN & COMPANY had a monster roll of new black belt which, set on end, resembled the base of a big smoke stack. It was 72 inches wide, 3-ply electric leather belt and weighed 2,200 pounds. Chas. A. Schieren Jr. and E. P. Atkinson represented their company, and, being located in the main entrance hall, held a veritable reception as their friends filed past.

FULTON FOUNDRY COMPANY, Cleveland, were found in the annex, and had two new trucks with connector draw-bar, besides automatic diamond switches, patent brake-shoes with interchanging slippers. Also the Lyons patent brush holder, and the Robinson wrecking truck. Those two good friends of all who know them, C. J. Langdon and W. E. Haycox, did much to contribute to the pleasure and comfort of the guests.

THE PECKHAM MOTOR TRUCK & WHEEL COMPANY, Kingston, N. Y., had in the parquet row of the annex a

set of their latest trucks equipped with their own wheels. This is the latest production of the Peckham works, and deserves the careful examination delegates seemed anxious to give. In addition to President Peckham, A. W. Field and P. S. Bemis, Jr., were in attendance, and found their time fully occupied meeting old friends and making new ones.

THE FORD-WASHBURN STORE ELECTRO COMPANY, of Cleveland, had a series of their storage batteries connected to and driving fans and small motors. It was the principal storage battery exhibit, and received a general inspection. G. A. Washburn and James Chamberlain answered the great variety of questions, with which the delegate is always well-stocked.

THE TAYLOR ELECTRIC TRUCK COMPANY, Troy, N. Y., filled a big fat space in the annex with their display, which was the subject of much favorable comment. Their truck was of the "Taylor Improved" type, attracting much attention, partly on account of the ease with which the car body can be removed, and the other apparent advantages of this truck. The company was represented by W. F. Gurley, and John Taylor.

THE SPERRY ELECTRIC RAILWAY COMPANY required a good-sized space in which to show their new motor on a McGuire truck. It was raised from the floor, connected to power and in constant operation. Aside from its being a new device, the interest in its work was sufficient to keep a large crowd constantly surrounding it. A case of switches, lightning arresters, etc., was also to be seen in their display. In charge of H. P. Barr and Mr. Sperry.

DORNER & DUTTON, Cleveland, had three exhibits. One at the works; another in the annex of two trucks equipped with short motors, and sample axles, wheels and gears, all of their own make, also their track cleaner. The third display was in the large platform, on Prospect street, just back of the headquarters hotel, where additional trucks, fenders and their specialties disported themselves. Mr. Dorner and Mr. Dutton both spent all their time on the grounds.

THE BROWNELL CAR COMPANY, St. Louis, occupied a double exhibit, a choice space in the annex, where were shown the new Brownell truck and the trolley bridge, recently illustrated in these columns. On the special track on Prospect street, side of Hollenden hotel, stood a brand new Accelerator, of which the managers heard so much, and which many saw for the first time. It was the object of much favorable comment, and frequently was loaded to the steps, and run out on exhibition trips, at which times the advantages of the arrangement was fully demonstrated. It was upholstered in heavy moquette of harmonious color, and mounted on a Brownell truck with a Short motor. President F. B. Brownell was in attendance with several assistants.

THE BARNES BRAKE COMPANY is another Cleveland concern, exploited by John T. and John A. Davis.

PITTSBURG TROLLEY COMPANY were represented by A. P. Manning, with samples of Duncan's trolley and self-oiling wheel.

THE GARTON ARRESTER will not stop a thief, but claims to stop a statical discharge. W. R. Garton, Keokuk, Iowa, in charge.

THE JEWELL BELTING COMPANY, Hartford, had a full line up to 48 inches, which was looked after by Chas. E. Newton, G. W. Bancroft and C. L. Tolles.

THE BODIFIELD BELTING COMPANY, Cleveland, had their display in the entrance to hall, in charge of Manager C. T. Bodifield. One belt was a sixty-inch.

BRIGHTMAN STOKER "set 'em up," but in the shape of a boiler front and rocking grate. G. B. Herenden shoveled in air and blew off imaginary pop valves.

THE W. BINGHAM COMPANY, Cleveland, used a handsome plush-covered background to display a nice line of bells, wrenches, hammers, etc. C. E. M. Young in charge.

THE TOLEDO ELECTRIC HEATING COMPANY displayed their new electric heaters, which were fully explained by C. S. Jones, vice-president, and F. B. Perkins, electrical engineer.

THE CLEVELAND MOTOR LIFT COMPANY explains its calling by its name, and are making a hydraulic lift for raising motors. D. J. Kuntz was in charge, and made many friends.

A BAR of any kind, except the draw bar, without which the cars can't run, is unknown at conventions. Billings & Spencer Company, Hartford, introduced their commutator bar.

THE W. H. II. PECK COMPANY, Cleveland, made a fine showing and set up a line of rawhide cords, rubber tubing, trolley cords and a lot of good things. O. A. Foote was at the head.

THE CLEVELAND ELECTRIC MANUFACTURING COMPANY displayed, among other things, an automatic electric car starter, which sounds leaving time on a big gong. A. B. Foster in charge.

THE MCINTOSH-HUNTINGTON COMPANY, jobbers in street railway supplies, had a large frame in which the firm name was spelled out in letters formed of wrenches, bits, etc. W. W. Johnston was in charge.

WM. WHARTON, JR., president; F. P. Howe, secretary; A. W. Stee, western agent; J. C. Robinson, Boston, were all present, and formed part of the contribution made by the Wharton Company, the balance being rail sections and special work.

THE MITCHELL-BRANT COPPER CO., of Erie, Penn., was a new-comer to most street railway men, but had a full line of commutator segments of pure copper, and exact gauge. copper castings. A. L. Daniels in charge of exhibits.

E. S. GREELEY & Co., 5 Dey street, New York, in addition to railway supplies, make a specialty of testing instruments, which were looked after by Frank A. Magee, who added many new names to his company's list of friends.

THE FOREST CITY ELECTRIC WORKS, Geneva, O., was a stranger to most visitors, but displayed some good work in switch boards, automatic current breakers and the Cleveland ammeter, the invention of W. B. Cleveland, who was in charge.

THE DEWEY ELECTRIC HEATER CO., Syracuse, N. Y., had full steam up and furnished plenty of hot air from their very attractive and compact electric heaters. Edwin B. Wyman, general manager; Mark Dewey, electrician, and Arthur S. Partridge, the energetic western sales agent, were all in attendance, and had their time fully occupied showing the workings of the heater.

THE SWAN LAMP CO., is a Cleveland house, and displayed a delicate colored glass swan resting on a nest of glass threads and eggs, all lighted with their 16-candle-power incandescent lamps. Also showed their railway specialty, the Tide filament railway lamp. Prof. E. P. Roberts, Geo. McGuire and H. B. Johnson in attendance.

STAR HEADLIGHT CO., Rochester, N. Y., had an assortment of oil and electric headlights with interchangeable signal colors, for both hood and dash. This system is the result of suggestions at the recent Syracuse convention held September 20th, and was worked out by Wm. M. Sturges, who with Sidney Wheelhouse represented his company.

THE CUSHION CAR WHEEL CO., in addition to the set of wheels under the McGuire special exhibit truck, had a set under the special palace car of the General Electric Co., and was the occasion of much favorable comment by guests who rode in that car. Its ease of motion and freedom from noise bore out all that is claimed for the cushion wheel. P. F. Leach, Chicago, vice president, represented this company.

THE MCGUIRE MANUFACTURING CO., Chicago, had a most striking and attractive display in their new No. 19F pressed steel truck, with polished steel axles and nickle plated frame. It was mounted on cushion car wheels, and was one of the most prominent exhibits in the hall. J. A. Hanna, D. B. Dean and M. G. Hubbard, Jr., were all in attendance. Mr. Cook was unexpectedly detained at home by the serious illness of his wife, and was greatly missed by his many friends. The McGuire trucks of other patterns were also shown in actual operation under operating cars on several Cleveland lines.

J. L. PAPER, of Cleveland, showed a new rolled steel self-tightening rail joint.

THE MT. AUBURN TROLLEY, of Cincinnati, was fully explained by H. M. Littell.

THE JONES Adjustable Metallic Spring Weather Strips were shown by H. N. Loomis.

THE CHAPMAN VALVE COMPANY, of Indian Orchard, had a very fine display of valves.

THE PARTRIDGE CARBON COMPANY, Sandusky, O., had quite a layout of their carbon brushes.

J. O. HADDOX, Louisville, making the well known Littell Track Cleaner, had one on exhibit.

COMBINATION CAR COMPANY, Boston, had a section of car showing sliding windows of large size.

THE CROSSLEY CAR BRAKE COMPANY, Cleveland, had a sample of their brake to show delegates.

THE OSBORN MANUFACTURING COMPANY, Cleveland, had a large display of brushes for street cleaning.

W. & L. E. GURLEY, of Troy, N. Y., had a fine line of surveying instruments. Represented by W. F. Gurley.

THE SMITH PATENT SIGNAL LIGHT BOX, a very handy device for holding signal lamps, was displayed to a great many.

THE PORTER TRAMWAY SWITCH COMPANY, Cleveland, showed the workings of the Rocker Switch manufactured by them.

THE RELIANCE STEAM GAUGE COMPANY, Cleveland, had a very large assortment of gauges. Represented by A. J. Wright and L. F. Wright.

A NEW rail candidate was the Stillman Improved Railway, of Providence, which improved the opportunity to meet the trade. H. L. Stillman in charge.

"GIVE the wheel another turn" was the word at the exhibit of the New York Car Wheel Works. A very fine line of wheels were shown by the company.

THE RELIABLE MANUFACTURING COMPANY, Boston, were represented by P. A. Williams, who kept an audience by showing their sand box, brake and switch.

THE EUREKA TEMPERED COPPER COMPANY, North East, Pennsylvania, had samples of pure tempered copper for bearings, trolleys, etc., etc. Represented by J. R. Coffman.

THE CARPENTER ENAMEL RHEOSTAT COMPANY, Bridgeport, Conn., were represented by C. E. Carpenter, inventor of the Carpenter Heaters, showing a large display of heaters.

R. A. CRAWFORD, of Pittsburgh showed his guard for cars with a pick-up device. The guard is so made with springs that it is not injured by striking pavement projecting above track.

THE HILL CLUTCH WORKS, Cleveland, had a large clutch on shaft with pulleys so that the workings could be shown very plainly. H. W. Hill and S. L. Leonard entertained the visitors.

THE PENNSYLVANIA STEEL COMPANY, Steelton, Pa., had a large display of rails, frogs, joints, turnouts, switches, and curves. They were represented by John F. Ostrom, M. D. Pratt and Ralph L. Crump.

THE VANDORN IRON WORKS, of Cleveland, had samples of iron poles weighing 375, 475, 750 and 1,000 lbs. each. They were very tastily painted and looked as if they would stand any kind of strain.

CHAS. SCOTT SPRING COMPANY, opened a fine line of fall and winter springs with all their new styles, which make them worth so much. Their display was well arranged and well repaid inspection.

THE WASHBURN-MOEN MANUFACTURING COMPANY contributed a case of assorted wires of all kinds and sizes, and which comprised a long line of their manufactures. It was much admired, and Edward Stockwell represented the company, and was kept busy answering inquiries.

THE JOHNSON ELECTRIC COMPANY, Cleveland, manufacturers of general electric railway supplies, had a very attractive display of their own manufactures, including gears, pinions, raw-hide pinions, journal boxes, armatures, trolley hangers, etc. J. S. Coleman represented his people in an able manner.

THE NATIONAL FARE BOX MANUFACTURING COMPANY, Chicago, had a tempting line of "slots to drop the nickle in," made of aluminium and looking as bright as a new silver dollar. By the way the delegates inspected the line, the light weight boxes will be a go. The exhibit was in charge of manager F. H. Roeschlamb.

MARKS & STERLING, Cleveland, had rail joints, and jointed rails, tie plates, and chairs sufficient in number and variety to set a newly-married couple up in house-keeping, had the furniture been the right kind. Other specialties in track work. C. E. Mark and W. B. Sterling were both present.

ONE of the most interesting pieces of machinery in operation was the turret lathe, manufactured by Lodge & Shipley, Cincinnati. On the old style of lathe two or three men are used in placing a motor gear to be turned down, but with the crane attached to the lathe one man can very easily put it in place, and when this machine is started the diameter is turned down, both sides are cut and the center bored at once, doing the whole work in twenty minutes.

THE MEHLING CAR COMPANY, Cleveland, had one of their combination cars running, which attracted a great deal of attention. It was manufactured by the G. C. Kuhlman Company, the Cleveland car builders.

ALFRED G. HATHAWAY laid a large floor on the vacant corner immediately back of the hotel on Prospect street, and displayed transfer tables running on actual tracks, also the Roche coupler and draw bar and other specialties.

DORNER & DUTTON used part of the Hathaway special space, with several trucks, track cleaners, wheels, journal boxes and gears creditably arranged. The Cleveland Frog and Crossing Company, also had samples of their special track work in the same place.

BENEDICT & BURNHAM MANUFACTURING COMPANY, 13 Murray street, New York, were kept prominently in the minds of delegates by their genial representative, E. H. Oswald, who was kept busy relating the successful record of their copper wire and cables for electrical purposes.

THE GENERAL ELECTRIC COMPANY'S display was a whole exhibit in itself, and was the largest and best arranged ever made by the T. H. Edison people. Complete lines of overhead materials, made of sheet mica, which they have just put on the market, were displayed. These have a guaranteed strength of from eight to sixteen thousand pounds strain. Also new Columbia feed wire glass insulators, new pall brackets and round and hexagon poles with all fittings. At one side, as a curiosity, was shown a set of fixtures in use five years ago, of motors—2 water proof 30-horse-power, mounted on Brill trucks, and another of 50-horse-power. One single 30-horse-power, type F., and one of same power, type G. Also an Edison, No. 13. A new hand press, for pressing on gears and pinions: a 650 amper slatt station switch-board were also shown.

Two illuminated signs of colored incandescent lamps, and a shield and eagle in national colors in small lamps and a monogram were much admired. The design of the display and illuminations were all the work of Elmer T. Morris, who has good reason to be proud of the effect. The general interests of the company were directed by W. J. Clark, assisted by a large staff.

THE C. & B. MANUFACTURING COMPANY, Troy, N. Y., had a Trolley Finder, a very simple device to assist in regaining the trolley wire. They were represented by C. H. Smith.

THE DUPLEX TRACK RAILWAY COMPANY made a fine display, putting in evidence rail sections and special work in the way of frogs, switches, turnouts, curves, etc. John D. Ellwell, general manager, H. L. Cargill and S. Russell, Jr., all familiar names to street railway men, were present, and all who met them, as almost every one did, carry away most pleasant recollections of the Duplex Company, its people and products.

STILLWELL & BIERCE COMPANY, Dayton, Ohio, was ably represented by their well-known Chicago western manager, E. Webster, who did the honors for his people with fitting grace.

THE ROCHESTER CAR WHEEL WORKS, Rochester, N. Y., had an exhibit of over 30 kinds of wheels, showing kinds of iron used, wheels after long service, and in all a very general display of their line. They were represented by C. T. Chapin, president; F. D. Russel, manager, and E. Packer, general sales agent.

VISITORS HAD a right to expect the R. D. Nuttall Company's display would be incomplete, owing to the annoyance occasioned by the fire in their works a few days previous to the convention. It did not, and Nuttall's Trolley was still there, together with all the big and little Nuttall gears and pinions, brush holders, rawhide supplies and armatures, and all the other specialties of the Nuttall product. Mr. Nuttall and Mr. Meyer were both present, to the delight of their many friends. P. H. Carey and E. H. Harrison, Chicago agents, were also present.

J. G. BRILL COMPANY always have an exhibit which attracts attention. This year they displayed a new palace car, 21-foot body, mounted on the Brill solid frame truck. Also an Eureka Maximum No. 21 truck, solid frame, and a truck with a 30-horse-power waterproof Thompson-Houston motor, and had six cars equipped with Westinghouse motors on the road in daily service. President G. M. Brill was present, assisted by W. H. Henling, P. K. Andrews, Samuel Curren and F. C. Randall.

WESTINGHOUSE ELECTRICAL & MANUFACTURING COMPANY, used a big slice of space in exhibit hall and filled it with a most interesting display which was constantly surrounded by a large crowd of visitors. Of motors they showed two single reduction 30-horse-power, and one railway generator of 150-horse power, all in motion. This generator has their latest armature, none of the many in use ever having been in the repair shop. A full line of station and car apparatus, including circuit breakers, lightning arresters, cut-out boxes, controllers, switches, fuse boxes, armatures and bearings was much admired, also a fancy 10-switch switch board. Motors were running on Dornier & Dutton trucks which were set up from the floor.

Among the Westinghouse representatives were: General Manager Bamister, W. F. Zimmerman, W. E. Clark, H. L. McHarding, A. Schmid, E. W. Seymour, E. F. Sanderson, R. S. Brown, C. A. Bragg, N. McCarty, and Messrs. Stewart, Gray, Wertz and Rutherford.

LIMA REGISTER COMPANY, Lima, Ohio, was represented by J. H. Rose, who was in demand explaining the merits of their register, which has made a good record on so many roads.

JOHN KUEHNLE, of Detroit, had the "Kuehnle" Trolley Wheel on exhibition and had lots of callers.

THE DETROIT ELECTRICAL WORKS were represented by General Manager Lockwood and Louis Myers, Chicago agent.

THE HACKNEY HAMMER COMPANY had one of their celebrated power hammers in operation. Represented by J. W. Smith.

ALUMINUM BRASS & BRONZE COMPANY, Bridgeport, Conn., had a nice line of specialties in charge of Gilbert M. Smith, Chicago agent.

P. H. HOOVER, Chicago manager of the Standard Paint Company, New York, was present, and gladly met by several hundred railway men who are using these goods.

LONG before you came in sight of the display of The P. Wall Manufacturing Company, of Allegheny, you could hear the "ringing of the bells." This display was very complete and attractive.

THE PITTSBURG STEEL HOLLOW-WARE COMPANY, Limited, of Allegheny, Pa., made lots of noise but as they had a clear sounding lot of bells the delegates were not annoyed in the least. They were represented by H. Rehbinter.

ANSON D. HARTWELL, of St. Louis, general agent of the Terra Haute Car Manufacturing Company, was disappointed in failure to receive his exhibits, which were delayed by a railroad strike, and became grounded en route.

ALBERT E. HAY, one of the most successful of the many young men coming to the front in the supply business, was present, and received many compliments on his electric truck, which was running under the "White House" Lamokin Car. Mr. Hay as president of the Robinson Machine Company, of Altoona, is rapidly bringing his company into prominent notice.

THE LEWIS & FOWLER MANUFACTURING COMPANY, Brooklyn, were so busy at their shops as not to feel warranted in preparing the extensive exhibits which have characterized their magnificent displays in former years. They sent a welcome delegation, however, in the persons of L. E. Roberts, Frank Morell and Geo. S. Whipp, who entertained their friends in the true Lewis & Fowler hospitable manner.

A. W. WRIGHT, of Wright & Meysenburg, Chicago, and vice-president of the Siemens-Halske Company of America, and General Sales Agent Gates, both of Chicago, were at the convention. Mr. Wright has been one of the warmest promoters of the Association in years past when chief engineer of the North Chicago Street Railway and was most gladly welcomed by a host of friends.

G. H. KEATING, Bay City, Michigan, displayed a fine line of hexagon wood poles manufactured by H. M. Loud & Sons Lumber Company, Au Sable, Mich.

THE JOHNSON COMPANY, Johnstown, Pa., made a fine display, using the largest space in the annex for their samples of special work showing all lines of rail sections, crossings, frogs, chairs, and electrically welded rails and chairs. It attracted much attention. Vice President Coolidge, H. C. Evans, and A. S. Littlefield were all present.

JOHN JONES, president of the J. M. Jones' Sons Car Company, Troy, N. Y., was greeted by a host of old friends who were anxious to introduce many new ones. The fame of this long established concern has gone abroad in the land and casts bigger and larger shadows than ever. May they never grow less.

EDWARD BEADLE, as natural and smiling as ever, was on hand, and found occasion to explain the merits of the Railway Register, to a large number of delegates attending their first convention, and who were added to his long list of staunch friends.

THE SHORT ELECTRIC RAILWAY COMPANY, not satisfied with a generous hospitality at their works, at which occasion the entire plant was made a part of their "exhibit," filled the entire large alcove at the end of the hall, over which the company name burned in letters of fire. The arrangement of gearless motors was a happy one, the first being one made in 1890, then the one exhibited at Pittsburg in 1891, and last, their latest improved, a 6-pole 25-horse-power motor. Also two single reduction motors of 20 and 30-horse-power respectively.

Other features were: A nickle-plated controlling stand and rheostat, a 24-inch motor armature partly wound to show interior, and two armature winders at work.

A 300-horse-power generator with Thrush bearings; a commutator for 39-inch machine set up in jig; a 50-inch 300-horse-power commutator; a gearless motor with exposed interior; a 20-horse-power single reduction, open; a 39-inch generator rocker and brush holder on pedestal, showing bearing; a 50-inch generator with brush holders attached, and a general line of car and station supplies combined to make a complete display. In the annex a 39-inch generator, running as a motor, ran one incandescent and one arc light machine, furnishing light and power for all exhibit purposes. At the exhibit Chas. Nebelacher and S. L. Nicholson explained the various features of exhibit.

In addition to vice-president Short and Assistant General Manager Hazelton, the company was represented by Frank A. Rogers and C. C. Curtiss, Cleveland; John E. Riddall, Pittsburg; E. J. Wessels, New York; W. S. Atchison, Atlanta; F. R. Ford, Chicago; Fred A. Schaeffer, Cleveland, and a large delegation from the company's home office, who ably assisted in acting the host to visiting members.

THE tests made in exhibit hall by the Washburn-Moen Company, of their "Salamander" wire, were in every way satisfactory and attracted a large number of interested spectators.

DERMAGLUTINE has become a railway household word, and was represented by W. C. Groetzinger, of Allegheny, who placed his exhibit of gears and pinions next that of the Nuttall Company of the same city. It made a good display.

THE LACLEDE CAR COMPANY, St. Louis, which has handled several of the largest car orders ever taken, during the past year, was represented by General Manager Robinson.

T. C. WHITE, of T. C. White & Company, found time from the demands of his large business to get away for a few days and join the delegates in the interchange of good fellowship and ideas.

THE EDDY ELECTRIC COMPANY, Windsor, Conn., contributed their general manager, Mr. Newton, who found plenty to occupy his time in the interests of this well-known company.

J. E. WHITTLESEY, New York, agent of the Gilbert Car Company, came early and stayed late, and had reason to be proud of the compliments passed on his palace cars which stood in front of the hotel.

THE ST. LOUIS CAR COMPANY, sent their greeting by General Manager Kling, and report the largest amount of work in hand of any time during the history of this successful and extensive car building company.

THE ELECTRICAL SUPPLY COMPANY, Chicago, distributed an attractive souvenir with the compliments of the railway department, illustrating their general railway supplies. M. W. Wood and C. K. King present.

GEORGE ELLIS, of the Ellis Car Company, Amesbury, Mass., chartered a special car, and made up a party of Boston delegates, who used the car for hotel during the festivities, and kept house in great style. They came on to Chicago to attend the dedication, and had a royal good time.

THE ROBINSON RADIAL CAR TRUCK made a nice exhibit in the annex, in charge of Wm. Robinson, general manager.

JOHN STEPHENSON COMPANY, New York, represented by the well-known friends, D. W. Pugh and J. A. Tackaberry, who distributed neat souvenirs, which were in great demand.

THE BALTIMORE CAR WHEEL COMPANY found a most hearty welcome for their representative, J. Paul Baker, secretary, and the genial John Pugh, who knows every street railway man east of the Mississippi river.

EXHIBIT OF STREET CARS.

THE exhibit of cars was far ahead of any previous meeting, and in addition to placards on a large number of cars in regular service on the various city lines, there were palace cars standing at the Prospect street entrance of the Hollenden, on a special track of Johnson rail, temporarily constructed and connecting with the electric tracks on Euclid avenue. By this arrangement a party was enabled to use any of the cars for a spin over any electric line in the city, just as they could have done with a carriage. Each of these special cars were models of all that is modern and improved in car-building, and were the objects of a large crowd of admirers, both day and night.

THE SHORT Private Car was built for them by the Gilbert Car Company, Troy, mounted on an Anger truck, also made by the Gilberts, and equipped with Short single reduction motors. The interior was a handsome finish and the entire effect imposing. The Short Company also used a car from the St. Louis Car Company, mounted on a Dorner & Dutton truck, and equipped with the latest Short gearless motor. This car was the object of special interest and in frequent demand to demonstrate the work of the gearless motor.

THE ACCELERATOR car, built of course by the Brownell Car Company, St. Louis, also came in for a large share of attention. It was mounted on the Brownell non-oscillating truck, with Short single reduction motor. The interior was of handsome finish and fully illustrated and frequently demonstrated the remarkable carrying capacity of this type of car body. President F. B. Brownell was in charge.

THE LAMOKIN CAR COMPANY placed on the witness stand a car taken from an order destined for the Calumet Electric, of Chicago. It was without any trimmings other than called for in the buyer's order, and made a striking appearance. The body was white, giving it the name of the "White House" car, and was carried on Robinson all steel trucks, with Short single reduction motor. Geo. Pratt took special delight with his specimen of every day work, as he had good reason to.

THE GENERAL ELECTRIC COMPANY had a palatial private car with beveled plate glass windows and silk curtains. It was built to order by the Gilbert Car Company, carried on McGuire trucks, and running on Cushion Car Wheels, Stanwood steps: single reduction water proof T.-H. motors. A fine effect. Also another car built by the Newburyport Car Company, on McGuire trucks.

THE SPERRY SYSTEM, being new to nearly all present, attracted much attention, and did excellent work, keeping its place in the procession and carrying heavy loads without noise or disappointment of any kind. Their car was mounted on McGuire trucks.

CONVENTION NOTES.

VERY LITTLE was seen or heard of the purely electrical papers, while those devoted to street railway interests exclusively, received greater recognition than ever.

J. F. RYDER, 239 Superior Street, Cleveland, will send a 20x24-inch photo of the party at the Short works, to any address on receipt of two dollars. The picture is well taken.

JAMES SILAW, of Boston, had a branch wire cut into his room and connected with a long-distance telephone, which not only "got Chicago," but reached the spirit world as well.

J. P. REYNOLDS, now, and for so many years, publisher of the "Master Car Builder," dropped in the last day to shake hands with old friends, with whom he is well supplied among the fraternity.

THE DISSEMINATION of so much "current" literature in the reception parlors of the various firms which kept open house did much to warm the hearts of the boys and make them glad they were alive.

JOHN J. STANLEY, of the Broadway and Newburg, as a committee to certify return tickets, was a pronounced success, and is the first of a long line of such functionaries which will be continued in the future.

PRESIDENT HOLMES, as we all knew he would, presided in his kindly, dignified manner, and made an ideal officer. His address is progressive yet not visionary, and could have only been improved by greater length.

MILWAUKEE gives us a Payne, but we are all going there next year with the biggest aggregation of street car men, ideas, and appliances ever gathered under the canopy, beside which the World's Fair will seem a mere annex.

MRS. S. H. SHORT and Mrs. Wm. Hazelton, 3rd., gave a reception and delightful tea to the visiting ladies, at the parlors of the Union Club on Thursday afternoon. It was a most graceful courtesy to the visitors and carried out in a most graceful manner.

JOSEPH HAYNES, the jolly mayor of Newark, N. J., set a good example to other mayors in attending the convention, in order to more fully post himself on what is best and latest in street railway art. From now on he will read the *STREET RAILWAY REVIEW*, and hereafter his only necessity for coming will be to meet old friends.

THE APPOINTMENT, as official stenographer, of T. E. Crossman, who has filled that office, but without the title, for ten years past, was a well-deserved recognition of a gentleman who has always served the convention with untiring faithfulness, and whose street railway friends, in all parts of the country, will feel pleased at this recognition by the executive committee.

IT WAS rumored that Sage, of Easton, had made a vow he would never attend another convention, until either the association gave more time to the questions of polity as pertaining to horse roads, or until his slight baldness had given place to an abundant hirsute covering. Those who know him will live in hopes the rumor is groundless; else they may never see him more.

THE *STREET RAILWAY REVIEW* headquarters, through the extreme courtesy of Landlord Brobst, were in that gentleman's private office, and was constantly filled with visitors. Many Cleveland people dropped in to see the "Chicago colors," with which the quarters were profusely decorated. By reason of its location, our headquarters being on the ground floor, our friends found it very handy. Still, it is nothing new for the *REVIEW* to come in on the ground floor of everything almost.

THE *STREET RAILWAY REVIEW SPECIAL* on the Lake Shore railway was filled and proved very enjoyable to all. By special favor of the road the extra sleepers were attached to the Limited, leaving at midnight, and thus allowed the party to remain to the banquet and still reach Chicago next morning. The officials of the road, Assistant General Passenger Agent Wilbur at Chicago, and General Passenger Agent Smith at Cleveland, took care of the delegates in a manner fully appreciated and not soon to be forgotten.

VICE-PRESIDENT McLAIN, upon whom the mantle fell when the president was called home so unexpectedly, wielded the gavel in a satisfactory manner under the somewhat complicated situation which wasted so much good time on Thursday afternoon. It should be in the power of the Executive Committee to change the date of meeting if in their judgement such action seems necessary. No better illustration could possibly be given than was experienced this year. Secretary Richardson and the local committee were deluged with letters requesting a change, if only of a few days, to permit the western, (and as it turned out, many from the Atlantic coast) to visit the Dedication in Chicago. It was found the Executive Committee could not change the date, and it was decided as impracticable to call the Association together simply to postpone for a few days. The Executive Committee has always been composed of men of good sense, and can be safely trusted with a matter which should have some elasticity.

GENERAL MANAGER HOGAN, of the well-known Bemis Car Box Company, Springfield, Mass., arrived the morning of the second day, thereby saving his friends the disappointment his absence would have caused. Secretary Stearns accompanied him, both traveling in the special car of the Boston party.

THE COLUMBIA INCANDESCENT LAMP COMPANY, St. Louis, could not have been better represented than by their Chicago agents, Taylor, Goodhue & Ames, in the person of Mr. Taylor.

IN THE PARLORS.

ALL the parlors of the hotel were in demand and open house in royal style by a large number of houses, receiving a large number of visitors from early morning until long past midnight.

THE GENERAL ELECTRIC occupied parlors A, B, and C, elegantly decorated with palms and cut-flowers, with an immense heap covering one table for visitors to select from. Numerous electrical ornaments hung from the walls and ceiling.

THE SHORT ELECTRIC had the large Ladies' Parlor, in which the electrician and florist had combined their utmost skill in transferring the elegant apartment into a veritable fairy bower.

J. G. BRILL COMPANY used two parlors keeping open house and entertaining liberally each day. The absence of John Brill, who was detained at home on account of sickness occasioned general regret. Their parlors were decorated with flowers.

BANQUET AT THE SHORT WORKS.

ALL the special exhibit cars were loaded and as many more extras furnished by the East Cleveland road left the Hollenden at 1 o'clock Wednesday, carrying four hundred invited guests, eminently *the "400"* of the cream of the street railway fraternity, on a visit to the Short works, where the cars were run to the door of the company's office. Alighting, the guests passed through the offices, which were banked on either side with elaborate floral decorations, from behind which floated the strains of the mandolin orchestra. Passing on our way into the factories, Prof. Short and Mr. Hazelton, assisted by their representatives, guided the visitors from one point of interest to another, finally reaching the factory devoted to railway work, where an elegant repast was served. The lunch was extensive and won the praise of all present, nothing being left undone to make the occasion a success. Reluctantly turning from the two hours' entertainment, feasting and music which will cause the memories of the



A LONG LINE AT SHORT'S.

THE STEEL RAILWAY JOURNAL had a parlor at head of stairs, and was represented by James H. McGraw president; C. E. Stump, business manager; C. B. Fairchild, editor and J. W. Dickinson, Chicago manager.

RAILWAY EQUIPMENT COMPANY had a reception room on the first floor where W. R. Mason presided and J. F. Macartney assisted.

THE WESTINGHOUSE ELECTRIC and MANUFACTURING COMPANY occupied two large parlors and made their headquarters one of the most attractive in the house. W. C. Clark, general agent, was at home to a never ending procession of visitors, with a large number of assistants.

THE SPERRY ELECTRIC had a pleasant retreat at end of main parlor hall which was graced with floral decorations, and the presence of H. P. Barr, general manager.

Short Electric to linger long in the minds of all present, the party returned to the hotel, many visiting the shops and power house of the East Cleveland road on the way.

THE LOCAL COMMITTEE.

THIS committee deserves much praise for thorough and complete arrangements planned and carried out. It is a big undertaking to have all the varied wants of a thousand strangers anticipated and provided for in advance, but nothing was left undone. The supply-men were well cared for, and all had desirable space. There were really no poor locations this year. This committee consisted of Dr. Everett, F. De H. Robinson, H. E. Andrews, J. B. Hanna and H. J. Davies: the two latter taking the active management, and are especially entitled to the thanks of the Association.

HOMeward BOUND.

THE STREET RAILWAY REVIEW special by the courtesy of the Lake Shore road was attached to the Chicago midnight limited and contained a large and jolly party. The banquet was the key stone in the big arch of good fellowship, and when the train pulled out the fun was continued until a late hour lest a too sudden cessation of festivities might cause a nervous shock. At one of the stations, Louis Meyers, of the Detroit Electrical Works, bought out a depot restaurant, and our cut illustrates the thoughtful Louis in his celebrated sandwich act, which was a highly appreciated performance.



LIST OF DELEGATES OF STREET RAILWAY COMPANIES.

John Metlin, Akron, Ohio.
 Mr. Sharp, Akron, Ohio
 Joel Hurt, Brooklyn, N. Y.
 D. A. Belden, Aurora, Ill.
 Daniel McDonald, Allegheny City, Pa.
 Geo. W. Mansfield, Allentown, Pa.
 A. H. Hayward, Allentown, Pa.
 Hudson T. Morton, Ann Arbor, Mich.
 L. H. McIntyre, Brooklyn, N. Y.
 T. K. Glenn, Atlanta, Ga.
 J. B. McClary, Birmingham, Ala.
 A. N. Connett, Baltimore, Md.
 Thomas B. Lashar, Bridgeport, Conn.
 S. W. Childs, Brooklyn, N. Y.
 W. J. Richardson, Brooklyn, N. Y.
 Wm. W. Morrison, Brooklyn, N. Y.
 J. Edwin Wallace, Boston, Mass.
 Wm. A. House, Jr., Baltimore, Md.
 A. H. Pomeroy, Berea, Ohio.
 C. W. D. Miller, Berea, Ohio.
 H. M. Watson, Buffalo, N. Y.
 H. H. Littell, Buffalo, N. Y.
 H. B. Rogers, Brockton, Mass.
 M. G. Starrett, Brooklyn, N. Y.
 L. J. Hurt, Boston, Mass.
 C. S. Sergeant, Boston, Mass.
 F. S. Pearson, Boston, Mass.
 H. Holton Wood, Birmingham, Conn.
 Louis B. Wheelton, Boston, Mass.
 W. G. Benedict, Boston, Mass.
 C. A. Hotchkiss, Bridgeport, Conn.

John A. Partridge, Brooklyn, N. Y.
 C. J. Field, Buffalo, N. Y.
 W. E. Patterson, Bloomington, N. Y.
 W. H. Patterson, Bloomington, Ill.
 A. Everett, Cleveland, Ohio.
 C. W. Wason, Cleveland, Ohio.
 L. E. Beilstein, Cleveland, Ohio.
 Edwin Duty, Cleveland, Ohio.
 R. M. Fuller, Cleveland, Ohio.
 W. G. Ellis, Cleveland, Ohio.
 Sam'l Harris, Cleveland, Ohio.
 H. Starke, Cleveland, Ohio.
 Geo. A. Stanley, Cleveland, Ohio.
 Geo. G. Mulhorn, Cleveland, O.
 E. G. Lang, Cleveland, Ohio.
 J. B. Hanna, Cleveland, Ohio.
 Chas. Hathaway, Cleveland, Ohio.
 Frank DeH. Robinson, Cleveland, Ohio.
 H. J. Davies, Cleveland, Ohio.
 A. L. Johnson, Cleveland, Ohio.
 John Koch, Cleveland, Ohio.
 Tom. L. Johnson, Cleveland, Ohio.
 Tom L. Johnson, Cleveland, O.
 A. E. Duty, Cleveland, Ohio.
 John J. Stanley, Cleveland, Ohio.
 A. H. Bates, Cleveland, Ohio.
 C. E. Abbott, Cleveland, Ohio.
 A. E. Hay, Chambersburg, Pa.
 Geo. Bullock, Cincinnati, Ohio.
 Thos. M. Jenkins, Covington, Conn.
 John Kilgour, Cincinnati, Ohio.
 W. J. Mead, Cleveland, Ohio.
 G. G. Browning, Camden, N. J.

J. J. Burleigh, Camden, N. J.
 W. C. Fuch, Chicago, Ill.
 R. S. Garth, Chicago, Ill.
 B. L. Baldwin, Cincinnati, Ohio.
 Henry Martin, Cincinnati, Ohio.
 W. F. Hays, Cincinnati, Ohio.
 H. M. Littell, Cincinnati, Ohio.
 W. F. Kelly, Columbus, Ohio.
 E. K. Stewart, Columbus, Ohio.
 Wm. S. Scull, Camden, N. J.
 A. C. Kendall, Connessville, Pa.
 Jno. W. Aiken, Carbondale, Pa.
 G. F. Pramelee, Cuyahoga Falls, Ohio.
 G. K. Wheeler, Chicago, Ill.
 F. B. Jones, Chicago, Ill.
 G. L. Reimaren, Chicago, Ill.
 A. W. Wright, Chicago, Ill.
 Chas. M. Swift, Detroit, Mich.
 John Grant, Detroit, Mich.
 Fred. Wardwell, Duluth, Minn.
 C. K. Durbin, Denver, Col.
 C. K. Frederick, Davenport, Iowa.
 E. W. Olds, Denver, Colo.
 H. P. Clegg, Dayton, Ohio.
 D. B. Corwin, Dayton, Ohio.
 Jno. H. Fry, Detroit, Mich.
 E. Binm, Dayton, Ohio.
 Nelson Routzohm, Dayton Ohio.
 Wm. Jones, Dayton, Ohio.
 J. D. Hawks, Detroit, Mich.
 E. S. Heineman, Detroit, Mich.
 N. W. Goodwin, Detroit, Mich.
 Geo. H. Russell, Detroit, Mich.
 G. B. Hopper, Des Moines, Iowa.
 J. S. Polk, Des Moines, Iowa.
 S. S. Hazard, Detroit, Mich.
 E. J. Carter, Fremont, Ohio.
 H. A. Willis, Fitchburg, Mass.
 Rob't S. Goff, Fall River, Mass.
 T. C. Frenyear, Gloversville, N. Y.
 Wm. W. Dean, Hamilton, Ont. (Canada)
 Edw. Martin, Hamilton, Ont. (Canada)
 B. E. Charlton, Hamilton, Ont. (Canada)
 T. B. Griffith, Hamilton, Ont. (Canada)
 W. E. Whittemore, Hoboken, N. J.
 E. S. Goodrich, Hartford, Conn.
 J. B. Griffith, Hamilton, Ont. (Canada)
 E. Lias, Hazleton, Pa.
 W. S. Jewell, Indianapolis, Ind.
 A. O. Anderson, Indianapolis, Ind.
 John G. Holmes, Indianapolis, Ind.
 H. M. Littell, Philadelphia, Pa.
 S. F. Hazlerigg, Indianapolis, Ind.
 O. C. Evans, Johnstown, Pa.
 John Hulsizer, Joliet, Ill.
 E. H. Stevens, Johnson City, Tenn.
 H. S. Haward, Jersey City, N. J.
 Geo. H. Maltby, Jamestown, N. Y.
 A. N. Broadhead, Jamestown, N. Y.
 Wm. F. Jackson, Jersey City, N. J.
 W. S. Jewett, Lawrence, Mass.

N. K. Horton, Lawrence, Mass.
 A. E. Butler, Lawrence, Mass.
 E. H. Prick, Lowell, Mass.
 M. F. Breman, Lowell, Mass.
 T. J. Minary, Lowell, Mass.
 Aug. H. Hagemeir, St. Louis, Mo.
 Wm. Esty, Little Rock, Ark.
 R. H. Smith, Lexington, Ky.
 R. H. Smith, Lexington, Ky.
 Maurice Hoopes, Lynn, Mass.
 Reed Carpenter, Mansfield, Ohio.
 S. H. Suenerfaith, Mansfield, Ohio.
 H. C. Payne, Milwaukee, Wis.
 H. A. Everett, Montreal, Canada.
 A. W. Lynn, Milwaukee, Wis.
 C. J. Helm, Milwaukee, Wis.
 J. C. Smith, McKeesport, Pa.
 C. P. Cogswell, Norwich, Conn.
 Chas. Odell, Newburyport, Mass.
 T. H. Johnson, Newburyport, Mass.
 Wm. Sheerer, Newark, N. J.
 Thos. C. Barr, Newark, N. J.
 F. S. Ward, Newark, N. J.
 Thos. H. McLean, New York City.
 W. D. Ferguson.
 E. P. Shaw, Jr., Norwich, Conn.
 H. P. Barr, New York City.
 Geo. F. Keep, Natick, Mass.
 Jno. W. McNamara, New York City.
 F. Bourne, Newark, N. J.
 Andrew Raddel, Newark, N. J.
 Thos. H. Johnson, Newburyport, Mass.
 D. C. Dewar, Ottawa, Canada.
 A. K. Stone, Omaha, Neb.
 F. M. Eppley, Orange, N. J.
 J. E. Hutcheson, Ottawa, Canada.
 W. Y. Soper, Ottawa, Canada.
 J. W. McRae, Ottawa, Canada.
 C. L. Madison, Oshkosh, Mich.
 John Finley, Peoria, Ill.
 E. P. Howe, Philadelphia, Pa.
 W. H. Jenney, Philadelphia, Pa.
 B. W. Griss, Philadelphia, Pa.
 Davis McDonald, Pittsburg, Pa.
 W. H. Ramsey, Pittsburg, Pa.
 M. H. Bromsion, Providence, R. I.
 Miller Elliott, Pittsburg, Pa.
 Jno. P. Ostrom, Philadelphia, Pa.
 A. T. Potter, Providence, R. I.
 D. F. Henry, Pittsburg, Pa.
 A. Dixon, Port Huron, Mich.
 John G. Holmes, Pittsburg, Pa.
 H. M. Littell, Philadelphia, Pa.
 M. Cummins, Peoria, Ill.
 M. R. McAdar, Atlantic City, N. J.
 W. C. Laughlin, Patterson, N. J.
 W. B. Ferguson, Gloucester, Mass.
 J. J. Giegan, Patterson, N. J.
 W. D. Rommel, Pittsburg, Pa.
 Wm. Ring, Patterson, N. J.
 J. H. Hall, Peoria, Ill.
 J. E. Rugg, Pittsburg, Pa.
 E. J. Lawless, Patterson, N. J.
 Wm. L. Eckins, Pittsburg, Pa.
 Chas. F. Luther, Pawtucket, R. I.

John D. Hall, Peoria, Ill.
 Wm. Wharton, Jr., Philadelphia, Pa.
 W. L. Jenks, Port Huron, Mich.
 H. A. Dixon, Port Huron, Mich.
 J. E. Fraggardh, Pittsburg, Pa.
 C. A. Derr, Rochester, N. Y.
 W. H. Shaffer, Richmond, Va.
 Geo. C. McCullough, Richmond, Ind.
 W. F. Carr, Roanoke, Va.
 Chas. A. Williams, Rochester, N. Y.
 L. W. Baumhoff, St. Louis, Mo.
 W. S. Patterson, Salt Lake City, Utah.
 Henry Parson, Savannah, Ga.
 E. J. Thomas, Savannah, Ga.
 Geo. Mahoney, St. Louis, Mo.
 Chas. K. Stearns, St. Cloud, Minn.
 E. H. Oswald, St. Louis, Mo.
 W. D. Drekarson, Great Falls, Mont.
 C. K. Minary, St. Louis, Mo.
 C. H. Pearson, St. Louis, Mo.
 J. F. Flood, Steubenville, Ohio.
 Frank B. Smith, Springfield, Mo.
 Robt. McCulloch, St. Louis, Mo.
 B. J. Jones, Sioux City, Iowa.
 J. H. Blockman, Trenton, N. J.
 R. S. Woodruff, Trenton, N. J.
 L. H. Parker, Trenton, N. J.
 C. H. Smith, Troy, N. Y.
 P. E. Hurley, Trenton, N. J.
 F. B. Perkins, Toledo, Ohio.
 Geo. C. Moore, Taunton, Mass.
 E. H. Oswald, Toledo, Ohio.
 F. H. Lincoln, Toledo, Ohio.

S. R. Break, Toronto, Ont.
 C. C. Baker, Topeka, Kan.
 Wm. McKenzie, Toronto, Ont.
 J. C. Grace, Toronto, Ont.
 W. E. Davis, Toronto, Ont.
 Wm. M. Sturges, Utica, N. Y.
 S. H. Wheelhouse, Utica, N. Y.
 Sam'l Winslow, Worcester, Mass.
 J. R. Smith, Waterbury, Conn.
 E. N. B. adley, Waterbury, Conn.
 I. A. Kelsey, West Haven, Conn.
 A. E. Pond, West Haven, Conn.
 W. J. Sliphenson, Washington, D. C.
 J. Fagan, Wilkesbarre, Pa.
 T. Rustling, West Bay City, Mich.
 A. M. Young, Waterbury, Conn.
 C. A. Loeb, Wilmington, N. C.
 R. R. Canfield, Windsor, Ont.
 S. T. Howell, West Superior, Wis.
 J. G. White, Wilmington, N. C.
 John Matram, Wilkesbarre, Pa.
 R. S. Brown, Wakefield, Mass.
 W. G. Eno, Wilkesbarre, Pa.
 A. S. Hatch, Windsor, Ont.
 C. B. Clegg,
 C. O. Maillous, Washington, D. C.
 S. Henric, Wyandotte, Mich.
 W. L. G. Thomas, Wilmington, Del.
 H. H. Archer, Wilmington, Del.
 F. D. Sweetter, Wilmington, Del.
 W. J. Hillier, Youngstown, Ohio.
 F. W. Brown, Youngstown, Ohio.
 W. S. Laimus, York, Pa.
 Frank Geise, York, Pa.
 D. A. Rupp, York, Pa.

C. A. Dainz and F. J. A. Keller, Cleveland Electrical Manufacturing Company, Cleveland.
 C. A. Benton, Sprague Electric Company, N. Y.
 W. N. Cloggett and J. R. Gathriyh, United Tramway Sprinkling Company, Louisville, Ky.
 Chas. E. Bibber, Consolidated Electric Manufacturing Company, Boston.
 Chas. Campbell, Weston Electric Company, Chicago.
 E. B. Carter, Ball Engine Company, Erie, Pa.
 Jas. Gerdinger, P. Leidenger, Dayton Manufacturing Company, Dayton, Ohio.
 C. J. Hill, Perkins Electric Lamp Company, Manchester, Conn.
 W. A. Hathaway, American Electrical Works, Providence, R. I.
 G. M. Angier, Mather Electric Company, Boston.
 F. M. McLaughlin and H. E. Webb, Salor Carbon Company, Pittsburg, Pa.
 W. L. Candee and Henry D. Stanley, Okonite Company, New York.
 J. H. Shay, Chas. Munson Belting Company, Chicago.
 S. S. Leonard, Hill Clutch Company, Cleveland.
 F. W. Russell, Rochester Car Wheel, New York.
 E. Packer, Rochester Car Wheel, New York.
 M. T. Sullivan, Street Railway Gazette, Chicago.
 E. F. Seixas, Street Railway Gazette, Chicago.
 E. G. Reynolds, Street Railway Gazette, Chicago.
 E. A. Record, Vacuum Oil Company, Boston.
 J. H. Parker, C. S. Knowles Company, Boston.
 W. H. Delaney, Railway Supply Company, New York.
 Jas. P. McQuaide, National Conduit Manufacturing Company.
 Chas. E. Rowe, Railway Equipment Company, Boston.
 John F. Ostrom, Pennsylvania Steel Company, Philadelphia.
 S. H. Wheelhouse, Star Headlight Company, Syracuse, N. Y.
 Geo. Kissona, Street Car Advertising, New York.
 L. A. Gray, Adams-Westlake Company, Chicago.
 T. B. Jones, Adams-Westlake Company, Chicago.
 J. H. Mason, Simplex Company, Boston.
 G. M. Balls, Westinghouse, Church, Kerr Company, Pittsburg.
 F. P. Howe and A. W. Slee, Wharton Company.
 E. S. Canman, Hale & Kilburn, Chicago.

The General Electric Company sent out the following delegation:

From Boston office: O. T. Crosby, W. H. Knight, Theo. Stibbins, A. A. Glazier, Carley D. Haskins, Geo. W. Mansfield, Percy Hodges, T. F. Mullaney, J. A. Kimball, W. S. Elliott, Mr. Erving, E. P. Sharp, W. B. Potter, G. H. Alton, Mr. Woolsey, R. E. Hood, Geo. N. Haskell.

From New York office: Arthur W. Jones, John McGhie, H. H. Harrison, A. H. Lewis, M. H. Hamilton.

From Chicago office: G. K. Wheeler.

From Cleveland office: F. H. Bostwick, B. M. Barr, F. Houston.

From Cincinnati office: Paul T. Brady, C. S. Rusling, C. E. Hart R. J. Randolph, F. H. Srieby, F. J. Reynolds, G. H. Stout; also E. G. Waters and C. T. Hamilton, of Pittsburg; C. W. Rice, of Lynn; F. H. Clark, Washington, D. C.; T. H. Fearey, Syracuse; F. E. Allen, St. Louis; C. R. Stearn and S. P. Wells, of St. Paul; W. A. Stein, of Philadelphia, and F. E. Jackson.

ORGANIZATION OF SUPPLYMEN.

Convened.

Scrapped.

Adjourned.

C. G. Clemenshaw and wife, Troy, found the convention city doubly attractive, as on Wednesday evening, their son, Wm. H. Clemenshaw, was married to Miss Mary A. Higbee, at the residence of the bride's parents. A large party of Troy friends were present and the occasion was one of the society events of Cleveland.

EAST CLEVELAND RAILROAD contributed a car of their own make, running on a Fulton Foundry truck, with a single reduction Short motor.

Among the ladies present were:

Mrs. F. B. Brownell, St. Louis; Mrs. W. Worth Bean, St. Joseph; Mrs. W. J. Richardson, Brooklyn; Mrs. T. H. McLain, New York; Mrs. C. T. Clemenshaw, Troy; Miss Richardson, Brooklyn; Mrs. H. C. Payne, Milwaukee; Mrs. J. B. Speed, Louisville; Mrs. C. A. Hoagland, New York; Mrs. D. B. Dean, Chicago; Mrs. A. E. Lang, Toledo; Mrs. S. H. Short, Cleveland; Mrs. Wm. Hazleton, Cleveland.

Prominent supplymen in attendance were:

Geo. E. Pratt, Lamokin Car Company, Philadelphia.
 Henry Cochran, superintendent Lamokin Car Company.
 H. T. Paiste, electrical specialties, Philadelphia.
 W. P. Seguire, Frost Veneer Seating Company, New York.
 D. J. Hauss, electrical engineer, Cincinnati.
 S. B. Portenbaugh, electrical engineer, Cleveland.
 S. A. Wackerman, Walker Manufacturing Company, Cleveland.
 L. Guttman, electrical engineer, Cleveland.
 H. J. Genken, A. French Spring Company, New York.
 D. J. Kurtz, W. Bingham Company, Cleveland.
 A. C. Harrington, Sargent & Lundy, Chicago.
 Gus Lockow, Richard Vase Spring Company, New York.
 L. F. Miller, Valentine & Co., Chicago.
 C. M. Fuller, Burrows Car Wheel Company, Portland, Me.
 C. G. Stearnes, car trucks, New York.
 W. S. Silver, W. S. Silver & Co., New York.
 John E. R. Dale, Short Electric Company, Pittsburg.
 Edward P. Sharp, American Mica Company, Boston.
 Geo. F. Small, Wakefield Rattan Company, Boston.
 Wm. M. McCandless, W. Webster Company, Philadelphia.
 P. B. Huyette, S. H. Scovell, W. C. Temple and J. A. Taft, Babcock & Wilcox Company, New York.
 Louis B. Whitney, Whitney & Son, Philadelphia.
 W. L. G. Thomas, None Such Fiber Company, Wilmington, Del.

ECHOES FROM THE TRADE.

AUGUSTUS DAY, of Detroit, is still in the market with snow plows and scrapers, of which so many are in use all over the North.

THE PENNSYLVANIA STEEL COMPANY has sold the City Railway, of Salt Lake City, a new equipment of 80-pound girder rail.

D. E. GARRISON & COMPANY, railway equipments, St. Louis, have a word to say in the "want" column about 300 tons of steel rail. See it.

P. S. BEMIS, JR., has been appointed western agent to represent the Peckham Motor, Truck & Wheel Company, and has opened a nice office in the Phoenix Building.

THE GENERAL ELECTRIC COMPANY, operating with Thompson-Houston and Edison motors, has in operation or under contract 438 roads; 8,414 cars; with 4,319 miles of track.

THE JOSEPH DIXON CRUCIBLE COMPANY, Jersey City, N. J., has just published a little volume called "Scientific Opinion of Graphite as a Lubricant." The manual is of great interest and can be had for the asking.

THE GILBERT CAR COMPANY has shipped the first of its large car order to the Fishkill Landing road, New York. The cars are 25 feet over all and the directors are highly pleased with the elegance of the workmanship.

GEORGE CUTTER has removed his salesrooms and offices to 329 Rookery, Chicago, where he has room more according to his needs. The new enameline electric heater specialty has been attended by the greatest success.

J. M. JONES' SONS, Troy, N. Y., have just delivered to the Villard syndicate at Milwaukee the first 12 cars of an order of 50. The new rolling stock is for the Becker street line, and the greatest satisfaction is expressed in regard to the new equipment.

THE M. C. BULLOCK COMPANY has recently installed, at Racine, Wis., a beautiful 250-horse-power engine of their type, with 22x44 cylinders; fly wheel 15 tons, 18 feet in diameter and 15-inch face. Three boilers are also placed *en bank*, each of 100-horse-power.

C. E. SARGENT, manager of the Chicago department of A. L. Ide & Son, Springfield, Ills., sends us a list of their engines sold in this city, aggregating 132 engines with a total of 11,899 horse-power—and still more coming. Certainly a highly satisfactory record.

THE ELECTRIC RAILWAY ENGINEERING COMPANY, of 180 Summer street, Boston, is the name of a new concern prepared to do general engineering, designing and

constructing of power plants and to install steam plants and build electric railways. J. F. McGowan is general manager.

PAUL W. BASSART, Chicago, special agent of the National Electric Manufacturing Company, Eau Claire, Wis., is actively pushing the claims of his company in this territory. Among recent installations is a large railway generator for Armour's Electric Freight Railway, described elsewhere in this issue.

WESTINGHOUSE double reduction motors made a famous record at the Lansing, Mich., Fair. Two 15-horse-power motors in each 16-foot motor car hauled two 20-foot trailers, up a 4½ per cent grade, 12 hours daily for the three days. The loads averaged 300 passengers per train, and on one load 360 fares were taken.

T. C. WHITE & COMPANY, St. Louis are out with a neat circular letter inviting street railway men to visit their complete establishment at 904 Pine Street, where they carry an extensive line of electric and railway supplies. They keep in stock a full line of R. D. Nuttall's and Ansonia Brass & Copper Company's goods at all times.

CHARLES C. CALDWELL, of Philadelphia, with an eye on the wonderful growth of the great Southeast, has opened an office at Durham, N. C., where he will prosecute his profession of consulting and contracting engineer. Mr. Caldwell's competence is unquestioned, and his services will no doubt be a large factor in the advancement of electrical industry in the South.

NEW CAR HEATER.—The Dewey Electric Heating Company of Syracuse, N. Y., are attracting no small amount of attention with their new car heater. Arthur S. Partridge, of St. Louis, has been selected as their sales-agent and with his active business qualities will rapidly bring the heater before street railway men. Car heating has ceased to be a mooted question, and is settling down to whose heater is the best. Mr. Partridge assures us investigation will prove his to be such.

THE TERRE HAUTE CAR & MANUFACTURING COMPANY, Terre Haute, Ind., are stepping into a nice business with their Barr chilled street car wheels, guaranteed for long life and good service. Anson D. Hartwell, their genial general sales agent, is actively canvassing the western territory from his St. Louis headquarters, and is meeting with excellent success. His wheels are already in use on nearly all the St. Louis roads, and in Kansas City. Some good orders were also taken in the Chicago territory.

THE DETROIT ELECTRICAL WORKS are naturally elated over their contract, secured in the face of strong opposition, for the equipment of the Woodward avenue line in that city. They will furnish the poles, wire, motors, dynamos and other necessary adjuncts, and the line must be in

operation by November 15. The Detroit Electrical Works have also just received a sixth order from the Calumet Electric in this city, and for the consolidated lines at Salina, Kansas. Their factory, while three times its size one year ago, is still crowded to the utmost with motor and railway generator orders.

CLINTON B. OSGOOD, for several years with the Crane Elevator Company, and later with the Chicago office of Westinghouse Electric, has accepted the position of general sales agent of the Premier Steel Company, and has opened attractive offices at 319 and 320 Manhattan Building. Mr. Osgood will have entire charge of the elevator business of the Premier Steel Company and is prepared to install either electric, hydraulic, or steam elevator service to operate at any speed and elevate any weight desired, for either passenger or freight service.

MESSRS. E. H. HARRISON and P. H. Carey, who have recently opened offices in the Ashland Block under the firm name of Harrison & Carey, report business good and prospects very flattering. They are general western agents for the R. D. Nuttall Company, of Allegheny, the well-known manufacturers of motor parts and general railway supplies. Mr. Harrison was heretofore secretary and treasurer of the H. Ward Leonard Company and Mr. Carey was formerly connected with the Edison Company and also with J. G. White Company, of New York.

THE MILWAUKEE STREET RAILWAY COMPANY report that the average daily earnings of the Accelerator car, built for them by the Brownell Car Company, from July 13th to Sept. 20th, were \$2.65 per car greater than the average of all their other cars. Taking fifteen years as the average life of a car, this would show an increased earning of \$14,208, or in other words, nine Accelerators would do the work of ten ordinary cars. Railroad companies anxious to earn dividends would do well to carefully consider the above.

A ROCKFORD RECORD.

THAT an electric line does not necessarily depopulate and utterly annihilate the population, as some would have us believe, is evidenced in a report from President Tickner, of the West End road, Rockford, Ill. His electrics have been in daily operation for 16 months past, have carried 324,867 passengers, and all without a single accident or claim presented for damages of any nature. Who can show a better record?

Sleeper, Chicago to Boston, \$1.50.

The Wabash Railroad, in connection with the Canadian Pacific, will hereafter run a tourist sleeping car to Boston, via Detroit and Montreal, leaving Chicago every Thursday at 3:00 P. M. Rate per berth to Boston, \$1.50; to intermediate points at correspondingly low rates.

Ticket office, 201 Clark street.

PERSONAL.

GEORGE KOBUSH, secretary and treasurer St. Louis Car Company, was in Chicago last week.

J. A. RHOMBERG, of storage battery fame, came into Chicago from Dubuque during October.

A. L. SMITH, president of the Appleton, Wis., Electric railway, was a Chicago visitor during the month.

FRANK GREEN, secretary of the Chicago City Railway, celebrated September by taking a much needed vacation in the West.

C. A. HOAGLAND, the genial sales agent of the New Departure Bell Company, is making a western trip. Mrs. Hoagland accompanies him.

E. C. STARK, treasurer of the Peckham Motor, Truck & Wheel Company, Kingston, N. Y., called on us in the midst of a successful western trip.

H. C. HARTMAN, Fort Wayne, general counsel of the Bradley General Electric Company, Chicago, was an October caller and reports the company's prospects bright.

ANSON D. HARTWELL, St. Louis, general selling agent for the street railway department of The Terre Haute Car & Manufacturing Company, entertained the REVIEW office with a pleasant call.

JAMES GOLDMARK, eastern sales agent of Wallace & Sons, recently made a very successful business trip through the west, and the REVIEW was among those favored with a pleasant call when in Chicago.

F. D. RUSSELL, general manager of the Rochester Car Wheel Works of 222 East Twenty-eighth street, New York, paid the REVIEW office a pleasant call on his late trip west. Mr. Russell is one of the most energetic of the wheel fraternity and will be remembered also as a successful special journalist.

D. B. DEAN, of the McGuire Company, recently returned from a 4,000 mile trip in the far west, visiting San Francisco, Portland, Victoria, British Columbia and all intermediate cities. The unusual sight of an electric car loaded to the bumpers and with twenty-nine passengers on the roof, was one of the sights in San Francisco.

M. D. STARKWEATHER, of Boston, for many years general manager of the Metropolitan Railway of that city, and who has been in railway work for upwards of twenty-five years, made us a pleasant call when on his recent western trip. In addition to a valuable experience in railway management, Mr. Starkweather is a most genial gentleman, to meet whom is a positive pleasure.

CAUGHT ON THE RUSH TRIP.

Alabama.

MOBILE, ALA.—The Mobile Street Railway property and franchise will be sold November 14, to satisfy mortgage to Fidelity Trust & Safety Vault Company, of New York.

MONTGOMERY, ALA.—Chas. H. Smith, secretary of the West End and Riverside, says his road is well under way. Westinghouse has the electric work and Brill the cars and tracks.

California.

LOS ANGELES, CAL.—Ex-Superintendent Wilson, of Colorado Springs, has been called here, as superintendent of the new electric.

OAKLAND, CAL.—The Davie Alsip franchises have been killed in council.

OAKLAND, CAL.—The Piedmont Company will equip West Oakland and Adeline street branches with electricity. Has also applied to city council for further extensions.

OAKLAND, CAL.—The Consolidated announced that for \$10,000 bonus it would continue the electric to Oakley. The money is now nearly all up.

SACRAMENTO, CAL.—The G street franchise has been granted to the Central Electric Company.

SAN FRANCISCO, CAL.—It is rumored with good foundation that the Omnibus Cable Company will soon consolidate with the North Beach & Mission Horse Car Line. The Omnibus has 13 miles at \$2,000,000 capital, and the N. B. & M. 16 miles at \$3,000,000 capital, with electric rights already obtained.

Chicago.

CHICAGO.—The following companies have been organized: Columbian Intramural Railway Company, capital stock, \$500,000; incorporators, William E. Baker, Monroe L. Willard, and Eugene H. Dupee. The Jefferson Street Railway Company, capital stock, \$500,000; incorporators, George H. Baker, J. R. Bickerdike, Fred E. Eldred, and others.

CHICAGO.—The McGuire Manufacturing Company has sold sixty-one trucks to the South Chicago Railway.

CHICAGO.—The Westinghouse Company has closed a contract with the South Chicago Railway for 61 car equipments and four 700-horsepower Multipolar generators.

CHICAGO.—The directors of the Alley L will meet in New York December 1st to authorize the issue of \$3,000,000 additional first mortgage bonds said to be necessary to complete the line to the World's Fair. Present bond issue is \$7,500,000 on eight miles of double track.

THE Chicago City Railway has ordered two pairs of Wheelock engines 1,000 h. p., 1,000 h. p. Baragwanath heater, fifth order, and John Mohr tubular boilers 16 feet in diameter by 30 feet long. The equipment goes to the power house corner 62d and State streets.

CHICAGO.—The Chicago Railway Construction Company has been given the contract for the construction on the West and South Town railway, on Twenty-second street, Johnson girder, eighty-pound, seven-and-a-half inches high. The company is ready for bids on \$250,000 of construction bonds, and is in the market for almost everything.

CHICAGO.—The Nuttall Railway Supply Company, with temporary quarters at 902 Ashland block, is the latest bidder for place among street railway supply men of the West. The firm is composed of Edward H. Harrison, late with Nuttall, of Allegheny, and Patrick H. Carey, late of the Edison General, both young and aggressive business men. E. A. Grotzinger, of the Munson Belting Company, is mentioned on the papers but has no active interest. The new firm will be exclusive western handlers of Nuttall of Allegheny's goods, besides other specialties,

and starts out under bright auspices. Mr. Harrison and Mr. Carey, one or both will be at Cleveland, and the firm will probably have their salesroom established by October 16.

CHICAGO, ILL.—The Chicago Traction Company, at Chicago, capital stock \$1,000,000; incorporators, Charles Vogel, Charles Vogel, Jr., and Thomas O'Brien. The Calumet Highlands Street Railway Company, at Chicago; capital stock, \$1,000,000; incorporators, L. H. Roach, John Keene and others.

Colorado.

DENVER, COL.—It is reported that the Santa Fe will make the Circle Railway an electric, with new connections in South Denver.

DENVER, COLO.—The Cripple Creek Street Railway Company, mentioned previously, has been granted certificate of incorporation; capital stock, \$100,000; will operate in El Paso county, with principal office in Fremont; directors, George Jordan, A. C. Hickman, A. B. Calloway and W. S. Montgomery.

DENVER, COLO.—The Centrefield Street Sweeper Company is organized at \$100,000 by C. H. Reemer of Syracuse, N. Y.; Webster Young of Cortland, N. Y.; C. W. Smith and H. P. Der-nison of Syracuse, officers Denver and Syracuse.

Connecticut.

BRIDGEPORT, CONN.—Land is being condemned for the new electric and operations will proceed as fast as possible.

MERIDEN, CT.—G. F. Swift, of Chicago, and E. C. Swift, of Boston, beef magnates, are the true owners of the Meriden road. They say neither the Thompson Houston nor the Westinghouse system will operate the road.

Florida.

JACKSONVILLE, FLA.—An electric is being enthusiastically proposed.

WORCESTER, MASS.—An agreement has been made as to the price of consolidated stock. \$200 is the figure named.

Georgia.

ATLANTA, GA.—The Traction Company's officers now are: Mr. James W. English, Jr., president; Mr. T. B. Paine, vice-president; Haines, Shubrick and Felder, attorneys.

SAVANNAH, GA.—President Collins says that he will extend the Thunderbolt line.

Illinois.

DECATUR, ILL.—One mile more electric will be built this fall. Bonus almost raised; balance in sight.

GALESBURG.—Galesburg West Side Street Railway Company, at Galesburg; capital stock, \$75,000; incorporators, Sol Frohlick, N. P. Glann and others.

STERLING, ILL.—There is an excellent opening here for the right parties to construct an electric railway. Some Boston men secured a franchise three years ago, laid two miles of track, and put up some of the pole work. Last June their forfeit of \$5,000 went to the city on account of failure to live up to contract. Some \$10,000 or \$15,000 worth of material is planted in tracks, and this can be bought cheap. The citizens will turn in and financially assist good parties to put in a first class road. About six miles are needed in all at the start. Sterling is a growing manufacturing city on the Rock River (water power), 110 miles west of Chicago. Town is built long and narrow, favoring a road. A loop is also needed to cross the river and take in Rock Falls, opposite on the south bank. Thirty manufacturing establishments. L. E. Brookfield, president Rock Falls Manufacturing Co., Sterling, Ill., will give all desired information.

SPRINGFIELD, ILL.—It is reported that the St. Louis-Chicago Inter-urban has broken ground with great eclat at Edinburgh, in the presence of 3,000 people.

Indiana.

HAMMOND, IND.—The electric road seems to be a "go." The road runs from here to Colour and East Chicago. Whiting and Roby will be accommodated. Work begins October 1.

HAMMOND, IND.—Whiting, Hammond and East Chicago Street Railway Company, capital \$100,000. A. R. Shroyer, A. Bloch, M. Joel and C. F. Griffin are the incorporators. The principal office will be at Hammond.

INDIANAPOLIS, IND.—John C. Shaffer says that he will extend his Ashbury Park line to Long Branch in the spring and add to his equipment. Address Indianapolis.

MUNCIE, IND.—Westside is the scene of the first construction of the Citizens' Electric Railway Company, and grading has begun. Joseph Bell, of Wheeling, is architect of the power-house, and the Delaware County Improvement Company is the most heavily interested party.

MUNCIE, IND.—The Citizens' Electric Street Railway Company has organized, with O. S. Kelly, president, J. S. Talley, vice-president and Geo. F. McCulloch, secretary.

NEW ALBANY, IND.—The Glen View Park Railway Company has been granted right to run electrics to the Park. Term of franchise 30 years. B. J. Hinkerbein, city clerk; W. A. Broecker, mayor.

Iowa.

COUNCIL BLUFFS, IA.—Ordinance 45 grants the Union Land and Improvement Company rights on certain streets and alleys. A. J. Stephenson, city clerk; N. D. Lawrence, mayor.

DES MOINES, IA.—The Street Railway Company has increased its stock to \$3,000,000.

DES MOINES, IA.—Mrs. E. N. Agnew is president of a woman auxiliary to the Street Railway Employes Union.

MARSHALLTOWN, IA.—C. D. Jones, president, S. B. Hovey, secretary, G. S. Woodruff and E. A. Hovey have been incorporated at \$250,000, as the Marshalltown Electric Railway Light and Power Company.

SIoux CITY, IA.—An ordinance to grant an electric franchise to the Morningside Street Railway has been introduced in the city Council. The company is a new one, and the incorporators are Wm. L. Joy, A. J. Riederich, A. M. Jackson, James M. Poorbaugh, James A. Jack-on, E. C. Peters and J. H. Quick.

Kansas.

LEAVENWORTH, KAS.—The Electric Street Railway Company has mortgaged the dummy line to the American Loan & Trust Company for \$300,000 for the purpose of equipping it with electricity. The papers are signed by W. F. Putnam and Wm. Dill of the railway company. Mr. Putnam will apply for further franchises.

Kentucky.

NEWPORT, KY.—The Campbell Turnpike Company have granted right of way over their road to the Electric Street Car Company. The line will now be built.

NEWPORT, KY.—The Fort Thomas line is under construction. The name of the company now, is the Newport & Cincinnati Electric Street Railway Company.

Louisiana.

BATON ROUGE, LA.—The Capital Railway and Lighting Company has been chartered with a capital stock of \$150,000. The board of directors consists of Messrs. W. J. Knox, O. B. Steele, Ben R. Mayer, of Baton Rouge; E. H. Farras, of New Orleans; Rorison, McDonald and Hawthorne of the Fort Wayne (Ind.) Company. Mr. B. R. Mayer was elected president, Captain O. B. Steele vice-president, and Mr. W. J.

Knox secretary and treasurer. The new company is organized to purchase the plants of the Baton Rouge Street Railway and the Citizens Light and Power Company and run them in conjunction.

NEW ORLEANS, LA.—Judah Hart was the only bidder for franchises sold Sept. 10, for a 25-year franchise on various streets. The right sold for \$500, with a bond of \$50,000 to secure faithful work. The improvements will amount to \$500,000. This railroad is to commence at Canal and Wells streets and to run uptown, to Dryades and Peters streets, and coming down Dryades to Canal street, to the starting point, and thence down town, through Chartres street to Port, over certain streets to the Northeastern Railroad depot, and coming up North Peters street to Ursulines, to North Peters, then on Decatur street to Canal and Wells.

NEW ORLEANS, LA.—The ordinances for the Carrollton extensions and the Crescent City's construction of the road purchased by the Electric Traction and Machinery Co., have been reported favorably.

Maine.

ROCKLAND, ME.—The R., T. & C. Electric Railway Company has purchased the Rockland gas and electric light and the Camden electric light plants.

Maryland.

BALTIMORE, MD.—S. M. Jarvis, president of the Lake Roland Elevated, says that the road will be running by January 1. Power house going up now at Stony Run.

Massachusetts.

MILLBURY, MASS.—The directors of the Worcester & Milbury have decided to run no more cars until the supreme court decides their case with the select men of Millbury.

STONEHAM, MASS.—Boston, Malden & Stoneham has been given right-of-way.

WORCESTER, MASS.—The Consolidated will equip electrically on several streets.

Michigan.

DETROIT, MICH.—The Detroit & Wyandotte Company will commence construction of a new power-house, next Monday.

DETROIT, MICH.—The Harris Electrical Propulsion Company, capital \$1,000,000, has been organized, by Friend Palmer, chairman; J. B. Peterson, secretary; Dr. M. W. Lau, treasurer; to exploit a three-rail system. W. H. Stevens has granted permission to use the Highland Park Railway for the experiment.

DETROIT, MICH.—At a meeting of the directors of the Citizen's Street Railway Company, the expected contract with the Detroit electrical works for a trolley system on Woodward avenue was let. It calls for the equipment of this line in forty-five days. The cost of this change on Woodward avenue is given out as \$100,000.

GRAND RAPIDS, MICH.—Percy T. Cook asks the right of way for a new railway on certain streets.

SAGINAW, MICH.—The Union Street Railway Company has elected the following officers: President, F. E. Snow; vice president, W. A. Jackson; secretary and treasurer, John M. Nicol; L. T. Durand, Jacob Seligman, David Ney, L. T. Durand.

DETROIT, MICH.—The Grosse Pointe road is to be absorbed by the Citizens. Healy motor and the trolley will be used.

Minnesota.

DULUTH, MINN.—W. C. Doherty has the contract for the line to Lakeside. The work must be done by Nov. 15.

Missouri.

KANSAS CITY, MO.—The Wyandotte Street Railway wish to put in electrics, and have applied for rights.

ST. JOSEPH, MO.—J. R. Jones, receiver, has asked leave to put in \$32,896.42 in improvement before winter. The present equipment is in a wretched condition.

TRENTON, MD.—W. M. Pond, mayor, says that a franchise for an electric has been granted. This is official.

Nebraska.

BEATRICE, NEB.—The street railway war is on again. The two opposing companies are bitter.

LINCOLN, NEB.—The Lincoln and Salt Lake Railway Co. Capital \$25,000. Termini O and 3rd street, town of Lincoln, to center of section 21, township 10, Lancaster Co. B. R. Cowdery, president; F. C. Sholes, secretary.

LINCOLN, NEB.—The reorganized Home Railway has elected J. H. McMurtry president; E. Finney, vice-president and general manager; K. K. Hayden, secretary and treasurer. The company will equip the entirely with electricity.

LINCOLN, NEB.—The Home Street Railway is the consolidation of the Lincoln City and the Capito Heights line. The capital stock has been increased from \$100,000 to \$300,000 and the intention is to refit the Capitol Heights line with electricity. The new officers elected are: J. H. McMurtry, president; E. Finney, vice president and general manager; K. K. Hayden, secretary and treasurer.

New Jersey.

ATLANTIC CITY, N. J.—An ordinance is in process granting J. Rush Ritter to operate an electric through the borough of Brigantine. A. B. Smith, mayor; A. E. Conover, clerk.

NEW BRUNSWICK, N. J.—E. J. Wessels, 35 Wall street, N. Y., has purchased controlling interest and will change to electricity immediately. Extensions will be made.

PATERSON, N. J.—The Paterson & Passaic Electric Railway and the Passaic, Rutherford and Carlstadt organized. Further news is that the officers of the Paterson and Passaic Company are: F. C. Van Dyk, president; C. A. Johnson, vice-president; C. H. Russell, treasurer; James A. Morriss, secretary, and John R. Lee, chairman of the executive committee. Of the Passaic, Rutherford and Carlstadt Electric Railway Company, Charles A. Johnson is president; James A. Morriss, vice-president; Charles H. Russell, treasurer, Raymond C. Johnson secretary and James A. Morriss chairman of executive committee. The stock of the two companies is held by Paterson and New York capitalists.

WEST HOBOKEN, N. J.—The Rapid Transit Association opposes the Hillside Road, but wants direct communication with the Fourteenth street ferry. They will pay bonus. Jakeway and McEwan are the heads of the movement.

New York.

BROOKLYN, N. Y.—The Brooklyn City has increased its capital to \$12,000,000, and will use the money to equip electrically.

BROOKLYN, N. Y.—The Brooklyn, Bushwick & Queen's Company Railroad, capital, \$100,000, has been organized by Charles McVeagh, Morristown, N. J.; John H. Emanuel, Jr., Ludlow W. Vinton, Edward H. Bronley, Warren L. Sampson, Henry S. Bidwell, Brooklyn; John G. How, Arthur P. Sturges, Charles H. Pond, Walter E. Dickinson, Edward M. Robinson, Robert P. Huntington, Jr.; Leslie Ryan, New York City.

BUFFALO, N. Y.—President H. M. Watson is looking for a car heater.

GLOVERSVILLE, N. Y.—The Cuyadutta has elected directors as follows: Daniel B. Judson, Jas. S. Burr, Geo. M. Place, G. Levor, Alva J. Zimmer, Jas. P. Argersinger, Jas. L. Younglove, Harwood Dudley, John G. Ferres, J. Laddie Hess, Robert Wemple, Jas. Shanahan, Everet, Smith, Jacob S. Friedman, Thomas C. Frenyear.

GLEN FALLS, N. Y.—The Glen Falls, Sandy Hill & Fort Edwards line reports gross earnings, \$30,040.33; operating expenses, \$20,395.28; gross income, \$13,554.19; net income, \$6,172.40. Road 7.7 miles long, 6 box c.; 8 e. m. c.; 4 h. and m.

NEW YORK CITY.—The syndicate ask five-year rights for the trolley from the Battery to West One Hundred and Tenth street and Ninth avenue, under the Sixth and Ninth Avenue Elevated railroad structures.

NIAGARA, N. Y.—The street railway company has let contracts for construction. John Fitch, of Pittsburg, will lay the iron.

TANNERSVILLE, N. Y.—Catskill & Tannersville Railway Company—to be operated as a narrow-gauge road (steam or electricity), about 7 miles long. Main line 5½ miles, from westerly terminus of the Otis Elevating Railway Company to Tannersville, with branch 1½ miles, long from Haines Falls to Santa Cruz Park. Principal office in New York City. Capital, \$30,000; and directors: Charles L. Rickerson, A. Van Santvoord, W. H. Ritter, and C. C. Hager, of New York; Geo. M. Snyder, of West Hoboken, N. J.; Isaac Pruyn and James Stead, of Catskill; Simon Z. Weighaft, of Kaaterskill; Jacob Homer, of Tannersville.

TROY, N. Y.—The American Road Improvement Association is organized. President, J. Russell Parsons, Hoosick Falls; secretary and treasurer, F. A. Sawiner, Portland, Me. Capital, \$300,000. Object, to build street rollers, make road building material and construct streets and roads. Factory probably at Hoosick Falls.

WATERTOWN, N. Y.—The street railway gives the following report: net income, \$4,624.87; dividends, \$1,200; surplus, \$3,424.87; total assets \$189,757 54½; total liabilities, with profit and loss surplus of \$22,024.86½ \$189,757 54½; passengers carried, 461,540. Superintendent receives \$1,200, conductors \$1.16 2-3 for 11 hours, car-house-men and dynamomen, ten hours, \$1.00 to \$1.50.

Ohio.

CINCINNATI, O.—Route 23 has been assigned by S. M. Johnson to C. H. Kilgour, who assigns to the Cincinnati Railway Co.

CLEVELAND, O.—The commissioners of Columbiana county have sued Tom L. Johnson, et. al., for \$10,000.

COLUMBUS, O.—The Worthington Electric railway will be running by May 1. The capital is \$30,000, and J. M. Milne has been elected director and vice-president. Asa Noble has been elected director.

COLUMBUS, O.—E. K. Stewart, of the Columbus Street Railway, has asked for permits to lay track on new streets, and to make new connections.

DAYTON, O.—The directors of the Dayton Street Railway have decided to negotiate for an electrical equipment on Third street.

NILES, O.—The Trumbull road has had its charter extended, provided it is built this fall.

PUT-IN-BAY, O.—L. S. Baumgardner has been appointed receiver of the Railway Light and Power Company by the U. S. Circuit Court at Cleveland.

URICHSVILLE, O.—Track laying has at last commenced on the line to Dennison.

ZANESVILLE, O.—Ordinance passed, giving right to build on River street. Work will begin at once.

Oregon.

PORTLAND, ORE.—The Barnes Heights & Cornell Mountain Electric has begun track work.

Pennsylvania.

COLUMBIA, PA.—The Columbia & Ironville Electric Railway Company has bought land and buildings for a power-house. The supply men are already after them, but two of the directors will make a tour before deciding. W. B. Given of this place and E. W. McGovern and Jas. Coyle of Lancaster, are the committee.

HANOVER, PA.—Organized: Hanover and McSherrytown Street Railway Company, electric; capital, \$30,000; three miles long. President, John Tanager; directors, C. D. Smith and John A. Poist, of McSherrytown; A. H. Melhorn, Aaron Hostetter, T. E. Ehrehart and C. E. Ehrehart, of Hanover.

HAZELTON, PA.—Right-of-way has been allowed the Hazelton and Suburban for overhead system.

HAZELTON, PA.—The Lackawana & Old Feorg Railway Company has been organized to build six miles of electric. Directors: John Graham, G. R. Bedford, C. J. Swan, Wilkes Barre; W. G. Eno, Plymouth; L. E. Hoover, Newville.

McKEESPORT, PA.—The Homestead and Highlands has been granted charter at \$30,000 capital. Two miles will be built. The directors are James S. Kuhn, of McKeesport; Jacob Trautman, Louis Rott, Dr. George Gladden, John F. Cox and Richard Tricking, of Homestead.

HARRISBURG, PA.—The following charters have been issued: Phillipsburg & Houtzdale Railroad Company, of Oceola Mills, the line to run between Phillipsburg and Houtzdale, ten miles, capital stock \$100,000; Clearfield & Curwensville Passenger Railroad Company, of Clearfield, to run between the above towns, seven miles, capital \$100,000; Hazleton & North Side Railway, capital \$75,000, to run from Hazleton through Harleigh, Oakdale, Japan, Drifton and Freeland; Hazleton & South Side Electric Railway, capital \$75,000. The routes cover Spring Mountain, Schuylkill County, Audenried, Jeansville, Hazleton, Stockton and Beaver Brook.

LANCASTER, PA.—Contract closed with Westinghouse for power for new railway; Ball, of New York, engines.

PHILADELPHIA, PA.—The Quaker City L will build a mile a month now. Offices 313-14 15-16 Girard building.

PHILADELPHIA.—Chas. W. Bucholtz, chief engineer of the N. Y. L. E. & W. R. R., has been made president and chief engineer of the Quaker City Elevated.

PHILADELPHIA, PA.—The Traction Company will put underground electric or cable on the Ridge avenue line.

PHILADELPHIA.—The Ferry Passenger Railway and the Walnut Street Railway have been granted additional franchises.

PITTSBURG.—The Allegheny and South Side Railroad Company has been organized to run from Spruce street and the Ohio river in Allegheny to a point in the Twenty-sixth ward, Pittsburgh, on the tracks of Monongahela Connecting Railway at South Twenty-fourth street. The capital stock is \$50,000. President, William Jenkins; Directors, Geo. M. Davis, E. D. Reis, J. F. Kuntz, J. Carrol Barr, W. T. Scudder and R. Theophilus.

POTTSTOWN, PA.—The new electric railway company has elected the following officers: John A. Weber, of Pottstown, president; James C. Hellig, of Pottstown, secretary and treasurer; John A. Weber, James C. Hellig and John P. Dunn, of Pottstown; ex-Assistant United States District Attorney J. Wilkins Carr and James M. Zacharias, of Philadelphia, directors. Capital \$70,000; length of line, 12½ miles.

POTTSVILLE, PA.—Pottsville, Cressona, Schuylkill Haven & Orwigsburg's Electric Railway Company. J. T. Shoener, Orwigsburg, president; C. W. Wildmuth, Pottsville, secretary; G. F. Dengler, Schuylkill Haven, treasurer.

SOUTH BETHLEHEM, PA.—R. A. Kline is now superintendent of the B. & S. P. Street Railway. He is a steam railroad man.

SUNBURY, PA.—Major Hamilton has the contract for laying the line between Ashland and Mt. Clemens.

WASHINGTON, PA.—The Electric Railway has agreed to extend its lines if a bonus is raised. Interested parties will raise money by buying unsold bonds.

WINCHESTER, PA.—The Murphy Electric Company, of New York, proposes to the cities of Winchester and Decherd to build an electric between these two places. They have been working the inhabitants for the right of way, and the scheme looks as if it might go.

Rhode Island.

PROVIDENCE, R. I.—The trolley franchise for the Union road has been granted, and the company will begin at once to convert the horse lines into electric.

South Carolina.

COLUMBIA, S. C.—W. A. Clark and J. Q. Marshall have moved the awarding of the electric contract to Short, of Cleveland. The order is for six 24-foot cars, twelve motors and two 150-horse generators.

Tennessee.

MEMPHIS, TENN.—John I. Beggs, of the General Electric, has turned over the railway to the home company and received a check from C. K. G. Billings for the same.

Washington.

SEATTLE, WASH.—The electric and cable railway, of Seattle, wish a renewal of franchise and promise to pay rent to the city for the streets.

West Virginia.

HUNTINGTON, W. VA.—The Consolidated has asked right of way on Second street.

Wisconsin.

ASHLAND WIS.—Philander Mott, W. Harris, Day, and other New York capitalists have purchased \$30,000 of lands and will invest \$20,000 more when electric can run to the plat.

CHIPPEWA FALLS, WIS.—Mayor Millard has appointed his railway committee as previously stated.

MADISON, WIS.—Superintendent Shaw will uniform his men.

MILWAUKEE, WIS.—The managers of the Soldiers' Home have voted right of way for the electric on the north side.

MILWAUKEE, WIS.—The Milwaukee and Cream City lost \$5,000 by the burning out of a cable.

MILWAUKEE, WIS.—The Supreme Court has given Hinckley the victory over Pfister and Vogel, on a suit to foreclose an equitable lien for \$125,000 on the electric railway. Pfister and Vogel must now share pro rata with the other creditors.

Two Daily Trains to Montana and Pacific Coast.

On and after April 31, trains on the Northern Pacific Railroad will run as follows: Train Number Three will leave St. Paul 9 a. m. daily, running through to Spokane, Seattle, Tacoma and Portland, via Butte-Montana. Train Number One will leave St. Paul 4:15 p. m. daily, running through to Spokane, Seattle, Tacoma and Portland, via Helena, Montana. Both trains carry complete equipment of Pullman first-class sleepers, tourist sleeping cars, free colonist sleepers, day coaches and dining cars.

Through Pullman and tourist sleeping cars will leave Chicago 10:45 p. m. daily, via Wisconsin Central Line, for Montana and the Pacific Northwest. First-class vestibule sleeper will leave Chicago 6 p. m. daily, via C. M. & St. P. Ry., for Butte, Spokane, Tacoma and Portland. These through sleeping cars afford the best of accommodations, and enable travelers to avoid all trouble or delays from change of cars en route.

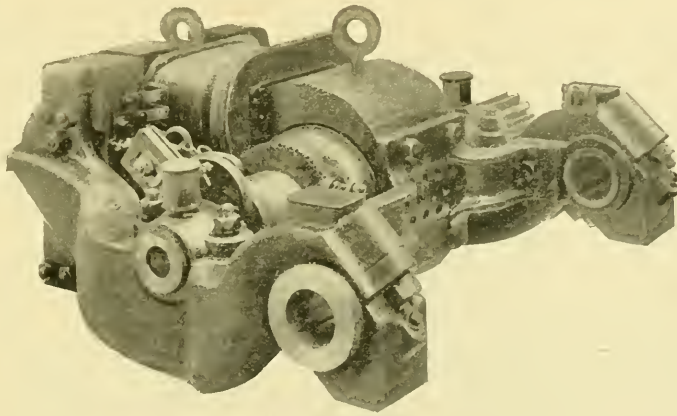
The dining cars on the Northern Pacific Line continue to meet with favor with the traveling public. No efforts are spared by the company to make this an attractive part of the service. With the superior accommodations now offered, tourists, business men or settlers will find the Northern Pacific Line the best route to Minnesota, North Dakota, Manitoba, Montana, Idaho, Oregon, Washington, British Columbia, Alaska and California.

Montana, Eastern and Western Washington folders, "Wonderland" book, Sportsman's guide, Yellowstone Park, Broadwater, Hot Springs and Alaska folders for the season of 1892 are now out of press. Any of these publications will be mailed free on application to General or District Passenger Agents, Northern Pacific Railroad, or to Chas. S. Fee, G. P. & T. A., N. P. R. R., St. Paul, Minn.

THE SINGLE REDUCTION "F. 30" RAILWAY MOTOR.

THE many advantages of the single reduction motor for electric railway services have, during the past year, been so emphatically proven, that the General Electric Company has re-designed its old double reduction F-30 motor, making it a single reduction machine, and designating it as the S. R. F. 30 railway motor. In compliance with the demand, already apparent, for the conversion of F. 30 motors, the company is now rebuilding, for many of its customers, a considerable number of these machines.

In effecting the change, the side arms, nose plate, intermediate shaft pinion and gear of the old F. 30 motor have been discarded and replaced by newly designed side arms which support the motor proper. As will be seen from



SINGLE REDUCTION, "F-30" RAILWAY MOTOR, GENERAL ELECTRIC COMPANY.

the illustration, they occupy a position exactly the reverse of that in the F. 30. The nose plate becomes a support to the pole pieces, and the pinion and gear are similar to those used on General Electric Company's W. P. railway motor.

By doubling the turns in convolutions in the armature winding, and leaving the field spools unchanged, two very important improvements have been secured—the armature speed is reduced one-half, and the strength of the torque of the motor doubled.

An improvement has been effected in the arrangement of the armature bearings, facilitating lubrication. The axle and armature bearings are now similar, and the same kind of grease can be used on both. Anyone will recognize the convenience of this.

The efficiency of the new Single Reduction F. 30, when compared with that of the F. 30, shows a decided increase in favor of the new type, although its speed under similar conditions of strength of fields is slightly less. The amount of heat developed after a run under full load is also considerably less than in the F. 30.

The satisfactory results of the trial tests of the Single Reduction F. motor tend to show that the transformation of the F. 30 from a double reduction to a single reduction motor will be satisfactory wherever effected.

DEDICATED.

IN the presence of over one hundred thousand people, beneath a vaulted roof of iron and glass, the largest in the world; attended by the vice president of the United States, members of Congress, judges of the Supreme Court, the governors of thirty states and royal representatives of foreign countries, was the World's Columbian Exposition dedicated. A grand military parade, a chorus of 6,000 voices, and at night the largest exhibition of fire-works ever given, were incidents of an event in every way fitting the occasion. In true Chicago style

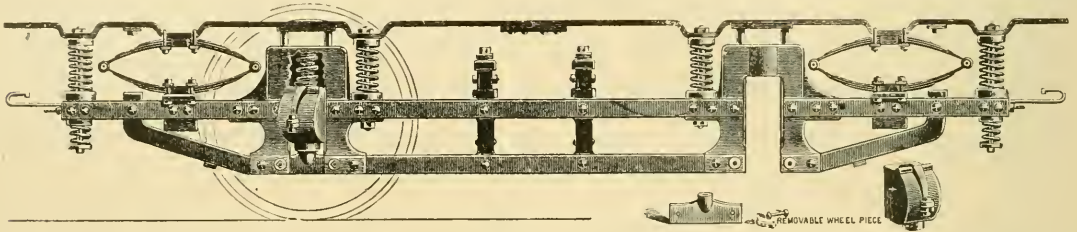
everything was the "biggest" on record. To add to the general turnout of citizens, which was larger than usual, there were at least 300,000 strangers in town.

The transportation of the masses during the day and the return to their homes at ten o'clock at night of the 600,000 who witnessed the pyrotechnic display was all accomplished without any loss of life and but few slight accidents. That the cable, elevated and suburban steam lines accomplished this under the adverse conditions of streets filled with almost continuous parades, is evidence of our ability to easily take care of any possible crowd during the Fair, especially in view of the fact that preparations are well along towards completion and which will be completed by January 1st., will afford fully double the present excellent facilities. Chicago enterprise is equal to any emergency.

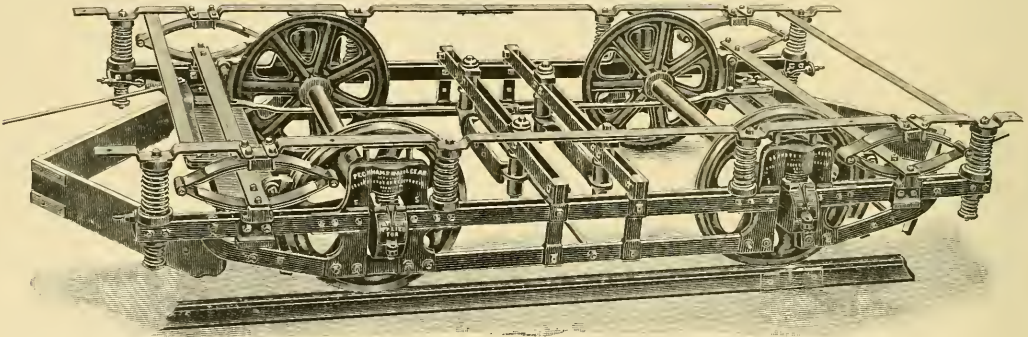
AN interesting relic of the Johnstown flood has been unearthed and an examination proved that the safe discovered had belonged to the old street railway company and contained \$10 in dimes and nickels.

PECKHAM'S RADIAL GEARED, CANTI-LEVER, EXTENSION TRUCK, 5 A.

THE above heading is indicative not only of a new style of truck, but of the many years of experience of Edgar Peckham in trying to arrive at an ideal, so far as careful plans, strong material and good workmanship will attain this end. The result is the radial geared, cantilever, extension truck, No. 5 A, which the inventor claims satisfies all the above conditions.



The new truck has a number of features which differ radically from the non-oscillating truck formerly so popular. The cantilever principle of supporting the ends of the frame is still retained but the shape of the side bars is altered. In place of the bolts the parts are firmly fastened by rivets which are upset while hot, thus absolutely preventing dropping of bolts. The radial motor hanger principle is retained, but elliptical springs have been substituted for the spirial springs employed over the main bolster, while a graduated double spring is employed at the end to prevent tetering.



The radial box heretofore used is subjected to a few minor changes and a double graduated spring is placed above the journal boxes to receive the shocks, which lessen the wear on the trucks to a great degree. The journal boxes have been the subject of considerable design and the radial principle here used relieves the draft on the curves and permits of the use of the largest sized cars. The truck herewith illustrated is especially adapted to the Thompson-Houston waterproof equipment. The truck gives ample room for the extension of motor. These trucks have seen satisfactory service on the Brooklyn City and on the Union Railway of New York.

THE LIFE-GIVING TROLLEY.

IN respect to the New York trolley war the following opinions on the trolley are of value: M. W. Russell, secretary of the Telegrapher's Union, voices the sentiment of his constituency and of the Trades' Council of New York, in a lengthy disquisition on the want of rapid transit in New York, and of the crying need for the trolley or any other immediate relief that may present itself. The Tailors' Union declares that on account of want of rapid transit 98 per cent of this class live in tenements.

The Builders' Trade are compelled to shelter 60 per cent in unhealthy lodgings on this account, and Mr. Russell says that one-half of his trade are in the same predicament.

The only salvation for the poor of New York from deadly diseases and foul streets is the later methods of mechanical traction, and to this only must the people look for better homes, cleaner streets and more healthful surroundings. The labor leaders are united on the question and the laboring classes demand it in humanity's name.

WANTED.

WANTED—Position as superintendent, by one who has had five years experience in that position with large cable and electric systems. Unquestioned references as to experience, ability and character.

Address, "Superintendent,"

Care STREET RAILWAY REVIEW,

Chicago, Ill.

THE Barre sliding railway will be a feature of the midway plaisance at the World's Fair grounds. There are rumors of other constructions.

THE GENETT AIR BRAKE FOR STREET RAILWAY CARS.

THE greatest advance in the operation of steam roads was undoubtedly the invention of the air brake, which admitted the use of much heavier cars at a greatly increased speed.

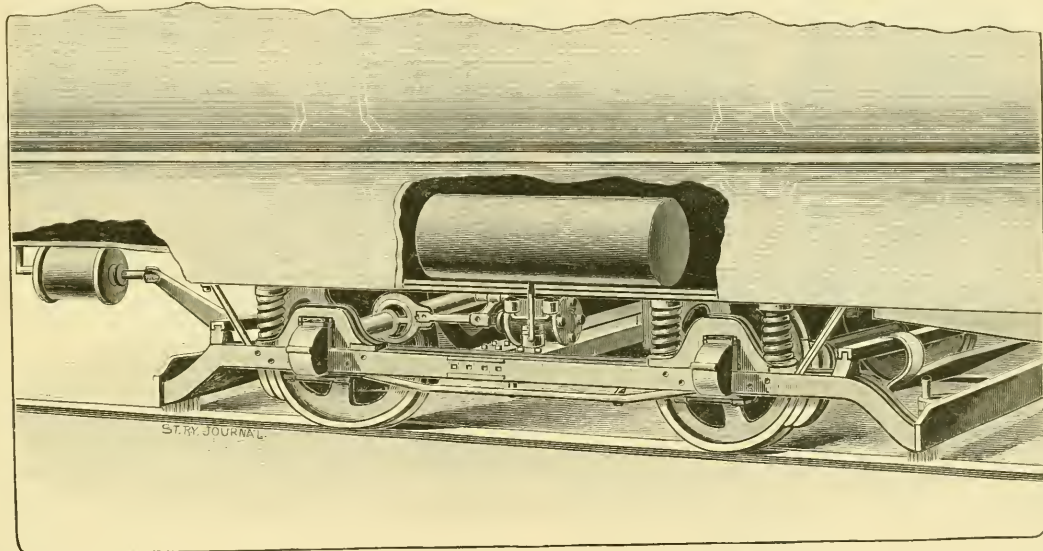
The tendency of street railways during the past three years has been in the same direction—rapid transit and larger and heavier equipments, with its consequent increase of load, but, unlike steam roads, the large cars and high speed came into use in advance of an air brake adapted to such use.

Every railway man realizes all too well, the loss of time in making necessary stops. On steam roads the study is to reduce these to a minimum compatible with an acceptable service. The street car, on the contrary, must be in readiness to stop at every intersecting street at the desire

mentation—simplicity. An air pump driven by an eccentric on the motor car axle; a reservoir to contain a constant supply; a jam-cylinder under each car to set the brake; and at the drivers stand, a small lever, which by a slight motion, does all the work. A pressure gauge to show the exact working air pressure at all times; this is all there is. What could be more simple?

In the first illustration is shown a single truck electric car equipment complete, with this brake and parts drawn to scale. The compressor rests upon the center bar of the truck, and the eccentric on the axle between the motor and the hub of the wheel. Beneath the seat is the storage tank, while close under the car body is the jam-cylinder connected to the brake levers.

A train of as many cars as desired may be controlled simultaneously by the driver as easily as one car. For trailers, the jam-cylinder only is required, connected with



SINGLE TRUCK ELECTRIC CAR WITH GENETT AIR BRAKE COMPLETE.

of any person. With the old horse car, the larger loss of time was in regaining the headway, and the heavier the load the greater this loss. The time required to bring the horse car to a stand-still was a less serious matter, owing to its low speed.

With electric and cable cars these conditions were reversed. Full speed became attainable in a few yards, but this speed must be cut down some distance before reaching a stop, entailing loss of time, which takes the edge from rapid transit and costs money. The less physical exertion required in operating the car leaves the driver in just that much better condition to intelligently control it, whatever be the system.

The Genett Air Brake, which was first introduced to the street railway world through these columns some months ago, comes in at the present emergency to fulfill the new requirements above set forth, and does it most effectually. Moreover, it deserves that prime recom-

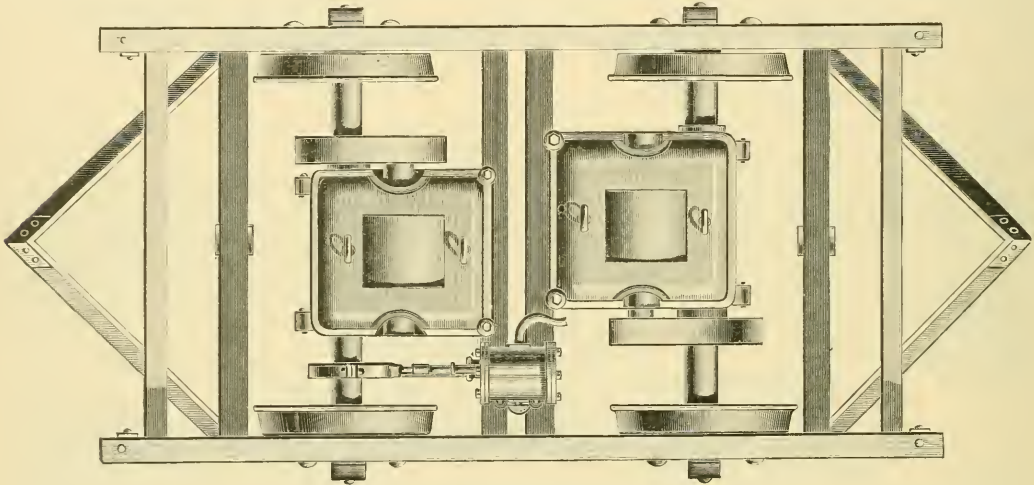
other cars in train by iron pipe and rubber hose at couplings. The storage tank always contains sufficient air to make several stops without re-charging, easily carrying 30 pounds pressure, while 3 pounds only is required to make a stop. The arrangement is such, however, by recent improvements that the reservoir fills after each discharge, but not until the car is moving at full headway. Although the pump requires only a fraction of a horse-power, the inventors have avoided even the slightest addition to the load when starting. The parts are few, simple, giving little wear, but renewed without any trouble. The action of the system is as positive and reliable as that on steam roads, but avoids the unpleasant noise produced when brake is released. A jam-cylinder of six inches diameter, with 30 pounds pressure in reservoir yields a breaking-power of 850 pounds. Increase in size of cylinder or pressure gives any greater power desired.

The eccentric is attached to axle without removing the wheel, and any street car can be equipped without interfering with existing arrangements. The adaptability of the Genett Air Brake to the varied existing forms of truck and car construction is one of its great advantages. It has been subjected to every possible test, is in no sense an experiment, and, we believe, will be found exactly what is needed on high speed cars. The company have an office and works in this city, at Nos. 11 to 23 South Jefferson street, and an Eastern office at 150 Broadway, New York. Equipment is already being made for a number of large roads, and a number of pending contracts will be closed in a few days. The company will mail on application an illustrated description, giving minute details.

Trolley Track Hanger for Electric Railways, W. Q. Prewitt, Lexington, Ky..... 483,388
 Electric Railway Conductor, R. M. Hunter, Philadelphia, Pa. . . 483,494

ISSUE OF OCTOBER 4, 1892.

Trolley Catcher, J. J. Hoppes, Springfield, Ohio..... 483,689
 Switch Attachment for (Street) Cars, W. E. Meagher and A. Howarth, Providence, R. I. 483,744
 Closed Conduit for Electric Railways, W. G. Creighton, Norwood Park, Ill..... 483,761
 Grip for Cable Railways, C. Vogel, San Anselmo, Cali, and C. McIntosh, Tacoma, Wash..... 483,774
 Grip for Cable Railways, C. Vogel, San Anselmo, Cali..... 483,775
 (Street) Car Brake Handle, A. B. Collett, Lynn, Mass..... 483,779
 Electric Locomotive, T. L. Willson, Brooklyn, N. Y..... 483,822
 Electric Railway, W. G. Murphy, Jr., Marysville, Cali..... 483,856
 Cable Grip, P. A. Yard, St. Louis, Mo..... 483,952
 Cable Railway, J. B. Mahaffey, Baltimore, Md..... 483,965
 Automatic Release for Cable Grips, A. D. & T. W. Smith, St. Louis, Mo.; reissue..... 11,275



PLAN VIEW OF SINGLE TRUCK ELECTRIC CAR WITH GENETT AIR BRAKE.

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days; reported especially for the STREET RAILWAY REVIEW, by Munn & Co., Patent Attorneys, 361 Broadway, New York, N. Y.

ISSUE OF SEPTEMAER 13, 1892.

Inclosed Conductor for Electric Railways, G.A. Dupuis, Detroit, Mich..... 482,343
 Street Railway Switch, T. L. Johnson, Cleveland, O..... 482,426
 Underground Trolley, J. Fisher Cleveland, O..... 482,506
 Switch Operating Device for (Street) Railway Cars, J. Kelly, Pittsfield, Mass., reissue..... 11,269

ISSUE OF SEPTEMBER 20, 1892.

Conduit for Electric Railways, F. O. Blackwell, Boston, Mass. . . 482,719
 Street Railway Switch Appliance, J. P. Holedger, Spokane, Wash..... 482,903
 Securing Device for Cables, W. F. Bossert, Utica, and J. H. Findlay, Ogdensburg, N. Y..... 482,939
 Electric Railway Conduit, R. M. Hunter, Philadelphia, Pa..... 482,964
 Closed Conduit for Electric Railways, S. P. Bunce, Minneapolis, Minn..... 482,993
 Trolley Stand for Electric Railways, J. C. Hough, Pittsburgh, Pa..... 483,061
 Fare Register and Recorder, C. Crook, Brooklyn, N. Y..... 483,102

ISSUE OF SEPTEMBER 27, 1892.

Guard for (Street) Railway Cars, P. Barron, Pittsburgh, Pa.... 483,202
 Electric Locomotive, N. C. Bassett, Lynn, Mass..... 483,204
 Electric Railway System, A. L. Ricker, New York, N. Y..... 483,366

NEW PUBLICATIONS.

THE EVENING DISPATCH, Chicago, is a bright new evening daily by Joseph R. Dunlop, a well-known journalist of this city.

DUNCAN'S TRAMWAY MANUAL for the year 1892, comes to our table with its usual complete contents. The manual contains traffic table abstracts of accounts and a complete directory of British and continental trams. It is published by Effingham Wilson, Royal Exchange, London, at five shillings.

THE BALL ENGINE COMPANY send out a neat catalogue of "Latest Improved Heavy Duty Engines for Railway Work," beautifully illustrated, with a list of 15,000-horse-power now in use in railway work. Another neat booklet gives the details of a Ball installation of an electric light station "On a Coral Reef."

THE MCGUIRE MANUFACTURING COMPANY, of Chicago, recently published a beautiful leatherette bound pamphlet catalogue of their well-known trucks, which they will take pleasure in presenting to any applicant. The book contains a list of over 200 railways using McGuire trucks, to any of which reference may be made.

RECENT PROGRESS IN ELECTRIC RAILWAYS, a compilation and summary of current literature relating to the subject, is the title of a recent book by Carl Hering, published by the W. J. Johnston Company, Limited, 167-176 Times Building, New York. The work lays no claim to particularly original matter, but the valuable hints and advice contained within its unpretentious covers bear marks of the careful and painstaking study of contemporaneous literature by its author. The practical electrician and electric railway manager as well as the manufacturer and employe can gain much from the perusal of its 306 pages. Price \$1.00.

A NEW LINE OF DEVICES FOR THE OVER-HEAD LINE CONSTRUCTION OF ELECTRIC RAILWAYS.

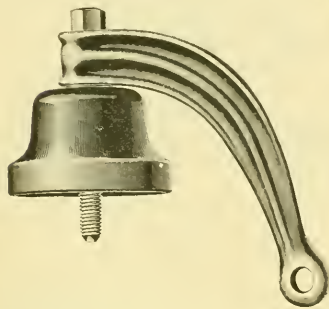
THE different devices used in electric railway construction for the suspension of the trolley wire have again undergone a marked improvement. During the past few months the Railway Department of the General Electric Company has been experimenting with a new insulator, and now has ready to place before the



CAT. NO. 16684.
Straight Line Insulated Body Suspension for Standard Cars.



CAT. NO. 16807:
Bracket M. R. Bell Insulator for Automatic Car.



Single Curve Bell Insulator for Automatic Cars.

railway public a complete line of these new overhead construction parts. The characteristic feature of these new devices is that the material used for insulation is solid sheet mica. This fact will be thoroughly appreciated by all electric railway men, as mica is recognized as having the highest insulating qualities of all the insulating substances used in the manufacture of electrical apparatus. More than this it will not deteriorate or disintegrate from age or the effects of weather. The accompanying cuts will give excellent ideas of the appearance of these new devices.

SOLID MICA INSULATORS.

The new insulator, made in form of a bell, is constructed as follows :

A main, metal casting, as will be seen in the cut of the cross-section, projects around under the head of the screw bolt which holds the trolley wire ear. The sheet mica is first placed in this casting, the screw bolt is then set in, and afterwards mica is put in until the casting is filled nearly to the top, then the metal piece into which is screwed the span wire clip or other suspension device is set down on the mica and the edges of the main casting folded over on it by hydraulic pressure. The whole device is then covered with an insulating composition which is perfectly impervious to the weather, which forms a secondary insulator and prevents any surface leakage.

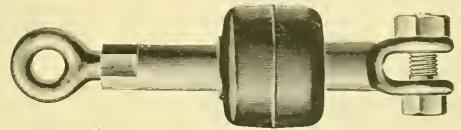


There are two styles of this bell, both shown in the accompanying cuts, differing from each only that the larger size has a metal rim around its lower edge, which protects the composition covering from being chipped or broken, should the trolley wheel happen to slip from the wire, under one of the insulators. Both forms of the bell are made with a square ended screw to hold the ordinary standard ears, and also with a longer pointed screw to fit the automatic ears.

As it is often necessary to put guard wires over the trolley wire; devices have been designed for this purpose resembling in all respects the bell insulator already described with the exception that they are small in size and are fitted with a small double hook, so that they hold the guard wire without the use of the ordinary ears.

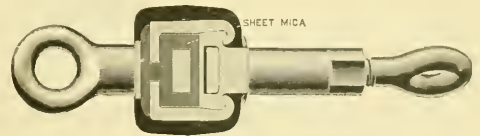
The span end strain wire insulators are constructed on exactly the same principle as the bell itself, and are manufactured in many different designs and combinations of clevis and eye, so as to meet all possible conditions of overhead line construction.

The numerous illustrations accompanying the preceding brief description, will sufficiently describe the particular merits of each special fixture. Those who attended the Cleveland convention will be forcibly reminded of the



Insulator for Suspending Trolley Wire.

magnificent display there made by the General Electric Company of overhead line supplies. These devices are all insulated with sheet mica, the value of which is fully appreciated by every electrician and railway manager.



CAT. NO. 16732.
Sheet Mica Insulating Turnbuckle.

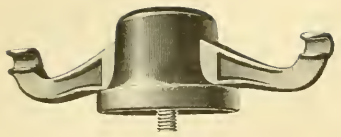
So well understood is their use, and the cuts so plainly demonstrate their construction, it is unnecessary for an individual description of each piece: hence we simply append the adopted title and the reader will readily do the rest.

(For the remaining devices see next page.)

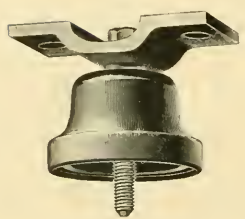
The conductor reads the gay street signs,

Drop a Nickle In

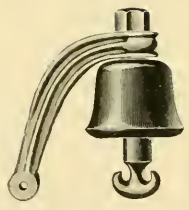
And says, "It ain't no sin,"
For everywhere I'm strictly told
To drop the nickle in.



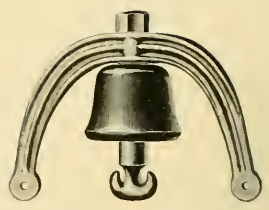
CAT. NO. 16798.
Straight Line Insulated M. R. Body Suspension for Standard Ears.



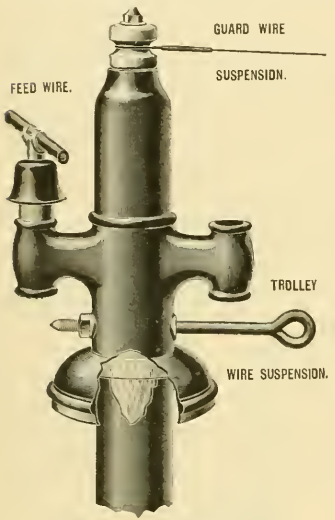
CAT. NO. 16809.
Ceiling Bell Insulator for Automatic Ear.



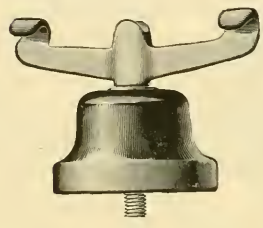
CAT. NO. 16754.
Single and Double Curve Guard Wire, Bell Suspension.



CAT. NO. 16756.
Single and Double Curve Guard Wire, Bell Suspension.



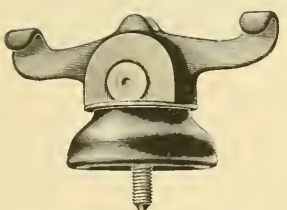
Pole-Top Construction.



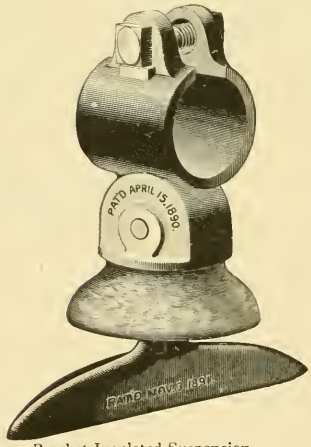
CAT. NO. 16800.
Straight Line Bell Insulator for Standard Ear.



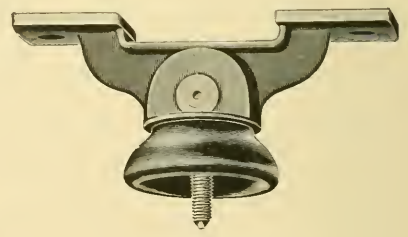
Single Curve Insulated Suspension, with Automatic Ear.



CAT. NO. 16706.
Span Wire Insulated Suspension, for Automatic Ear.



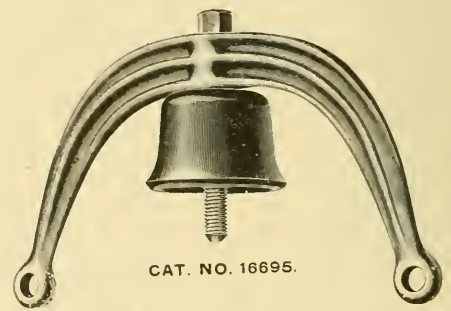
Bracket Insulated Suspension, with Automatic Ear.



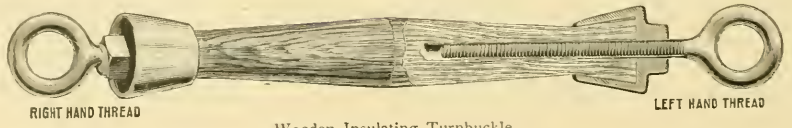
CAT. NO. 16704.
Ceiling Insulated Suspension, for Automatic Ear.



Double Curve Insulated Suspension, with Automatic Ear.



CAT. NO. 16695.
Double Curve Bell Insulator, for Automatic Ear.



Wooden Insulating Turnbuckle.



WINDSOR & KENFIELD,

PUBLISHERS AND PROPRIETORS,

334 DEARBORN ST., - - - CHICAGO.

Published on the 15th of each month.

SUBSCRIPTION, - - - TWO DOLLARS.

FOREIGN SUBSCRIPTION, - - - 20 SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW,
Canton Building, 334 Dearborn Street, Chicago.

H. H. WINDSOR,
Editor.

F. L. KENFIELD,
Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW,
334 Dearborn Street, Chicago

Entered at the Post Office at Chicago as Second Class Matter.

This paper member Chicago Publishers' Association.

VOL. 2. NOVEMBER, 1892. NO. 11

A WRITER in the Scientific American recently stated that the great "Thanksgiving Fire" in Boston was caused from trolley wires. W. J. Clark, of the General Electric, Boston, replies in the same paper, having taken the trouble to secure a letter from the chief of the fire department, who denies the trolley wire feature of the disastrous conflagration. This should forever settle this question.

PROBABLY no person in America is better qualified to write on the problem of rail and rail joints in street railway practice than Mr. Moxham, whose valuable and interesting paper on "Experiments on the Expansion of Continuous Rails," will be found elsewhere in this number. A continuous rail of 500 feet is much less a question of uncertainty than were cable cars and the electric system a few years ago.

THE action of the executive committee of the American Street Railway Association, in sitting down hard on the proposal to farm out the publication of the annual report of the Association to an enterprising Chicago advertising agency, was very fitting. While the bidder would probably have gotten the report out in less time than has been customary heretofore, the interlarding of every other page with advertisements is hardly in keeping with the dignity of an association representing several hundred millions of invested capital.

WE know of a small electric road in upper Michigan which is experiencing a season of enforced retirement, and for two weeks past have not been able to run a car. Their generator armature burned out, and it has taken two weeks to get a new one. It would seem as though ordinary foresight would provide at least one reserve armature always on hand. The interest on the money so tied up would be saved in one day's operation when the emergency comes.

A NEW wrinkle has been discovered by the powers that be in Cincinnati, and the new ordinance now on the auction block there provides for a yearly payment to the city of four dollars per lineal foot, inside measurement, of all cars run on the line; also a further contribution of two-and-one-half per cent of the gross earnings of the lines. We cannot predict what the gross earnings will be, but have a very lively idea of the probable size of the net receipts under such circumstances.

IT is the perfection of details that makes the operation of a street railway popular, and things very insignificant in themselves often cause great trouble and expense. A well managed company now has a suit hanging on a ten-penny nail, which protruded just enough from the car platform to catch a lady's dress as she stepped from the car, throwing her to the ground where she struck the pavement and was injured. A figure fiend could easily tell us how many danger available nails exist on a road operating 100 cars, and it would be seen they run into the thousands. While the position of inspector general of platform nails may never lead to fame, the fact remains that this, as many other duties unknown to the public, plays a no small part in the safe transportation of the daily millions of American street car riders.

THE recent fire which destroyed the Euclid avenue opera house in Cleveland, was attributed by some "non-resident" newspapers to the railway trolley wires. To ascertain what foundation existed for such a statement we wrote the city electrician, George M. Hoag, and the following is part of that gentleman's very courteous and prompt reply: "Regarding the cause of the burning of the Euclid avenue opera house, the writer can state that after nearly four years' use of the trolley systems in Cleveland we have yet to make our first record of a fire from their use." The gentleman then facetiously postscripts the following: "The 'kick' of the trolley may be a little more dangerous than that of the street car mule, but as regards fire risk we think there is very little difference." If the trolley had lived in Chicago in 1871, very likely Mrs. O'Leary's cow would have been robbed of the credit of being such a high kicker.

IN our department of Street Railway Law this month, will be noted a decision by the supreme court of the state of Michigan, sustaining the right of the street railway companies to protect themselves by restrictive clauses printed upon and governing the use of transfer tickets. The suggestive lesson in the case is that the

transportation of the passenger, over the route called for in the transfer ticket, was a voluntary action on the part of the street railway company, and not an obligation growing out of contract with the city through the medium of accepted ordinance. Hence, in cases where the transfer points become inevitable, it will be found an important protective precaution to anticipate any legislation compelling transfer, either by voluntarily assuming the burden, or, as a last resort, to put it in operation but without having the obligation legally imposed by anything of record. While the company will usually find a broad-gauged, liberal policy with its patrons, the profitable and politic one on which to deal, at the same time it is so harassed by unscrupulous and irresponsible persons that every possible precaution is absolutely needed purely as a matter of self-protection.

THE recognition of the "union" as the occasion of the disgraceful and unwarranted strike in New Orleans, had no more conspicuous feature than the action of the street car drivers. These men had absolutely no grievance, and careful inquiry among a large number of the men failed to discover any knowledge on their part, as to why they had so suddenly quit work, save that the Amalgamated Council had so decreed. Without notice to their employing companies, and with no consideration for the public, the men left their cars at 3:30 in the afternoon.

Should the railway manager discharge at one stroke every man in his company's employ, without reason other than that the superintendent of some other line of business in his city desired such action, what a howl would go up from the wageworkers! And yet this is exactly the position in which the striking street car employes of New Orleans placed themselves.

The financial loss to the city in business, diverted by reason of the strike, will be felt for years: and the laboring man will indirectly suffer in that loss, though it is hardly to be expected that he can be made to comprehend the inevitable results of cause and effect.

THE supreme court of Massachusetts has decided that when a person alights from a car he ceases to be a passenger. The ruling was made in a case where a person left the car from the rear platform, and by a few steps came upon the other track where he was killed by a car passing in the opposite direction. Claim was made by the widow for damage as to a passenger. On this point the Court said: "The street is in no sense a passenger station for the safety of which a street railway company is responsible. When a passenger steps from the car upon the street he becomes a traveler upon the highway, and terminates his relation and rights as a passenger, and the railroad company is not responsible to him as a carrier for the condition of the street or for his safe passage from the car to the sidewalk." Accident to such persons then becomes a case of damage to pedestrian, in which the question of degree of negligence on part of company's driver and plaintiff must be established. It is gratifying to receive an opinion so tersely stated as

above quoted. This, however satisfactory to the railways, will hardly be relished by a regiment of chronic fault-finders, who would not hesitate to sue the company, if, after having rode in safety and comfort a distance of eight or ten miles for five cents, chance to stub a toe in crossing the family threshold.

ENTERPRISE is a good thing, but there can be too much, sometimes, of even very good things. In no business is a progressive and public spirited policy more necessary than in the office of the street railway. An instance of competition getting the better of business methods was clearly instanced in the Seattle Consolidated Electric Railway. This company was endeavoring to force certain grants for street franchises against other competitors, and, in a rash moment of abandon, pledged itself to light with arc lamps the entire right of way when the line should be built. The line has been operated some time, but the amount of business will not warrant any such expenditure as the fulfilment of the lighting clause would incur, and, as far as the company is concerned, nothing has been done to lighten up the gloom. They are now begging off on an offer to pay the city \$50 a month in lieu of light. The company were foolish to make or accept any such offer; the city should never have demanded or insisted on the condition. The company certainly in constructing a line returned, in so doing, untold benefits to property owners and the city, and should have rested their case on the merits of a 5-cent ride for a 5-cent fare without any illuminations thrown in. A street railway, like people, cannot give something for nothing, and the lesson is plain to any road uncertain as to how many "extras" they should be expected to give.

THE decision a few days ago by Judge Maynard, of New York, in the case of the Hudson River Telephone Company vs. the Watervleit Turnpike and Railroad Company, is the most complete and far reaching decision yet rendered touching the right to maintain trolley wires. The case is the well-known one where a telephone company sought to enjoin the operation of electric trolley cars, claiming interference with the working of the telephone instruments. The opinion is printed in full on another page and is so replete with precedent as to command the attention of all our readers. In commenting upon the report of the referee, the Judge takes occasion to say:—

"The report of the referee removes all doubt with reference to the safety and practical usefulness of the system adopted by the defendants. It finds in substance that it (the overhead trolley system, Ed.) is the most efficient and economical and the best thus far devised, and less liable to accidents, through the displacement of machinery, than any other trolley system; that it subserves the public interests and satisfies the public wants with respect to transportation; that it is not prejudicial to the public health or dangerous to human life; and that no other system of electric propulsion of cars has thus far been demonstrated to be as practical, effective and as advantageous,

both to the public and private interests, as the overhead trolley system." (Note:—italics our own.—Editor.)

The Court further states:—"If any presumption is to be indulged in, it is that general legislative enactments are mindful of the growth and increasing needs of society, and they should be construed to encourage rather than to embarrass the inventive and progressive tendency of the people."

The decision will be of far reaching effect, and of great value to street railways in those places where there has been conflict between telephone and railway interests.

IT would be a great pity to close the World's Fair evenings. Such action deprives the public of nearly four hours that would be available were the gates closed at 10 P. M., instead of 6 P. M. The management also curtail a large revenue, for while the annual expositions in all the large cities are not in all respects a suitable comparison, still such enterprises draw largest crowds during the evening. Exclusive of Sundays there are 158 days of 11 hours each for attendance, but the extra hours from 6 to 10 P. M. amount to an equivalent of 70 days of 11 hours. So vast will be the display that, under the best possible arrangements, the allotted time will be all too short. The management, of course, should be best qualified to judge as to whether it is within possibilities to sweep, clean and dust the grounds and buildings in the eight hours which would remain after a ten o'clock closing, but it would seem that at least some of the buildings might be kept open; perhaps opening those one week which were closed the previous week, and thus alternating. The Electricity building would suffer a special hardship in being closed at night, as many attractive features could not be shown to any advantage except after sundown. Such an arrangement involves a large extra police and other workforce, as it could not be expected to work the day crew the full 15 hours, and this applies with equal force to fully 3,000 employes in other departments; but the director general has worked out other problems equally difficult, and we trust there may be some way found to do so in this case.

THE length of time which a car shall lay at end of route is one which the managers of many electric roads may well study with profit to their stockholders.

Under the old horse regime there was an absolute necessity during a part, and in many cases the whole year, for allowing from five to ten minutes resting time before starting on the return trip. When mechanical power was substituted on many roads the old custom was continued. In some exceptional cases there are reasons for this delay, but in many cases there is none and the ten minutes wait at each end amounts in the course of a day to no less than four hours laying time for a twelve trip car. Multiply this by whatever number of cars are running, say six, and the result is a dead loss of 24 idle car hours in every working day. Where the laying time is only five minutes the loss of course would only be but twelve. If a more extensive stock than the six men-

tioned is required, the loss increases proportionally, and in any event becomes a serious matter, as a road with few cars generally has to practice a more strict economy than its larger brothers with big barns full of rolling stock.

The engines are working continuously, the wages of the men at the power house do not stop, the consumption of fuel would be no less, and the pay of the car crew is going on, all the time the cars are lying idle, of no service to the public or the company.

Many a company can increase its service, shorten its headway, give better service to the public and earn more money, by judiciously cutting down the laying time. During meal hours there may be a necessity for some exception to the rule, especially where there are no relief men; but meals are not required during more than two hours and generally but one in the day.

Try the plan on one line and watch the results. There will be increased wear on wheels, car, motor and truck but they were purchased to wear out.

TROLLEY cars without speed is rapid transit minus the rapid, and a banquet without the necessary ticket that admits. Such, however, is the somewhat surprising condition of affairs in the business district of the city of Buffalo. The granting of consent to change the horse car lines to electricity has been conducted very much upon the principal of the Dutchman cutting off the dog's tail, an inch at a time, so that it would not hurt the dog. First, consent was granted to change to electricity on Niagara street; then followed Main street, on the granting of which the council took occasion to fix the rate of speed at eight miles an hour in the central part, or business portion of the city, and twelve miles an hour in residence districts and outer limits. More recently, in obtaining consent to change all of the remaining horse car lines to the trolley system, the board of councilmen insisted upon changing the speed limit in the central part of the city to six miles an hour between blocks, and four miles an hour at street crossings. The Railroad Commission of the state, in granting their permission to make the change, ratified the action of the council, and settled the speed question, in spite of the protests of the railway company, who saw the end from the beginning. As the good people of Buffalo came to enjoy the advantages of rapid transit at the residence end of the trip, the change to the six mile rate on passing the dead line was at first very noticeable, then a burden, and finally intolerable. The company also demonstrated the fact that the operation at high speed on the unrestricted portion of the route was not attended with the disastrous consequences the well-meaning but inexperienced city fathers had imagined; and now, partly by a change of heart in the solons themselves, and more especially from a public clamor, which would not be suppressed, the same body which were responsible for the speed limitations, now petition the State Board for a removal of the restrictions. The REVIEW has had frequent occasion to comment on the question of the speed at which cars should move in various portions of a city,

and has always held that this is a matter which may safely, and in the best interests of the public should be, left to the judgment of the operating company. No corporation can afford, or is going to run its cars at twenty miles an hour through a dense business district during those hours when the streets are choked. Injuries to people always cost money, and aside from any humanitarian motive—which, very unjustly, the railway company is not credited with considering—the selfish motives of dollars will restrain a dangerous speed; for roads are not run with a view to killing off its patrons, but rather to give such accommodations and transportation as will increase its business. Although not apparently recognized by the daily press, a passenger has never been known to again pay fares to a road on which he has been once killed; but instead the company has to fork over a big sum, the amount of which is fixed by a generous jury. So that purely in self preservation no road is going to run its cars at other than a proper speed. But there are many hours out of the twenty-four, when many business streets are as deserted as the western plains, at which time a very high speed can be maintained with perfect safety, and other hours when eight to twelve miles is unattended with risk. These periods change with the seasons and local reasons, which an iron-clad law cannot possibly anticipate, but blindly retards the wheels of commerce in a senseless and useless manner. The Buffalo case is but one more instance of the advantages which would inure to the public, were the street railway ever to pass into the hands of municipal contract, with a fresh recurring board of aldermen each year to educate to what is really best. When the Buffalo council passed its restricting clause of six miles an hour, they acted on their best judgment. But that they were in error is clearly proved by their present retraction. In the meantime, nearly a year has passed in useless delay. The Buffalo City Railway has for its exclusive business the operation of street cars in that city, and in the nature of things are in a position best to know, and do, what is most practical, most advantageous and most desirable; and the rate of speed at which its cars shall run should be left to it to determine. The Buffalo experience is but a repetition of several other cities and with a similar finale.

In our article of last issue, concerning the management of the City and Suburban Railway Company, of Portland, Oregon, mention was made that it was almost wholly in the hands of the Campbell brothers. Our information is incorrect, H. C. Campbell, the general manager, and C. F. Swigert, secretary and treasurer, being large stockholders, and to them is due the perfection of the present system of the City and Suburban Railway Company. J. W. Campbell is superintendent and purchasing agent and not now interested otherwise.

In the case of *Stewart vs. the Village of Ashtabula*, the circuit court has decided in favor of the village and the case will now go to the supreme court.

NEW ORLEANS STRIKE.



STRIKES seem to be a favorite pastime of the workers in Louisiana, and the latest is a tie-up of nearly all the manufacturing interest of the city. The Typographical union threatens to follow the action of the draymen, laborers and clerks by a general cessation. The Amalgamated council of workmen has aroused public indignation by its action, and the recent lesson in the street railway strike is still fresh in the minds of sufferers.

A most senseless street car strike has capped proceedings. At three o'clock on the sixth of this month a general order from the Drivers, union tied up all the lines in the city, and the misery of a few months ago re-enacted. When the union was recognized at the time of the last strike, all troubles were adjusted, and the only claim made is, that the strike is "sympathetic." The driving idiocy of the action brings down the indignation of the entire city upon the heads of the council, and the poor working girls who pay 25 cents to ride to work and back to their homes seem to be very tired of helping on the "cause." A general harvest for vehicle owners is the only thing gained.

AT COLUMBUS.

A most unwarranted and ill-timed strike was precipitated on the citizens of Columbus, Ohio, November 8th, the entire street car force of 600 men going out. All companies have a rule not to accept counterfeit or mutilated money from conductors, who, in turn, are not allowed to receive it from passengers, except at the conductor's risk. Some passenger reported a conductor for refusing to receive a dime, which the passenger claimed was perfectly good. The complaint came from a responsible source, and the conductor was temporarily suspended pending investigation. This investigation had only progressed a few hours, when the men demanded immediate reinstatement, and gave the company one hour in which to put him on a car. This the company refused to do, as the case would have been decided later in the afternoon. Without further conference with the company the men went out.

We believe it is the custom in Columbus, as it is in most cities, where a man is laid off pending investigation to allow him his time in case the report proves groundless, so that the employe suffers no loss. Altogether the action of the men, in this case, was inconsistent with all justice and reason, and exhibits a blind desire to exceed their rights, without regard to the merits of the case.

THE cable cars were running until three in the morning, election night, to take care of the immense crowds that remained down town to receive returns in Chicago.

PERSONAL.

JOHN F. OSTRAM, Philadelphia, was a caller at our office a few days ago.

JOHN SCULLIN, the president of the Mound City Street Railway, St. Louis, has returned from Europe.

SUPERINTENDENT C. E. BARNES, of Kingston, N. Y., was a Chicago visitor after the Cleveland convention.

EDITOR FRANK N. CICOTT, of the Railway World, London, was a visitor at the REVIEW office during the month.

CHAS. D. SHAIN, 136 Liberty street, New York, has become selling agent for the Siemens-Halske Electric Company of America.

WM. ARMSTRONG, superintendent, of the Wilkes Barre Suburban has resigned to accept the superintendency of the Lancaster railway.

W. M. STEWART, 412 Broadway, Milwaukee, Wis., is the Upper Peninsular and Wisconsin sales agent for the Siemens-Halske of America.

SUPERINTENDENT MOSBY, of the electric railway at Lancaster, Pa., has resigned his position on account of ill-health. A successor is wanted.

EX-SUPERINTENDENT L. D. TIBBETTS, of the Tacoma Railway and Motor Company, has been presented with a gold watch by his former employes.

M. B. WALLER, son of ex-Governor Waller, of Connecticut, has been appointed superintendent and manager of the New London Electric Railway.

P. B. MARSHALL, of Gloucester Square, Portman Square, London, has been elected to a seat on the board of the Southampton, England, tramways.

PRESIDENT J. H. HENRY, of the Central Electric Railway, of Sacramento, Cal., was recently presented with a gold-headed cane, the gift of his employes.

GEO. I. BURNS is president of the new electric club of St. Paul, Minn. The other officers are H. B. Farrington, vice-president and A. H. Savage, secretary.

R. R. FAIRBURN, manager of the West Metropolitan Tramways Company, London, England, has been presented with a fine piano by his admiring friends.

ELMER P. MORRIS, manager railway supply department of the General Electric, Boston, spent several days in the city and made the REVIEW a pleasant call.

WILLARD F. POND, on the opening of the Providence street extension of the Millbury Street Railway, invited his friends to his grounds to celebrate the opening.

JOHN N. REYNOLDS, of the National Car and Locomotive Builder, of New York, made a pleasant call at the REVIEW office. Mr. Reynolds reported a successful western trip.

TOM L. JOHNSON, of Cleveland, has been returned to Congress by his admiring democratic friends. His street railway friends, regardless of party, congratulate him on the outcome.

W. H. CLARK, the new manager of the Helena, Mont., Transit Company, is not only doing a splendid business but is extending his lines and adding materially to the convenience of the citizens.

EDWIN REYNOLDS, of Reynolds-Corliss reputation, denies a report that he is about to sever his connections with the E. P. Allis Company. He is a large stockholder in the Milwaukee establishment.

J. A. MCLURE, formerly of the Short Company, has taken a similar position as superintendent of construction with the Siemens-Halske of America. Mr. McLures' familiarity with the work will render him invaluable to the new concern.

FORD O. RUSTLING has resigned the superintendency of the West Bay City Electric road, to accept a financially better position. Mr. Rustling was a popular and efficient man. Electrician Chas. Harry will succeed to the place, and gives great promise of good work.

CHARLES R. HOLMES, of Chicago, has been elected superintendent of the Electric Light and Power Company, of Anaconda, Montana. Mr. Holmes is an unusually bright young man, and carries to his new and responsible position a push characteristic of Chicago business methods.

THE SECURITY REGISTER, manufactured by the St. Louis Register Company, is now offered to managers, having successfully gone through a whole year's trial with 200 machines, on four St. Louis roads. Superintendent Davidson, of the Missouri Railroad Company, under date of October 17th, 1892, writes:—"We have used your register for the past year, and have found it to be very simple and accurate, and so far as our experience goes, I consider it superior to any register now in use."

A PITTSBURG electric conductor came to the end of his route the other day, and being a new hand, and evidently not much of a hand at best, replaced the wheel against a telephone wire and waited for the car to go. But it didn't. He then telephoned for help—which came, and now the conductor is looking for a new job with less "head" required.

M. BIDARD, professor of chemistry at Rouen, France, has a new theory of accumulators soon to be published, and promises some new developments, the result of experiments now being made.

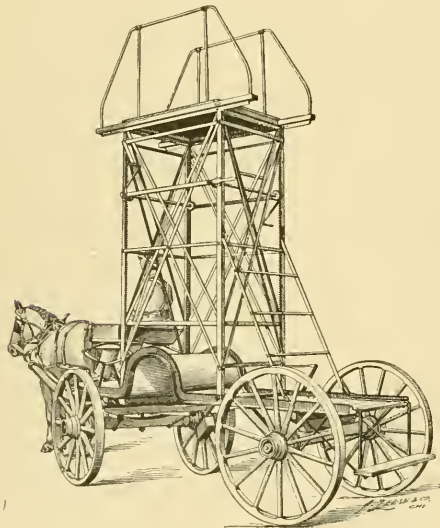
A SERVICEABLE TOWER WAGON.

THE necessity of a strong, serviceable and light tower wagon for overhead street railway work is too well known to managers to suggest the use of such a device. It might be well to state, however, that the principle, "The best is none too good," applies here as elsewhere, and the saving of money dependent upon proper appliances gives the clinch to the nail of the above good advice. Accidents to workmen, proper fixture of wire and quick repairs are largely dependent on a firm, easily moved and light tower wagon.

The illustrations below given show a new wagon manufactured by Hill & Welles, LaFayette, Ind.

The wagon is on the telescoping principle and is built entirely of iron, except the platform above, which is of wood thoroughly insulated with rubber strips where the wood joins the iron, and by hard rubber bushings where the bolts pass through, making it practically impossible to get a "ground," even if a ground connection were made from the lower part of the tower.

The tower is raised and lowered by four pinions in racks at each corner. The pinions are keyed to a shaft running across the lower sections, and a crank attached to each shaft makes it easy for two men to work them and also to slide the side bars over the square part of the shaft holding the upper section rigid.



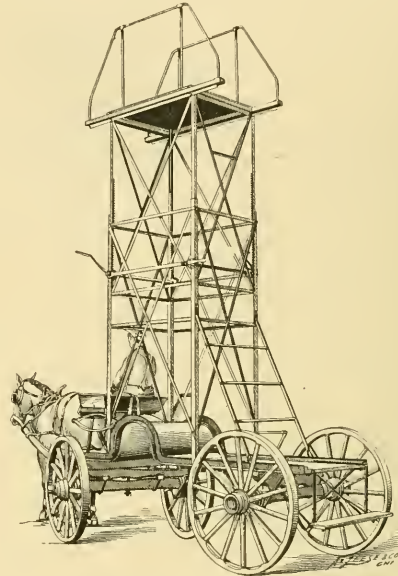
TOWER WAGON.

The extreme height of tower when raised is 16 feet from the ground, and when lowered 12 feet, though it can be made any height desired, and of two or more sections, but as the average height of trolley wire is 20 feet, the above dimensions are suitable for all ordinary cases, and a great many times a man can work on the line without raising the upper section at all.

The running gears are the O'Brien make and the

vehicle can be turned in the smallest possible space without upsetting, as the top frame of the T iron is arched.

The horses can be turned at right angles when working on a live wire. The tower can be used for stringing purposes and ample provision is made for carrying a reel on the rear of the wagon, and by setting a brake on reel and wagon the upper section can be raised, thus



PLATFORM AS RAISED.

tightening the wire without use of blocks or pulleys. The wagon is meeting with great favor and is already in successful use on several roads.

The address of the firm is, Box 603, LaFayette, Ind.

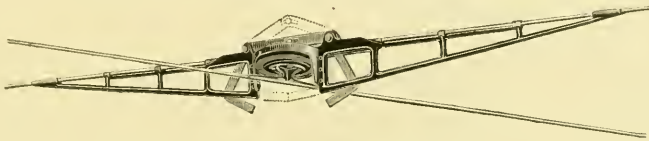
CHANGES IN DETROIT.

AN important change of ownership of street railway property has recently been effected in Detroit. A new organization composed of the directors of the Citizen Railway Company, and known as the "Detroit Suburban Railway Company," has purchased the Jefferson avenue (Grosse Point), the East Detroit and Grosse Point, the Gratiot avenue and Detroit Electric systems, of which George Hendrie, S. Hendrie and Cameron Curry were the principal owners. The articles of incorporation are signed by D. M. Ferry, M. S. Smith, George H. Russell, M. C. Colburn, II. B. Ledyard and W. W. Cook. The new management will issue \$400,000 in bonds, the proceeds of which will be used in part for the improvement of the lines. The Citizens will have control of the new company, which, under the new organization, will be free from entanglements with the law the Citizens is now laboring to extricate itself from. Public interests will be subserved by the change.

THE BAGNALL IMPROVED TROLLEY CROSSING.

A LONG with the marked improvement which has characterized the growth of the trolley system, perhaps no line fixture has received more attention than that of the trolley crossing. Certainly, as one remembers those first placed on the market, no device has more greatly needed betterment.

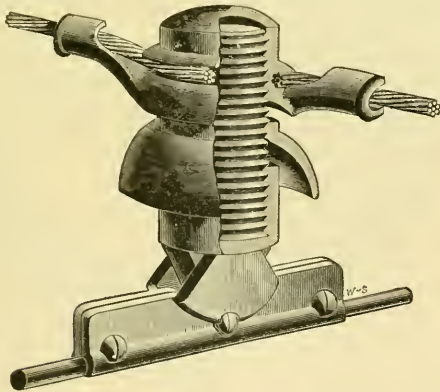
Among the more recent and best is that of the Bagnall Live Trolley Crossing; simple, as shown in the illustration, and also strong and durable. The hard knocks bestowed upon a trolley crossing make it a half-brother to the rail joint, and demands a construction that will not be easily discouraged. The crossing illustrated is made



BAGNALL TROLLEY CROSSING.

of a special bronze composition, securing thereby several advantages. It hangs directly on the trolley wire and without any other visible—or invisible—means of support. Neither line needs to be cut, which fact alone is self-evident of advantage, and its condition can be easily changed at any time to equalize shifting of the lines.

As current can be taken at all points, there is absolutely no danger from blockades from failure to secure current, and the crossing can be placed at any desired angle. Of course it is thoroughly insulated. As illustrated, one line carries its trolley direct, while the cross-line is made to



NEW TROLLEY HANGER.

support the fixture. A pair of arms automatically pass around one trolley wire, allowing trolley to pass while still receiving current from its own—the other wire. In short, the crossing combines those principles most needed with positive action, while the first cost is not great.

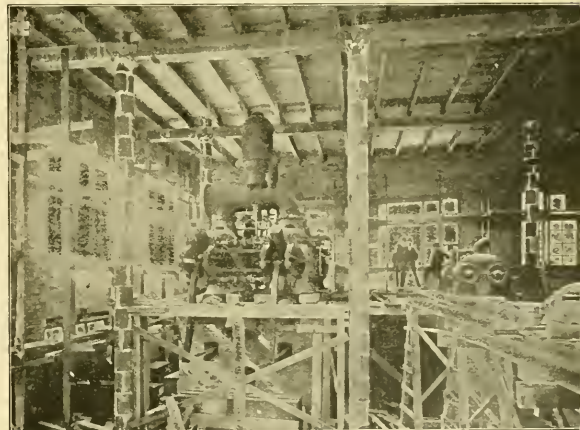
Another device manufactured by the same firm, the Emerson Electric Manufacturing Company, St. Louis, is their new trolley hanger, which, while less expensive than many on the market, is fully equal in appearance to others, and is said to be stronger. The insulation is perfect, a short circuit being impossible.

NORTHERN NOTES.

SUIT has been commenced against the Northern Car Company, of Minneapolis, by Andrew B. Robbins, founder of Robbinsdale, where the car works were located, for the recovery of five notes of \$5,000 each, payable in one, two, three, four and five years from October 31st, 1891. The car works were destroyed by fire on May 7th of this year, and since then, Mr. Robbins claims, the business has not been continued. He further states that on October 29th, 1892, the board of directors passed a resolution advising the winding up of the business and its dissolution, and is now circulating a petition among its stockholders to this effect. The court granted him a temporary injunction.

WORTHINGTON PUMPS AT THE WORLD'S FAIR.

THE almost incredible amount of water necessary to slake the thirst of the various steam plants at the Exposition will be furnished by Worthington pumps, made by the world-known manufacturers of that name, at Liberty street, New York. In the pump-house at the World's Fair there are, therefore, four pumps with an aggregate capacity of 40 million gallons per diem, against a pressure of 100 pounds per square inch.



WORTHINGTON PUMPS AT WORLD'S FAIR.

In Machinery hall, in process of installation, there is another plant with a proposed capacity of 25 million gallons per diem. These two plants will require altogether 2,500 horse-power to operate.

FRANK R. FORD, who has been appointed agent at Chicago for the Short Company, was given an informal dinner in honor of the occasion at the Great Northern, on October 27, by his contemporaries.

THE SECURITY REGISTER.

NO argument is needed as to the necessity for a reliable fare register as a part of the equipment of every well managed road. One of the several types in use, the Security Register, is manufactured by the St. Louis Register Company, of which John H. Maxon is president; Ephron Catlin is vice-president and treasurer; and E. F. Wickham secretary.



Their register is not an untried device which they invite managers to test for them, but offer machines which have been in actual service on large roads, whose managers furnish very gratifying testimonials.

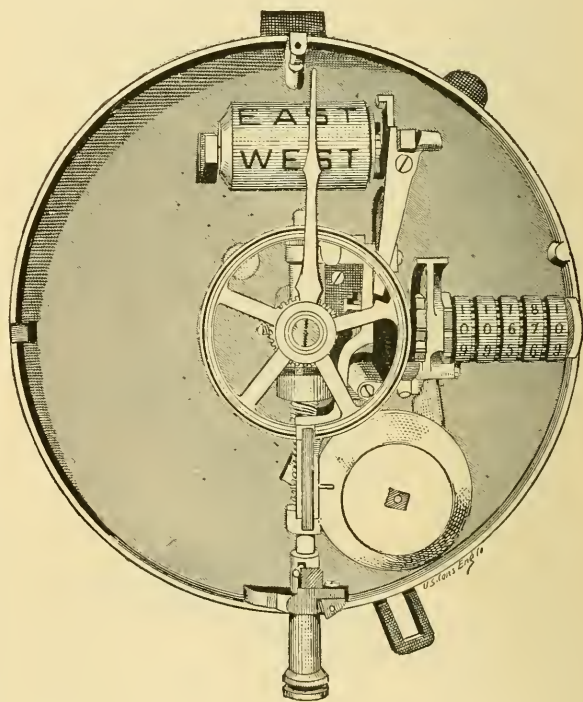
The Register is a handsome 12-inch dial machine, furnished either in nickel plate or brass cases as desired. It is extremely simple, the mechanism being all worked by the movement of one shaft, to which all the working parts are geared.

It has only five compression springs and three wheels, all of the strongest construction. It is made of iron, steel and brass, and on account of the very small amount of working parts is practically indestructible. It totalizes 99,999 and is furnished with a hood to conceal it from the conductor, or can be left open to view. The ringing device has a detent attachment which makes it impossible for a conductor to snap the rope without registering a fare.

The indicator is seated on the registering wheel, and cannot point except directly on the fare mark. The totalizer is the old turnstile counting machine, and is absolutely correct. The gong is a very fine one, and is securely fastened by a bolt and nut extending entirely through the back of the machine, thus rendering it

impossible to work loose. To return the indicator to zero, conductor simply pushes up the knob at the bottom, then rotates until the knob drops of its own accord, which will be at zero. When the conductor pushes knob up to return indicator to zero, the machine is locked and cannot be worked until after the indicator has reached the zero mark: and the direction plate can be changed only when the indicator is at zero. The box is three and one-half inches thick, including ringing device. The Security Register is in use on four roads in St. Louis alone, and is now being rapidly introduced elsewhere. The manufacturers refused to put any boxes on the market until they had given the register one full year's test at home. This they have done, having had 200 in daily use on four St. Louis roads, and without the expenditure of a single dollar for repairs. Hence, little wonder the roads give very flattering testimonials of its success.

L. TURNER, one of the bright young men who have commenced early and are growing up in street railway experience in that excellent school, the Chicago City Railway, has been elected auditor of the company.

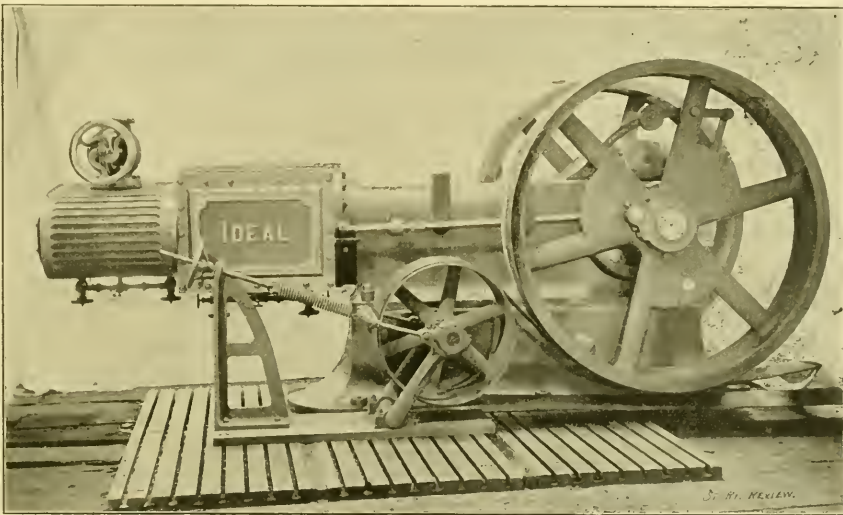


THE Leeds Daily News tells in England it is the great thing to learn how to descend from a moving tram car on a muddy day. "The correct method for a young gentleman is to light a cigarette on the rear platform, take his cane under his arm, and, keeping his back to the horses step lightly off the car. All the girls inside will notice the feat and speak of it; but it requires some training." There is some well-concealed humor in this and someone ought to offer a prize for its exhumation.

IDE'S NEW SYSTEM OF DRIVING GENERATORS.

A NEW system of generator driving has been put in operation by A. L. Ide & Son, Springfield, Ill., who have built and installed for the Forest City Electric Light and Power Company, Rockford, Ill., a 250-horse-power tandem compound Ideal engine. This will be used for driving their street railway generator.

The shaft is also extended on the opposite of the engine, and carries four pulleys, which drive four 50-light arc dynamo by the use of the "Ideal Transmitter," which permit any of the machines being stopped or started at



THE IDEAL TRANSMITTER.

will while the machine is running at full speed, by slacking the spring and allowing the yoke and pulley to drop down.

This device became specially desirable on account of the space not being sufficient for long belts.

The dynamo is located close to the shaft, and by the use of the spring, any desired tension of the belt can be obtained, also the yielding, elastic tension, the same as accomplished by the use of long belts. By the use of this transmitter the belt contact on the dynamo pulley is increased, thereby giving greater driving power to the belt, and avoids liability of heating of the dynamo bearings and the engine bearings, as the belt carries the weight of the engine pulley, thus relieving the engine bearing of all friction occasioned by the weight of the pulley and the pull on the belt. The advantages of the device are readily apparent, the illustration really being its own best description.

CLEVELAND capitalists are trying to purchase and consolidate the the Dayton, O., roads. Thus far they have met with poor success.

CLEANING CARS.

A GREAT deal more care is now given to car cleaning than was considered necessary only a few years ago. This is partly due to the fact that better cars are in use, deserving and requiring better care; and partly, also, that a manager who is derelict in this respect very soon, and properly, hears from a large constituency of passengers. Even an ordinary car, well kept, is often more presentable than a much higher priced one which is neglected and allowed to run with several thicknesses of real estate within and without. As cars are now finished in expensive paints and varnish, many of the old-time methods are poorly suited for the work,

and remove not only dirt, but very soon all the delicate finish. The Magic Cleanser Company, Cleveland, have a preparation specially suited for car cleaning, and which is giving excellent satisfaction on the many lines where it is now in use. Among others the East Cleveland road speaks very highly of its efficiency.

MONTREAL ELECTION.

AT the election of officers of the Montreal Street Railway Company held November 2nd, the following were elected: D. J. Forget, president; H. A. Everett, vice-president and managing director; E. Lusher, secretary and treasurer; J. J. Franklin, superintendent; Granville C. Cunningham, chief engineer; and W. H. Brenner, electrical engineer.

AN ELECTRIC tramway from Havre to Montivilliers, is proposed by M. P. Burton, of the former place. M. Renau, formerly engineer of bridges and harbors, is the chief of construction. It is a syndicate scheme and likely to carry. The road will be built on the most approved plans, and probably the overhead wire will be used.

THE TRANSPORTATION TEMPLE.

THE engraving on the opposite page represents the statuary and bas relief of the grand Transportation building at the World's Columbian Exposition. The striking aptness of the emblematic figures and the Grecian simplicity of the entire effect is, if not destined to be a joy forever, will at least take the sting from many unkind criticisms on western taste.

Particular attention should be bestowed upon the center piece of the page, and to the fact that the poetry and art of the future will, of necessity, come to a better understanding of the heroic and esthetic in modern life, and such prosaic things as street railways and sanitary engineering.

The Illustrated World's Fair, from which publication the engraving was procured, is making a worthy gallery of the notable things of the great exposition.

TRANSPORTATION IN CHICAGO DURING THE WORLD'S FAIR.

THE great Dedication ceremonies at the World's Fair Grounds have come and gone, and aside from the surpassing interest occasioned by the event, have been highly important in demonstrating the urban transportation facilities, and will serve as a most valuable basis in preparing for next year.

The enormous crowds of October 21st were handled without any loss of life and with but few minor casualties, by three companies—the Illinois Central Railroad, the Chicago City Railway and the Alley Elevated. While the two first-named delivered at the Fair entrance, the Elevated labored under the disadvantage of a terminus fully a mile from the grounds. This, however, will be remedied by February 1st, when the construction now under way will land their patrons directly at the gate. All three routes start from the business center of the city.

On the day mentioned the Chicago City Railway lines carried 600,000, collecting 575,000 fares, it being estimated that 25,000 escaped collection owing to the great crowds. Conductors' registers indicated from 130 to 160 fares per car per half trip. The Elevated carried 114,400, and in the three days of celebration a total of 257,000. Illinois Central ran 239 trains on October 20th, and 362 trains on October 21st, and 236 on the day following, transporting an average of 175,000 people daily.

In the case of each of the three transporting lines mentioned, the preparations already well under way, will furnish in the aggregate fully double the present facilities when the Fair opens, although there will be few days during 1893 when the crowd on the grounds will exceed the 150,000 who assembled in the great building.

The City Railway are now constructing new tracks and replacing horses with electricity on a number of cross town lines, which will provide for a territory two miles wide and five long, extending westward from the grounds. Their car equipment is also being largely

increased, and will enable that company to start a train of four cars on each of its two down town cables, once every 30 seconds. These run direct to the grounds. They can take care of 1,000,000 passengers daily.

The Illinois Central, whose tracks hug the lake shore, without grade crossings, will use in all eight tracks, two of which will be given up entirely to through express trains, running between down town and the gate. Two other tracks will take care of intermediate business with frequent stops. Remaining four are for through freight and passenger trains. The block system now installing will enable the operation of 300 Fair trains each way every 10 hours. They are also building 300 passenger cars for the Fair service.

In addition to the above, the B. & O. have switch entrance to the grounds, and, with a dozen other roads who will use their track, will run suburban trains from different portions of the city, and all will have ingress for excursion trains from any part of the country.

The water transportation system had gone into winter quarters before the dedication, but carried several thousand. This will be fully equipped next spring, a dock 1,000 feet long and 300 feet wide having been built at each terminal landing. A daily service of 100,000 passengers may be relied on from this source.

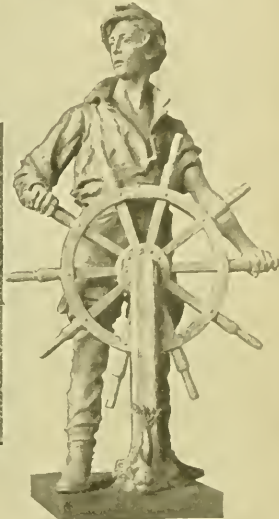
From the business center of the city from which all the above routes start, the cable systems of the North and West Chicago roads will easily distribute 1,500,000 persons, and the hundred of suburban trains running out 40 miles or less in all directions, will enable fully 300,000 more to leave the city for the night at an expense of from 20 to 60 minutes each way.

The territory including South Chicago, Pullman, Kensington, Roseland, Harvey, Grand Crossing, etc., will be well taken care of by the new electric road building from those districts to the grounds. Verily all roads lead to the World's Fair!

All other accommodations are preparing at a rate which insures ample supply, and the only point on which any question of doubt existed in the minds of Chicagoans has been that of urban transportation. With the record of Dedication week, and the actual figures for estimate and comparison we can intelligently forecast our wants in 1893 in this respect, and the whole world can rest assured the supply of rides, and eight mile rides for five cents at that, will be available and in any quantity desired.

A WOMAN'S RIGHTS WOMAN.

IT was on a back bay horse car, at — street, she stopped the car, and upon reaching the crowded platform, attempted to get off on the wrong side. "The other side, madam," said the conductor. "I want to get off on this side," she insisted. "You can't do it, madam," was the reply. "Conductor!" she exclaimed indignantly, "I want to get off on *this* side of the car." Whereupon the polite official of the West End in a loud voice remarked, "Gentlemen, please stand aside and let the lady climb the gate."



BAS RELIEF AND EMBLEMATIC STATUES—EXTERIOR OF TRANSPORTATION BUILDING, WORLD'S FAIR.

DESCRIPTION OF OFFICES OF BROOKLYN CITY RAILWAY.

WHEN the Brooklyn City Railway Company established its general offices at No. 10 Fulton street, the stress of business did not call for an elaborate display of architectural magnificence. Nor did the size of the sinking fund warrant any undue extravagance in this direction. That was in 1853. Since then the road has increased in size four times, the transportation eight times, and the receipts per annum have jumped from one-half to four millions.

This stress of business resulted in the desertion of the old quarters and a re-establishment at Montague and Clinton streets. This change was consummated last July, and it is the aim of this article to describe the new abode.

The general offices of the company are on the ground floor. Opening from the main corridor, here is the general reception room adjoining the president's office. This reception room is finished in old oak panels with furniture to correspond, and candelabra uniting gas and electric light.

The presidential air is situated in the corner of the building, securing an abundance of light from the large windows. The room is beautifully finished in red birch, natural wood, and the walls are tinted to blend with the surroundings.

The ceilings are decorated with plaster mouldings of an arabesque design, which serves to deepen the general tone. Most prominent in the center of the floor is Mr. Lewis' big desk, overhung by a branching nickle chandelier. The furniture is of solid mahogany upholstered in leather, and arm chairs are placed conveniently about the room. The small library of old and current reports and other reference volumes, is encased in a cherry book-case, which occupies a corner of the room. A long distance telephone receiver and transmitter, just behind the president's chair, places him within a moment's call of every class of business on the line. Axminster carpets of rich design complete the setting.

Leaving the president's office and passing through

the reception room, again we are brought to the door of Secretary and Treasurer Thompson's office. It is not necessary to go into particulars concerning the appointments of this room, inasmuch as everything in it is in duplicate with the appointments of the president's room. The same general tone prevails, and the furniture is similar.

Out on the corridor again we come to the door of the general office. As we pass within we find ourselves in

an enclosed space, fenced off from the rest of the office. This is the receiving space with windows opening to the cashier's enclosure, the lost property and ticket clerk, and the assistant secretary's desk. The partitions which separate the room into compartments, are of marble for a distance of 3½ feet from the floor, after which they are continued up in brass and nickel work half way to the ceiling. The eight receivers and the cashier have a separate compartment, while the rest of the office is given over to the stenographers and general clerks. The company's vault is entered through the cashier's department. The idea of it Mr. Thompson claims his own. The ordinary vault is on a level with the general floor, but below this is a sub-vault



OFFICE BUILDING—BROOKLYN CITY RAILWAY.

for the deposition of heavy securities and valuable papers. It can be entered only through an iron grated trap door set in the floor of the vault above. The upper vault is the current vault, where all moneys and records of transient business are kept. The vault is fitted with the Lang document file, which will, allowing for increase of business, last for 25 years.

On the same corridor with the general office is the superintendent's and division superintendent's offices.

The director's room, on the second floor, is entered through an ante-room furnished in mahogany. The room itself is plainly furnished in the conventional directors-room style.

All the offices are heated with the Baker, Smith &

Company, Chicago, steam heating system, and, taking it all in all, is convenient, beautiful and a credit to the road it represents.

The architect of this attractive and imposing structure, was A. W. Ross, of Brooklyn, and his is the honor of erecting one of the three largest and finest street railway buildings in the country.

THE WISCONSIN ELECTRIC CLUB.

THE third annual banquet of the Wisconsin Electric Club was held at the Pabst Hotel, Milwaukee, Oct. 27. Seventy-five members and guests were present. President W. S. Johnson was toastmaster. The club has fifty-five members and is in a flourishing condition.



PRESIDENT LEWIS' PRIVATE OFFICE.

H. A. EVERETT, for a number of years secretary of the East Cleveland system, has resigned to devote all his time to his syndicate interests in Montreal and Toronto, of which he is general manager. L. F. Bal-

AN enterprising youth, with the apostolic name of Daniel Benjamin, has recently come to the notice of the East Cleveland Railway Company, on account of the alleged embezzlement of 1,800 street car tickets. The



SECRETARY AND TREASURER THOMPSON'S OFFICE.

stein, who has been the efficient assisting secretary, has been elected to fill his place, and will make an energetic and successful officer.



GENERAL OFFICE.

tickets so used were intended for destruction, having been once used. Benjamin sold them to conductors at "cut rates."

THE STEEPEST RAILWAY IN THE WORLD.

IN line with our illustrated article on the Catskill cable climb, we are enabled to present to our readers a rather steeper story in the following short description of the rack-railroad ascent of Mount Pilatus, one of the slimmest and most barren of the Alps. The engraving, for which we thank the Locomotive Engineer, was made from a photograph, and shows two combination cars and engines on a grade of 48 per cent., or 2,534.40 feet to the mile.

All attempts at ordinary racks were failures, until a Swiss engineer devised a double rack with teeth cut on the sides and guide wheels to hold them in mesh. The center rack is cut out of plates of mild steel and are, with



A PATERSON SCENE.

A PATERSON SCENE.

THE illustration indicates an interesting construction in Paterson, N. J., where the electric line of the Central Electric Railway makes a reverse curve while passing under a low bridge. The car in the foreground is a Lamokin built body, 24 feet long, with vestibule observation windows, and interior finish in quartered oak, and blue and old gold Wilton carpet for upholstery. The car rides on an Anger truck, built by the Gilbert Car Company, and has Stanwood steps. The car roof is after the style of a steam car roof, extending over the vestibule. To accommodate the bridge the car was restricted in height to 10 feet 3 inches from top of rail to top of trolley board.

the other rails, bolted down so that crawling is impossible. The boiler is put crosswise the track to maintain water level. The engine is highly geared, the crank shaft making 180 turns per minute. The car advances 39 inches per second.

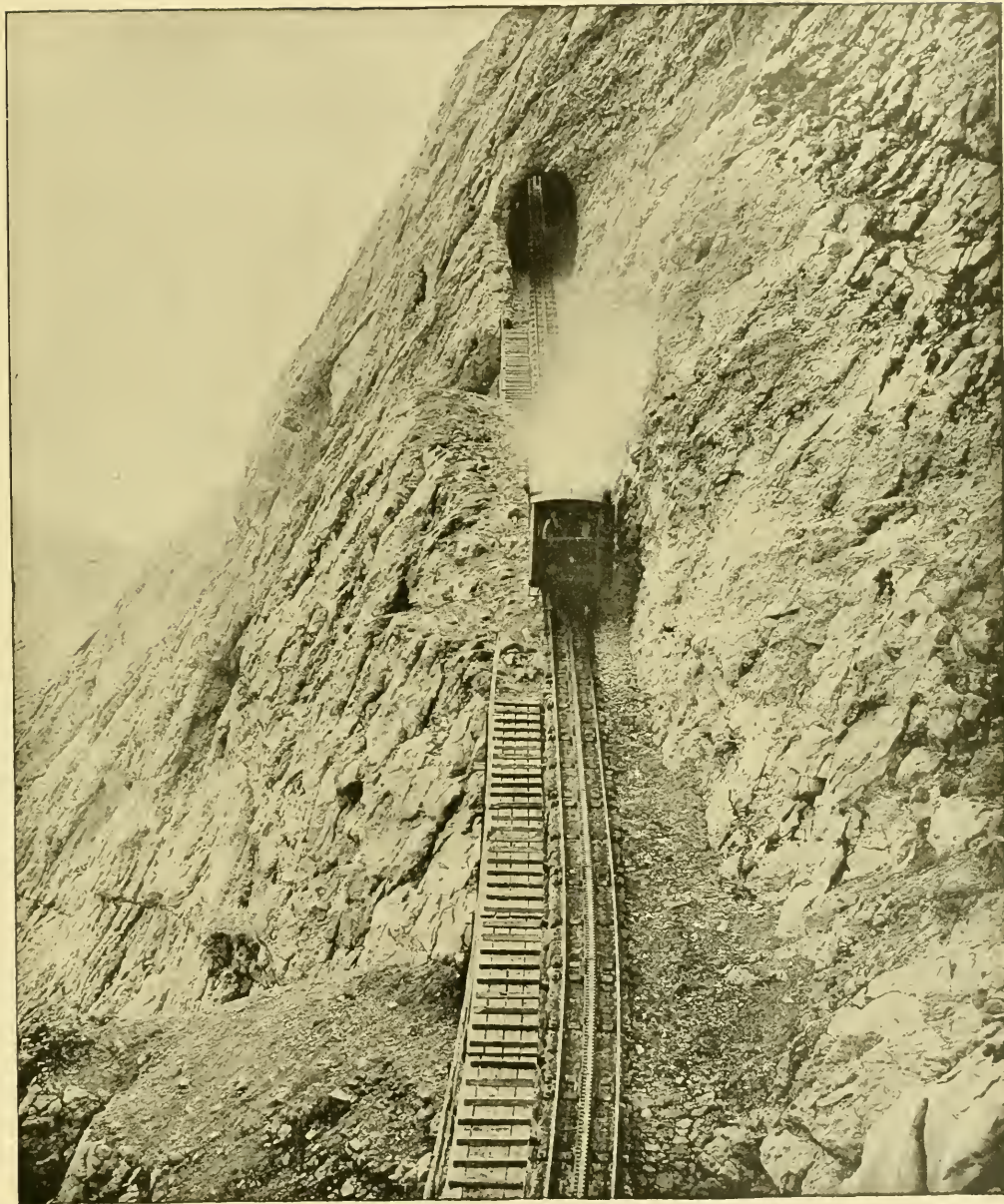
The combination is provided with a compressed air brake, a friction brake on crank-shaft, a friction brake on leading pinions, and an automatic band-brake on the upper pinions when the speed exceeds 1.3 meters a second.

The carriages carry thirty-two persons, and the road is three miles long with a single trip of 1.5 hours. The road starts at 1,440 feet above the sea and reaches 6,790 feet. Switches being impossible, movable sections of track not unlike a transfer table are used to pass the trains.

The weight of the car and engine complete with thirty-five persons is 22,960, including 1,763 pounds of water and 770 pounds of coal.

A SCORCH AT SHEBOYGAN.

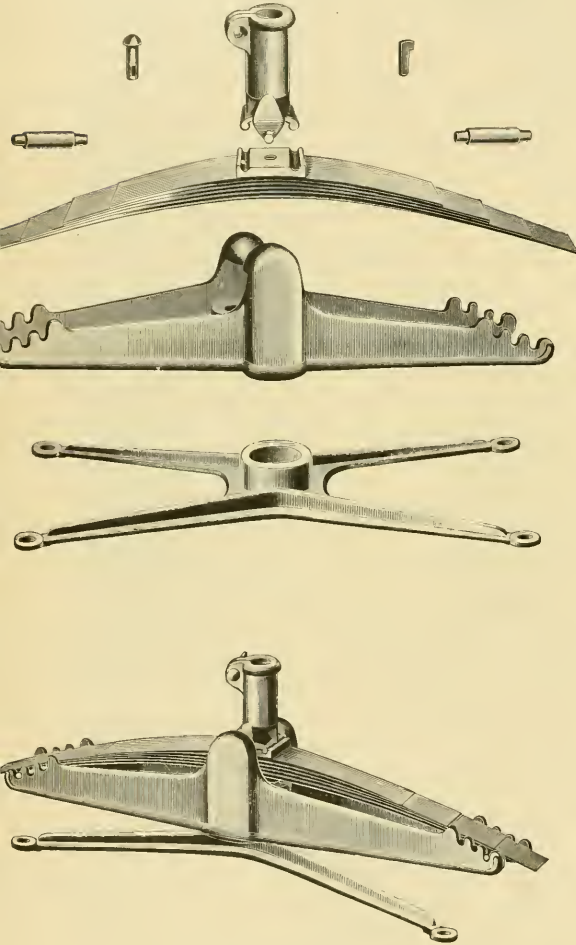
THE City Railway at Sheboygan, Wisconsin, were still storing part of their car equipment in the old car shed, and would have moved into the new car house in only a day or two more, when the shed was burned with its contents. The company lose six of their best cars, and aside from the loss in traffic while new cars are being built, the loss on the cars is total, as the insurance had expired only a few days previous, and no one thought that the risk of the intervening week, at the expiration of which time the cars would have been covered as a part of the new building, was worth providing against. The shed caught from an adjoining livery stable, and the case is one of those odd coincidences in the light of which we are apt to compare our "foresight with aftersight."



STEEPEST RAILWAY IN THE WORLD—RACK RAILWAY, MT. PILATUS, SWITZERLAND.

THE PHILADELPHIA TROLLEY.

THE Philadelphia trolley is another new candidate for railway favor, and has been designed with a view to meeting the largest possible number of wants in the hard service of railway work. It is extremely simple, having but nine parts, and these are of substantial mechanical construction; light, yet durable. A striking feature is the ease and rapidity with which it can be dis-



THE PHILADELPHIA TROLLEY.

mantled, requiring only seven seconds, while the parts can be again assembled in twenty-two seconds, and all without the use of a wrench. There is not a nut, bolt, screw, or washer in the construction; neither are there chains or coil springs to rust.

The parts are also interchangeable and require no oil or grease. It has side motion, besides being pivoted and free to turn, and the design of the cam against the leaf spring gives it equal tension against the trolley wire from vertical to horizontal positions. The degree of tension also is adjustable through a wide range. The illustrations convey an intelligent idea of the construction of the device.

The Philadelphia Trolley is manufactured by Pepper & Register, at their Technic Electrical Works, Philadelphia. Agencies are being established in all parts of the country. Taylor, Goodhue & Ames, Chicago, have already taken the western agency.

AS OTHERS SEE US.

A CANNY Scot, with all the critical proclivities of his race, wrote the following to the Scotsman, the principal Scotch daily, in regard to the Minneapolis-St. Paul electric.

"The ugliness of the overhead system is, in my opinion, very much exaggerated. It is no uglier to our eyes than the rows of street lamps were to the eyes of our forefathers, who deplored the picturesque effect of the hanging lanterns so convenient and accessible in 1790. Here the lighting and the tramways are separate properties, and if they were not, the central pillars would be utilized for the electric lamps, and the effect would be the same as in the boulevards at Paris. If we prefer to let posterity enjoy the advantages, we shall wait for accumulators to save the disfigurement of such lovely scenery as abounds in Leith-walk and the bridges. In places like Princes'-street it would be possible at some sacrifice to convey the wires underground."

His admiration of the Twin Cities' management is unbounded, and his surprise at the amount of travel at "2 1/2 d." a trip, is amusing to contemplate.

A WHALE OF A WHEEL.

FORTY tons of hub and shaft, for the Broadway cable line, New York, was recently brought from the foot of West Thirty-ninth street to Houston street and Broadway, by thirteen teams of horses. The wheel of the truck cut through the pavement in several places and broke in a number of manholes en route. Two horses were killed, and the iron finally landed the day following.

All for 55 Cents.

The Monon Route has added to its already splendid equipment, two brand new dining cars, which are now in daily service on the fast day trains between Chicago and Louisville.

These cars are models of convenience, comfort and beauty, and are operated on the a la carte plan, which means that a passenger can get anything he wants and pay only for what he gets. An elegant steak, with bread, butter, coffee or tea with cream is served for only 55 cents.

Watch for the Monon's new schedule to Florida.

SUPPLIES WANTED.

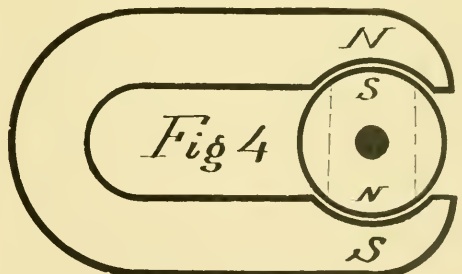
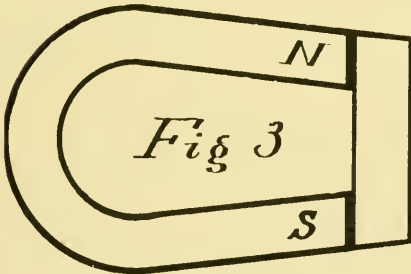
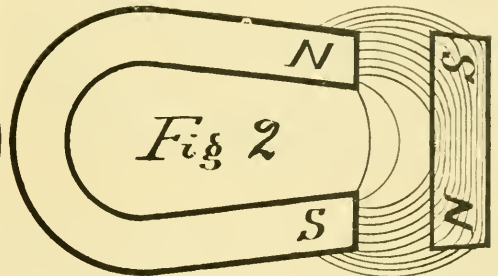
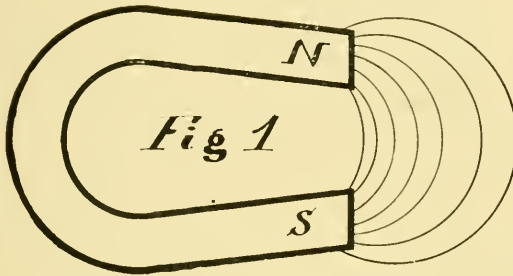
PROPOSITIONS are wanted for covering the boilers and steam pipes of the San Antonio, Texas, Street Railway Company's plant. President W. H. Weiss will receive bids.

BUCKING OF MOTORS.

Some Leading Causes and Suggested Remedies. Paper Written on the Occasion of the Eleventh Meeting of the American Street Railway Association.

ELECTRIC railroading is not perfection as yet, and one of the troubles, which no doubt has been experienced by most managers, is in the bucking of motors. A short time ago an article appeared in one of the electrical papers, by Prof. Shepardson, on this subject, charging the traveling electrical engineer with narrow-mindedness and so-called business secrecy. Not being now connected with any street car motor manufacturer, I take this opportunity to defend the poor traveling engineer, whose duties are not the most charming ones. I do not desire to

extent, if iron is placed in the path of these lines, (Fig. 2,) and if this iron is now allowed to move freely, then the lines of force, in the endeavor to shorten, attract the iron as in Fig. 3. In an electric motor, we have a similar condition, varying only in the one point, that the piece of iron instead of moving laterally towards the poles, is pivoted or supported on an axle so as to be able to change its position. In either case we have two magnets. Returning once more to Fig. 2, we see that the iron piece, by virtue of being under the influence of the horseshoe magnet becomes a bar magnet, and similarly in Fig.



restrict my remarks to how the currents flow under abnormal conditions, but what will interest you more, of the causes that will produce bucking; how they can be prevented; and how the life of a motor can be prolonged.

Bucking is a short word, which in reality means the end of life of an armature or field winding. While this fault is becoming less frequent, on account of more complete construction, yet it happens often enough, and more frequently on some motor constructions than on others. With the reader's permission, I will express myself, in terms very elementary to many, and begin with the action between an armature and its field magnet. We have all had in our hands the little horseshoe magnet which we can buy at any optical or hardware store with the armature or keeper, and we remember that this small piece of iron is attracted, if it is held some distance from the magnet. This action is generally explained with the aid of imaginary lines, which thread from a north pole to the south in constantly increasing curves. See Fig. 1. The tendency of these curves is to shorten their paths as much as possible. This shortening takes place to a considerable

4 we have a horseshoe magnet and a bar magnet. The wire wound around the field and armature magnet has the effect of increasing their power as magnets, but the commutator and brushes are instrumental in effecting constant rotation. Notice that in Figs. 2 and 3 the armature comes to rest when it strikes the field pole, and so would the armature, if the poles of the armature would come in front of those of the magnet as in Fig. 4. The commutator and brushes (Figs. 5 and 6) have the effect of shifting the poles in the iron ring or disc at the same speed as the core rotates towards or away from a magnet pole (Fig. 5.) The coils on the armature rotate with the same speed and it will be seen that while the whole armature and wire rotates with the desire of bringing the pole N. S. of the ring to face those of the field; the brushes on the commutator hold the poles in the same position, and therefore, as long as the brushes and current are applied, the poles are caused, and the armature remains in magnetic instability. As said, the wire on the field magnet and armature have been applied to obtain

stronger magnets, and these wires are located and connected so as to receive with the smallest amount of material, the greatest or most economical result. If the electric current can increase the magnetizing power, there must be also conditions that will cause to weaken it. This is accomplished by applying a greater or smaller amount of current or by reversing the direction of flow of the current.

A generator and a motor can be one and the same machine; it only depends which force you apply. If you apply mechan

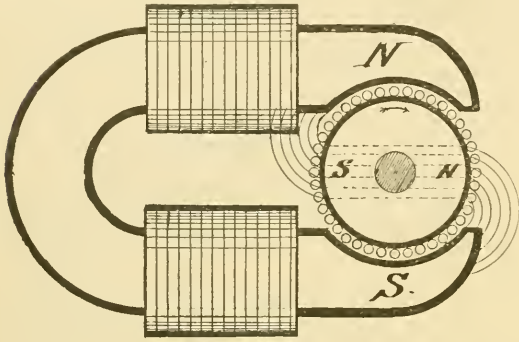


FIG. 5.

ical power then the rotation of the armature between the field poles will change this power into an electric current, which form is more desirable for transmission, if propulsion is not stationary, but extending to great distances. The same machine becomes a motor when other than mechanical action rotates the armature, as when the electric current is applied. This current causes the armature to rotate and return as mechanical power, nearly the whole amount of which was required to produce this amount of current. The electric current now has a very bad habit. It tries to accomplish everything in the easiest possible way. If it can shorten its route, it will always try to do so, and this tendency becomes the more troublesome the higher the pressure, and the nearer we get to the limit of our insulating capacity. It is evident that we do not need to insulate wires much, if the current comes from a chemical battery, whose pressure or voltage is less than one hundredth of that of a street railway generator or motor. It is therefore a prime factor that the current should circulate through all the wires of the generator or motor, to work to the best advantage. The generator is mostly in the hands of competent men, and not subject to the hard treatment to which the street car motor quietly submits. Therefore let us give special attention to the motor.

In case the insulation of a wire is faulty, by cutting, abrasion or heating, a wire terminal is exposed; it facilitates trouble if moisture, dust, carbon or metal is allowed to accumulate so as to connect two metallic parts, or this faulty place to the iron part of the motor or truck. If this takes place, we speak of a leakage, we derive from the central station a given amount of power not all of which passes the regular channel. A portion goes over this special path to ground. We lose power or current similarly to a leaky water tube, (the smaller the hole in the wall, the more will remain in the tubes; the greater the fault, the greater the trouble.)

After a rainstorm, when the brushes, commutator and car are wet, and we can receive a shock, then we speak of leakage. If the leakage can connect two portions to such an extent as to exclude the flow of current in an intermediate portion, then we speak of this part being short circuited. If the leakage is

such as to connect a portion of the circuit to the track or rail, excluding the remaining part of the circuit, then we speak of a ground.

In all street car systems now in use, see Fig. 7, the current starts from the brush of the generator of the station; goes to the trolley wire suspended in the street; by means of the trolley wheel and pole, it comes to the cut-out switch; to rheostatic or resistance coils; to reverse switch or controller stand; to field coils; to armature; to the motor frame; to wheel; and to the rail from where it returns, partly through the rail, partly through the buried ground return wire to the other dynamo brush. In a diagram, Fig. 8, the circuit is shown conventionally, while the two motors mounted on a car are shown in diagram in Fig. 9, 10 and 11, gives the circuits of a T. H. or Edison, Short, Westinghouse, Wightman and Eickemeyer motor having one or more resistances or rheostats. The current, after having passed the same, divides itself to circulate through the field coils, and may or may not meet again at the reversing switch, between fields and armatures in the T. H. or E. system, or at the cut-out box, or controller on the Westinghouse or Wightman systems. The former has been shown in Figs. 9 and 10, while in Fig. 11 the circuit is shown to meet not until having passed the field and armature of each motor.

Having these simple circuits in our mind, we can easily account for the action of a motor. Suppose that, during a severe rainstorm, the lower one of the field coils becomes so soaked that the insulation first begins to smoke, then gives way to the current, which jumps across the last turns to the field core. As soon as this takes place there is a hard kick or jerk, and the car fuse melts. The fault that has developed has caused an excess of current to flow through the field winding to the core, the armature having both brushes connected to the motor frame, is short circuited, and rotates between the field poles, which are far more powerful than when operating normally. The armature generates under these conditions

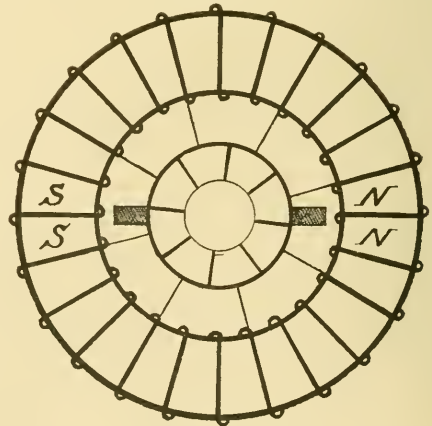


FIG. 6.

currents far greater than the wire on it is calculated for, or could stand for any length of time. The quantity of electrical energy developed by the armature can only be produced at the expenditure of power, which, in this case, is supplied by the momentum of the car, which quickly comes to a standstill. The condition is shown in Fig. 12, which represents a trouble which frequently occurred on now abandoned motor constructions. This figure clearly shows how the current, instead of following the wire of the lower coil and going to

the brush through armature; to brush, and then to ground, as in Fig. 8, how it takes a short cut to the frame of the motor, and how, thereby, the armature is closed on itself, or short circuited. The path being indicated by arrows. If there is but one motor on the car, it will not start up when the fuse is again inserted, but the fuse will melt again. If there are two motors, the car would not come to a standstill as quickly as with a single motor, on account of the great momentum of the car and the propelling power of the second motor, and when after the fuse has been melted and been substituted, and the faulty motor been cut out, the car can proceed with the other motor. The faulty motor can easily be detected either by the greater heat of field and armature coils or smell, if the current has been excessive so as to burn the insulation, or also by the ragged appearance of the brushes, which disclose excess of current and sparking. More puzzling than the above is a broken wire which temporarily establishes a ground. It frequently occurs that engineers or station wiremen, who connect the motors when the car-body is mounted, do not allow a sufficient length of loose wire from the place on the car, where the wires are supported, to the motor terminals where

increases with the constant jar of a loose armature, and its subsequent location on the magnetic field which reaches its maximum when the armature is allowed to strike the field poles. The flashing causes, first, heating of the commutator; second, heating of armature winding, core and shaft. The consequence is quicker abrasion of carbon, which, under these conditions, do not lie against the commutator; but are constantly knocked away by the latter and hammered back into their normal position by the brush holder springs, causing quicker feed of oil from the bearings. It is now easy to understand how the oil can creep up on the side and soak the insulation on the head of the commutator, which is also covered with carbon. It is then only a question of short time when the current seeks its way from the commutator to the spindles. Another trouble that can result in this way, is that by the over-heating of the commutator bars, armature wires become unsoldered. As soon as a wire becomes freed from the solder, it creates an open circuit in the armature and the current, in desiring to maintain its flow, causes an arc, which, under such circumstances, would be maintained, and connecting by a short path, both brushes. The armature is short circuited.

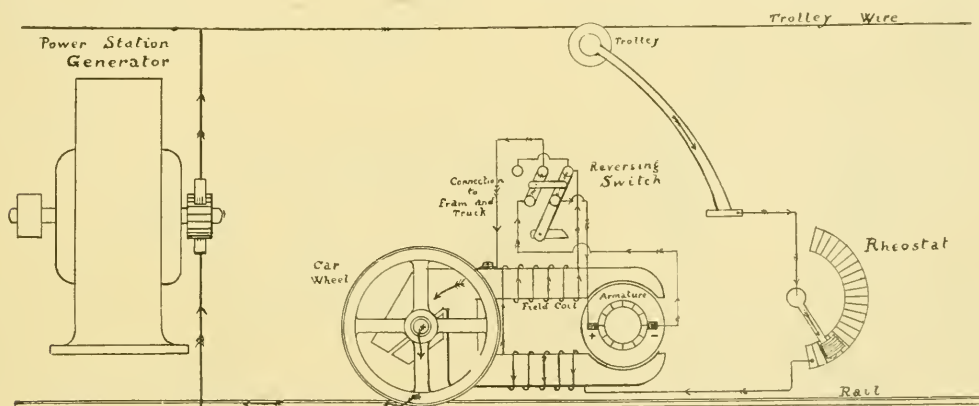


FIG. 7.

they are connected. These wires connect the controlling devices of the car to the motor on the truck; allowance therefore must be made for the springs supporting the car, and those supporting the motor. In going over a bad rail joint, it can easily happen that such wire might break. Generally they break off short at the motor terminal and the wire hangs about loose. Depending on its location, it may temporarily come in contact with the frame and cause bucking. This bucking also takes place when the commutator end plate consists of vulcanite only, and no better insulator is applied between it and the core. In the present case the current will jump from the brush by means of dirt, carbon, copper dust, and moisture, to the axle or armature shaft. This class of ground is, however, not restricted to the motor, but will be caused also on such systems employing controller stands, such as Sprague, Edison, Westinghouse, Wightman and Eickemeyer, if accidentally such terminals are connected. I remember on one occasion that a Sprague car, which had done good service, received a repaired controller drum, but the motors started bucking. On examination it was found that an inexperienced man had repaired the drum and caused a piece of solder to connect a terminal to the drum spindle, and from there to the ground. Bucking can occur when bearings are loose or the babbit in the bearings is worn down, so that the armature is much nearer one pole than the other. The flashing, originally due to simple mechanical irregularities of bearings,

Bucking is the consequence. Sometimes flashing is attributed to a high bar. This can only then take place after the overheating of the commutator, as on arrival from any factory every commutator is turned off true. It will therefore come mostly from overheating of the commutator, its consequent expansion, and on cooling and contraction loosening of parts. But generally commutators are so constructed that nothing can get loose, and a more suitable explanation may be that the flashing softens some bars more than others, which latter are heated only by conduction. These softer bars wear away quicker, and we find irregularities on the commutator which superficially are called a high bar. There are a number of cases where bucking occurs temporarily, but these are the results of neglect and misuse, and depend in their nature more on the special system under consideration. They are found to be in favor of locating either at the controller stands or at the connections coming from the car-body and going to the motor terminals, and lastly on the armature and brushes. Such troubles occur when the insulation has been worn off the connecting wires, and the car in passing over a rough track causes them to strike the motor frame, or in some systems, the cover over the controller stand is not properly fixed, and becomes undone by the jolting of the car, and in falling down connect for an instant some of these terminals; also when accidentally the car is reversed, or the reversing levers are not properly in their places.

It is not my intention to cover all cases of bucking, but wish now to refer more particularly to the causes. They may be in the construction of the motor; then the designer or the manufacturing company is to blame. Or if the motor is properly built, we cannot blame the system, have to look elsewhere for the fault. To begin with, let us consider the double reduction motor, which is the older type. At this point, I wish to say that we have to respect the work of the pioneers, Daft, Van Depoele, and Sprague. Their motors have done excellent work in their time, and it is at their expense that developments have been accomplished. If I now criticise these older types, which to some extent are still in existence, then I beg you not to understand me in the light of finding fault with those motors. They were constructed at a time when electric roads were experiments and rare undertakings, and motors were not subjected to heavy work. The times have changed. The public is educated to that point not

up to the pole, and are held so tightly and so near the armature that the protecting end canvas is often cut through. This type of the field may have done good service years ago, but it has such drawbacks that it had to give way to the iron-clad fields. (Fig. 14). Fields which expose the poles to the armature, but have almost no stray magnetism, as the so-called indifferent core portion, is made use of to surround the armature, poles and coils, to protect these parts in a similar manner, but still more effectively than the pans, which everywhere made the same impression as awkward and cumbersome parts which ought to be dispensed with. Next in turn, as a weak construction, is the armature of those days when carried over to perform service in these days of heavy travel. I wish to refer to the smooth armature of the drum or ring type. (Figs. 15 and 16). In either case the wire is wound on the smooth surface, and surrounds the iron completely. These types of armature construction may be well for gen-

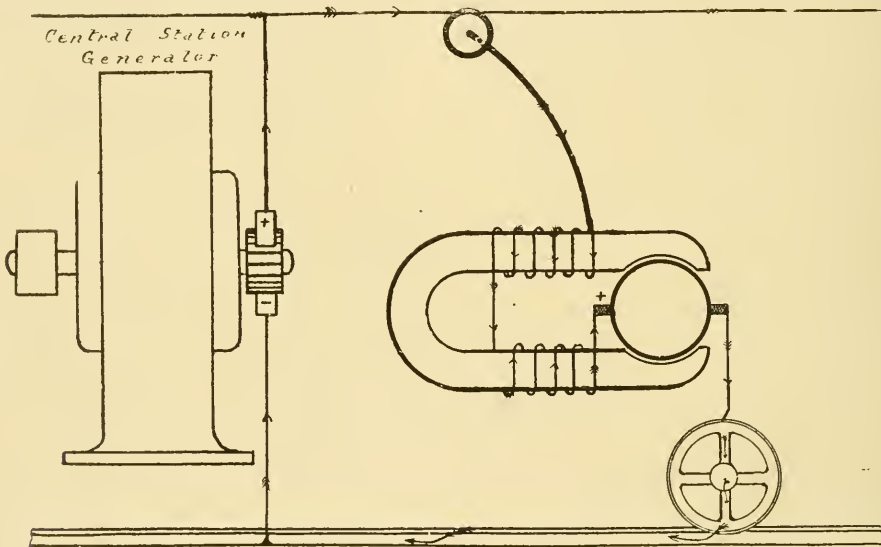


FIG. 8.

only to realize the improvement, but they make demands for quicker service, disregarding the number of people a motor would have to transport. The increased travel made it a necessity to construct motors, not only more powerful, but constructed on more sound mechanical principles. Referring now to Fig. 7, we have here the well known two pole machine, which has spoiled so many watches. We find the lower coil and one pole within four or six inches from the ground, and it has been necessary to protect them by pans, which are often left off. Any iron, nails or wires lying in the street is picked up by the attraction of the magnet, and works its way up to the pole, aided by the constant jarring and vibration caused by the roughness of joints or track. This picking up of iron pieces is often the cause of scraping the insulation and of connecting the outside layer of the winding to the field pole, grounding the field and causing a severe bucking. (See Fig. 13). In following the arrows we notice immediately the difference at the lower coil from the normal flow shown in Fig. 8. It will be observed that the current, after having passed some of the coils or layers, is following the iron wire, which makes contact with the field magnet pole. The currents of field and armature follow the same abnormal path as in Fig. 12. Iron pieces are attracted right

erators, or stationary motors, but are weak when used for street railway work. We have no longer the condition of stationary machines which are gradually excited, and allow the armature to pick up as the fields become stronger. This is not the case with street railway motors. Here we turn on the power whether the motor has any work to do, or is overloaded. This turning on and off of the power, the motor has to stand several thousand times a day. It is constantly under the greatest strain to which a machine or body can be subjected: namely, to change in an instant from no load, to half, full or overload. What is the consequence? If a motor is under a heavy load, and does not start up immediately, more resistance is cut out to make the motor start up quicker. The armature must move as it is located, in an extremely intense field, but as the core is keyed on the shaft, and this geared to the car, which is held at rest by weight and the brake, we find that there is a tendency for the less rigid part (the wire) to move ahead of the core. It is not simply a desire, for in reality considerable force is acting on these wires, which are sometimes, especially at the ends, forced sideways for a quarter inch or more, rubbing hard on the neighboring wires, and shave off the insulation, especially in the hands of inexperienced motor men, who often forget to release the brake.

Frequent repetition will quickly develop this slight trouble in the complete removal of the insulation at the point of contact, and we have a short circuited coil which will buck twice in every revolution, namely, as often as the coil receives the full flux of the magnetic force. Some people try to substitute the ends with flexible wires, which only weakens the construction, unless these wires are completely out of the influence of the magnetic force. The only way to overcome this weak point, is to provide a bearing for each coil or wire, viz.: It has or ought to be imbedded in the core itself. (See Figs. 17 and 18). In this case it is impossible for the wire to move ahead of its core. In other words, for the heavy work to be done, we need iron clad armatures. Whether the motors should be double reduction, single reduction, or gearless; of high or medium speed, does not enter into consideration here. This

and secondly, the management of the roads themselves. It is the most trying of all professions to be a traveling engineer and straighten out troubles. For instance, an engineer gets his instructions to go to a certain city in which trouble is reported, which is considerably greater than there is any reason for. He arrives and hunts for the trouble. He finds in the place a very pleasant superintendent, who has all the good qualities imaginable, except the knowledge required for his position. We find a wire or lineman who plays electrician, or an armature winder who does all the repairing which is required. These people are especially fond of experimenting, and changing parts of the apparatus. In fact, the whole road often depends upon the capacity of a lineman or armature winder. Often there is not even a machinist in the place. The company had changed for instance some four or six

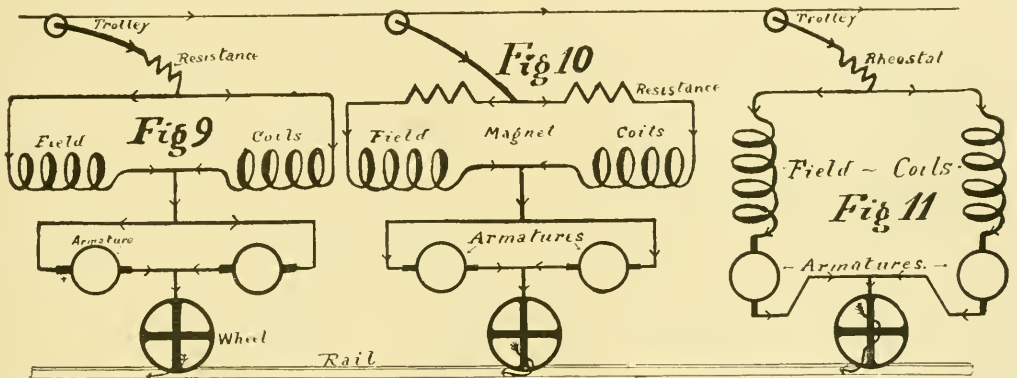


FIG. 9.

FIG. 10.

FIG. 11.

belongs to the engineers to decide, and depends entirely upon the conditions whether steep grades are to be climbed or whether there is to be heavy traffic and many starts and stops to make, or whether the cars connect two distinct places without requiring any stops. Before going to any other class of trouble, I wish to mention that even good motors, if not mounted carefully, may not work to the best advantage. An engineer, in mounting two motors on a car, should always see that both take the same amount of current, not only when running slowly, but when going at high speed. There is no difficulty about it. On starting, they generally take the same amount of current, but when running up to higher speed, it may happen that one of the motors will at first have but one-half the current of the other, and then fall back to zero, and cause the other motor to do all the work. All that is required, is the adjustment of the magnetic circuit. The difference in consumption of current should be kept as small as possible between the two motors. An easy method of detecting whether two motors do equal work or not, is to bring the car up to its maximum speed, and then suddenly turn off the power, and after an instant close the circuit again. If the motor car receives a slight buck, either on turning off or on of power when going at a high rate of speed, or behaves as if it had been checked, behaves sluggish, then the motors need adjusting, as the one motor tries to do, at certain times, the work for both, while the second runs idle.

So far, I have criticised the motor, its manufacture, and weak points, and have now to turn your attention, after arriving at the iron clad field and iron clad armature, Fig. 14, to the other weak points, and here I have to name first, the inexperience of the motormen, which is due to the sudden demand for electric roads without a chance of instructing the operators;

months only, from horse to motors, and in these first months^s everything goes so smoothly and without any repairing, that the people begin to think that it ought to be always so, and that machinery needs no supervision. Yes, some people think

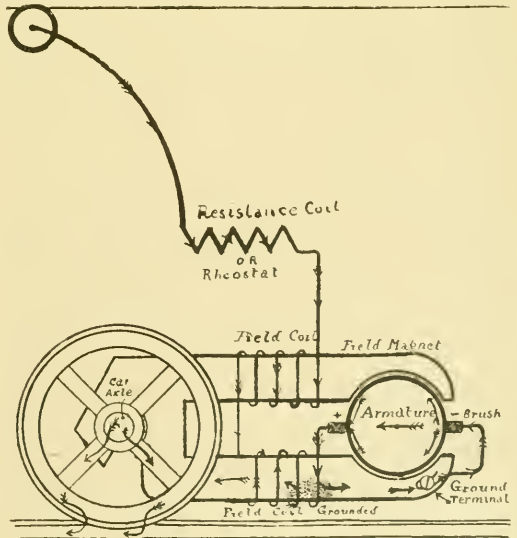


FIG. 12.

that engineers have so improved machinery that no machinists are required. This perfection will never be reached. It is short-sightedness to think or speak this way. Just as little

as we would put a confectioner's store in charge of a shoe-maker, just so little can we expect that machinery can be operated or run successfully by a carpenter or painter. To make or maintain machinery economically, we need men who have learned the trade; we need machinists. These men, when properly instructed, can and will see that proper oil is applied; that the bolts holding bearings are tight, and see the

not to run their cars so fast and rather work with the brake partially set. After having overhauled all cars and instructed a machinist and all the men, I made some tests. The time of the road trip was forty-eight minutes, average horse power per trip on the level road, 4.7 H. P. Something that interested me more than this was the consumption of power by an experienced or careful man and another who has been running for a week. What did I find? The new men used two and a half and three times the amount of power per trip the other man did. I repeated this test with similar results. It will then be seen that a careful and experienced man is often worth double the wages of a new man simply considering the coal bill, and not the wear on the machinery. The road is running satisfactorily, there are no more bad armatures, and but very little wear in the brushes, and I am glad to say that the road has now been running all right for over a year. But now comes the traveling engineer before the president or vice-president. If the question is asked, "Did you find and remove the troubles?" Shall he say, "I did repair the cars, but did not remove the trouble," because he found the trouble everywhere else but in the machinery? Can he say to these gray-haired and venerable men, gentlemen who have made a success in their business and now invest their money in street railways, can the young man say, "Gentlemen, you don't know how to run your business, you have no management?" He cannot, and if he couches it in the most careful form no official can and will look at it in the light the engineer wishes to interpret it. To run your road with less expense, you must begin with getting a superintendent whose qualification is not as relative of one of the big stock-holders; not a man who has your perfect confidence as former horse car driver, but who is no practical man; nor a man who is a politician, who can help you to accomplish much before the city council. These men may all have first rate characters and qualities, and if they have to have a position, then make them managers or assistants, but get as superintendent for your road, a mechanical engineer with sound electrical knowledge, or a good electrician who

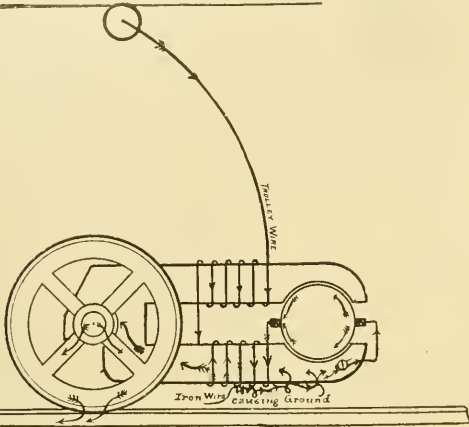


FIG. 13.

state of babbit or bearings and attend to them when necessary; and will not use unreasonable power in removing a commutator from the shaft. If it does not come off with the power they think ought to be sufficient, then they think over and examine the construction, while the so-called "handy men" say, "It has to come off," and either spoil the commutator or bend the armature shaft. There is no necessity for hunting these facts, they occur daily, especially on armatures of earlier constructions, whose shafts are not heavy enough for the work the armatures have to perform. In one place, for instance, I found on looking at the station instruments, very great fluctuations. It was astonishing how plainly the start of each car could be noticed. The cars run at twenty-five miles an hour, and the people had trouble with their motors. Armatures gave out. The whole motors were excessively hot and brushes wore at an awful rate. Attending to the motor myself, I found a stock-room open to anybody, and everyone helped himself. Cars disabled were simply sent into the barn for repairs; the motorman jumped on another car that might be in reserve. On examining the cars the whole truck, axle and motor were hot. I found insufficient oil in the axle bearings, unsuitable grease used for motors, which did not feed and simply clogged the oil holes; the babbit and shaft had been worn considerably, and some of the armatures were hitting the lower field poles when running at twenty-five miles an hour. Do you see why the motors must spark? Why the brushes, by this constant side motion, must wear away quickly, and why armatures must give out under such circumstances? In this particular place I have found iron castings worn away for over one-fourth of an inch, parts on which there is no wear, if all bolts had been tight. But this is not all. I found a constant change of motormen, who in that city of 50,000 or 60,000 inhabitants, receive from 12 to 15 cents an hour. The company thought to make lots of money and when the men got 15 cents laid them off and green men took their places. It is, however, not very agreeable to simply be shown how to turn a handle, and sent out through the city without knowing anything about the cars. No wonder that such men preferred

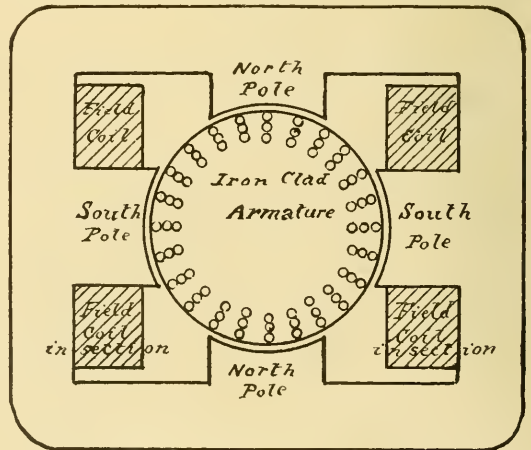
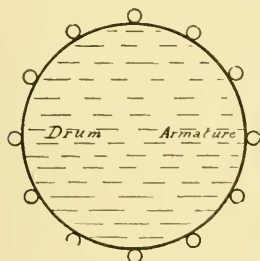


FIG. 14.

has had practical experience. At present it often happens that a motorman knows more than the superintendent, but if this is found out he is discharged. These so-called superintendents rather prevent their men from knowing what they ought to know, and are a hindrance to the traveling engineer in as much as they often like to hide their ignorance and are afraid that the higher officials will be informed. They may

be willing to learn, but are opposed to instruction given to the men.

We are living in a time when the question is ripe, why should a motorman not know as much of his car as the engineer of his locomotive? I think he should, and have found invariably that the men prefer to know, that they are more careful and interested in their work. The more the motorman knows, the more valuable he is to the company. At present such advancement of knowledge can only be accomplished by superintendents who know their business, and do not think that a motorman can take their place by giving them proper instructions and answers to their questions. With increasing traffic, it becomes a serious question to intrust a car with passengers to a man who does not know anything else of his machine than to turn the handle, and this he may forget in time of danger just when he needs it most. In larger cities, the conditions are not much better. Here we find, sometimes, 30 machinists, blacksmiths, carpenters, etc., necessary to keep 50 or 60 motormen supplied with cars, for the simple reason that on account of the frequent changes of cars, motormen and conductors become indifferent to the car, and some become reckless because they know they cannot be controlled, and if they spoil a motor they cannot be blamed.



Unprotected Windings

FIG. 15.

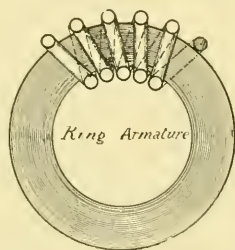
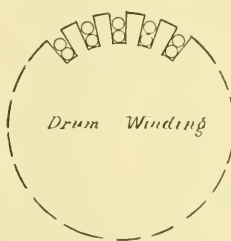


FIG. 16.



Protected Windings.

FIG. 17.

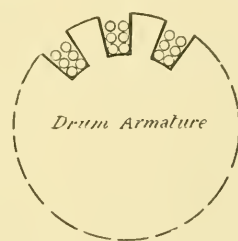


FIG. 18.

There may be some who may not agree with me, but I know that the majority will, when I say that a management is deficient if material is bought for the repairing of cars and used without being charged to any car in particular; if motormen can handle a car and the careless one and his destructive work cannot be located by the more frequent repairs of his car. I am perfectly aware that, at all times, it cannot be followed strictly that motormen and their conductors should have the same car, but if adhered to as closely as possible, the car would last far longer. If disabled, it would be good to lay off the two motormen until the car is in shape again, or better to make them help or assist to repair the cars. A practice of recent date, is to treat electric cars similar to cable cars, but the superintendent forgets that the only thing that requires an inspection on a cable car is the grip, while in an electric car there are dozens of points in and below the car needing inspection, which cannot be done in just five minutes nor even fifteen minutes. What does an inspector know of the behavior of a car out on the road, when it stands motionless before him? The motormen of to-day may observe irregularities, and say the car does not work right, but he cannot bring the inspector nearer to the trouble. In hot weather and constant travel, motors are properly layed over for several minutes to cool down, but I have often found that the trap doors are not opened to facilitate ventilation, and so the motors are allowed to bake in their own heat. It would, in such a case, be preferable instead of letting the motor stand, to cause it

to continue to run with a slight current, as the draft caused by the rotation of the armature and the motion of the car, will be more effective than having it stand in a barn. Motormen at such times, say the motor does not move fast enough, and put the current on quicker than necessary, simply to accomplish the opposite of what they want. Forcing a heavier current through the machine, instead of starting gradually, means heating of armature and field, and consequently decreasing its efficiency and reducing its capacity. As long as the motormen remain uninstructed, I think it would be better to have the inspector jump on any of the cars and see how they behave when in operation. You may think that speaking of the running of cars, that I have gone off the track, so to speak, that I have forgotten to speak of bucking, but that is not the case. If your motorman was instructed, and allowed to know his business or his profession, then he could, quicker than anyone else, detect irregularities (as he ought to). Forty motormen can watch their cars easier than five inspectors forty cars. The motormen are not expected to attend to anything but trifling matters, such as a loose connection, while other troubles are to be reported in time. The present policy is to make makeshifts until the motor begins to buck, until the faults have developed to such an extent that the armature generally has

gone beyond recall, while the method here proposed, and which will reduce your running expenses over 50 and 60 per cent, is based on the golden rule: "Prevention is better than cure. 'A stitch in time saves nine.'"

LUDWIG GUTMANN.

OCT. 19, 1892.

PRESIDENT LEWIS AND HIS SCHEME.

WHEN anyone, conductor or steam road magnate, gets ahead of President D. F. Lewis, of Brooklyn, he must rise early and keep at it late.

Recently Austin Corbin, the steam road owner, threatened to get out an injunction against the Brooklyn City to restrain them from crossing the Manhattan Beach at a point two miles north of King's Highway. This he told the Brooklyn people, and expected them to be duly scared. But not so; Mr. Lewis, J. C. Cameron and John C. King, of the Brooklyn City, loaded up about 100 Italian laborers, and at midnight reached the "point of dispute," just as the last Manhattan Beach train thundered by, leaving the track clear.

In a jiffy the one hundred men were at work, and before day broke the crossing was laid and the wires strung, and the day was won.

THOMAS H. M'LEAN.

THE president for the coming year of the New York State Street Railway Association, and than whom no man is more fit, and prominent figure of the National organization, was born in Albany on the tenth of December, 1855. After his school days, in his twentieth year, his first experience in passenger traffic was gained with the Albany day line, in which employ he remained until 1877. In October of the latter year he entered the service of the Twenty-Third Street Railway Company, New York, as receiver, subsequently was book-keeper and acting secretary, and in 1882 was elected secretary and general manager, and was in active charge during the troublesome strikes of 1885-1886.

In April of the present year he was promoted to the position of general manager, to take charge of the general supervision of all the departments in the different branches under the control of the Houston, West Street and Pavonia Ferry Railroad Company, comprising the following lines:

Broadway and Seventh Avenue Railroad Company; Sixth Avenue Railroad Company; Ninth Avenue Railroad Company; Twenty-Third Street Railroad Company; Houston, West Street and Pavonia Ferry Railroad Company; Metropolitan Cross-town Railroad Company; Chambers Street and Grand Street Ferry Railroad Company.

Mr. McLean's pleasing personality, vim, vigor and practical education in all the most difficult branches of rapid transit, peculiarly fit him for the unsought but appreciated honor conferred by the Association, the members of which hold him in the highest regard.

A RUSTIC CAFE RESORT.

A CAFE has been opened at the terminus of the Glen Echo Electric Railway. The present building is the beginning of a village of such resorts, dining parlors, or pagodas in the tree tops. These are to be connected together by bridges, and thus restore the romance and genius loci, which disappeared with the fire of 1890.

The railway people advertise freely in the daily papers, and the resort will figure prominently in middle society affairs next season.

A HERO ON THE FRONT PLATFORM.

WHEN the police ambulance took the trampled and bruised body of Driver Edward Dorlan of the One-Hundred-and-Tenth Street line, of New York, to Harlem Hospital, it bore a hero. Just as much a hero as ever was shot at Shiloh or butchered at Balaklava. It happened this way. A maddened run-a-way team was bearing down on the car in which half-a-dozen were either fainting or screaming with terror, and the heavy truck would have killed some one if Driver Dorlan had not sprung to the rescue and swerved the team from its deadly course at the expense of his own injury

PROPOSED ELECTRIC CONNECTING SEATTLE AND TACOMA.

THE Rapid Transit Railroad company has been incorporated in Tacoma, with \$100,000 capital stock, to build an electric road between Seattle and Tacoma. The incorporators are John Snyder, E. B. Kittle and L. D. Craig. The line is to be about 34 miles long, and without grade almost the whole distance, running through rich valleys as level as a table. It will run on the county roads and will have express cars, making the trip between the two cities in 50 minutes at the most, and will also make a special feature of hauling garden truck and milk. It is claimed by Mr. Snyder that there will be no difficulty in running at the speed named, as cars on the Edison line at Tacoma have been speeded up to 55 miles an hour, and great improvements have since been made in electric motors. An electric line has already been built 7 miles southward from this city, which will form part of the through line.

PATTON MOTOR HIBERNATES.

THE poetic mechanical reporter of the Portland Oregonian is evidently wanting in that appreciation of the inherent beauties of the four-ring combination of gas engine, dynamo, storage battery and motor which has been playing in such hard luck under the name of the Patton motor. When a representative of the REVIEW was in Portland last June, the motor was resting peacefully in the street at the down-town terminus of the Second Street line, ostensibly until a new set of wheels could be received from the East. We incline to the opinion that the very excellent trolley systems of Portland have not yet been entirely supplanted, judging from the following which appeared a few days ago in the Oregonian:

The curious and complicated street railway motor, which has stood so long at the terminus of the Second Street Car line, near Glisan street, has been hauled up to the old Mechanics' pavilion and stored for the winter. The motor was brought out here to be tried, but so far appears not to have been a success.

It contains a gasoline engine, which furnishes the motive power, and it also contains a dynamo and a storage battery. It is intended that the dynamo shall be run when the motor is going down hill, and the electricity generated is to be piled up in the storage battery and used to assist the engine in going up steep grades. The concern was run up Second street once, some time ago, but did not work satisfactorily. It has since been standing at the foot of the street, cased in canvas, and many people have stopped to peep under the covering and see what was inside. A new set of wheels was put under it a short time since, and it ventured out for another spin. It only went up as far as Grant street, and then returned to its canvas cover.

It was quite a job to get the machine to the pavilion. It was loaded on the O. T. Co's huge truck, Monarch, which is built to carry 30 tons. Six horses started to haul it up Third street, over the bituminous rock pavement, but they got stalled at the foot of the hill and stopped the electric cars for some time. Finally, one of the cars was hitched to it, and it was got up to the pavilion. When the truck was backed up to the sidewalk the pole could not be got out of the way of the cars, and there was another blockade. Finally, tracks were brought into the pavilion and the cumbersome and complicated machine was hauled into the building. The world moved on again, but the machine is not likely to move on again for some time.



THOMAS H. McLEAN,

*General Manager Houston, West Street and Paronia Ferry Railroad Company,
New York City.*

A NEW RHEOSTAT.

Paper Read Before the General Meeting of the American Institute of Electrical Engineers, at Chicago, by Charles E. Carpenter.

IT is a well-known fact that an insulated wire suspended in the air will carry a given amount of current at a lower temperature than the same wire without this covering of insulation under the same conditions. This is obviously due to the fact that while the cross-section of both conductors is the same, the one which is insulated has a much larger radiating surface than the bare wire, and therefore dissipates the heat conducted through the insulation more rapidly. Suppose, for convenience of illustration, we conceive a conductor to be first covered with some insulating substance, and then enclosed within a metallic tube so that its insulated surface shall fit perfectly within and against the inside surface of the tube, as shown in section in Fig. 1. We thus have a comparatively small conductor with a largely increased radiating surface, and the insulation between the two metallic bodies does not materially obstruct the flux of heat from the conductor to the outside metallic shell.



FIG. 1.

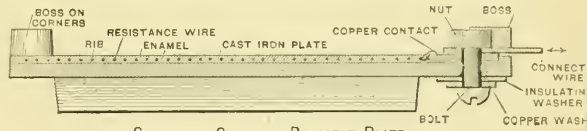
One of the early experiments of the writer in electric heating—in fact, his first successful apparatus—consisted of two iron plates, between which was interposed an iron resistance wire of the “reflex” or “zig-zag” type, insulated from both plates by means of thin sheets of mica or asbestos paper, with screws passing through one plate and engaging the other. By this means the plates could be pressed into close relation to the resistance wire. By connecting this apparatus to a constant potential system, the current at first would be comparatively large, but would gradually decrease as the temperature of the plates increased until a point was reached where the heat was dissipated as fast as generated. By tightening or loosening the screws, the current could then be either increased or decreased. This increase of the current by increasing the mechanical pressure is due to a reduction of temperature effected by the more intimate heat conducting relations between the resistance and plate, facilitating the flux of heat. The better the conduction for the heat is made, the less will be the difference of temperature between the wire and the outside radiating surface plate, and it follows that the larger the surface of the radiating plates which are closely impressed upon the conductor, the larger will be the current-carrying capacity of the latter.

These experiments are cited as an illustration leading to a thorough appreciation of the extent to which the current capacity of a resistance wire may be carried, as it is upon this principle, but with modifications of construction, that the new and improved rheostat herein described is based, that is, a resistance wire of small cross-section is used, but a large radiating capacity is secured by placing the wire in such relations to a metal plate as to practically increase its radiating surface to a very great extent.

The results of the experiments described above, suggested a modified form of construction, one in which the resistance would be entirely covered by a medium which would protect the wire from oxidation and yet act as a good insulator of electricity and a good conductor of heat, and which will permanently attach the wire to, but insulate it from, a radiating plate. A special enamel was finally found by the writer to be suitable for this purpose. A section of this construction is shown in Fig. 2.

The injurious effect of linear expansion of the resistance wire, due to heat, is avoided in this method by the “reflexed” or “zig-zag” form in which the wire is bent, as shown in Fig. 3, and it has been demonstrated by experience that this linear expansion is thereby so distributed as not to injure or crack off the enamel in practice.

On this principle, since we are able to greatly reduce the cross-section of the conductor, it follows that its length is also proportionately shortened for any required resistance, and no consideration of mechanical strength of the wire enters into this construction, since it is so perfectly confined and supported on all sides.



SECTION OF STANDARD RHEOSTAT PLATE

FIG. 2

Practice has demonstrated that 20 watts of electrical energy may be dissipated continuously to each square inch of resistance surface, without injury to the apparatus. However, on account of the excessive temperature of the plate used in close proximity to the other materials, it is not practicable to dissipate over 8 or 10 watts to the square inch in continuous service.

By placing one surface of the plate in contact with water, so that its heat is dissipated in this manner, we are able to continuously dissipate about 25 watts to the square inch. From this it will be seen that by means of water we are able to increase the capacity of a certain plate to about three times that of the same plate dissipating its heat directly into the atmosphere, or we may decrease the size of the plate to one-third for the same capacity where water is used.

In many applications, especially in railway work, apparatus is often subjected to a load beyond its rated capacity. Rheostat plates for such service are made with narrow ribs, between which the resistance wire and enamel are placed. It is found that by means of these ribs, the safe carrying capacity of a wire is greatly increased, while the ribs serve also to protect the insulation and wires from mechanical injury.

In adapting this construction to meet practical require-

ments in its several applications, it is necessary to alter only in detail the general construction and distribution before explained, and shown in Fig. 3, which shows the usual plan of distributing the wires in a simple rheostat plate. Connection to the resistance wire is made by means of a sheet copper contact strip, one portion of which is folded back upon itself, and after inserting a portion of the wire this sheet copper is crushed about it. The joint so formed can not oxidize, since it is completely sealed by the enamel fused about it.

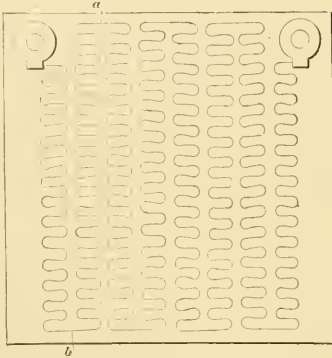


FIG. 3.

To divide the resistance so formed into steps, it is only necessary to place contacts for connection to the resistance wire at convenient points where the loops approach the edge of the plate, as at *a*, and so on, in Fig. 3. This particular way of locating the connecting points on one side of the plate is especially convenient in using these plates with small motors, where only few steps or divisions of the resistance are required. A modification of this arrangement is to have the connecting points alternate from one side of the plate to the other, as at *b*, *a*, etc., Fig. 3. A distribution best adopted for stage or field-controlling rheostat, or one in which a great number of steps are required, is secured by arranging the resistance in a similar manner around the entire outer portion of a disk with contact connections near the circumference. Another arrangement is required in a plate of low resistance and high ampere capacity. In this case, several coils are placed in parallel and connected to a common contact piece.

The plates, with their coils and contacts distributed as above described, are well suited for use in connection with rheostat switches. They are provided with ribs or blades for extending their radiating surface, and lugs at the corners for convenience in attaching them to the back of the switch. Each contact of the resistance plate is connected by a very short wire or strip to the corresponding contact piece on the rheostat switch.

A very simple and complete rheostat is made by placing the switch contacts and lever, properly insulated, directly upon the radiating plate, on the surface opposite the resistance face. With this arrangement, as shown in Fig. 4, a rheostat is obtained which is no larger than the switch parts alone of existing rheostats,

To make a single plate large enough to dissipate the energy wasted in the rheostat in starting a large motor, would make it necessary to have a surface so large as to be objectionable. To avoid this difficulty, a number of plates of, say, 10 inches square, are placed in parallel with each other, but separated by sufficient space to admit of proper ventilation, and connection made from the switch contacts to the contacts upon the various plates as required. With this arrangement, a rheostat of very large watt capacity may be placed within a small cubic space.

This form of rheostat, by reason of its compactness, is well adapted for use with arc lamps on constant potential circuits. In this application, the resistance plate may be attached directly to the outside of the casing, leaving just sufficient space between the casing and the plate for ventilation. Where the casing is cylindrical, the plate may be disk-shaped and placed on top of the cylindrical casing, with holes in the plate for the hooks and chimney to pass through. A valuable feature of this rheostat in this application is that it will endure exposure to the weather while in use. As an example of this, the writer knows of a case where one of these plates has now been in use on a pair of lamps for over seven months, where the plate is in a horizontal position, with the enameled side up and water dripping upon it continually.

In some places the heating effects of rheostats should be avoided. For example, in stage controllers 5 to 10 kilowatts continually converted into heat is extremely objectionable in warm weather. This may be done by conveying the heat away through the agency of running water. To accomplish this, the resistance plate may be

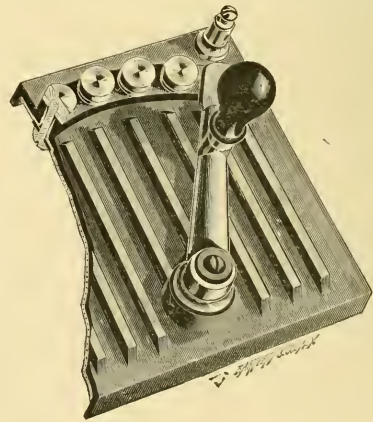


FIG. 4.

hollow, with inlet and outlet pipes connected directly to a source of water supply. By this means and with proper circulation the plates will always be comparatively cold, and no sensible amount of heat will be given off to the surrounding atmosphere, while the size of the apparatus is so reduced as to occupy no considerable amount of space.

It is evident that numerous modifications of this general design may easily be made to adapt the apparatus to the requirements of practice.

The following claims are advanced for this rheostat: No combustible material enters into its construction; resistance wires cannot deteriorate from oxidation, etc., thus insuring durability; compactness, requiring less than 5 per cent of cubic space of ordinary coiled wire rheostat; simplicity, the resistance wires, insulation and radiating surface plate being fused into one integral mass; cheapness by securing given resistance and carrying capacity from wire whose cross-section and length are but one-tenth that required in the arc; and it is unaffected by heat, cold, water, or chemicals.

THE Broadway conductors, New York, will be neatly uniformed this winter in a special winter garb.

A NEW CHICAGO POWER HOUSE.

THE new electric rights of the Chicago City Railway have borne fruit already in the equipments mentioned at various times, and now in the contract for a new power station at Fifty-second street and Wabash avenue. McDermott & Co., of 3528 Wabash avenue, are the contractors, and are bound to complete it in 70 days from date of the contract. The structure will be one story high, covering 130 by 147 feet of ground, at an estimated cost of \$35,000. Seven Murphy furnaces, Mohr boilers, Wheelock engines, with 18-foot fly wheel at 100 r. p. m. and Baragwanath water heaters will be used, as before mentioned.



"A BOVINE MOTOR."

THE illustration herewith, an echo of days gone by, is of a motor not generally in use at any time, although in actual service for a long period on the tracks of a southern city. Some years ago, and before the construction of the excellent electric system, which now operates modern palace cars at high speed along the streets of Houston, Texas, the sight of a street car drawn by a gentle-eyed cow was so common an occurrence as not to arouse attention, or comment, save from strangers to whom the combination was highly suggestive of the ridiculous.

Progress has now forever banished the bovine to the pasture, and steam, through the agency of electricity, has wrought its mighty transformation. There are still many

places where the service is little better than that illustrated, where a determined effort can work a revolution no less marked than was the transformation scene at Houston.

CONSCIENCE MONEY.

WE hear of conscience making cowards of us all, and not infrequently making honest men of smugglers and absconders, but recently Jas. A. Collins, secretary of the Cincinnati Street Railway, received an anonymous \$20 bill, with the single word enclosed—"Conscience." The only explanation he can give is that some employe had robbed the company of that amount and returned it thus without credit.

STREET RAILWAY LAW.

EDITED BY MR. FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Transfer Tickets.

A restriction that a street railway transfer ticket give without extra charge must be used within fifteen minutes after it is punched on the first line, is not unreasonable or invalid, in the absence of any contract or obligation to carry a passenger on both lines for a single fare without exceptions or conditions, or any provisions to that effect in the charter or ordinance.

Morse, C. J., in delivering the opinion of the Court says:

The proofs show that plaintiff had paid his fare as alleged, upon the Woodward Avenue car, and asked the conductor for a "change off" ticket to the Michigan Central depot. This ticket showed upon its face that it was "void unless used October 8, 1890, as indicated hereon." This indication marked by the pointing of an index finger of a hand, read as follows: "This slip will not be honored unless presented at the intersection of the Woodward Avenue line and the line punched in margin, within fifteen minutes of time punched, for a continuous trip only. S. Hendrie, Treas." The plaintiff testifies that he got off the Woodward Avenue car at the corner of Woodward and Jefferson avenues, and waited 14 minutes, and no car coming along or being in sight going towards the depot on Jefferson avenue, he then went to the post office, going there on Jefferson avenue and Griswold street; mailed some letters and came back, where he again waited eleven minutes before he got a car. On presenting his ticket the conductor told him it was not good. Plaintiff asked what was the matter of it, and the conductor replied, "read your ticket." Plaintiff said "I am not obliged to read it." Conductor replied, "they are good only fifteen minutes after they are punched." Plaintiff then said, "I have been waiting a good deal longer than that for your car." The conductor then told him he must pay the fare or get off the car. Plaintiff refused to pay the fare and said that he would not get off the car unless he was put off. The conductor then put him off. The plaintiff did not resist, and was not injured physically. He had the money to pay the fare, but did not think he ought to pay it. He had used these tickets before, but had never read them, and did not read this one before he was ejected from the car. It will be seen that the proofs did not correspond with the allegations of the declaration, as plaintiff was not given a ticket which entitled him to ride on this car except within a certain time; and from the declaration it would be inferred that there were no conditions attached to the ticket. But under the proofs, if the declaration had made proper averments to correspond therewith, we do not think the plaintiff was entitled to recover. The following section of the ordinance of the city of Detroit was put in evidence: "Sec. 30. The tracks upon Jefferson avenue, Woodward avenue, and Gratiot street, shall each be considered and run as one route, and subject its passengers to the payment of a single fare each; provided, however, that all cars running north of Jefferson avenue shall run to and from Jefferson

avenue and the routes intersecting Woodward avenue shall be considered as making a portion of each of said routes respectively." The defendant company was under no obligation by contract or ordinance to take the plaintiff upon the Jefferson avenue line from off the Woodward avenue line, to the Michigan Central depot, or the single fare of five cents, except upon the conditions printed on the face of the ticket; nor is there anything unreasonable in the requirement that the ticket must be used within fifteen minutes. The company had the right, under the ordinances of the city, to treat the Jefferson Avenue line as a single road, and to charge five cents fare; but it saw fit to make a continuous fare of five cents from any point on the Woodward Avenue line to the Michigan Central depot, if the transfer was made in fifteen minutes from one line to the other. In this case half an hour at least had elapsed. If no car had passed within that time, and the car from which the plaintiff was ejected was the first one to pass after the plaintiff had alighted from the Woodward Avenue car, the plaintiff may, upon a proper declaration, have an action against defendant, but no such state of facts was averred in the declaration in this case. It was the duty of the defendant to read the ticket. His failure to read it cannot give him any rights against the defendant which he would not have had, had he read it. And it was also the duty of the conductor not to receive this ticket and to require the payment of five cents fare, and neither he nor the company could be made liable for putting the plaintiff off the car in the manner in which he was ejected without physical hurt or damage.

Sup. Ct. Mich. *Heffron vs. Detroit City R. Co.*, 16 L. R. A. 345.

NOTE: See also the case of *Pine vs. St. Paul City R. Co.*, decided by the Supreme Court of Minnesota, and cited in Volume II *STREET RAILWAY REVIEW* page 358, in which it is held by the ordinance of the city of St. Paul granting certain franchises to the defendant, a passenger who has paid one fare on any line operated by the company in the city is entitled to a transfer check or ticket entitling him to a continuous passage over any connecting or crossing line. Where such passenger applies for and accepts a transfer ticket for one of several continuous or crossing lines plainly marked and designated, he will be limited to the line so selected; but where the ticket designated is not so limited, but is equally applicable to several lines, he will be entitled to be transported over either.—ED.

Persons Alighting From Moving Car—When Relation of Passenger Ceases—Injury by Passing Car—Negligence.

The plaintiff's intestate was instantly killed on Warren street by an electric car which, it was testified, was running at a speed of fifteen miles an hour. His death under the circumstances gave the plaintiff a right to maintain the action under Stat. 1886, Chap. 140. If when killed he was a passenger, or if, not being a passenger, he was in the exercise of due diligence. He had ridden as a passenger upon another car which he had left immediately before he was killed. When struck, he was wal n

across Warren street, having taken one or two steps from where he had touched the ground on leaving his car, and was between the rails of the track on which was the car by which he was struck. He had not reached or had time to reach the sidewalk of Warren street, but he had left the car on which he had been a passenger and had begun his progress on foot across the street. We are of the opinion that he was not a passenger when the accident occurred, and that he ceased to be a passenger when he alighted upon the street from his car. The street is in no sense a passenger station for the safety of which a street railway company is responsible. When a passenger steps from a car upon the street he becomes a traveler upon the highway and terminates his relations and rights as a passenger and the railroad company is not responsible to him as a carrier, for the condition of the street or for his safe passage from the car to the sidewalk. When he rose from his seat and started to get off, two men, one the conductor and the other a fellow passenger, who were standing on the platform immediately behind him, shouted to him to stop, but he did not appear to hear, and stepped right off on the street to go across and was on the other track, having taken the first step and being in the act of finishing the second, when he was struck. The plaintiff therefore cannot recover unless he shows by affirmative evidence that the deceased was in the exercise of due diligence to avoid injury in traveling upon the street. As there was no such evidence, a verdict for the defendant was rightly ordered.

Sup. Jud. Ct. Mass. Creamer vs. West End Street R. Co., 16 L. R. A. 490.

Damages by Elevated Railroad—Contiguous Property—Diminished Rental Value.

The trial Court refused to find that the plaintiff, during the time in question, occupied and used his building as a dealer in flour and for its storage and manipulation. The evidence required that finding if it was material to the question of damages. There was evidence tending to show a substantial impairment of rental value of the plaintiff's premises caused by the acts of the defendants, but there was none tending to show any special injury to the plaintiff's flour business. The defendants' position in effect is: We did, it is true, impair the actual or marketable value of the plaintiff's premises for six years, but he can recover nothing because he did not offer his premises for rent, but used them himself in his own business, and has not proved, in respect of that business, that our acts occasioned him any loss or damage. We do not think the defendants' position tenable. The past damages which the plaintiff was entitled to recover, were measurable by the amount which the rental or usable value of the plaintiff's premises had been diminished by the construction, maintenance, and operation of the defendants' railway. He could take his choice between the rental or usable value as the premises actually were, whichever was most profitable to him. The defendants in the present case seem to think that for the pur-

pose of diminishing the damages they can take their choice between the actual rental and usable value of the premises as they were actually used. The case affords no warrant for such a position. The defendants were wrongdoers and must pay full compensation for the wrong done by them.

Ct. Appls. N. Y. Woolsey vs. N. Y. Elevated Ry. Co., 8 N. Y. L. Jour. 161.

Street Railway Mortgage—Foreclosure—Receiver—Bonds Invalid—Sale of Property to Pay Expenses Incurred by Receiver—Property Intended to Be Used on Road.

In a suit to foreclose a mortgage given by a street railroad company to secure payment of certain bonds, it appeared that the bonds were invalid; but, all the property covered by the mortgage being in the possession of the receiver appointed pending the litigation, who had issued certificates for expenses incurred for the preservation of the property, and it appearing that the defendant company was wholly insolvent, upon request and consent of all parties in interest a decree was entered, ascertaining the amount of the respective claims, and directing the sale

all the property involved to satisfy the same. Held, that rails, fish-plates, and bolts purchased by the company for use on its road, but which had not been actually used, and were stacked upon land not within the company's right of way, were within the terms of the mortgage and decree, both of which by their terms included all real and personal property "used or intended to be used in connection with or for the purpose of such railroad," and passed to the purchaser at such sale.

U. S. Cir. Ct. S. D. Cal. Farmers' Loan & Trust Co. vs. San Diego Street Car Co., 49 Fed. Rep. 188.

Obstruction on Track—Passenger Assisting in Moving Car From Track—Personal Injury—Contributory Negligence.

Plaintiff, a passenger on defendants' up-town car, was requested by the conductor to get out and assist in getting the car off the track, so as to enable it to pass the obstruction. While he was on the street for that purpose, defendants' down-town car, for the purpose of passing the same obstruction, "jumped" the track to the east instead of to the west, thereby catching plaintiff between the two cars. Held, that plaintiff being lawfully on the street at the time, was not guilty of contributory negligence, and entitled to recover for the injuries so received.

Superior Court New York City. Stasner vs. Second Ave. R. Co., 18 N. Y. Supp. 880.

Action for Causing Death of Child—Negligence of Driver of Street Car—Instructions to Jury.

An action was brought by the parents for causing the death of their minor son, and the petition alleged negligence on the part of the driver of the car. Held, that it was error to refuse to instruct the jury that "if under all the evidence in this case you find that the driver of

said car was driving the same at a rate of speed at which it could not have been readily and quickly stopped, should occasion require; that such speed was careless and dangerous, considering the number of persons and vehicles on said street; and you find that the injury was caused by said negligence, and that the plaintiffs are the father and mother of the child, your verdict must be for the plaintiffs.

Sup. Ct. Mo. Humbird vs. Union St. R. Co., 19 S. W. Rep. 69.

BABCOCK & WILCOX, New York City, are now building 50,000 horse-power per month of the excellent boilers bearing their name, and which are yielding such satisfactory service in all parts of the world, and specially where introduced for street railway work.



A TRACTION FEAT.

NOT long ago the E. T. B. & G. Railroad delivered a Short Railway generator at the W. & A. Railroad yards in Atlanta, Ga., by mistake. As it happened, on Friday evening there was no switch engine obtainable in the yards and R. L. Caldwell, the expert in charge of the Short installation at Atlanta, was in a quandary as to how to get that 24,000 pounds of wire, iron and brass from the railroad yards to the power station, which was a matter of five or six miles distant. Besides the expense of hauling it by wagons, the road en route was in bad condition in several places, and the entire expense of loading, reloading and hauling, repairing the road and loss of time, would have been expensive at best. Mr. Caldwell is a man of ideas and his faith in Short motors is very long. After the switch engine had put it on the electric tracks a feat was to be performed.

Therefore an ordinary Atlanta Consolidated Street

INCREASED RIDING IN BROCTON, MASS.

THE record of eleven years in the history and growth of Brocton, Mass., street railway, of which Horace B. Rogers has been the efficient progressive manager since its inception, is highly gratifying. In this time six horse cars on four miles of track, have increased to 21 miles, mostly electric, and 90 cars. From 638,409 passengers hauled in 1882, the business has grown to 3,198,718 in the year ending Sept. 30th, 1892, a gain of over three million passengers annually in eleven years. A car mileage of 549,561; earnings of \$143,506; and 150 men constantly employed, are also features of the past fiscal year. Considering the available riding population the record is one reflecting much credit on the management.

Railway passenger car, 16 feet in length and equipped with two 20-horse-power motors was attached to the cumbersome freight car and started for the plant. As the gauge of both tracks was the same, the switching was easy. The following table gives at a glance the magnitude of the work:

| | |
|---|-------------|
| Pennsylvania R. R. Co car No. 5,653, weight | 23,150 lbs. |
| One Short generator, 150-horse-power, weight..... | 24,000 lbs. |
| Total..... | 47,150 lbs. |

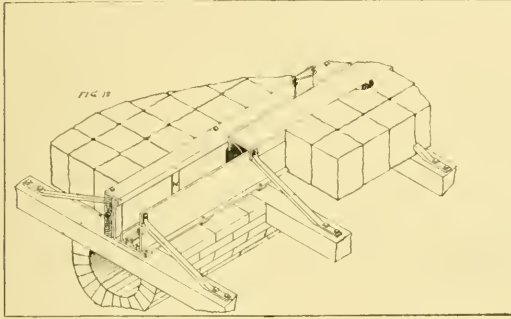
Added to this the grade between the Georgia Pacific R. R. station and the power station at Collins Park is from 5 to 6 per cent in the $\frac{1}{2}$ miles.

Our engraving shows well the disproportion in size of the big inert freight car and its load and the energetic little motor car that breathed the breath of life into it. The trip was made in thirty minutes without difficulty.

THE SHOEMAKER ELECTRIC CONDUIT SYSTEM.

THIS system is an underground trolley method, the invention of Milton Shoemaker, M. D., of Sioux City, Iowa, and is the result of three years' study.

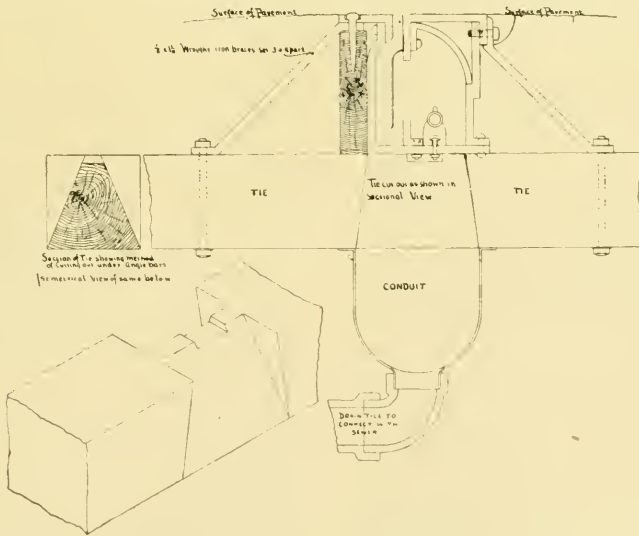
The Shoemaker system aims, first, to avoid presence of moisture by specially adapted drainage; second, should it still exist, to dispel it by artificial means. The only



SECTION OF TRACK SHOWING SLOT RAIL REMOVED.

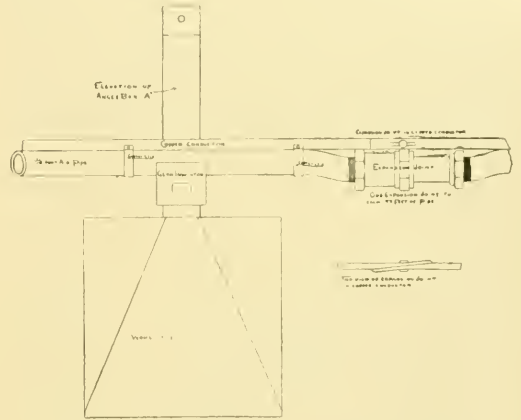
change from ordinary arrangement of cars is that the current is brought from below instead of from above.

The conduit is a continuous rolled steel case about 8 inches square and braced to withstand street traffic. It is open at the bottom, except for the steel braces, and a smaller conduit of brick or cement underneath conducts any water to the sewer connections. The slot is similar to a cable slot, and is placed near the upper left hand corner of the large conduit. Near the bottom of the opposite side of conduit is laid a rail, which carries the conductor. A continuous metal shield, or partition depends from the right hand edge of slot to a point about one inch from bottom of conduit, preventing any direct entrance of moisture from slot to conductor. Two "carriage rails," placed opposite, one at top and bottom of conduit and between partition shield and conductor rail serve as guides for the trolley carriage. The conductor rail is a metal tube resting on glass insulators, and, with the conductor, is provided with expansion joints, contrived to always present a perfectly smooth upper surface to the trolley, thus obviating all "sparking."



CROSS SECTION OF CONDUIT AND BEVELLED FORM OF CROSS TIES.

be deflected by the partition shield away from the conductor and down between the ties which are bevelled to shed freely, into the drainage conduit, and thence to sewer. The conducting wire to motor must pass around this partition in the shape of a U. The trolley carriage has grooved



SIDE VIEW SHOWING EXPANDING JOINT OF CONDUCTOR.

wheels running on the upper and lower guide rails, and is placed in position through a trap at starting, or other points. The slot bar is of steel.

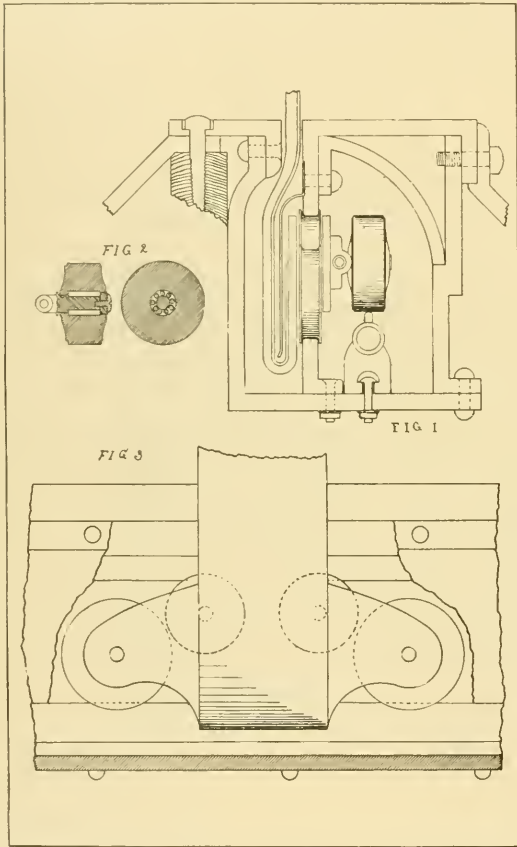
Having protected the conductor from direct attack of moisture, Mr. Shoemaker goes farther, contemplates absolute absence of dampness by forcing a blast of hot air through the tubular conductor rail, already described, and on which rests the conductor. This, it is believed, will not only melt any snow, or frost which might gain a resting place there, but dispel all dampness. On a very long line provision is made for re-heating the air at necessary intervals. This, the inventor claims is a radical departure from all previous electric railway conduits system.

Other claims offered for the Shoemaker is, reasonable cheapness in construction, perfect insulation, freedom from sparks and ability to convert existing cable conduits to underground electric system, should that become desirable. The salient parts are indicated by the following letters:

A, trolley; B, hinge; F F, wheels of trolley carriage; G, lower carriage-rail; H, upper carriage-rail; I, shield; J, glass insulator; K, conductor; O, slot-bar; W, tubular metallic conductor rail.

WOMEN AND RAPID TRANSIT.

THE pretty suburbs of Cincinnati known as Price Hill, the two Fairmounts and Westwood have been long at a disadvantage as to rapid transit. The recent offer of the Cleveland syndicate, headed by the gallant Al. Johnson, to build an electric road, was therefore hailed with joy by the inhabitants of the above mentioned villages. Several cross franchises were in the hands of the Board of Administration from the home company, and to determine the rights and privileges of the contending applicants takes time.



A CROSS SECTION CONDUIT WITH END VIEW OF TROLLEY AND SIDE VIEW OF TROLLEY GUIDE WHEELS, SHOEMAKER SYSTEM.

The women were in a hurry. They wanted to go shopping down town. So to facilitate matters and express their opinion, a delegation of about 200 from North Fairmount came down to the rooms of the board and explained the reason of their call.

The president, gallant man, was all at sea. He breathed hard. Then he told the invaders that the matter would be decided that afternoon and reported next morning.

Oh, no! That was too long. They had come to stay.

The president then explained the troubles of conflicting offers for franchises.

This was too complicated. The women still stayed. Then they started on a new tack. Each woman produced a tin horn and marched and counter-marched to the discordant tones. The president still breathed hard. They surrounded each member of the board. But the horrid men stuck to the slow method and were obdurate. The women then departed.

THE CELEBRATION CROWDS IN NEW YORK.

THE great Columbian celebration in New York City, with its three-days' festivities, severely taxed the rapid transit of the metropolis. All day and all night the trains of the elevated were engaged in bringing in and carrying out the crowds.

Col. Hain, the general manager, gives the following detailed report of the three days, figuring up to midnight of each day:

| | No. of Passengers. |
|-------------------------------|--------------------|
| Monday..... | 945,000 |
| Tuesday..... | 901,000 |
| Wednesday..... | 1,075,537 |
| Total for the three days..... | 2,921,537 |
| Average per day..... | 973,845 |

Those were the greatest days in the history of the company. The average number carried per day, too, is in excess of the previous biggest day's business done by the company, namely, on the occasion of the Centennial parade, when 867,000 passengers were carried in the 24 hours.

This magnificent record of one road shows well for the management, and reflects great credit on Col. Hain and his assistants.

NEW YORK CAR HORSES.

IN New York, now with Philadelphia, occupying the unenviable reputation of having the greatest number of horse cars of any city in the world. There are signs that the following numbers will be replaced by mechanical traction:

| | |
|--|--------------|
| Broadway and Seventh Avenue Line..... | 700 horses |
| Second Avenue..... | 2,000 horses |
| Third Avenue..... | 2,900 horses |
| Fourth Avenue..... | 1,700 horses |
| Sixth Avenue..... | 1,000 horses |
| Belt Line..... | 1,700 horses |
| Christopher Street Ferry Line..... | 450 horses |
| Houston Street Pavonia Ferry, Etc..... | 450 horses |
| Chambers Street..... | 350 horses |
| Dry Dock..... | 1,700 horses |
| Twenty-third, Crosstown..... | 1,000 horses |
| Green Line..... | 450 horses |
| Forty-second Street, Crosstown..... | 1,700 horses |

A DEVICE has been introduced in the East, whereby railroad cars are swept and dusted by a current of high pressure air, directed through a rubber hose just as water is used for cleaning.

EXPERIMENTS ON THE EXPANSION OF CONTINUOUS RAILS.

A Paper Read Before the American Street Railway Association.

BY A. J. MOXHAM.

Of all the papers presented at the recent convention, the following represents the most painstaking study and experimental labor, and is especially valuable, coming from so high an authority:—

Gentlemen:—

In the matter of track construction to-day, the question of paramount importance is that of the joint. For many years the question has been the rail. As this has received time and attention, one weak spot after another has been eliminated, and so great has been the pruning process, that the one weak spot left, "the joint," is only the more glaring from the absence of many of its brothers in misfortune.

Known to be the weakest point in the structure, the question of the joint has had its full share of attention. It is not, perhaps, generally known, but is nevertheless a fact, that the joint of the formerly despised street-railway has already distanced its heretofore leader, the steam railroad; certainly in its practical application, if not in its scientific development.

The question of the best joint is not entirely a scientific question. It is also a commercial question, and it ceases to be scientific when it ceases to be commercial; it then becomes "*non est.*" All evil is comparative:

"The little girl who had a little curl
Right in the middle of her forehead,
Who, when she was good, was very, very good,
And when she was bad was horrid,"



FIG. 1.—DETAILS OF THE JOINT.

might have been either a little angel or a little devil, according to whether the conditions were favorable to her easy control or not. So with the joint. The joint of the steam road can be controlled—it is exposed, and therefore accessible; that of the street road cannot; it is practically inaccessible. It has been proposed to overcome this by making it accessible by means of boxes with removable covers. Apart from the objection that this adds to the amount of street taken up by the track, the cost, if properly done, is almost prohibitive. I have been informed by the manager of one of our largest and most progressive street railway systems that, after a careful trial, it was found to be cheaper to take up the paving and tighten the joints once every few months than to pay the interest on the investment of the boxes.

The question of a good joint is embodied in very few words, to wit: "absence of motion"; and it must be absence of motion of the cars as well as of the rails, particularly in the case of electric roads. If two rails be placed in perfect surface and alignment and closely butted, and so held, the problem is solved. Not only must they be true to surface and line, but they must be abutted. It will not do to leave the usual expansion space. This can be quickly demonstrated by cutting a groove one-quarter of an inch wide in the head of the middle portion of a rail. The surface and alignment are here true, but not abutted. A slight jar can be felt from the first; in a short time it becomes worse, and after continued use, bad and rapid wear, accompanied by a low spot, results. In this case there is no motion of the rails; the evil is resultant from the motion of the cars. This, however, goes without saying, as of course the cars are the destructive agency, and it is only emphasized because it is a very prevalent opinion that if the rails as laid to-day could only be held rigidly level, the problem would be solved.

A few words as to the evolution of the joint: Ignoring the old stringer construction, the first leap was taken from the steam road, at that time

far in advance of street-railway construction, at least in this country. The girder rail of to-day was in general use abroad some time before it was adopted here; but when adopted here, its advent once permitted the use of the ordinary splice bars, in which the bevel of the plates, fitting between similarly beveled portions of the rail and drawn into place by bolts, provided the joint. So amply strong was this joint considered, that at first it was deemed capable of economy; the bars and bolts were made light and the bearing surface small. With the horse car it appeared satisfactory. The development of cable roads, however, at once indicated the weakness of the early practice, and the size of the bars and bolts was increased, and much larger bearing surfaces provided, in the shape of channel splice bars. Electricity now appearing showed even this improvement inadequate. It was found that the wear was concentrated at the rail juncture, and a bar that had become useless because of actual wear at this point, showed no wear at the extreme ends. In other words, the wear was indicated by motion at the rail ends, and did not extend to the whole bar. The problem was then attacked on the theory of stopping all motion. In this, two points were essential:

First—To hold the rail against motion by means of the fastening bars; to which end it was necessary to.

Second—Hold the fastening bars against motion by means of the bolts.

As to the first: Not only were the bars made of great rigidity both vertically and laterally (for both are essential), but they were made to

fit the rail. If one of our hearers will carefully examine an ordinary splice bar after it is tightened up, he will be somewhat surprised at the result. Taking a thin piece of paper and trying to work it into the fit, he will probably come to the conclusion that he has not more than 50 per cent. of real bearing or fit, as compared with the apparent bearing. No matter whether the track comes from a careful or careless manufacturer, nor how rigid the inspection, the evil will be found; it is only a question of more or less. It is due to the absolute impossibility of making a fit of rolled surfaces when the structure is rigid. A good machinist will tell you that even with the lathe or planer this is a difficult achievement, let alone without. To avoid this, a spring or yield was introduced, and this under conditions demanding rigidity as a sequence. In other words, the springing or yielding portion was in itself of great rigidity, and only made to yield by excessive tightening power. Hence, the bearings, while strong and rigid in themselves, were made to spring or yield to a fit when tightened home by bolts large in diameter and many in number; and to secure this, very deep bars, of great structural stiffness, which permit of two rows of bolts of large diameter were developed. It must be remembered that this must all be embodied in the joint itself; to make a poor joint and then merely support it, has been proved a total failure.

As to the second point, properly holding the bars: A large number of bolts was the first development, and increased size or diameter followed. A nut lock to prevent slackness has been experimented with. If without spring to take up, not only the slack of the nut, but also the stretch of the bolt, it is useless, and few, if any, exist with these desiderata. A bolt so large in diameter that it will not stretch, and threads well cut and tight fitting, so that the nut is not liable to turn, are to-day the best safeguards. Not only the size, but the location of the bolts, is an important factor. It is the jolt or impact of the car that loosens the nuts. The

vibration passes along well-defined lines. If the bolts are located in the line of greatest vibration, the nuts will tend to turn more quickly than if located elsewhere. A double row of bolts with the lower row staggered gives excellent results. A single row does not suffice.

Such is the joint of to-day, structurally stiff, heavy enough to take up the jar of the blow without transmitting it all to the nuts, a yielding fit that tends to counteract all motion, and large bolts, carefully located with a view to vibration. In itself good, and as it now stands, to a certain extent, capable of economical use, and far ahead of its brother on the steam road, even of the heaviest construction. But even so *it will not do*. If not, query, "What then?" There is but one answer. *No joint at all*. While apparently a bold suggestion, it is at least worthy of thought and discussion. That the rail can be made continuous by mechanical means, we know, but what of expansion and contraction? *We will do without it*; and that we can do so, the sequel I think will show.

To the credit of Mr. Philip Noonan, I think, belongs the first practical idea of a continuous rail. His theory, in a nutshell, may be described as gripping the rail at one end and permitting the wave motion or flow induced by passing trains to be, so to speak, rolled out before the train wheels, into a tension device that within certain limits holds what it gets. He provides against danger of rupture by a spring device which limits the strain. He puts his ideas to a test, built a considerable stretch of track (some three miles) on the Lynchburg and Durham Railroad, at or

track was laid and in use, it was determined that it was best to make the rail continuous by a joint rigid and stronger than the rail, so as not to have to remove the roadbed. This because the roadbed, which was macadam, had become solidly packed, and represented normal conditions hard to obtain if once disturbed. Remember that when the experiment was made it was thought questionable whether the rail, when prevented from expansion and contraction, could be at all restrained by the roadbed; hence all the restraining power offered was to be retained. At the end of each separate rail the usual one-fourth of an inch had been left for expansion. This was filled by a carefully measured dog, made of the same section as the rail, cut to fill the space tightly, and then driven into place.

Now for the joints: These were to be stronger than the rail itself, and for connection body-bound, machine-turned bolts were decided upon. The two side bars were of steel, 4x1 3/4 inches thick, and 5 feet 4 1/4 inches long. The body-bound bolts were 18 in number, and 1 1/4 inches in diameter.

It is well known, one of the most difficult things in metal working is to secure a real fit between two surfaces. The usual work of a machine tool—be it lathe, planer or what not—is very far from accurate, as the introduction of templet work into a shop soon shows. Out of an ordinary selection of average machinists, it is rare to find one in ten capable of making a real fit, sometimes less. To insure an absolute fit was deemed

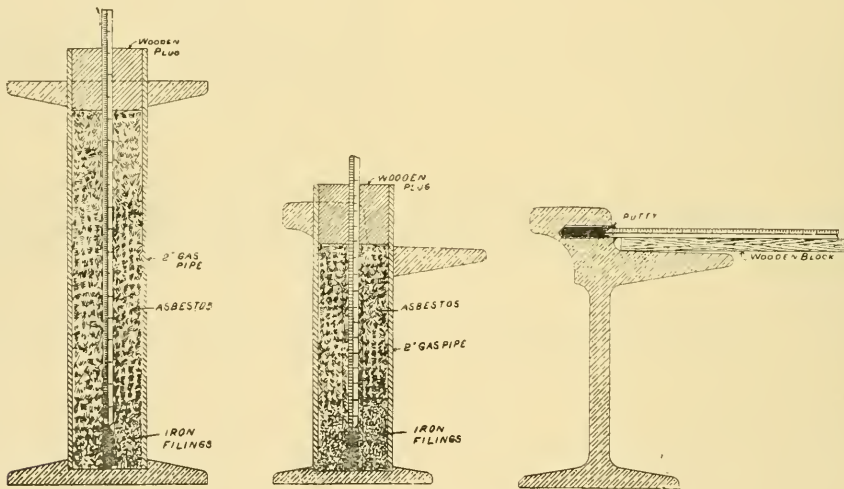


FIG. 11.—LOCATION OF THERMOMETERS.

near Gladys Station, Va., and it to-day is in successful use. Expert investigation and report indorses it in all essential particulars, though it is perhaps questionable whether the fastenings he used to make his rail continuous are strong and rigid enough to prohibit all yield. For details those who care to investigate may be referred to a pamphlet on the subject, that can be obtained by addressing the inventor at the above named place.

At a glance, the problem of a street-railway differs from the steam road in that the former is surrounded by the roadbed, while the latter is at least to a great extent, exposed. The effect of the surrounding roadbed is twofold.

First—By its great surface friction, it tends to hold the rail against change, stops all wave motion, and

Second—It to some extent modifies the temperature.

The problem was to find a measure of value for both. To this end the following experiment was made.

One rail in a section of track was so connected that in reality it was a continuous rail. One side of the track was taken instead of both, because it was thought the parallelism of the adjacent rail would at once indicate changes that were expected to occur, which perhaps other measurements might fail to disclose. The length was 1,160 feet, and the profile one that embodied level track, up grade and down grade. As th

a necessity. It was done as follows: A number of jigs were made having a hardened steel guide for the drill. With this the bars were drilled in pairs, and as drilled, each bar carefully tested by the standard. The holes were drilled 1-32 of an inch smaller in diameter than ultimately needed. The roadbed surrounding a joint being removed, one bar was clamped to the rail, and the holes (also 1-32 of an inch small) were drilled through the web, using the bar as a guide. After the temperature of the parts was equalized, the adjoining bar was then adjusted and a rose-bit reamer carefully worked through the three holes. As quickly as one hole was completed the gauge was taken, and one of a series of machine bolts (previously turned to a standard slightly large) was accurately turned for this special hole; and so to completion. The accuracy of the work may be shown by the fact that after reaming, if anything interfered with the equalized temperature (as for instance one bar being removed and laid in the shade) during the work, the bolts could not be put home. Each bolt was a driving fit. It took twenty-four hours to properly adjust each joint. The track was thus made continuous.

At five points along the line heavy stakes were firmly fixed in the ground, one on each side of the road, in the top of which were set small wire nails. A thin but strong cord was tightly stretched from stake to stake, the tops of which were several inches above the top of the rail.

Directly underneath this line a mark was made on the head of the rail with a cold chisel. Measurements were taken from the stake to the chisel mark, and from the top of the rail to the tightly stretched cord. Observations were taken at these five points, in the manner indicated, throughout the whole summer.

The work was started on the 19th of March, and finished on the 25th of April, 1892. The average temperature during the work was 43.04°, the maximum 81°, and the minimum 10°.

The section of rail used in the track is of the girder type, 6 inches deep, weighing 78 lbs. to the yard, and shown on Drawing No. 1. The rail is fastened to the ties by means of tie-plates, and the gauge is preserved by tie-rods spaced 10 feet apart. The ties are spaced 11 to 30 feet apart, and the roadway is excellent macadam.

Anticipating the unknown, provision was made for a possible sudden stoppage of the line, by means of portable connecting tracks kept in readiness. In order to further explain whatever might occur, careful preparations were made to read the temperature of the rail at different parts above and below ground, during the experiment. As the rail was in use, this was done by a special rail in the adjoining roadbed, and in order that the scope of investigation should be fully complete, the temperature was continuously taken at the head of the rail, at the lower

and explains itself. The rails were imbeded in macadam, and in such a manner as to most closely resemble the conditions found in an actual roadbed. The thermometers were enclosed by a box, with sides of wire netting admitting the air freely, and intended only to protect the thermometers from accidental breakage.

During the experiment many thousand readings were taken. Without wearying you with the dry, technical details of their repetition, the writer merely calls attention to the fact that a recapitulation of these readings, in the form of averages, is attached to this paper, and in such shape, that the engineering student to whom they will perhaps appeal, will find food for study. There are eight different comparisons. Speaking very briefly, it may be stated as the result of an analysis of some of these averages:

First—That the roadbed at ten inches depth averaged,

A.—During day readings (see Table No. 4.)

At 8 A. M. 1.25° less than air in the shade.

" 12 M. 5.52° " " " " " "

" 6 P. M. 1.88° " " " " " "

B.—During night readings (see Table No. 4A)

At 6 P. M. 1.93° less than air in the shade.

" 12 P. M. 8.30° more " " " " " "

" 6 A. M. 8.09° " " " " " "

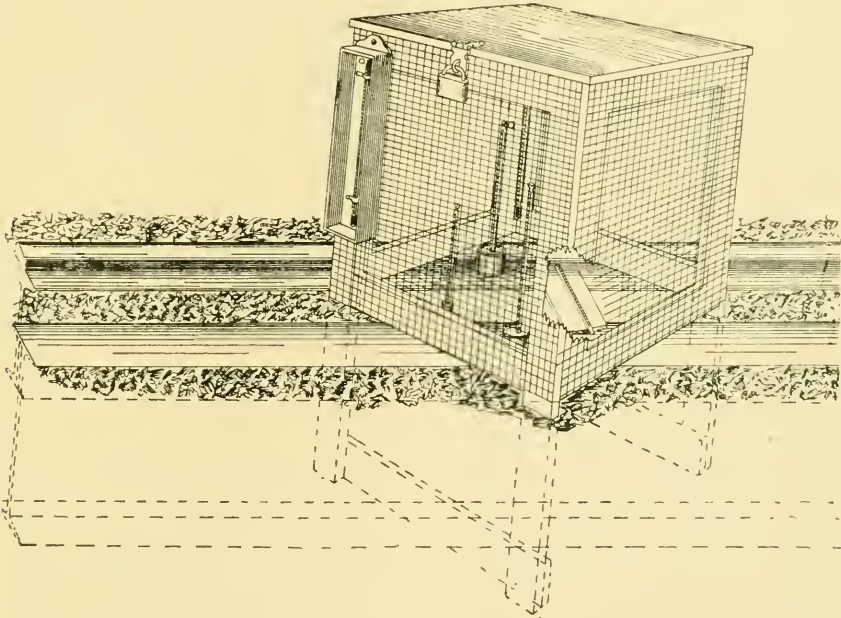


FIG. III.—ARRANGEMENT FOR READING THERMOMETERS.

flange of a six-inch rail, of a seven-inch rail and of a ten-inch rail, or its practicable equivalent, a ten-inch I-beam. Simultaneously readings of temperature were taken as follows:

- Air in the shade.
- " " sun.
- Roadbed at a depth of seven inches.
- " " " ten "

The apparatus used for the purpose of these readings is fully illustrated in Drawings No. 4 and 5 attached. Before using the thermometers they were tested for comparative readings by immersing them all in the same bath, which was raised gradually from freezing point to the maximum limit of thermometers; simultaneous readings being taken at intervals of five degrees. It was not found necessary to make any comparative corrections, no difference greater than one-half degree being found. The correction for the stem exposed in the thermometers was in all cases so small, not amounting to more than one-quarter degree, that it was neglected. The thermometers were obtained from Queen & Co., and are graduated to one-quarter degree. Drawing No. 4 shows the arrangement of thermometers for procuring temperature of top and bottom of rails,

as was to be expected, the earth being colder than the air temperature during the day, and warmer during the night.

Second—That the flange and head of rail, as laid in the roadbed, differed from the air temperature as follows:

A.—During day readings (see Table No. 1.)

At 8 A.M. Flange 2.36° less than air. Head 3.13° less than air.

" 12 M. " 3.63° " " " 4.40° " " "

" 6 P. M. " 2.19° more " " " 5.61° more " "

B.—During night readings (see Table No. 2.)

At 12 P.M. Flange 5.93° more than air. Head 4.00° more than air.

" 6 P.M. " 3.94° " " " 2.68° " " "

Comparison is always made with the air in the shade, because the irregularity of the sun's rays introduces disturbing elements so great as to hide the law. As a factor of correction, if desired, the percentage of difference can be deduced from Table No. 3.

This slight analysis of the tables will suffice to prove to the practical railroad man that for all ordinary purposes, the rail may be assumed to be subject to nearly full air temperature, and that the roadbed will not suffice, as has been believed, to keep the rail temperature virtually regu-

lar. Steel is a far better heat conductor than earth, and, as the tables show, the whole rail (flanges as well as head) closely follows the air temperatures. Readings taken over a long period, night as well as day, every fifteen minutes (in Table No. 6) give the whole kaleidoscope of changing temperature for the close student. With this fact before us, one element of doubt has been removed; but it also proves that the heating of the sun in the day, and the cooling of its absence at night, leaves the expansion and contraction most certainly there.

Now for its effects. The experiment has proved absolutely and beyond cavil, that it is restrained and held by the surface friction of the surrounding roadbed. From first to last, from a temperature of 22° below freezing point (or 10°), to a temperature of 89° above freezing point (or 121°) extending from March to August, there was *absolutely no movement of the track out of place*. Even at the ends was this true; proving that no only will the roadbed hold the track as a complete structure, but it will do it consecutively. Once bedded, it will hold a rail 10 feet or 30 feet, as well as one 1,100 feet. On this point there is no room for error. The expansion in 1,100 feet, if not neutralized, would equal 5¼ inches, under the conditions here stated, and 5¼ inches would throw the rail out of line 14 feet, if it were held at the ends and permitted to bow in the center. An expansion of one rail would mean about 6 inches in 30 feet out of line. The query arises, "What has become of it?" It is existent, and like all force, it would flow to the point of least resistance. In the case of a street rail, buried in the roadbed, it is reasonable to believe this point is in a minute enlargement and reduction of the sectional area of the rail.

As to its effect upon the steel: Experts teach us that a variation of 7° in temperature, if held, would subject the rail to a stress of 1,000 pounds per square inch. Taking a track laid at the low temperature of 40° and subject to a maximum of 120°, or a variation of 80°, the stress is equal to less than 12,000 pounds per square inch. Much less than the elastic limit, and less than the strain put upon an ordinary bridge, or similar structure. It would therefore appear that the effect on the steel would be harmless.

On the face of it, therefore, there is nothing to prevent us abutting our rails, and this is but the prelude to an absolutely continuous track—*one without joints*—the rails welded by electricity, or otherwise connected one to the other, up to such lengths as may be deemed best.

As to its practical application, many precautions suggest themselves. It must be remembered that a track so laid will be like a huge spring under tension, absolutely safe and harmless when restrained by the roadbed, but ready to spring like a shot from a cannon if, while in this condition, the roadbed be removed. The part of common sense would appear to be to limit the length of a continuous rail to, say five hundred or a thousand feet, with specially devised expansion joints at these intervals; or, if desirable to take up the paving for repairs on a very short piece, the following would be effective: First remove only a foot of paving, then with a hack saw cut out, say six inches of rail, thus removing the tension or compression, as may be. This done, the rest of the roadbed could be removed, starting from the cut part of the track, without danger. Be this as it may, it should be borne in mind that chained lightning is not a nice plaything, and therefore a lightning conductor is sometimes handy.

One important saving that would be effected by a "track without joints" would be in the weight of the rail. A rail of 100 pounds per yard is to day in use, and next year will be extensively used. Perhaps without their knowledge, the cause of this has been the street railroad men's dearly bought and sad experience with joints. The joint being defective, the effort has been made to secure such stability of track as to relieve the joints by means of a heavy rail. In a 100-pound rail there are but 30 pounds of wearing surface, of which not more than 18 pounds can be used before the rail will have to be thrown out; therefore there will be 82 pounds unused. For mere stiffness and rigidity, a 66-pound rail, if supported by the proper number of cross-ties, will answer every engineering demand, even of electric cars at high speed. Anything over this goes to the debt of "bad joints."

TABLE No. 1.

DAY READINGS.

Variations between Flange, Head of Rail and Air (Thermometer shaded) for 8 A. M., 12 M., and 6 P. M.

GENERAL AVERAGE.

| Month. | No. of Readings. | Flange of Rail. | Head of Rail. | Air (Shade). |
|--------------------|------------------|-----------------|---------------|--------------|
| April | 57 | 48.40 | 49.18 | 49.97 |
| May | 70 | 62.76 | 63.98 | 65.17 |
| June | 46 | 78.00 | 78.95 | 79.43 |
| July | 72 | 77.57 | 77.91 | 79.54 |
| August | 78 | 75.17 | 75.07 | 77.68 |
| September | 36 | 65.88 | 65.38 | 67.11 |
| | 359 | 69.13 | 70.09 | 71.79 |
| AVERAGE AT 8 A. M. | | | | |
| April | 19 | 42.07 | 46.50 | 41.05 |
| May | 23 | 56.97 | 59.78 | 61.91 |
| June | 17 | 71.44 | 73.26 | 74.17 |
| July | 24 | 68.07 | 65.31 | 71.50 |
| August | 36 | 68.80 | 69.38 | 71.19 |
| September | 12 | 63.28 | 59.70 | 53.33 |
| | 121 | 61.21 | 60.44 | 63.57 |
| AVERAGE AT 12 M. | | | | |
| April | 20 | 50.00 | 50.90 | 54.30 |
| May | 23 | 64.78 | 66.71 | 69.21 |
| June | 16 | 80.59 | 81.03 | 85.53 |
| July | 24 | 79.10 | 81.27 | 83.89 |
| August | 36 | 79.44 | 75.00 | 81.71 |
| September | 12 | 71.50 | 72.23 | 73.29 |
| | 121 | 71.91 | 71.14 | 75.54 |
| AVERAGE AT 6 P. M. | | | | |
| April | 20 | 52.70 | 52.98 | 53.85 |
| May | 24 | 65.85 | 65.81 | 61.10 |
| June | 14 | 84.73 | 83.88 | 78.84 |
| July | 24 | 81.79 | 81.70 | 75.08 |
| August | 26 | 78.40 | 79.57 | 73.83 |
| September | 12 | 71.75 | 70.04 | 68.04 |
| | 120 | 72.26 | 72.84 | 69.45 |

TABLE No. 2.

NIGHT READINGS.

Variations between Flanges, Head of Rail and Air, for 6 P. M., 12 P. M., and 6 A. M.

GENERAL AVERAGE.

| Month. | No. of Readings. | Flange of Rail. | Head of Rail. | Air (Shade). |
|---------------------|------------------|-----------------|---------------|--------------|
| May | 37 | 59.88 | 58.75 | 56.07 |
| June | 48 | 73.76 | 72.37 | 68.32 |
| July | 71 | 74.40 | 72.93 | 68.54 |
| August | 75 | 74.25 | 71.70 | 68.41 |
| September | 33 | 65.76 | 63.48 | 59.63 |
| | 264 | 70.74 | 68.96 | 65.60 |
| AVERAGE AT 6 A. M. | | | | |
| May | 12 | 54.25 | 53.58 | 49.79 |
| June | 17 | 67.41 | 66.66 | 63.00 |
| July | 24 | 67.22 | 66.08 | 60.66 |
| August | 25 | 67.12 | 65.99 | 62.54 |
| September | 11 | 59.27 | 58.54 | 53.13 |
| | 89 | 64.50 | 63.54 | 59.23 |
| AVERAGE AT 12 P. M. | | | | |
| May | 13 | 58.11 | 56.77 | 54.88 |
| June | 17 | 71.37 | 69.50 | 63.98 |
| July | 23 | 72.96 | 71.39 | 66.17 |
| August | 25 | 71.46 | 69.90 | 66.14 |
| September | 11 | 63.86 | 62.22 | 56.90 |
| | 89 | 69.15 | 67.22 | 63.22 |
| AVERAGE AT 6 P. M. | | | | |
| May | 12 | 67.12 | 66.08 | 63.62 |
| June | 14 | 83.64 | 82.53 | 78.21 |
| July | 24 | 82.96 | 81.25 | 78.08 |
| August | 30 | 80.18 | 79.26 | 76.18 |
| September | 11 | 72.31 | 70.59 | 68.86 |
| | 86 | 78.69 | 77.42 | 74.75 |

TABLE No. 3.
SIMULTANEOUS RECORDS
of Air Temperature exposed to the Sun and in the Shade.
GENERAL AVERAGE.

| Month. | No. of Readings. | Air (Shade). | Air (Sun). |
|--------------------|------------------|--------------|------------|
| August | 60 | 77.96 | 82.00 |
| September | 30 | 65.40 | 73.38 |
| | 90 | 77.11 | 79.15 |
| AVERAGE AT 9 A. M. | | | |
| August | 30 | 69.25 | 105.45 |
| September | 10 | 59.50 | 60.55 |
| | 30 | 66.00 | 90.48 |
| AVERAGE AT 12 M. | | | |
| August | 30 | 82.79 | 98.87 |
| September | 10 | 73.72 | 63.85 |
| | 30 | 81.10 | 97.20 |
| AVERAGE AT 6 P. M. | | | |
| August | 30 | 80.47 | 75.70 |
| September | 10 | 69.05 | 66.30 |
| | 30 | 76.66 | 72.56 |

TABLE No. 4.

DAY READINGS.

Earth Temperature at 7 and 10 inch depths, and simultaneous Air Temperatures air taken in shade only.

GENERAL AVERAGE.

| Month. | No. of Readings. | Earth 10". | Earth 7". | Air (Shade). |
|--------------------|------------------|------------|-----------|--------------|
| July | 72 | 71.74 | 71.46 | 79.11 |
| August | 18 | 66.79 | 67.72 | 76.73 |
| | 90 | 69.62 | 70.71 | 78.66 |
| AVERAGE AT 8 A. M. | | | | |
| July | 24 | 69.83 | 69.43 | 71.52 |
| August | 6 | 70.00 | 69.50 | 69.50 |
| | 30 | 69.88 | 69.45 | 71.11 |
| AVERAGE AT 12 M. | | | | |
| July | 24 | 72.00 | 73.62 | 75.97 |
| August | 6 | 71.00 | 73.00 | 82.83 |
| | 30 | 71.83 | 73.22 | 77.35 |
| AVERAGE AT 6 P. M. | | | | |
| July | 24 | 75.91 | 78.79 | 77.81 |
| August | 6 | 76.08 | 78.33 | 77.83 |
| | 30 | 75.93 | 78.70 | 77.81 |

TABLE No. 4A.

NIGHT READINGS.

Earth Temperatures at 7 and 10 inch depths, and simultaneous Air Temperatures.

GENERAL AVERAGE.

| Month. | No. of Readings. | Earth 10". | Earth 7". | Air (Shade). |
|---------------------|------------------|------------|-----------|--------------|
| July | 71 | 73.6 | 73.73 | 70.6 |
| August | 17 | 73.1 | 74.7 | 70.8 |
| | 88 | 73.5 | 73.6 | 68.3 |
| AVERAGE AT 6 A. M. | | | | |
| July | 24 | 70.9 | 70.5 | 61.0 |
| August | 5 | 68.9 | 69.7 | 61.7 |
| | 29 | 70.5 | 70.4 | 61.6 |
| AVERAGE AT 6 P. M. | | | | |
| July | 23 | 76.1 | 74.8 | 78.2 |
| August | 6 | 76.0 | 78.3 | 77.8 |
| | 29 | 76.17 | 75.5 | 78.1 |
| AVERAGE AT 12 P. M. | | | | |
| July | 24 | 73.8 | 74.7 | 64.7 |
| August | 6 | 73.8 | 75.3 | 68.8 |
| | 30 | 73.8 | 74.8 | 65.5 |

TABLE No. 5.

COMPARISON.

Between Air Temperature and Rail-Head. Air in the shade, Air in the Sun and Rail-Head.

GENERAL AVERAGE.

| Month. | No. of Readings. | Air (Shade). | Air (Sun). | Head of Rail. |
|--------------------|------------------|--------------|------------|---------------|
| August | 60 | 77.96 | 83.61 | 74.46 |
| September | 33 | 67.51 | 70.96 | 65.70 |
| | 93 | 74.19 | 78.07 | 71.22 |
| AVERAGE AT 9 A. M. | | | | |
| August | 30 | 71.75 | 78.45 | 69.80 |
| September | 11 | 58.18 | 60.13 | 59.68 |
| | 31 | 62.88 | 67.58 | 62.21 |
| AVERAGE AT 12 M. | | | | |
| August | 30 | 84.77 | 111.87 | 75.70 |
| September | 11 | 73.59 | 91.81 | 66.72 |
| | 31 | 75.90 | 98.41 | 68.12 |
| AVERAGE AT 6 P. M. | | | | |
| August | 30 | 77.47 | 75.70 | 78.95 |
| September | 11 | 65.86 | 66.27 | 70.59 |
| | 31 | 69.90 | 67.97 | 71.96 |

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days; reported especially for the STREET RAILWAY REVIEW, by Munn & Co., Patent Attorneys, 361 Broadway, N. Y.

ISSUE OF OCTOBER 11, 1892.

| | |
|---|---------|
| Electrically-operated (Electric) Railway Switch, C. A. Stone, Newton, Mass., and E. S. Webster, Boston, Mass. | 484,123 |
| Apparatus for Indicating the Position of Railway Cars, J. H. Hunter, Pittsburg, Pa., and J. T. Lucock, Allegheny, Pa. | 484,205 |
| (Street) Switch-Operating Device, G. Schumacher, Milwaukee, Wis. | 484,250 |
| Trolley-Wire Insulator, A. Anderson, Boston, Mass. | 484,280 |
| (Street) Track-Rail, J. T. Hill, and B. Meiring, Cleveland, O. | 484,315 |
| Trolley-Wire Cleaner, E. B. Smith, South Amherst, Mass. | 484,344 |
| Automatic Release for Cable Crossings, F. W. Smith, St. Louis, Mo. | 484,346 |

ISSUE OF OCTOBER 18, 1892.

| | |
|--|---------|
| Skylight for Electric Cars, H. Cochran, Chester, Pa. | 484,515 |
| Tramway Switch, J. H. Gagle, Seattle, Wash. | 484,706 |

ISSUE OF OCTOBER 25, 1892.

| | |
|--|---------|
| Cable Crossing, H. A. Benedict, New York, N. Y. | 484,772 |
| Electric Railway System, J. H. Pendleton, Brooklyn, N. Y. | 484,919 |
| Grip Mechanism for Cable Railways, J. H. Robertson, New York, N. Y. | 484,920 |
| Closed Conduit for Electric Railways, B. F. Sutton, Brooklyn, N. Y. | 484,924 |
| Apparatus for Sanding R. R. Tracks, A. A. Whipple, Providence, R. I. | 484,926 |
| Brake Handle, R. L. Fosbough and J. F. Milligan, St. Louis, Mo. | 484,954 |
| Trolley Pole Catcher, M. M. Wood, Chicago, Ill. | 484,986 |
| Car Fender and Guard, W. W. Baxter, Boston, Mass. | 484,989 |
| Insulator for Electric Railway Conductors, C. T. Lee, Boston, Mass. | 485,105 |

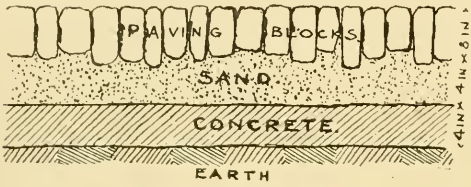
ISSUE OF NOVEMBER 1, 1892.

| | |
|--|---------|
| Cable Railway Grip, P. T. Taylor, San Francisco, Cal. | 485,237 |
| Underground Electric Trolley System, R. B. Ayres, New York, N. Y. | 485,252 |
| Switch Operating Device, B. Bartelmes, Brooklyn, N. Y. | 485,446 |
| Fare Registering Apparatus for Vehicles, F. W. G. Bruhn, Hamburg, Germany | 485,529 |
| Ratchet Brake for Cars, P. M. Kling, St. Louis, Mo. | 485,548 |
| Underground Electric Conduit and Trolley Bar for Electric Railway, J. S. Moss, Martinsburg, W. Va. | 485,555 |
| Safety Guard for Cars, J. Simms, New York, N. Y. | 485,498 |

WOOD PAVING.

THE disrepute into which wood paving has fallen in some places comes from the double disadvantage of ordinary methods. In the first place the greater part of the streets of many cities have to serve the double purpose of boulevards and traffic thoroughfares, and the alternative of heavy and light traffic can not be subserved by any one system of paving, to the highest degree of efficiency, but the friends of wood paving are firm in the belief that this system comprehends the most points of vantage and excludes the greatest disadvantage.

To what extent this statement may be received depends altogether upon the experience of the person with wood



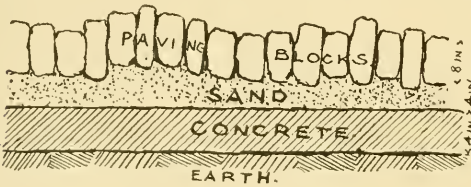
GRANITE BLOCK AS FIRST LAID.

pavement, bearing in mind three salient points, viz.: The construction, the bed upon which the construction is laid, and the traffic over the pavement.

It is stated, and truly stated, that various conditions and various defects demand different actions and various cures, so that no advocate of any one system of paving can cover all general conditions and say boldly, "My pavement is here the best." For instance, upon grades, asphalt is almost useless, and with heavy traffic and a yielding soil the detritus of macadam makes it inadmissible.

With wood paving the same holds true, and the surest method of judgment is by the experience of others.

In 1881 the "Improved Wood Pavement Company of London" proposed a trial of its system in Paris. The



GRANITE BLOCK AFTER USE.

blocks of red northern pine were set standing in such a way that the pressure was on the end of the grain, after being plunged into a bath of tar and creosote at the factory, and laid on a bed of cement. The blocks of each row were placed in contact, but between these consecutive rows three-eighths inch joints were filled with lath which was afterwards removed. These joints were then filled with bitumen, run warm to a third of their height and the remaining part filled with cement. As a finish, a bed of gravel was overlaid. In 1883, after eighteen months, the pavement was examined in six details. First, there was little depression; second, no decay of the blocks was noticeable; third, the street presented a good appearance;

fourth, the wood was unaltered; fifth, the cost of maintenance was small; and lastly, the tractive effort required to haul loads on this pavement was not so great as on cobble stones.

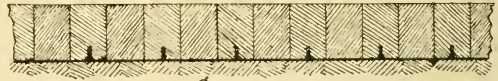
These were accounted for by reason of the care of laying the blocks, the resilience of the surface and the rigidity of the foundation.

On account of this trial the wood pavement was established on many thoroughfares, under these conditions, namely: The company was to lay the pavement; to maintain it for eighteen years, and receive in payment an annuity of 97 cents, and 45 cents for depreciation, payable quarterly. The 45 cents being for depreciation of the first coat at \$4.60, and 52 cents for annual maintenance.

Under these conditions there were laid upon the Avenue or the Champs Elysees 28,750 square yards, which has been in successful service since.

In England, the status of wood paving is as flattering as in Paris. In Kensington all main roads are paved with wood on a foundation of concrete six inches thick.

Over 200,000 square yards have been laid and in various ways. Creosoting is largely practiced, and the grouting used is in the most successful cases, Portland cement. Hence the paving costs about 37 cents a square yard per annum for first cost, and the blocks last 10 years. The concrete is practically good forever, and remains over as assets to the next term.



WOOD BLOCK AS FIRST LAID BY NATIONAL PAVEMENT CO.

In London there are 1,718 miles of public road, divided as follows:

| | |
|------------------------|-----------|
| Macadam | 573 miles |
| Granite | 280 " |
| Wood | 53 " |
| Asphalt | 13 1/2 " |
| Flint and gravel | 798 1/2 " |

The superficial area of wood pavement laid in the last year has been 980,533 square yards, and generally under the same conditions as the Kensington roads, with cement joints and solid foundations.

In America, where a solid foundation, which seems to be the chief desideration, our wood paving has not been so successful, from either a mechanical or sanitary point of view. The grouting here used is ordinarily gravel, and the foundation planks laid on the earth. This, of course, is easily broken and readily filled with water, which cannot find convenient course to the sewer.

To remedy these serious defects there has recently come into notice the method proposed by the National Pavement Company, with office at 624 The Temple, Chicago.

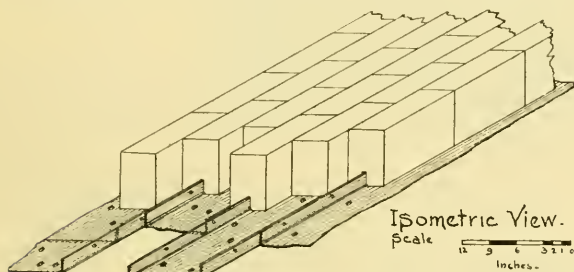
This method, shortly described, has for the foundation a steel plate capable of a tensile strength of 50,000 pounds to the inch. These plates are in 3-foot lengths, with flanges or ribs 1 3/8 inches high, on either side. These are laid from curb to curb across the street. Suitable

THE WAGNER MOTOR.

holes for pinning the flanges together are provided, and the bottoms of the plates are perforated for drainage. This foundation is the strongest possible, and is banked beneath by thoroughly settled soil with from two to three inches of sand. For heavy traffic there will be laid on the steel plates a surfacing of southern pine block, cut to size, say 9 inches long by 4 inches wide and 6 inches high. Every other block is grooved to sufficient height and width to straddle the plate rib, thus closing the joint and holding the plate pins immovable. Into each block small iron pins are driven, the heads protruding one-quarter inch, thus preserving a uniform space between the block. This interstice is finally filled with concrete, absolutely preventing the blocks from pulling out or tilting.

The advantages claimed are these: The pavement is inter-locking, self-supporting and even-wearing. The uniform blocks and plates are interchangeable, making repair easy. Sink holes are avoided. Soft steel plates are claimed to last 50 years. There is no detriment. It is rapidly laid. No foreign products are necessary. Man-holes may be covered by the blocks. The plates

AMONG the many new appliances electrical, a motor, the result of two years' study by Herbert A. Wagner, and manufactured by the Wagner Electric Manufacturing Company, St. Louis, is attracting much attention. The illustration shows it a compact machine, with heavy base, and occupying very small floor space, but exceedingly strong. Prominent among its good features are, perfect mechanical and electrical balance, low center of gravity, small number of parts, and ease of removing armature and field coils without disturbing pillow blocks. The field coils are wound on spools, securing highest insulation, but easily removed. All of the armature wire is embedded in iron core, and perfect ventilation is secured. Oil is required but once a month when motor is working, the bearings being self-feeding by means of a loose ring, which distributes lubricant from the oil boxes which have sight feeds. All bearings are



NATIONAL PAVEMENT COMPANY'S SYSTEM.

tested were loaded to 10,034 pounds on a 13-inch base without support, and showed a deflection of only a quarter of an inch. These plates were of number 10 tank steel.

The tractive possibilities are as follows, according to the London test. A horse can travel before falling:

| | |
|-----------------|------------|
| On granite..... | 132 miles. |
| On asphalt..... | 191 miles. |
| On wood..... | 330 miles. |

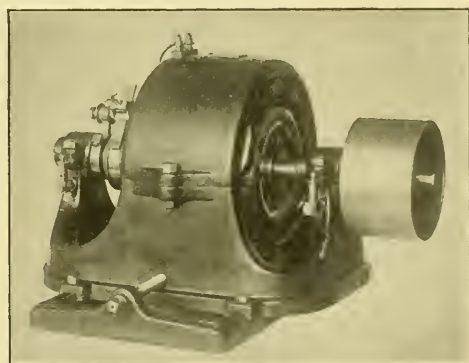
[On the preferences of drivers see September REVIEW.—Ed.]

The above shows the wood very applicable to paving streets for horse car tracks as well as for ordinary traffic.

The cost of laying this pavement is calculated at the same price per yard as granite laid on concrete, while the maintenance is claimed at almost nothing.

Our engravings show the blocks, plates and method clearly, and also a specimen of granite on concrete after wear.

AN ELECTRIC car got off the track in Houston, Texas, the other day, shaking up the passengers pretty generally, but the only one who really enjoyed the ride was a gallant Texas newspaper man, who says he did not mind it a bit, as a pretty young lady held him fast until the car stopped, when she stopped holding him.



THE WAGNER MOTOR.

mounted on universal ball sockets. Brushes are self-feeding, will not spark under change of load, may be changed while motor is running, and require renewal only three times a year. The motor may be reversed without changing the brush holders, readily starts under full load, and quickly attains normal speed. It is free from external magnetism, and small air gaps in magnetic circuit effect great saving in field current. These motors are perfectly adapted for constant potential currents and on 500-volt circuits. Great pains have been taken to secure a beautiful mechanical design, giving an attractive appearance to these motors, which will be built to any desired capacity. Taylor, Goodhue & Ames have the agency for six states, and will push the work actively.

Something New.

Leaving Chicago every Thursday at 3:00 p. m., on the fast express, the Wabash R. R. runs a Tourist Sleeper to Boston via Detroit, Montreal and the Canadian Pacific Railway. Rate per berth to Montreal, \$1.25; to Boston, \$1.50.

The Wabash also runs a Tourist Sleeping Car to Boston via Niagara Falls, leaving Chicago every Monday at 3:00 p. m. Same rate.

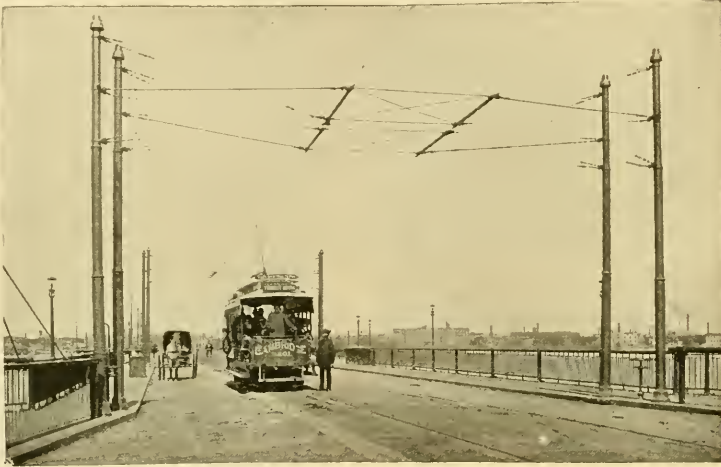
THE TROLLEY IN BOSTON.

A CORRESPONDENT in the Boston Herald makes the following brief, but concise and suggestive history of the rise of the broader spirit of the Hub:—

"The 'bridge car' has proved to be a great institution, and quite the most popular means of transit, rapid or

A COMPLIMENT.

THE Pittsburg Dispatch, in a fair-minded and liberal manner, pays the following compliment to the Pittsburg rapid transit companies: "Of all the influences which have combined to expand the material growth of Pittsburg, rapid transit is by far the most important. It has built up thousands of acres, which, under the old system



THE BRIDGE CAR.—BOSTON.

otherwise, Cambridge has yet known. A ride over 'the bridge,' as it is called, opens one of the most astonishing

of locomotion were practically worthless. This accession of territory and its improvement have added largely



THE "BRIDGE."—BOSTON.

views of newer Boston it is possible for the oldest inhabitant to imagine. Every day changes the aspect of a city whose proud boast once was to be as narrow in mind as narrow in streets, and to live and die a true blue conservative. But where Boston will end, now it has taken to making a fad of a new electric ride, goodness knows!"

The Bridge line is a part of the West End System, and was installed by the Thomson-Houston Company.

to the revenue of the city by increasing the number of taxpayers. It will be years before Pittsburg will accomplish its destiny by absorbing the county, but with the progress of rapid transit the work will go forward until consummated. New commercial and business centers will be established capable of sustaining large populations, and comfortable homes will fill the valleys and hillsides." So much for rapid transit.

TROLLEY VS. TELEPHONE.

Full Text of the Recent Important Victory of the Trolley over the Telephone, in the New York Court of Appeals.

THE following article is the opinion of Judge Maynard, of the New York Court of Appeals, and commends itself not only to the corporation attorney, but to the electric railway man, the manufacturer, and the general public as well.

It is perhaps the most luminous, just and appreciate legal view ever given on the subject. The decision points out 1. That the railway company in question had the right under the general law to adopt electric traction. 2. That laws are meant to be hospitable to invention and advance of sciences. 3. A judicial estimate of the trolley system.

The learned judge, in his decision, comes out in unqualified terms and gives the references of the referee, the law and the statutes on the case.

THE DECISION.

COURT OF APPEALS, HALL BLDG., N. Y.

ERRATUM:

Page 653, second column, line 26, read "horse cars" for "street cars."

ment of such a franchise, and urges many grounds in support of its position. We cannot assent to the argument of the learned counsel for the defendant, that the determination of this question is immaterial, because the state alone by its attorney general can bring suit for a usurpation of corporate powers, or because, ordinarily, the local authorities must prosecute unlawful obstruction of the streets, not involving the appropriation of private property. In the case of a corporation exercising a delegated authority for the public benefit, the actionable quality of a private injury resulting therefrom may depend upon the legislative will and the aggrieved party may be without remedy, if the damage sustained is the result of the proper exercise of a power or privilege conferred by law, and a right of action is not given by express enactment. This immunity from liability does not, however, extend to acts which are *ultra vires*, or which are equivalent to a confiscation or condemnation of the property rights of the citizen, unless provision is made for due compensation. If the sovereign power has never granted to the defendant the right to make use of electricity in the traction of its cars in the streets of Albany, it must respond to the plaintiff and to all others whose lawful pursuits are invaded by its illegal procedure. But, we think it is clear that under the act of 1862 (Chapter 233) and the ordinances of the common council of the city, the defendant was invested with the authority to adopt this method of transportation, and to place in the streets in question the apparatus and fixtures necessary for its practical and efficient use. The choice of a motive power is not expressly limited in the statute, except by the exclusion of the force of steam. It is not impliedly limited, except that the power selected must be of such a kind, or require such a mode of application as will make it a public nuisance, or render the passage of the street unsafe, or dangerous for travelers availing themselves of the ordinary means of locomotion. The report of the referee removes all doubt with reference to the safety and practical usefulness of the system adopted by the defendant. He finds, in substance, that it is the most efficient and economical and the best thus far devised, and less liable to accidents, through the displacement of machinery, than any other trolley system; that it subserves the public interests and satisfies the public wants with respect to transportation; that it is not prejudicial to the public health or dangerous to human life, and that no other system of electric propulsion of cars has thus far been demonstrated to be as practicable, effective and advantageous both to the public and to private interests, as the overhead single trolley system. As the evidence

is not contained in the record these findings must be deemed to have been supported by competent proofs and they leave no room for the contention that the use of this system is unsafe or dangerous or in any degree a public nuisance.

SCOPE OF THE ACT OF 1862.

The act of 1862 cannot properly be limited to such methods of operating street surface railways in cities as had then been invented and were then in actual use. The words of the statute are to be interpreted according to their natural and obvious meaning, and, as the terms employed are not ambiguous, extrinsic facts are not available to restrict the authority which it plainly confers. The language, literally construed, includes undiscovered as well as existing modes of operation. Electricity, as a natural and applied force, was then well known, and it is reasonable to infer that its adaptation as a propelling power was even then anticipated. It would be an unjust reflection upon the wisdom and intelligence of the law making body to assume that they intended to confine the scope of their legislation to the present, and to exclude considerations for the development of the future. If any presumption is to be indulged in it is that general legislative enactments are mindful of the growth and increasing needs of society, and they should be construed to encourage rather than to embarrass the inventive and progressive tendency of the people. The application of the defendant for this new grant of power must have reminded the legislature that in thirty years its original franchise of a turnpike may have proved inadequate for the wants of a thickly populous community, and it could not have failed to perceive that in a like period of time the operation of street cars might become obsolete or undesirable. It, therefore, wisely provided for the occurrence of such an emergency. It is not to be denied that it is a sound rule of statutory construction which permits nothing to be taken in a grant of corporate powers that is not plainly expressed or unequivocally given or not demanded by necessary implication. The defendant claims nothing more, but the plaintiff endeavors to cut down the franchise bestowed by eliminating from the statute the general words of the grant. As in 1862 these railways were run exclusively by animal power, the provision in section 4 of the act, which authorizes the defendant to adopt any mechanical or other power, or the combination of them, which it might choose to employ, except steam, was superfluous, if its range of selection is to be confined to the motive forces which had then been discovered and employed. The history of plaintiff's franchise is instructive upon this point. It is an intruder in the public streets and not possessed of any property rights which a court of equity can be invoked to protect, if the canon of construction which it insists upon apply to the grant of the defendant's franchises, shall be allowed to prevail. It is incorporated under the act of 1848 (chapter 265) providing for the formation of telegraph companies. At that time, and for twenty years afterward, the art of telegraphy, as known and practiced, did not include the transmission of human speech by means of the telephone over wires strung upon poles. But it has been held in other states and countries, and, as we think, rightly, that this form of transmitting messages through the medium of an electric current passing over extended wires is authorized by a statute for the incorporation of telegraph companies, although when the act was passed such form of communication was unknown. (*Wisconsin Telephone Company vs. Ashkoch*, 62 Wis. 32; *Cumberland Telegraph and Telephone Company vs. the United Electric Railway Company*, 42 Fed. Rep., 273; *Attorney General vs. Edison Telephone Company*, L. R. 6 Q. B. D., 244.) It would also be a narrow and illiberal construction of the statute to hold that the defendant was irrevocably bound by the choice of a motive power made in 1862. It then selected the only practicable one, but the authority to employ others was not thereby exhausted. It was a continuing privilege and was intended to be potential whenever and as often as the means of public travel might be improved or facilitated by its exercise. Equally flexible was the power given to the common council of the city to impose such reasonable conditions upon the enjoyment by the defendant of the franchises of a street railway company as in their judgment the interests of the public seem to require. Their authority in this respect was coincident in extent with the company's right of selection. They could limit the municipal assent to a railroad operated in a specified way, as they did by the ordinance of 1862, and while that remained unmodified no other method could be lawfully used, and

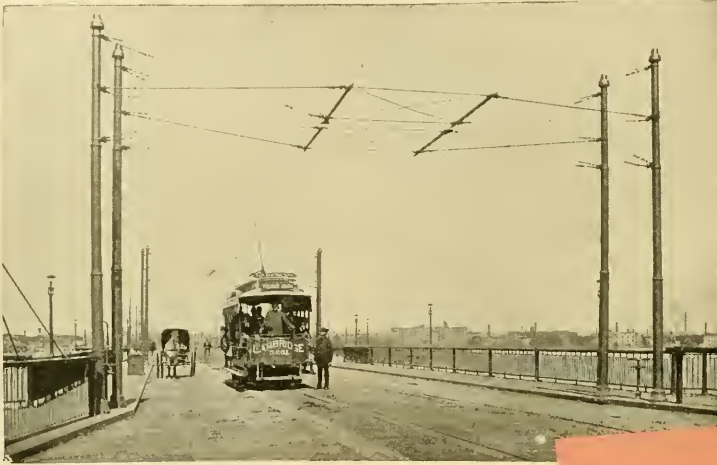
THE TROLLEY IN BOSTON.

A CORRESPONDENT in the Boston Herald makes the following brief, but concise and suggestive history of the rise of the broader spirit of the Hub:—

"The 'bridge car' has proved to be a great institution, and quite the most popular means of transit, rapid or

A COMPLIMENT.

THE Pittsburg Dispatch, in a fair-minded and liberal manner, pays the following compliment to the Pittsburg rapid transit companies: "Of all the influences which have combined to expand the material growth of Pittsburg, rapid transit is by far the most important. It has built up thousands of acres, which, under the old system



THE BRIDGE CAR.—BOSTON.

otherwise, Cambridge has yet known. A ride over 'the bridge,' as it is called, opens one of the most astonishing

of locomotion were a vision of territory an



THE "BRIDGE,"—BOSTON.

views of newer Boston it is possible for the oldest inhabitant to imagine. Every day changes the aspect of a city whose proud boast once was to be as narrow in mind as narrow in streets, and to live and die a true blue conservative. But where Boston will end, now it has taken to making a fad of a new electric ride, goodness knows!"

The Bridge line is a part of the West End System, and was installed by the Thomson-Houston Company.

to the revenue of the city by increasing the number of taxpayers. It will be years before Pittsburg will accomplish its destiny by absorbing the county, but with the progress of rapid transit the work will go forward until consummated. New commercial and business centers will be established capable of sustaining large populations, and comfortable homes will fill the valleys and hillsides." So much for rapid transit.

TROLLEY VS. TELEPHONE.

Full Text of the Recent Important Victory of the Trolley over the Telephone, in the New York Court of Appeals.

THE following article is the opinion of Judge Maynard, of the New York Court of Appeals, and commends itself not only to the corporation attorney, but to the electric railway man, the manufacturer, and the general public as well.

It is perhaps the most luminous, just and appreciate legal view ever given on the subject. The decision points out 1. That the railway company in question had the right under the general law to adopt electric traction. 2. That laws are meant to be hospitable to invention and advance of sciences. 3. A judicial estimate of the trolley system.

The learned judge, in his decision, comes out in unqualified terms and gives the references of the referee, the law and the statutes on the case.

THE DECISION.

COURT OF APPEALS—Hudson River Telephone company, respondent, vs. Watervliet Turnpike and Railroad company, appellant. John S. Wise and Marcus T. Hun, for appellant. E. Countryman and John A. Delehanty, for respondent. MAYNARD, J.

All the injuries of which the plaintiff complains are due to the adoption by the defendant of the single trolley system of electric propulsion. It becomes, therefore, of the first importance to determine whether this change of motive power was authorized by law. The plaintiff makes a vigorous attack upon the right of the railway company to the employment of such a franchise, and urges many grounds in support of its position. We cannot assent to the argument of the learned counsel for the defendant, that the determination of this question is immaterial, because the state alone by its attorney general can bring suit for a usurpation of corporate powers, or because, ordinarily, the local authorities must prosecute unlawful obstruction of the streets, not involving the appropriation of private property. In the case of a corporation exercising a delegated authority for the public benefit, the actionable quality of a private injury resulting therefrom may depend upon the legislative will and the aggrieved party may be without remedy, if the damage sustained is the result of the proper exercise of a power or privilege conferred by law, and a right of action is not given by express enactment. This immunity from liability does not, however, extend to acts which are *ultra vires*, or which are equivalent to a confiscation or condemnation of the property rights of the citizen, unless provision is made for due compensation. If the sovereign power has never granted to the defendant the right to make use of electricity in the traction of its cars in the streets of Albany, it must respond to the plaintiff and to all others whose lawful pursuits are invaded by its illegal procedure. But, we think it is clear that under the act of 1862 (Chapter 233) and the ordinances of the common council of the city, the defendant was invested with the authority to adopt this method of transportation, and to place in the streets in question the apparatus and fixtures necessary for its practical and efficient use. The choice of a motive power is not expressly limited in the statute, except by the exclusion of the force of steam. It is not impliedly limited, except that the power selected must be of such a kind, or require such a mode of application as will make it a public nuisance, or render the passage of the street unsafe, or dangerous for travelers availing themselves of the ordinary means of locomotion. The report of the referee removes all doubt with reference to the safety and practical usefulness of the system adopted by the defendant. He finds, in substance, that it is the most efficient and economical and the best thus far devised, and less liable to accidents, through the displacement of machinery, than any other trolley system; that it subserves the public interests and satisfies the public wants with respect to transportation; that it is not prejudicial to the public health or dangerous to human life, and that no other system of electric propulsion of cars has thus far been demonstrated to be as practicable, effective and advantageous both to the public and to private interests, as the overhead single trolley system. As the evidence

is not contained in the record these findings must be deemed to have been supported by competent proofs and they leave no room for the contention that the use of this system is unsafe or dangerous or in any degree a public nuisance.

SCOPE OF THE ACT OF 1862.

The act of 1862 cannot properly be limited to such methods of operating street surface railways in cities as had then been invented and were then in actual use. The words of the statute are to be interpreted according to their natural and obvious meaning, and, as the terms employed are not ambiguous, extrinsic facts are not available to restrict the authority which it plainly confers. The language, literally construed, includes undiscovered as well as existing modes of operation. Electricity, as a natural and applied force, was then well known, and it is reasonable to infer that its adaptation as a propelling power was even then anticipated. It would be an unjust reflection upon the wisdom and intelligence of the law making body to assume that they intended to confine the scope of their legislation to the present, and to exclude considerations for the development of the future. If any presumption is to be indulged in it is that general legislative enactments are mindful of the growth and increasing needs of society, and they should be construed to encourage rather than to embarrass the inventive and progressive tendency of the people. The application of the defendant for this new grant of power must have reminded the legislature that in thirty years its original franchise of a turnpike may have proved inadequate for the wants of a thickly populous community, and it could not have failed to perceive that in a like period of time the operation of street cars might become obsolete or undesirable. It, therefore, wisely provided for the occurrence of such an emergency. It is not to be denied that it is a sound rule of statutory construction which permits nothing to be taken in a grant of corporate powers that is not plainly expressed or unequivocally given or not demanded by necessary implication. The defendant claims nothing more, but the plaintiff endeavors to cut down the franchise bestowed by eliminating from the statute the general words of the grant. As in 1862 these railways were run exclusively by animal power, the provision in section 4 of the act, which authorizes the defendant to adopt any mechanical or other power, or the combination of them, which it might choose to employ, except steam, was superfluous, if its range of selection is to be confined to the motive forces which had then been discovered and employed. The history of plaintiff's franchise is instructive upon this point. It is an intruder in the public streets and not possessed of any property rights which a court of equity can be invoked to protect, if the canon of construction which it insists upon apply to the grant of the defendant's franchises, shall be allowed to prevail. It is incorporated under the act of 1848 (chapter 265) providing for the formation of telegraph companies. At that time, and for twenty years afterward, the art of telegraphy, as known and practiced, did not include the transmission of human speech by means of the telephone over wires strung upon poles. But it has been held in other states and countries, and, as we think, rightly, that this form of transmitting messages through the medium of an electric current passing over extended wires is authorized by a statute for the incorporation of telegraph companies, although when the act was passed such form of communication was unknown. (*Wisconsin Telephone Company vs. Ashkoeh*, 62 Wis. 32; *Cumberland Telegraph and Telephone Company vs. The United Electric Railway Company*, 42 Fed. Rep., 273; *Attorney General vs. Edison Telephone Company*, L. R. 6 Q. B. D., 244.) It would also be a narrow and illiberal construction of the statute to hold that the defendant was irrevocably bound by the choice of a motive power made in 1862. It then selected the only practicable one, but the authority to employ others was not thereby exhausted. It was a continuing privilege and was intended to be potential whenever and as often as the means of public travel might be improved or facilitated by its exercise. Equally flexible was the power given to the common council of the city to impose such reasonable conditions upon the enjoyment by the defendant of the franchises of a street railway company as in their judgment the interests of the public seem to require. Their authority in this respect was coincident in extent with the company's right of selection. They could limit the municipal assent to a railroad operated in a specified way, as they did by the ordinance of 1862, and while that remained unmodified no other method could be lawfully used, and

they could, by a subsequent ordinance, as in 1889, authorize the necessary changes to be made in the equipment of the streets for the introduction of electricity as a propelling force. This power is fairly inferable from the original act, and may also, perhaps, be deduced from the provisions of the city charter, which authorize them to regulate the use of the streets by railroads.

A DISTINCTION TO BE BORNE IN MIND.

This case is clearly distinguishable from that of the Third Avenue railroad (112 N. Y. 396) cited at length by plaintiff's counsel. There the railroad company had no express grant of legislative authority, and the consent of the municipality was refused. It attempted to override the local authorities and compel them by mandamus to give their approval to the opening and excavation of the streets for the purpose of substituting a sub-surface mode of operation, when the granting of the permission plainly involved the exercise of judgment and discretion. It was held that under such circumstances the department of public works could not be coerced to act favorably upon the company's application. But the case is not authority for the broad proposition for which the plaintiff contends, that where the right to select a motive power is expressly given and is not limited, either as to time or kind, and a selection has been made with the approval of the city authorities, the company cannot subsequently adopt a new and better system of propulsion upon obtaining the municipal consent thereto. The defendant was not subject to the provisions of section 12 of the street surface railroad act of 1884 (chapter 252), as amended by chapter 531 of the laws of 1889, requiring the approval of the railroad commissioners and the consent of the owners of one-half in value of the property abutting upon the streets. It had the right to make the change under the act of 1862, upon obtaining the consent of the common council, and hence it is embraced within the saving clause contained in section 18, which declares that the act of 1883 shall not interfere with, repeal, or invalidate any rights theretofore acquired under the laws of the State by any horse railroad company, or affect or repeal any right of an existing street surface railroad company to construct, extend, operate and maintain its road in accordance with the terms and provisions of its charter and the acts amendatory thereof. Inchoate, as well as perfected rights, are saved by such a provision. [N. Y. Cable Company, vs. Mayor, etc., 104 N. Y. 1.] The defendant's authority to use electric motors in the propulsion of its cars in the streets of Albany, and to operate them by the single trolley system, cannot, therefore, be successfully questioned, and, unless some actionable damage has resulted, or will result, to the plaintiff therefrom, its complaint was properly dismissed by the trial court. There is no question of prior equities involved. It is a matter of strict legal right. Neither priority of grant, nor priority of occupation can avail either party. The plaintiff has a franchise, which is entitled to protection, but the prime difficulty it encounters grows out of its subordinate charter. It has been given and accepted upon the express condition that it shall not obstruct or interfere with the enjoyment by the defendant of its franchises. The plaintiff is not using the streets for one of the purposes to which they have been dedicated as public highways, while the defendant is occupying them in such a manner as to expedite public travel and promote the public use to which they were originally devoted. The condition contained in the plaintiff's grant would have been implied had it not been expressly named. The primary and dominant purpose of a street is for public passage, and any appropriation of it by legislative sanction to other objects must be deemed to be in subordination to this use unless a contrary intent is clearly expressed. The inconvenience, or loss which others may suffer from the adoption of a mode of locomotion authorized by law, which is carefully and skillfully employed, and which does not destroy or impair the usefulness of a street as a public way, is not sufficient cause for a recovery unless there is some statute which makes it actionable. A different rule prevails if there has been an encroachment upon private rights to the extent of an appropriation of private property, and it was upon this ground that the decision in the elevated railroad cases was placed. (Story vs. N. Y. E. R. R. Company, 90 N. Y. 122; Lahr vs. Met. E. R. R. Company, 104 id. 268.) It was there held that an abutting owner has an easement of light, air and access in the street in front of his premises, of which he cannot be lawfully deprived without compensation, by the erection and use of an elevated railway structure. But the plaintiff has no easement in the public streets. It is there by virtue of a legislative grant, revocable at the pleasure of the power which made it, constituting, while it continues, a valuable franchise, which is recognized as property in the fullest sense of the term. (People, etc. vs. O'Brien, 111 N. Y. 1.) The plaintiff's title to this property is, however, encumbered by a condition, which diminishes its value, and it cannot rightfully complain of the burden which it has voluntarily

assumed. It is a part of its compact with the State that the maintenance of its lines of communication shall not prevent the adoption by the public of any safe, convenient and expeditious mode of transit, such as the defendant's system has been shown to be. It is not deprived of any property right, but is simply compelled to yield the subservience which it is bound to render under the charter which gave it existence. These considerations, necessarily, dispose of one of the grounds upon which the plaintiff claims to be entitled to relief from the special injury sustained by the acts of the defendant, namely, the derangement of the electric currents upon its lines of wire by means of induction, as it is called, in electrical dynamics. It seems to be indispensable to the successful prosecution of the plaintiff's business, that it should make use of an exceedingly weak and sensitive current of electricity. By a law of electric force, not clearly defined or understood, the transmission of a powerful current, such as the defendant must use to supply motion to its cars, along a line of wire parallel with and in close proximity to the plaintiff's wires, induces upon the latter an additional current, which renders the operation of the plaintiff's telephones at all times difficult and sometimes impracticable. It is found that this disturbance cannot be avoided by the defendant without a complete change of the system adopted, and the use of motors which are more expensive, more dangerous and less useful and efficient. It is obvious that to require such change to be made would be to grant to the plaintiff, by a decree of the court, that which the legislature has expressly and intentionally withheld.

ONLY PARTIAL OCCUPANCY OF THE STREETS.

But the plaintiff is exposed to another danger which deserves consideration. Its system of communication is only partially established in the public streets. Its telephones are located upon the premises of its subscribers and patrons and at a central exchange, which is upon private property. Its instruments are connected by branch wires with the main wires suspended on the poles in the streets. To render their respective plants available, both parties must have a return electric current and both use the current for that purpose. The plaintiff grounds its wires upon private property and, in many cases, connects them with the gas and water pipes, and in this way establishes and completes its required circuit. It is immaterial whether its wires are grounded upon its own property or that of others who permit the plaintiff to so use their premises. Its possession as a licensee would be lawful while the license continues. The defendant allows the electric current used for the movement of its cars to escape or discharge, at least in part, directly from the rails into the ground, from whence it spreads or flows by reason of the conductivity of the earth upon plaintiff's grounded wires, and the most serious loss which the plaintiff sustains results from this cause, which is scientifically known as conduction. The defendant insists that it has an equal right with plaintiff to make use of this property or law of nature in the conduct of its business just as all are entitled to the common use of the air and the light of the heavens, which in a certain sense is undoubtedly true. But the defendant does something more. It does not leave the natural forces of matter free to act unaffected by any interference on its part. It generates and accumulates electricity in large and turbulent quantities and then allows it to escape upon the premises occupied by the plaintiff, to its damage. We are not prepared to hold that a person, even in the prosecution of a lawful trade or business upon his own land, can gather there by artificial means a natural element like electricity and discharge it in such a volume that, owing to the conductive properties of the earth, it will be conveyed upon the grounds of his neighbor with such force and to such an extent as to break up his business, or impair the value of his property and not be held responsible for the resulting injury. The possibilities of the manifold industrial and commercial uses to which electricity may eventually be adapted and which are even now foreshadowed by the achievements of science, are so great as to lead us to hesitate before declaring an exemption from liability in such a case. It is difficult to see how responsibility is diminished or avoided, because the actor is aided in the accomplishment of the result by natural law. It is not the operation of the law to which the plaintiff objects, but the protection upon its premises by unnatural and artificial causes of an electric current in such a manner and with such intensity as to materially injure its property. It cannot be questioned that one has the right to accumulate water upon his own real property and use it for a motive power, but he cannot discharge it there in such quantities that, by the action of physical forces, it will inundate his neighbor's lands and destroy his property, and shield himself from liability by the plea that it was not his act, but an inexorable law of nature that caused the damage. Except where the franchise is to be exercised for the benefit of the public, the corporate character of the aggressor can

make no difference. The legislative authority is required to enable it to do business in its corporate form, but such authority carries with it no lawful right to do an act which would be a trespass, if done by a private person conducting a like business. If either collects for pleasure or profit, the subtle and imperceptible electric fluid, there would seem to be no great hardship in imposing upon it, or him, the same duty which is enacted of the owner of the accumulated water power, that of providing an artificial conduit for the artificial product, if necessary to prevent injury to others. But the record before us does not require a determination of the question in this form. The use which the plaintiff is making of its grounded wires is part of its system of telephonic construction through its public streets and a necessary component of the service it maintains there under the permission of the state, and is subject to the condition that it will not incommode the use of the streets by the public. It is one indivisible franchise and is in its entirety subservient to the lawful uses which may be made of these thoroughfares for public travel. In this respect no distinction can be made between the injuries resulting from induction and conduction.

INJURIES AS AFFECTED BY PROXIMITY.

In the disposition of this appeal there has been no occasion to make any application of the rule that where a public use, authorized by law, takes no property of the individual, but merely affects him by proximity, the necessary interference in his business or in the enjoyment of his property, occasioned by such use, furnishes no basis for damages. (*Raccliff Exrs. vs. Mayor*, 4 N. Y. 195; *Bellinger vs. N. Y. C. R. R.*, 23 id. 42; *Mayor vs. N. Y. C. and H. R. R. R.*, 88 id. 351; *Uline vs. N. Y. C. and H. R. R. R.*, 101 id. 98; *Am. Bk. Note Co. vs. N. Y. E. R. R. Co.* 129 id. 250.) Under such a rule it would be a grave question whether the injuries, to which the plaintiff is subjected, would not, if made permanent, constitute a servitude upon its property, which could not be imposed without compensation, provided the parties were occupying the streets upon an equal footing. As was said by Judge Andrews in *Cogwell vs. N. Y. and N. H. R. R. Co.* (103 N. Y., 14): "It is, in many cases, difficult to draw the line and to determine whether a particular use is consistent with the duties and burdens arising from vicinage, or whether it inflicts an injury for which the law affords a remedy." We are spared the task of discrimination in this case by reason of the legal attitude which the plaintiff has assumed in its occupation of the streets. It has accorded to the public, by the manner in which it has elected to use its franchise, the unrestricted right of passage, and it cannot question the form in which such right shall be enjoyed, so long as it is of lawful origin and is utilized with proper care and skill. The defendant's mode of conveyance of passengers is of this character, and the plaintiff can no more justly complain of its loss from this source than it could if, by the jarring of loaded vehicles passing up and down Broadway, its delicate and sensitive instruments were displaced, and their beneficial use impaired or destroyed. There is also an appeal by the defendant from an order denying a motion for an extra allowance of costs. The decision of the court below was placed upon the ground of a want of power, and the special reason assigned was "that the action being to restrain the defendant from employing a particular system only, and over a part only of the road, the franchise was not involved, and there is, therefore, no basis on which an allowance can be estimated." In denying the motion for this sole cause we think the supreme court erred. The subject matter of the controversy litigated was the right of the defendant to use the single trolley system in the operation of its road upon Broadway and South Ferry street, and the prayer for relief in the complaint is that an injunction issue "restraining the defendant from operating its said railroad through the city of Albany by the electric system herein described." If the right thus sought to be perpetually enjoined has a money value, and there was any evidence in the moving papers tending to establish such value, the court had jurisdiction to entertain the motion, and it was its duty to exercise its discretion and dispose of the application upon its merits. We have examined the record sufficiently to satisfy us that there was some proof of this character. One witness testified that the right of the defendant to run its cars by electric motors upon the single trolley system in the city of Albany is worth to the company the sum of at least \$300,000, and as against the double trolley system or any other known system, at least \$76,000. We are not permitted to say how much this and similar evidence may be worth. We are dealing exclusively with a question of power. Whether there shall be any allowance at all, or what the amount of it shall be, and how far the hardships of the plaintiff's situation shall affect the allowance, if at all, are questions primarily to be considered by the special term, and can be safely entrusted to its determination. The authorities cited in the opinion of the general term were all cases where no evidence was pre-

sented as to the commercial value of the right or franchise in question, and the decision was that in the absence of such evidence it could not be presumed to have a particular value. The just inference from them is that, if such proofs had been submitted, the court might have considered them as the basis for an allowance. (*The People vs. the Genesee Valley Can. R. R. Co.*, 95 N. Y. 666; *Conaughty vs. Saratoga Bk.*, 92 id. 401; *Heilman vs. Lazarus*, 12 Abb. N. C. 19). The order of the general term granting a new trial must be reversed, and the judgment entered upon the report of the referee affirmed, with costs in all courts. The order denying the motion for an additional allowance must be reversed, with costs, and the motion remitted to the supreme court to be there heard upon its merits. All concur.

NEW PUBLICATIONS.

ELECTRIC TRACTION ON RAILWAYS AND TRAMWAYS is a late publication of Biggs & Co., 139-40 Salisbury Court, Fleet street, London, E. C., which bears upon its title page the well-known name of Anthon Reckenzann, member of all the widely-known electrical societies of Europe.

It is not the scope of the book to go deeply into original research, but is rather a summary of all the important incidents of the history of electric traction, together with a resume of the best practice in regard to construction and operation. A careful reader of current traction literature will readily recognize the extent of Mr. Reckenzann's draft upon these supplies of information, and will gladly supplement his reading of current history by a perusal of the dictum expressed in this work. As a compendium of practical information, the book will be of benefit to almost every electric worker, while to the lay-reader also it is of considerable interest. Chap. VII. 442 pp. Price, \$1.25.

R. D. NUTTALL COMPANY, Allegheny, are mailing an attractive new catalogue to the trade, and on the first page of the text have an important announcement "To owners and managers of street railways." Sixty pages are required even to concisely set forth the specialties of this company, presenting a striking illustration of the growth and present magnitude of their business. Special attention is called to their trolley and intermediate rawhide gears.

LIPPINCOTT'S MAGAZINE for November is fully up to the high standard so long established, and has, among other prominent articles, "More than Kin," by Marion Harland; "The Sporting Editor" (of the racy Journalist series), by J. B. McCormick; "Cricket in the United States;" "In a Gondola," and "A Story Without a Moral." There is not a dull page in the number.

COMPLIMENTS of the Electrical Supply Company, railway department, is the reading engraved in an original manner on the cover of a neat pamphlet, distributed at the Convention, and now being mailed to street railways.

THE SHORT ELECTRIC RAILWAY COMPANY issue two tasty leaflets under title of "The Short Fearless Motor" and "The Short Slow Speed Generators," setting forth the salient features, advantages and history of the apparatus named.

"**SOME Saw Suggestions**" is the artistic cover title of a nicely illustrated pamphlet, explaining in detail the operation of the Bryant metal sawing machines, made by the Q. & C. Company, Phenix Building, Chicago.

GIVING A GOOD MAN CREDIT.

STREET Railways and Republics are supposed, by the general public, to be ungrateful, but the recent action of the Cincinnati Street Railway gives the above assertion the lie, by adopting an appreciate vote of thanks to John Harris, the superintendent who handled the large crowds of the Columbus reception in such a satisfactory manner, as follows:

Resolved, That the thanks of this company are due to Superintendent John Harris, for the very efficient manner in which he handled the cars on the various lines of the company during the three days of Christopher Columbus reception festivities, causing no interference with the parades, and at the same time accommodating the patrons of the street railways to the fullest extent.

Cincinnati, October 25th, 1892.

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

D. F. LONGSTREET, PRESIDENT, Denver, Col.
 DR. A. EVERETT, FIRST VICE-PRESIDENT, Cleveland, O.
 JOEL HURT, SECOND VICE-PRESIDENT, Atlanta, Ga.
 W. WORTH BEAN, THIRD VICE-PRESIDENT, St. Joseph, Mich.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE PRESIDENTS, and JOHN G. HOLMES, PITTSBURG, Pa.; J. D. CRIMMINS, New York City; THOS. MINARY, Louisville, Ky.; JAS. R. CHAPMAN, Grand Rapids, Mich., and BENJ. E. CHARLTON, Hamilton, Ont.

Massachusetts Street Railway Association.

President, CHARLES B. PRATT, Salem; Vice-presidents, H. M. WHITNEY, Boston, AMOS F. BREED, Lynn, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON; Lawrence.
 Meets first Wednesday of each month.

Ohio State Tramway Association.

JOHN N. STEWART, Ashtabula, President; JOHN HARRIS, Cincinnati, Vice-president; J. B. HANNA, Cleveland, Secretary and Treasurer; E. K. STEWART, Columbus Chairman Executive Committee.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice-president, THOS. C. BARE, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee, OFFICERS and C. B. THURSTON, Jersey City; H. ROMAINE, Patterson; LEWIS PERLINE, JR., Trenton.

The Street Railway Association of the State of New York.

C. DENSMORE WYMAN, PRESIDENT, New York.
 D. B. HANSBROUCK, FIRST VICE-PRESIDENT, New York.
 JAS. A. POWERS, SECOND VICE-PRESIDENT, Glen Falls.
 W. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn.
 EXECUTIVE COMMITTEE.—D. F. LEWIS, Brooklyn; JOHN N. BECKLEY, Rochester.
 J. W. McNAMARA, Albany.
 The next meeting will be held at Rochester, September 19, 1893.

Alabama.

MONTGOMERY, ALA.—The West End, Riverside & Electric Railway is a certainty. It will cost \$75,000 and the New York Electrical & Engineering Company, under F. H. Tidman, resident manager, will do the installing.

Arizona.

PHOENIX, ARIZ.—Forfeit of \$25,000 has been put up to assure work on the new electric this fall. G. W. Stone, of San Francisco, is also in the city for the purpose of closing up contracts relative to building electric lines throughout the city. These two enterprises involve the investment of more than half a million dollars.

California.

OAKLAND, CAL.—Welles Whitmore and J. K. Alsip have applied for a franchise to the western part of the city.

OAKLAND, CAL.—Theodore Meetz has bought and paid for the Oakland-Alameda horse line. The electric equipment of the line will now be made.

PASADENA, CAL.—The report is positively made that a road will be in operation in a year between Los Angeles and Pasadena.

SAN JOSE, CAL.—Jacob Rich asks city council for additional streets. Ordinance still pending.

SACRAMENTO, CAL.—Livermore & Gallatin file \$25,000 bond to construct railway, water power to be used; L. T. Hatfield, attorney.

Chicago.

CHICAGO.—The Chicago & Evanston Electric Railway ordinance has been reported favorably by the finance committee to run electric cars on the Evanston line of the North Chicago Railway, from Graceland avenue to Dewey court.

CHICAGO.—The Cicero and Proviso will apply to the Mzywood board for a franchise.

CHICAGO.—The St. Louis-Chicago Electric has right-of-way into the two cities and have contracted for ties. General Electric and Westinghouse figuring on motors.

Colorado.

DENVER, COLO.—Leonard & Montgomery will soon begin active work on the Manchester, Valverde & Ft. Logan line.

DENVER, COLO.—Lakewood Electric and Investment Company succeed the D. L. & G. road. The company will supply electricity for heating, lighting and power purposes. Directors, F. E. Gove, G. D. F. Rouse, F. W. Loveland, H. V. Cooke and H. H. Martin. The capital stock is \$50,000.

PUEBLO, COLO.—The council has passed an ordinance making grades and compelling street railways to lower or elevate their tracks in conformity.

DENVER, COLO.—The Lakewood & Golden lets power-house to Smith & Ashton, \$10,000; Sioux City Corliss, Erie boilers; electrical equipment ordered.

DENVER, COLO.—The Jones Car Company has been organized. H. A. W. Tabor, president; W. E. Finch, secretary; H. M. Jones, manager.

DENVER, COLO.—Work has begun on the Westminster University electric road. J. H. Drinkwater and others are buying land for town lots.

DENVER, COLO.—The Metropolitan extension franchise has been passed over the mayor's veto.

DENVER, COLO. The Phoenix Tramway Company articles of incorporation; capital stock, \$200,000; will operate in Arapahoe county, Colorado, and Arizona Territory, with principal office at Denver; directors John S. Macbeth, Frederick Robinson, Jr., Henry B. Robinson, Granville Malcolm and George M. Harris; object, to build, construct and maintain street railways.

Connecticut.

MERIDEN, CONN.—J. W. Coe and C. W. Cahill, new owners of the Meriden Railway, say that electricity will be put in next spring.

NEW BRITAIN, CONN.—The new railway and light company has organized. Chas. S. Landers, of this place, secretary; and Louis Whitney, general manager.

NEW HAVEN, CONN.—New Haven and West Haven Road sold to the Winchester Avenue for \$500,000, purchase mortgage. The Winchester will apply for trolley rights, and is a syndicate concern, Wagner & Kelley, lawyers, pushed the deal.

District of Columbia.

WASHINGTON, D. C.—The D. C. Suburban Railway Company, with offices in the Loan and Trust Building, has decided to begin building at once. D. J. Howell, engineer, will prepare specifications for bids. Col. G. Moyer, D. J. Howell and H. Barton were at the convention to report on various systems.

WASHINGTON, D. C.—The electric road from Takoma to Burnt Mills has organized. Capital, \$100,000. Directors: Dr. C. G. Stone, C. H. Mosher, E. P. Clark, J. D. Gibbs, S. D. Waters and B. F. Peters.

Florida.

JACKSONVILLE, FLA.—Col. D. B. Dyer, of Atlanta, Ga., and also of the Conklin syndicate, of Kansas City, is here. It probably means a road for the syndicate.

JACKSONVILLE, FLA.—The council adopted the Jacksonville Street Railway Company franchise, and the road must be an electric. Mayor Robinson and Dr. L'Engle are the public works committee.

Georgia.

ATLANTA, GA.—Henry Lanier and New York capitalists will begin immediately a new street railway on a number of streets. The New Yorkers will be in town November 20. The franchise has been granted and the route mapped out. A new office building will probably be built.

ATLANTA, GA.—The Metropolitan and all its property under the control of Receiver Broyles were sold to H. M. Atkinson at \$121,000. Boston parties are behind the deal.

OPELIKA, GA.—The building of a dummy line from Opelika to Auburn is again being agitated. A South Carolina gentleman proposes to take \$12,000 stock, and asks only \$10,000 more to complete the work. Between \$4,000 and \$5,000 has already been subscribed, and it is beginning to look like the dummy is a certainty.

SAVANNAH, GA.—D. G. Purse will apply for right to condemn right-of-way for a new line of the Savannah and Isle of Hope Railway.

Illinois.

CHARLESTON, ILL.—The Charleston Street Railway Company; capital stock, \$100,000; incorporators, Murat W. Hopkins, James W. Near and James W. Rardin.

E. ST. LOUIS, ILL.—Engineer A. E. Abend has surveyed a road for Gignon & Greenwood to connect Landsdown Heights with the city. Contracts ready to let.

ELGIN, ILL.—The Elgin, Aurora & Fox River Electric has all the right of way, except two or three farms, which will be acquired this winter. The rails will be T.

GENEVA, ILL.—Work on the Elgin, Aurora and Fox River electric is progressing well.

PEORIA, ILL.—The Prospect Heights Railway Company has been organized at \$50,000. The stock all taken. The officers are: Martin Kingman, president; Charles W. Constantine, vice-president; O. T. Heald, treasurer; J. B. Samuel, secretary.

Indiana.

INDIANAPOLIS, IND.—Citizens on the south side are holding meetings toward securing electric traction for that portion of the city. Father O'Donoghue is chairman of committee to wait upon President Frenzel, of the Citizens road.

LA FAYETTE, IND.—Snoddy, Brown, et al, will construct two miles of road-bed for the railway extension to be completed by July 1, 93, T. J. Levering.

MUNCIE, IND.—Fred E. Smith, of Montpelier, Vt., president of the Muncie Street Railway, says that electricity will be used, and work will begin soon.

Indian Territory.

OKLAHOMA.—Organized, at Guthrie, the Guthrie Electric Railway Company; capital stock, \$75,000. Directors—Wm. D. Ford, Pittsburg, Kan.; L. West, L. F. Rafferty, U. C. Guss, F. R. Phister and D. M. Ross, Guthrie.

Iowa.

DAVENPORT, IA.—The railway has elected the same directors.

DUBUQUE, IA.—Notice is given of the organization of the Eighth street and West Dubuque Electric Street Railway Company. J. R. Lindsay, secretary. Capital, \$100,000. The persons constituting the first board of directors are: William H. Doane, Lucius H. Biglow, Edward P. Griswold, Walter Tod, Jacob C. Harper, J. R. Lindsay, Geo. W. Kiesel. The board may elect a president, a vice president, a secretary and treasurer, and such other agents and employes as may from time to time be needed.

KEOKUK, IA.—Ordinance 31 grants the Keokuk Railway and Improvement Association, railway rights; J. E. Craig, Mayor.

SIoux CITY, IA.—A local syndicate, of which the Sioux City Street Railway Company is principal, think of purchasing the Talbot farm for a park, and building an extension of the Pierce street tracks to it.

Kansas.

ATCHISON, KAN.—Organized. The Atchison Electric Motor and Street Railway Company applied for a charter. The incorporators are Messrs. W. F. Dolan, J. C. Fox, A. J. Harwi, J. T. Hersey and A. W. Simpson. The capital stock of the company is \$500,000. It is proposed to build lines over the principal streets of the city aggregating in

all about thirty miles. The company will go before the city council at their next meeting and ask for a charter for their lines over the city. They are negotiating for ground at the foot of Commercial street upon which to erect their power house.

LEAVENWORTH, KAN.—The Dummy line has been appraised at \$39,535, and will be sold to satisfy judgment held by O. H. P. Piper, et al., for \$196,000. A two-thirds bid will take the road.

TOPEKA, KAN.—The Atchison Electric Motor and Street Railway Company directors are: A. J. Harwi, J. C. Fox, W. F. Dolan, J. T. Hersey and A. W. Simpson. Capital stock, \$500,000.

Kentucky.

COVINGTON, KY.—The South Covington & Cincinnati company have accepted the 5-cent fare ordinance and the Belt line will now be built.

OWENSBORO, KY.—The much contested ordinance has been granted to R. Monarch for an electric line.

Louisiana.

NEW ORLEANS.—Council has granted right to build overhead railway to J. H. Keller, and also authorizes purchaser of franchise No. 6352 additional rights on Peters avenue.

NEW ORLEANS.—Council has passed the Crescent City Railway franchise and the Canal street line ordinance.

Maine.

SOUTH THOMASTON, ME.—This town will give a bonus to the Camden Electric to build a branch here.

MIDDLETON, ME.—Electric Railway proposed. Home business men propose the scheme.

Maryland.

BALTIMORE, MD.—The Baltimore-Washington boulevard line is assured. Eight corps of engineers will soon be put on the road.

BALTIMORE.—Mayor Latrobe has signed the Edmondson Avenue, Catonsville and Ellicott City ordinance.

HAGARSTOWN, MD.—The Hagarstown Manufacturing, Mining and Land Association has a street railway on the card.

Massachusetts.

BEVERLY, MASS.—John I. Baker, of the Harbor and Land Commission, and P. E. Clark, of the Beverly and Danvers Street Railway Company, are working to bring the ownership of street railway into the hands of the town.

BOSTON.—The Quincy, Boston, has elected: President, John R. Graham; secretary and treasurer, Fred H. Smith.

Haverhill, MASS.—The Haverhill and Amesbury Street Railway has leased building for power house. Engines and boilers of 75-horse-power leased with building.

HOLYOKE, MASS.—The street railway will make considerable extensions in the spring, touching neighboring towns.

MERRIMAC, MASS.—J. H. Winchell et al., of Haverhill, some time ago applied for a charter, and have been quietly at work for some time in that direction. Several towns are in the belt of the road.

PITTSFIELD, MASS.—The Railway Company has elected president, Joseph Tucker; clerk, J. M. Stevenson; treasurer, C. E. Merrill. Increase in traffic this year, 50 per cent.

NEW BEDFORD, MASS.—A. P. Smith, general manager of the Union Company, is before the council asking permission to double track his single track lines.

PLYMOUTH, MASS.—The Plymouth & Kingston has elected president, John H. Cunningham, Chelsea; treasurer, James D. Thurber, Plymouth; clerk, Thomas Loring; directors, John H. Cunningham, of Chelsea; E. P. Shaw, of Newburyport; A. R. Mitchell and A. L. Gordon, of Newville; W. B. Ferguson, of Malden; W. H. Hedden, of Boston, and Charles E. Barnes, of Plymouth. They declared a dividend of 7 per cent.

SPRINGFIELD, MASS.—The street railway makes the following statement for the year: The capital stock has increased from \$650,000 to \$1,000,000, the number of miles run from 758,608 to 1,088,965, the passengers carried from 4,391,251 to 6,395,519, and the amount of track operated from 21 2-5 to 32 1/2 miles. The amount of track is in exact figures 58,540 feet, while 16,050 feet of old track was relaid, \$293,983 being spent in new equipment and construction. Last year 18 2 5 miles were operated by electricity against 30 miles this year. The total earnings were \$333,550 the past year, the running expenses, including renewal of stock, \$251,000, interest \$3,473, and an 8 percent dividend \$44,000 leaving a surplus of \$34,476.

WORCESTER, MASS.—Geo. H. Seeley, of New York, says that the road here is to change hands. The syndicate will buy it. The stock will sell at \$1,400,000.

Michigan.

CARSONVILLE, MICH.—An interurban electric road is talked of.

DETROIT, MICH.—The Jefferson avenue, the East Detroit, the Gratiot avenue and the Detroit Electric Railroads Company, of which latter Strathearn and George Hendrie are principals, have been sold to a new company composed of directors of the Citizens. D. M. Ferry, M. S. Smith, George H. Russell and W. C. McMillan, sign the articles of incorporation. The new company will issue \$400,000 of new bonds. The new company is called the Detroit Suburban Railroad Company. Total consideration \$400,000.

DETROIT, MICH.—The Union Trust Company of Detroit, has a chattel mortgage on the Detroit, Belle Isle and Ft. Wayne for \$400,000 at 6 per cent.

ISHPEMING, MICH.—The Ishpeming Gas and Electric Light Company has been absorbed by the Street Railway.

LANSING, MICH.—Organized; The Lansing City Electric Railway Company; capital stock, \$100,000. Officers: President, Gordon McDonald, New York; vice-president, C. H. Osband, Lansing; secretary, Gay P. Lee, Lansing; treasurer, Willard V. King, New York. This corporation has purchased the Lansing Street Railway from the Continental Trust Company of New York.

MANISTEE, MICH.—Gen. G. A. Hart says that eight miles of electric will be running by Jan. 1. Power house, 100x125 now building; ten-car road.

Minnesota.

MANKATO, MINN.—Ordinance 92 provides that power to operate and construct electric railways to the Mankato Street Railway Company. H. W. Brown, City Recorder.

ST. PAUL, MINN.—The city council has ordered the St. Paul City Railway Company to build certain horse car lines, which were accepted by the predecessor of this company. An ordinance is also introduced forcing a new electric from Rice street to Minnehaha, and to restore traffic and increase cars on several lines.

ST. PAUL.—The Grand Forks, S. D. Electric Street Railway has been incorporated here. Capital stock, \$100,000. Chas. F. Arrol, of St. Paul, is president.

Missouri.

ST. JOSEPH, MO.—The Central Trust Company of New York, files petition to foreclose mortgage on the Messanie and the Citizens' lines. Claimed that interest is defaulted.

ST. LOUIS, MO.—J. D. Houseman, Jr., F. W. Roeder and Geo. Minch, have incorporated and bought the Kirkwood-St. Louis franchise. They say they mean business and the road must be built by January 1, '94.

ST. LOUIS, MO.—Organized: Suburban Electric Light and Power Company, of St. Louis; capital, \$10,000. Incorporators: S. W. Simons, Walter Krausneck and Gus George.

WARRENSBURG, MO.—Incorporated: Magnolia Light, Heat and Power Company, of Warrensburg; capital, \$20,000. Incorporated by W. P. Hunt, A. M. Zimmerman, John T. Cheatam and others.

Montana.

HELENA, MONT.—The Rapid Transit Company will extend. W. H. Clark, the manager, is a progressive man.

Nebraska.

BEATRICE, NEB.—The Beatrice Street Railway has been sold and transferred to the Beatrice Rapid Transit & Power Company. Consideration, \$50,000. The new company will equip with electricity at once.

BEATRICE, NEB.—The power house of the Street Railway and Light Company burned. Loss, \$15,000; fully insured.

HASTINGS, NEB.—City Engineer Woodward has surveyed a new street railway for a new company; name unknown.

OMAHA, NEB.—J. G. Markel has admitted the Metropolitan sale. Extensions will be made by new owners.

PERTH AMBOY, N. J.—W. B. Price, secretary of the City Railway, New Brunswick, applies for rights on certain streets.

New Jersey.

SOMER'S POINT, N. J.—The citizens of this place, Linwood and Beekersville wish to put in an electric connecting those places. They subscribe \$25,000 and will agitate the matter.

New York.

ALBANY, N. Y.—The Albany road has elected president, Robert C. Pruyn; vice president, Anthony N. Brady; secretary, James McCredie; treasurer and general manager, John H. W. McNamara.

BUFFALO.—Incorporated: The Delaware Avenue Electric Land Company; capital stock, \$115,000; directors: Marcellus A. Churchill, Robert S. Hambleton and Angus W. Smith of Buffalo, and Anson W. Olmstead of Kenmore.

ELMIRA, N. Y.—Griswold, Maloney & Co., of the Fifth ward, are promoters of a \$30,000 road, of which \$20,000 has been subscribed Mr. Jud. Griswold is prime mover, and says rise in property will pay for it.

LOCKPORT, N. Y.—Organized: Lock City Electric; capital, \$150,000; length, 7 miles; Wendell Goodwin, Frederick Swift, Frederick H. Reed, and George N. McKibbin, of New York City, and S. Curt Lewis, John A. Merritt, Willard T. Ransom, William Spalding, S. Wright McCollum, Charles Whitmore, John Hodge and Eugene M. Ashley, of Lockport.

NEW YORK CITY.—Organized: The Standard Supply Company, \$200,000, F. W. Brooks, M. W. Conkling, H. H. Howard; car seats and patented articles.

NEW YORK CITY.—The Broadway of Brooklyn has been bought by Drexel Morgan & Company as stated.

NEW YORK CITY.—The Traction Company has acquired the Forty-second street and Grand street ferry line. Capital stock, \$748,000; 16 per cent dividends; owns 495 horses and 50 cars; J. M. Calhoun, president.

UTICA, N. Y.—The Oneida Street Railway has elected the following officers: President, Walter E. Northrup; secretary and treasurer Harry C. Stone.

YONKERS, N. Y.—It is stated, with some authority, that the Yonkers, the East Chester, the New Rochelle and the Curtis & Deane railways have consolidated; and it is said that arrangements are made for interurban connection.

Ohio.

CINCINNATI.—Citizens in North Fairmount have petitioned President Kilgour to extend electric line through their suburb.

CINCINNATI, O.—The Consolidated is reported to be about to consolidate the Pendleton and Sixth Street lines and put in electricity.

CINCINNATI.—The dummy line from Delta Station to the Observatory will be reconstructed for electric. Several other extensions will be made.

CINCINNATI, O.—The Price Hill Street Railway will change to electricity. The building on route 23 has begun.

COLUMBUS, O.—The Leonard Avenue Street Railway Company has disposed of its franchise and property to a company headed by H. H. Littell, of Buffalo, James Daugherty, Cincinnati, and Ed. Bultman, Buffalo.

DAYTON, OHIO.—Albert M. Cusler and Robert Appleby have secured consent of property owners, and have asked for franchise for electric line from the corporation limits to the county line.

PIQUA, O.—The new Troy-Piqua road has organized at \$10,000. Incorporators: Colonel W. P. Orr, L. M. Flesh, A. M. Orr, W. F. Steiner and W. D. Jones. This road, if built, will command a fine traffic between the two cities.

SPRINGFIELD, O.—The Springfield Electric and the Citizens' were consolidated October 20th, under the name of the Springfield Railway Company, W. B. McKinley, president; S. L. Nelson, secretary and general manager.

TOLEDO, O.—The contract will soon be let for heavy girder rail for the part of the Belt line not yet supplied.

WARREN, O.—The council requires the Park Avenue line of the Trumbull road to be built first.

YOUNGSTOWN, O.—Street Railway Company has accepted a franchise on Elm street.

Oregon.

PORTLAND, ORE.—The track for the Barnes Heights & Cornell Mountain Electric have been laid. Car orders have not been filled yet. Wire is strung on the Mt. Tabor Railway.

Pennsylvania.

COLUMBIA, PA.—The Columbia and Ironville Electric Railway ordinance has passed and the company accepted it.

EASTON, PA.—The grading on the Weygadt Mount Railway has begun at Shawnee Springs.

HAZELTON, PA.—Charter has been granted to the Beaver Meadow Hazelton, Mahoney and Shenandoah Railway. Capital, \$150,000. Proposes to build 25 miles. Directors are: A. Markle, J. J. McGeehin, N. C. Yost, Hazelton; A. P. Blakeslee, Dealno; and P. J. Ferguson, Shenandoah.

HAZLETON, PA.—The Wyoming Valley Traction Company has decided to extend to Pittston. Work to be done within the year.

LANCASTER, PA.—The West End Railway have secured their franchise.

MCKEESPORT, PA.—Keeling, Ridge & Company have begun excavation for the track-laying on the Citizens.

MCKEESPORT, PA.—The Reynoldston and Port Vue Traction Company has been chartered to work in harmony with the South McKeesport Land Company.

NORRISTOWN, PA.—The Citizen's is preparing for electricity.

PHILADELPHIA.—The Northeastern "L" elected officers, C. W. Buchal, president; L. C. Troutman, secretary; C. B. McMichael, counsel. Permission has been asked to open Front and Market streets for construction.

PHILADELPHIA.—The Union Passenger Railway will extend its tracks.

PITTSBURG, PA.—The West End road will be ready by Nov. 15. Further extensions will be made.

PITTSBURG, PA.—Organized, The Valley Passenger Railway Company; capital, \$200,000. Sheriff Fahey, G. M. Hallstead and M. W. Collins chief owners. Road will be 26 miles long. Will begin to build in the spring.

READING, PA.—East Reading Electric will extend. City Passenger will double-track and add equipment.

SCRANTON, PA.—The People's Street Railway has been bought in by the Scranton Traction Company. On November 8, a meeting of directors will be held to pass the title. Improvements and extensions are contemplated.

SCRANTON, PA.—The Scranton street railways ask for extensive right to make extensions and changes. A belt line to connect the termini of various lines is under consideration. Several lines will be double-tracked. The Seventh street line will be greatly extended and new branches added to the Hyde Park line. H. E. Hand, secretary.

SILVER SPRINGS, PA.—The Silver Spring & Sligo elected following officers: B. F. Leighton, president; Woodbury Blair, vice president; F. B. Noyes, treasurer; Julian Dowell, secretary. The road will use the trolley.

Rhode Island.

PROVIDENCE, R. I.—Four hundred citizens of Auburn petition the Union Railroad to extend its electric.

PROVIDENCE, R. I.—The Inter-state Electric Railway has mortgaged its entire plant, equipment and franchises to the New York Guarantee & Indemnity Company, of New York, for \$1,000,000. The money is to be used in large extensions and betterments. The company will issue bonds from 1 to 1,000, expiring 1922; interest, 5 per cent.

PROVIDENCE, R. I.—The trolley is to be used on the Eddy and Ocean street lines.

PROVIDENCE, R. I.—The Union Railway will propose for more streets in East Providence

South Carolina.

CHARLESTON, S. C.—The National Land Improvement and Manufacturing Company asks for certain railway rights, which will undoubtedly be granted.

COLUMBIA, S. C.—The survey of the new electric line is being made and some equipment has been shipped.

Tennessee.

CHATTAHOOGA, TENN.—Money all raised to build the Alton Park Electric.

MEMPHIS, TENN.—The city is attempting to compel the Street Railway Company to pave with brick.

MEMPHIS, TENN.—Capt. G. H. Bunch is studying other towns with a view of electrifying the East End Railway.

NASHVILLE, TENN.—Manager D. Deaderick of the Citizens has resigned. W. S. Jones, secretary, is temporary supply.

NASHVILLE, TENN.—The board of directors of the United Electric Railway will make an attempt to put their bonds and stocks on a paying basis, and ask advice from stockholders. Nearly all the stock is held in Nashville.

NASHVILLE, TENN.—The charter of the East Nashville Electric Railroad has been filed in the register's office. The incorporators are Fred. W. Hunter, Gilbert F. Brown, T. W. Crutcher, F. M. Cruzen and Charles B. Duncan. The proposed route of the new road is as follows: Commencing at the Public Square the new road is to run east across the Cumberland river bridge, out Woodland street to Second; thence northwardly on Second street to Main street; thence east to corporate limits east of Nashville. Also commencing on Main street at the junction of Fourth street; thence north to the corner of North Third and Spring streets; thence west on Spring streets to North First; thence north on First to Foster; thence eastwardly on Foster to North Second; thence north on North Second to the corporate limits; thence east to Lischey avenue, together with any extensions that may hereafter be made.

NASHVILLE, TENN.—The Lischey Avenue Electric has been sold to F. W. Hunter for \$1,190.

Texas.

DALLAS, TEXAS.—Chartered Dallas Consolidated Street Railway Company, capital stock, \$500,000; J. E. Henderson, W. H. Flippen and J. T. Oliver, incorporators.

SAN ANTONIO, TEX.—The Alamo Electric, 12 miles, and equipment bought by C. A. Harris, New York, for \$25,000. Will be operated again

Utah.

SALT LAKE CITY.—There have been credited reports on the streets that the Rapid Transit had sold out to E. H. Rollins & Sons. But the officers of the railroad company do not know anything about it, so it is evident that the grantors are not ready to let the cat out of the bag.

Washington.

COLFAX, WASH.—D. T. Thomson, of Portland, has applied for franchise. Proposals also made by Milton Santee, of San Diego. Prospects favor the Portland capitalist.

TACOMA, WASH.—The Rapid Transit Railroad Company, operated by the Thomson-Houston, has been granted right of way by county commissioners along county roads.

Wisconsin.

APPLETON, WIS.—John Muir, New York, is trying to put through a scheme for an electric between this city and Neenah.

EAU CLAIRE, WIS.—The company has let contracts for about \$12,000 in improvements in power house. The McDonough Manufacturing Company has the contract.

MILWAUKEE, WIS.—A new repair and paint shop will be erected by the syndicate.

MILWAUKEE, WIS.—The Milwaukee Street Railway Company has decided to extend its Clybourn street line across the Menomonee Valley to Calvary cemetery.

MILWAUKEE, WIS.—The Milwaukee Motor Company has increased its stock to \$300,000. Officers: President, James Petley; vice-president, J. W. Bingham; secretary and treasurer, A. B. Myers. The company is willing to operate a line to North Greenfield if the citizens of that suburb will raise enough funds to build the track.

MILWAUKEE, WIS.—Two lines have been granted franchises to Cudahy through Lake. The road must be built by December 31, '93. The land owners on the Howell road subscribe \$39,000 toward the road.

RACINE, WIS.—The Belle City will pave with stone.

West Virginia.

WHEELING, W. VA.—The new power-house will be built immediately. Architect, W. F. Giesey.

Canada.

MONTREAL, CAN.—Improved service has increased the receipts 57 per cent over last year.

Something New.

Leaving Chicago every Thursday at 3:00 p. m. on the fast express, the Wabash R. R. runs a Tourist Sleeper to Boston via Detroit, Montreal and the Canadian Pacific Railway. Rate per berth to Montreal, \$1.25; to Boston, \$1.50.

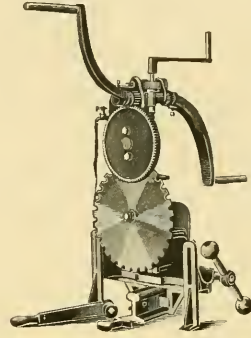
The Wabash also runs a Tourist Sleeping Car to Boston via Niagara Falls, leaving Chicago every Monday at 3:00 p. m. Same rate.

IMPROVED PORTABLE RAIL SAW.

THE success which has followed the introduction, by the Q. & C. Company, Chicago, of their Bryant rail saw, has led to still further improvements.

The smaller sizes, for use anywhere along the tracks, or in various parts of shops and buildings, has now been fitted with an automatic feed, while even less power is required to operate the saw than ever before.

Accuracy to $\frac{1}{16}$ of an inch is assured. Two saw blades accompany each machine, the total weight of which is only 220 pounds. The larger sizes for operation by power are in several styles, and fully cover all the necessities of road and shop work. The rapidity with which the saw does its work is fully equalled by the exactness with which it cuts, and large or small roads will find the rail saw not only a convenience, but a necessity, once used never to be without.



THE CHICAGO-ST. LOUIS ELECTRIC will begin work in Livingstone and Cook counties.

Abraham Lincoln

When leaving his home at Springfield, Ill., to be inaugurated President of the United States, made a farewell address to his old friends and neighbors, in which he said, "NEIGHBORS GIVE YOUR BOYS A CHANCE." These words come with as much force to day as they did thirty years ago.

How give them this chance?

Up in the Northwest is a great empire waiting for young, and sturdy fellows to come and develop it and "grow up with the country." All over this land are the young fellows, the boys that Lincoln referred to seeking to better their condition and get on in life.

Here is their chance!

The country referred to lies along the Northern Pacific R. R. Here you can find almost anything you want. In Minnesota, and in the Red River Valley of North Dakota, the finest of prairie lands fitted for wheat and grain, or as well as for diversified farming. In Western North Dakota, and Montana, are stock ranges limitless in extent, clothed with the most nutritious of grasses.

If a fruit farming region is wanted there is the whole State of Washington to select from.

As for scenic delights the Northern Pacific Railroad passes through a country unparalleled. In crossing the Rocky, Bitter Root, and Cascade Mountains, the greatest mountain scenery to be seen in the United States from car windows is to be found. The wonderful bad lands wonderful in graceful form and glowing color, are a poem. Lakes Pend d'Oreille and Cœur d'Alene, are alone worth a trans-continental trip, while they are the fisherman's Ultima Thule. The ride along Clark's Ford of the Columbia River is a daylight dream. To cap the climax this is the only way to reach the far-famed Yellowstone Park.

To reach and see all this the Northern Pacific Railroad furnish trains and service of unsurpassed excellence. The most approved and comfortable Palace Sleeping cars; the best Dining cars that can be made; Pullman Tourist cars good for both first and second class passengers; easy riding Day coaches, with Baggage, Express, and Postal cars all drawn by powerful Baldwin locomotives, make a train fit for royalty itself.

Those seeking for new homes should take this train and go and spy out the land. To be prepared, write to

CHAS. S. FEE,
G. P. & T. A.
St. Paul, Minn.

MARCH OF THE AMAZONS.

THE life of the gentle street railway manager is full of long hours and the culmination of the unexpected and undesired. His life is one constant, endless battle, to do for an unappreciative, thankless clientage, those acts of public good and necessity which go to make the hamlet a city, and convert the song of the mower into a rousing "vox populi" from whom he hears so often.

It is strange how some people think to impede the progress of the trolley car as it goes singing down the years toward the end of the century. They did the same when horse cars fought their way into place as one of the necessities of life, and doubtless many of these same good people, had they been there when Columbus made a landing, would have taken out an injunction. Now when it comes to a question of whether a certain street and the inhabitants thereof need a new street car line, there can be no question but that the superintendent is the one person best fitted to know and judge.

Just as when the doctor gives you dope you can't relish—it is wholly for your own good—the fee contingent cuts no figure, except in the bill.

Down in Columbus, in the good old state of Ohio, the other day the superintendent came to a realizing sense that a car track must go down Oak street. Now the people on the selected line are as live, staunch, and unyielding as the tree for which the highway is named. They, in their shortsightedness, did not consider the great good which the company had at heart for them, and the vast unselfish motives which prompted the decision. Wholly as an act of charity the company hired 400 men, who sadly needed work. Naturally these men were anxious to get to work at once. Having been hired Saturday night, the next day was Sunday. Sunday is a day of rest—from troublesome injunctions—but this did not discourage the superintendent, and the good work commenced. These 400 men each threw out 15 shovelful of terra firma every 60 seconds. This was at the rate of 360,000 shovels per hour; at which rate Columbus would soon have become a modern Pompeii. One arrogant aristocrat who had a landed possession, even went so far as to menace the quiet of the day by bringing out his gun and wildly talking of slaying the first man. But as there were exactly 400 first men in the enterprise, a blue-coated pillar of the law very properly arrested the belligerent, and saved him from himself. As Mr. Man accompanied the officer down to jail his other half shed bitter, briny tears of anguish. As these tears fell in angry spats upon the earth, an idea struck her. She grasped it, and in a jiffy had trained the garden hose on the battle ground, where the ties that bind were now going in at a highly satisfactory rate—to the superintendent. The neighbors all caught the inspira-



tion, and the gallant boys in the trench caught the drenching. Some murmured they preferred beer to water, but the dozens of garden hoses on both sides of the street squirted viciously, preventing any dust, and also were



quite a safeguard against sun stroke, which, as all know, is highly fatal in Ohio in November. Just as the ardor of the track layers was beginning to dampen, the sheriff hove in sight with the coveted injunction. The superintendent suddenly remembered an engagement at his summer residence, at which point, ten miles distant in the country, the sheriff overtook him, read his writ, and the injunction was served. In the meantime the work was well on toward completion, and the sun, which had watched the fun all day, reluctantly went to bed.

THE CONDUCTOR.

Who helps the ladies, plain and fair,
Who greets the dead beat with a glare,
Whose eye and hand are everywhere?
The conductor.

Who saves the bad boy's worthless hide
As close to him the cold wheels glide,
Who wears his buttons brass with pride?
The conductor.

Who starts the car up with a jerk
Just as you feel where handles lurk,
And answers "cuss" words with a smirk?
The conductor.

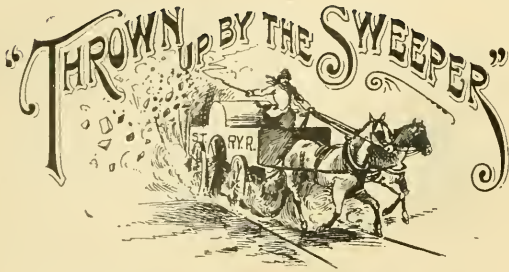
Who runs by females old and grim
Who wildly shake their fists at him,
And flirts with young ones neat and trim?
The conductor.

Who jerks the register and cares
That people "pony up" in pairs?
Carries six people and four fares?
The conductor.

DEWEY HEATER DOINGS.

A TEST was made recently of the Dewey electric heater, and with excellent results. Two 16-foot cars were equipped with four heaters each, and one 27-foot car with six heaters. Each day for a week previous to using the heaters the fuel burned at the central station was all weighed. The heaters were then run two weeks, again weighing the coal each day, at the end of which time it was found that when using the heaters less than 500 pounds more of coal was consumed. The fuel used was a low grade of soft coal, and gives a valuable basis for estimate for managers uncertain as to the probable increase in fuel bill, which rather than the first cost of the various heaters, is the real question at issue. The heater above mentioned, is not, however, higher priced than others.

The road just mentioned was one of a large number recently equipped by Arthur S. Partridge, St. Louis, who reports highly satisfactory results from heaters now in use, and large orders coming in daily.



A PAIR OF CHICAGO STORIES.

West Side car conductors are getting very accommodating nowadays, some of them at least. This one happened to be aboard of a west bound horse car, and the woman who sat in the corner was being much annoyed by the man who sat next her. He expectorated very freely about him, and the woman kept drawing her skirts back and evincing disgust in every possible way, but to no avail.

Brought to desperate measures she called the conductor and haughtily inquired:

"Have you no place for people to—to spit?"

For a moment the conductor looked dazed; then taking in the situation he politely replied:

"No, madam; just spit wherever you please."

A Dearborn street horse car recently left the track for a few moment's recreation one day last week, and as it bumped over the cobbles of that much abused thoroughfare, a young man with speaking trousers and a red necktie, evinced his disapproval in language as loud and strong as his breath. Just then a little man swelling up like a turkey cock, advanced threateningly and remarked with ill concealed wrath, "How dare you swear before my wife, sir!" "Beg pardon," grunted he of the striped pants, "I didn't know your wife wanted to swear first." Then he got up and took the cable.

The talkative passenger roosted on the back dash of a State street horse car, and to the conductor spake:

"Muddy!"

"Yep," replied the bluecoat. "No traffic on a fine day, people walk."

"It isn't very remunerative to you, is it?" queried the passenger.

"Nope," said the conductor sadly, "not with these punches. What we need in our business is the Corbett punch."

The passenger looked his question.

"Know what that is?" asked the conductor.

The passenger shook his head.

"It's the kind of a punch Corbett used in New Orleans. Cleaned up \$35,000 with it in about two hours and only had to knock down on one passenger," and the conductor sighed as he rang the bell to let the inside passenger get off.

A SUMMER IDYL.

He was full. The day was hot, but he was happy. He entered a Twenty-third street car, and with his coat sleeve wiping a stream of perspiration from his brow, addressed the man across the aisle.

"Did you ever make a fool of yourself by getting full on a hot day?"

"No sir!" was the decisive reply.

"Good man! Look at my condition. Got tight and lost my handkerchief. While the thermometer stands at 92 degrees in the shade, I stand at 200. Couldn't lend me your handkerchief, eh!"

"No, sir!"

"Just so. If you was me and I was you I'd see you wilt first. Nobody any business to get drunk on a hot day. Don't look much like a howling swell, do I?"

"Not a bit."

"Thanks. You are an honest, sober man, you are, and you are no liar. I am not a howlin' swell; I'm just a common swell, and no howl. Here, conductor, come in here."

"What do you want?" demanded that official as he entered.

"Is this a refrigerator car?"

"No, sir."

"Good boy. I knew it wasn't, but wanted to see if you would lie about it. Got any ice water for benefit passengers?"

"No, sir."

"Carry any handkerchiefs benefit poor and sufferin' passengers!"

"No, sir."

"Any fans for sale?"

"No, sir."

"Don't seem to have the convenience of the public at heart. Public be blowed. Can't I stop and get a fan?"

"You must keep quiet, sir!"

"If I don't you'll throw me off, eh?"

"Yes, sir."

"Do you run to the river?"

"I do."

"Will you have the kindness to throw me off when we get there—throw me into the river in some shady spot? Please pick out a cool spot—cool, breezy spot, and if 'twouldn't be askin' too much I'd like to have you hold me under water about 15 minutes until I get thoroughly damp. That's all, conductor. Like to meet a man like you. Like to be thrown off. Like to see a man have my best interests at heart on a hot day. Ta-ta! River—throw—cool spot—see you later!"—New York Herald.

A SOUTH AFRICAN newspaper is much chagrined that when one rainy day the governor of the province entered a tram car, that some one did not go on to the platform or out in the rain and give his excellency a seat.

NEW TIE JOINT AND RAIL JOINT BRIDGE.

THE importance of the question of joint support and rail joints in general is so well discussed in the present number of the REVIEW that we forbear making a longer introduction of the two specialties of the American Rail Joint Company, of Marion, Ind.

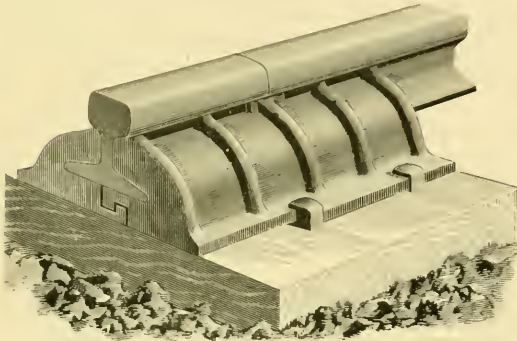


FIG. 1.—JOINT IN POSITION.

The illustrations numbered 1, 2 and 3 show the new tie joint made by this company for T rails. The joint is of malleable iron, made in two pieces, and is easily adjusted without disturbing the rails. The joint prevents creeping and slipping, and has a solid bottom to rest on the tie.

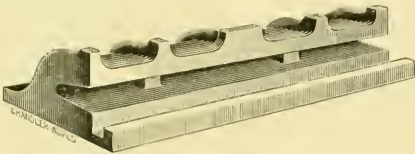


FIG. 2.—STATIONARY SIDE SHOWING LUGS TO PREVENT CREEPING

The remaining figures, 3 and 4, show the rail joint bridge, or suspended joint, in which no bolts are used. It is also of malleable iron, and is in two parts, which are easily fitted together without disturbing the position of the rail. It tightens on the wedge principle. Its removal

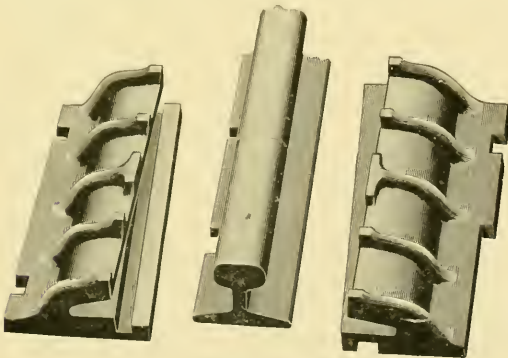


FIG. 3.—METHOD OF ATTACHMENT.

is effected by a few sledge blows, and the action is positive. Its total length is from 12 to 18 inches.

Both devices have been in use some time, and are highly spoken of by their users. Both are equally applicable to old and new work.

A trial order of the girder rail joint bridges was laid on the lines of the North Chicago cable railway, last winter, when the ground was frozen. They were subject to the hardest service on the line, and when frost came out in the spring it was expected the joint would

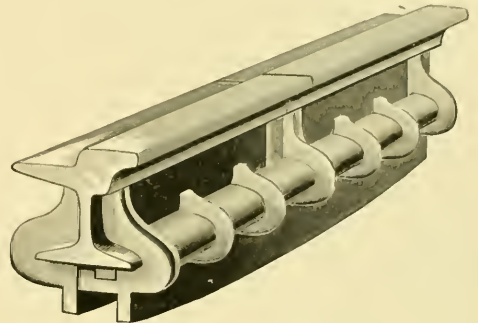


FIG. 4.—NEW RAIL JOINT BRIDGE.

yield. But it did not, and when during the summer the road was laid with new iron, the workmen experienced no small difficulty in starting the joint so firmly was it held. These joint bridges are also in use on the Chicago City Railway cable lines.

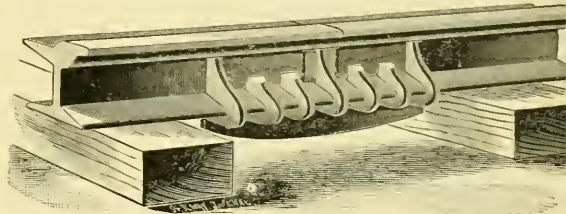


FIG. 5.—RAIL JOINT BRIDGE IN POSITION.

Any information upon the subject will be cheerfully furnished by the manufacturers, who are in a position to promptly take care of all orders.

THE BALL ENGINE COMPANY, of Erie, Pa., report that they are having the largest amount of business in their existence, and have enough orders yet to carry them well through the winter. Among some of their recent orders are the following: Brockton Street Railway Company, Brockton, Mass., one 600-horse-power, Cross Compound; Calumet Street Railway Company, Chicago, Ill., four 300, Cross Compound; San Leandro Street Railway Company, San Francisco, Cal., one 500, Tandem Compound; East Oakland Street Railway Company, San Francisco, Cal., one 400, Tandem Compound; Englewood Electric Company, Chicago, Ill., one 600, Cross Compound; Binghampton Electric Light Company, Binghampton, N. Y., two 250, Tandem Compound; Wheeling Street Railway Company, Wheeling, W. Va., three 250, Cross Compound; Pottstown Electric Light Company, Pottstown, Pa., one 250, Cross Compound; Erie Electric Motor Company, Erie, Pa., three 150 Tandem Compound.

ECHOES FROM THE TRADE.

POND ENGINEERING COMPANY have lately taken some large installment contracts at the Chicago office.

C. & G. COOPER COMPANY, Mt. Vernon, Ills., report good patronage.

DETROIT ELECTRICAL WORKS have the usual run of motor orders.

BATES MACHINE COMPANY, of Joliet, reports large sales of their well-known products.

THE Chicago agency of the Stearns Manufacturing Company has placed orders for six Woodbury engines during the past month.

THE ST. LOUIS CAR COMPANY is full and running night and day to keep up with the procession of orders that are coming in.

GENERAL MANAGER KLING, of the St. Louis Car Company, is in New York, where he has been since the convention.

THE ECLIPSE CLUTCH WORKS, of Beloit, have nothing but the best to say in the matter of their transmission machinery.

THE CAR TRUCK SUPPLY COMPANY, Chicago, reports business very good. The ratchet drill sold by them has a sale that makes a large business of itself.

THE BARR WHEEL & FOUNDRY COMPANY, of Chicago, is a new concern in wheel circles. H. R. Walker and J. N. Barr are named stockholders.

THE MASON REGULATOR COMPANY is erecting an addition to the factory to accommodate their new departure in boiler feed pumps.

HARRY H. CUTLER, the inventor of the ammeter which is being introduced to many railway plants, has just returned from a pleasure trip through the East.

THE MAIN BELTING COMPANY, Philadelphia, exhibited a full line of their big belts at the Mechanics' Fair, Boston.

THE BROWNELL CAR COMPANY, St. Louis, have just made a shipment of an order of 20 of their Accelerators to Columbus, Ohio, to be used on the Consolidated lines.

THE MCGUIRE truck, at Cleveland, attracted so much attention that 38 trucks were ordered by telegraph immediately afterwards.

THE ELLIOTT POWER BRAKE COMPANY excited considerable favorable comment on its power brake applied to an electric car at the late Mechanics' fair at Boston.

THE PEET VALVE COMPANY, of Boston, is making a strong bid for their valve, which will soon be ready to apply to railway power stations.

THE INDIANA RUBBER & INSULATED WIRE COMPANY of 242 Madison street, Chicago, is running at full capacity, but fills its orders promptly and can supply any size of wire.

THE HUYETT & SMITH MANUFACTURING COMPANY, of Detroit, has some new ideas on heating machine shops and like buildings. This method is fully described in a pamphlet on the subject.

THE POND ENGINEERING COMPANY has the contract for boilers, engines and heaters for the Tattersall American plant at the corner of Sixteenth and Dearborn streets, Chicago.

THE J. G. BRILL COMPANY, Philadelphia, has shipped several of its late order of twenty-four cars to the Consolidated of Toledo, O. The new cars are 18 feet long, and equipped with single reduction motors.

SWAN & LANE, contractors, 190 Summer street, Boston, have had their hands full of installations of light and power plants and taking care of orders for their current indicator.

MAYBIE W. BROWN & COMPANY, with offices at 620 Atlantic avenue, Boston, have the exclusive agency for a number of valuable railway appliances, to which they will devote all their time.

THE CARPENTER ENAMEL RHEOSTAT COMPANY, of Boston, has doubled its furnace capacity and is running night and day. The rheostat is meeting with great success. The street railway rheostat is greatly appreciated.

THE BRADBURY-STONE BATTERY COMPANY has a special Ellis car on McGuire trucks with a 30-horsepower Detroit motor. This car is equipped with 140 cells type X, and has also an electric fare register and electric lights and call bells.

THE CUSHION CAR WHEEL COMPANY reports business good and orders coming fast. Among the latest roads to adopt their wheels are the Williamsport Passenger Railway Company, Williamsport, and the Fort Wayne Street Railway Company, Fort Wayne, Ind.

THE Q. & C. COMPANY's factory burnt out one Saturday night, but Secretary Quincy says that by employing the following Sunday to the best advantage the works were in operation Monday morning, and all orders are being as promptly filled as usual.

THE UNIVERSAL ELECTRIC COMPANY, of Cleveland, recently organized by U. S. Possons, W. J. Possons and George R. Lean, is now about ready for business and will, besides reviving dead lamps, do an electrical specialty business. All the men engaged are practical electricians and their success seems assured.

THE LODGE & SHIPLEY MACHINE TOOL COMPANY have recently closed orders for two motor gear lathes, and a like machine for the West End of Boston.

THE JACKSON & WOODIN MANUFACTURING COMPANY, Berwick, Pa., has contracted with the Berlin Bridge Company for a new car wheel foundry.

WESTERN BANK NOTE COMPANY, Chicago, had a close call in the burning of the new Athletic Club Building adjoining them, and for a time their own magnificent structure was in danger. They were unharmed, however, and the engraving of railroad stocks and bonds goes on in undiminished amount.

N. W. HARRIS & COMPANY, bankers, Chicago, New York, Boston, have recently bought a block of the \$295,000 of 5 per cent bonds of the Metropolitan Railway Company of Kansas City, and the total issue of \$450,000 of the first mortgage 6 per cent bonds of the San Antonio Railway of Texas.



ECHOES OF FORMER MEETINGS SUGGESTED BY THE RECENT CONVENTION.

THE WASHBURN & MOEN MANUFACTURING COMPANY, of Worcester, is meeting with tremendous success in the sale of its salamander wire. A late order is 35 miles of water-proof for Brooklyn. Its size was 500,000 circular mills.

M. C. BULLOCK MANUFACTURING COMPANY, Chicago, are enjoying a period of immense prosperity. They have never been so full of orders, and the works are running 23 out of every 24 hours, on their Corliss engines, of which many are compound.

SHULTZ BELTING COMPANY, of St. Louis, report the largest trade of any Fall during the 17 years they have manufactured belts. They have recently replaced the belts on the Union Depot Line of St. Louis, there being two 54-inch belts, 76 and 130 feet in length. They also report a very large demand for foreign shipment. Have recently sent 4,000 feet to Moscow, Russia; 6,000 feet to London, England; 3,000 feet to Halifax, N. S.; 3,000 feet to Lumsball, Sweden, and still have booked orders for 4,000 feet for London, England,

THE RAILWAY EQUIPMENT COMPANY, Chicago, states that the new Type G overhead material is having a very large sale in all parts of the country, and is giving the most complete satisfaction. The company is also rushed with orders for the Ahearn Electric Heaters, both for heating and cooking purposes. The company has had enough experience in the electric heating line to make its recommendations valuable, and now states that they are prepared to not only recommend, but to guarantee the successful operation of the Ahearn Electric Heaters.

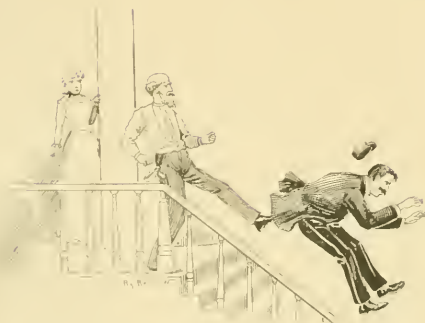
OUR DICTIONARY OF TECHNICAL TERMS.



"FULL TIME."



"A JOINT CHAIR."



"LEAVING TIME."

THE PARTRIDGE CARBON COMPANY, of Sandusky, is rapidly coming to the front as manufacturers of the best grades of motor, dynamo and generator brushes. The concern makes brushes for all standard motors and give particular and prompt attention to railway work. Their works are favorably situated and their facilities practically unlimited. The company is prepared to submit a comparative test of all brushes made, showing theirs in a very favorable light.

THE LAMOKIN CAR COMPANY report the following orders during the past two weeks: Schuylkill Traction Company, 4 (second order), Citizens' Passenger Company, 4 (second order), Harrisburg, Pa.; Chester and Media Railway, of Chester, Pa., 4; Calumet Electric Street Railway, Chicago, 6; Fon du Lac Electric Light and Street Railway Company, 4; Brainerd Electric Railway Company, Brainerd, Minn., 4. Shipments during the month include twenty-two car bodies.

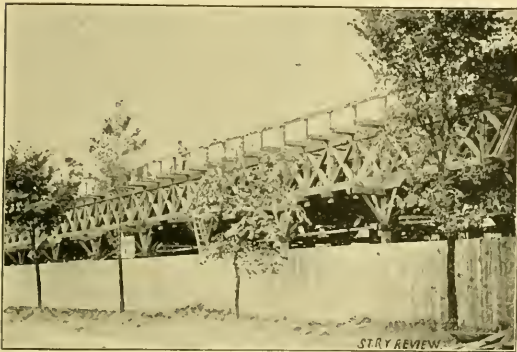
R. D. NUTTALL COMPANY, Allegheny, have made their list of specialties larger than ever, and since the fire have made some radical changes in their factory. While the loss was great, both in property destroyed and time, the company have taken advantage of the reconstruction to put themselves in better condition than ever before, in the way of production and workmanship, and have a large amount of new automatic machinery, enabling them to fill orders on very short notice.

TAYLOR, GOODHUE & AMES are pleased with the success which has already attended their efforts, although they have been in the field less than a month. They have secured the general selling agency for the Nutting Arc Lamp, suitable for all circuits, and the well-known Burton Electric Car Heater. They also have secured a large selling territory for specialties made by the Wagner Electric Company and the Columbia Incandescent Lamp Company. One of their recent acquisitions is the general western agency for the Philadelphia Trolley, which made so favorable an impression upon practical men at the recent Cleveland convention.

F. S. TERRY, Manager of the Electrical Supply Company, recently made a hurried visit to the works of Crocker-Wheeler Electric Company, New York, where he was shown their unsurpassed facilities for the manufacture of motors. The Electrical Supply Company have recently added a motor department to their already extensive business, and the sales of that department have grown so rapidly that Mr. Terry was able to make closer arrangements with the Crocker-Wheeler Company to represent them in the West. The policy of the Crocker-Wheeler Company is to have their motors of the highest possible grade, and it is entirely on the ground of quality that they have established their reputation. A new specialty recently brought out by this company is the motor generator, or direct current transformer, which is particularly serviceable in electric railway work for the purpose of transforming the E. M. F. of 500 volts to 110 volts for lighting purposes.

THE BARRE SLIDING RAILWAY AT THE WORLD'S FAIR.

N EARLY thirty-eight years ago a French hydraulic engineer by the name of L. D. Girard began a series of experiments in pneumatic traction. Finding, however, that pneumatic effort was insufficient, M. Girard turned to his specialty for consolation, and began a series of researches in hydraulic pressure as applied to the horizontal propulsion of a load. The difficulties to be overcome were numerous. Machinery had to be made for the special purposes intended, and it was not until 1864 that suitable apparatus was constructed to put in operation a working model on the private grounds of the inventor.



SIDE VIEW OF BARR SLIDING RAILWAY.

The Franco-Prussian war numbered among its other casualties the violent death of the engineer, at the age of 40, which event put a stop to further improvements of the road. A. Barre, M. Girard's principal assistant, however, was an enthusiastic believer in the ultimate success of the new idea, and carried on to the present stage of perfection the work begun by the inventor. To more fully demonstrate the plan, M. Barre applied to the management of the great Parisian exposition for constructive rights on the grounds. These rights having been granted, a working model was erected upon a larger scale than had been attempted before, and the first commercial road was put in commission in the fall of 1889. This road was 502 feet in length, built on a wrought iron frame, which elevated the superstructure to the average height of 6 feet. The run on this road was made in 30½ seconds, and the maximum speed was about 20 miles an hour.

Encouraged both by the financial and mechanical successes of the Parisian road, M. Barre carried the war into Britain by constructing another slider at the service of the visitors of the Edinburgh exposition, and later another at the Crystal Palace, Sydenham, London.

The American exposition attracted the promoters of this method to Chicago. Chauncey Depew did the honor of introducing Philipp Horvath, the manager, to President Palmer, of the exposition.

Mr. Horvath immediately made arrangements for the specimen of the chemin de fer glissant, which is the subject of this article, and the superstructure of which may be seen on the Midway Plaisance, at the exposition grounds. The superstructure, which is now almost finished, may be seen, section and elevation, in our engravings, and the length is 1,450 yards, running from the station of the intramural electric to the Cottage Grove avenue line, of the Chicago City Railway. The average height of the structure to the left of the accumulator is 12 feet, while the maximum height of the structure is 28 feet.

The rails of rolled steel are 8¾ inches wide, held down to the sleepers by means of clamps and big screws, secured and adjusted in cast iron rail chairs, which are also firmly bolted to the sleepers.

The space below the sleepers is bottomed with boards and galvanized iron and forms a channel, into which the water discharged by the patins or skate, and also that used for propulsion, is collected and conveyed away for renewed use. The skate or patins performs the functions of wheels in an ordinary car. The cast iron skate forms a hollow box turned bottom up and resting on the rail by its margin, which widens to two inches towards the inside.



END VIEW BARR SLIDING RAILWAY.

This margin is grooved with four holes, which, however, are not continuous, but checked at intervals and they stop short of both edges internally and externally. This is to prevent a too rapid usage of the water, which is forced into the hollow skate and thus lifts it and its load so that the skate slides on a thin film of water. As hinted, the propulsion is hydraulic, and to effect this a cast iron pipe of 14 inches diameter, runs the whole length of the road, except where the accumulators are placed, in which latter the pressure is maintained by means of compressed air. Two accumulators placed near to each other feed one "propeller," and the distance between these propellers is dependent on the length of the shortest train, as one of them at least must always be under the train.

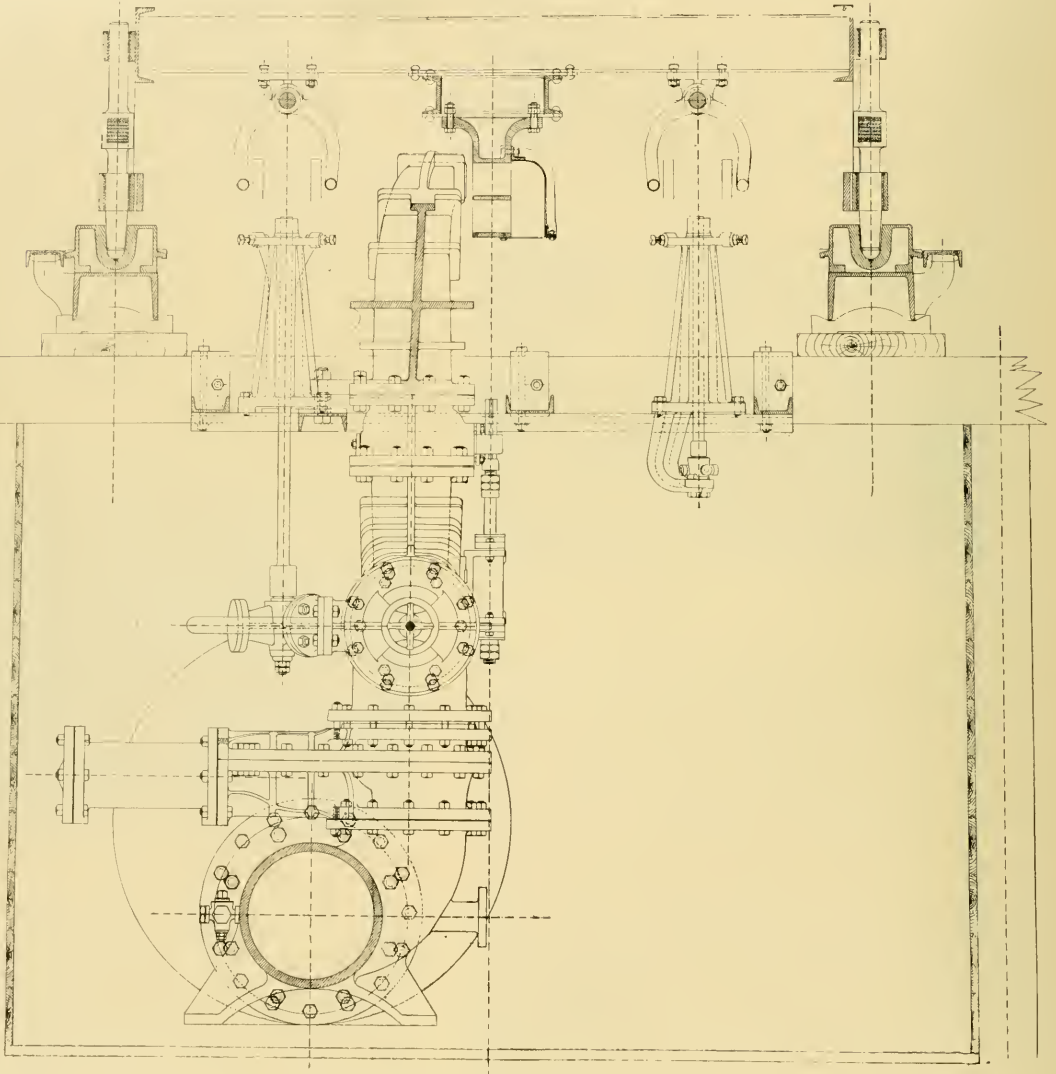
The propeller consists of a quick-operating pocket valve governed by a hydraulic cylinder, and communicating with the delivering nozzle which projects above the

rail level. The hydraulic cylinder governing the propeller is operated by a three-way cock which, in turn, is worked by a handle rising above the rail level. The train passing above the propeller automatically opens or closes the latter through the handle by means of cams placed underneath the train.

A straight line turbine or bucket-rack or rail is bolted

mentioned above force the water under high pressure against these buckets and thus move the train.

On the first car or tender are two cylindrical reservoirs, 40 $\frac{3}{8}$ inches in diameter and 30 feet long, filled with water under a working pressure of 56 pounds per square inch. This pressure is maintained with compressed air which half fills the reservoir.



SECTIONAL VIEW OF WORKING PARTS.

Showing mains; accumulators; nozzle; car-truck and its governors; together with rails; skates; and the loft of the superstructure in sections.

rigidly to the bottom of the cross-beams of each car, and continuous for the whole train, shutting off or turning on the water under the skates. To brake the train it is necessary only to turn off the water under the skates. This rack consists of two series of buckets, placed one above the other and curved in opposite directions, in order to propel the train both ways. The delivering nozzles

The water in these reservoirs is used to feed the skates during the moving of the train, the pressure being maintained constant by a reducing valve. These reservoirs are filled by stand pipes at the station.

On the first and last car are placed the levers working the cams.

The main pipe is fed by direct acting steam pumps at

the central power station which is placed near the center of Midway Plaisance.

The weight of the tender is about twelve tons when charged, that of a passenger car, carrying fifty persons, about four tons.

The speed is almost incredible, and the exerted hydraulic pressure ought to be powerful enough to move any load, especially when bedded on a film of water. M. Barre claims that the car can surmount a grade four times steeper than the highest grade which can be overcome by an ordinary railway, and turn in the sharpest curves.

Each skate consumes a quart of water per second. Advantages claimed by M. Barre are: 1. Ease of movement; no lateral movement. 2. No noise, dust smoke or steam. 3. No derailment. 4. Very quick starting, great speed—about 125 miles per hour.

The cost of first construction of an elevated railway is said to be about \$200,000 per mile, and the cost of operation about one half of that of an ordinary railway.

The accompanying illustrations will be of assistance in comprehending the rather complicated method of operation. The first illustrations show clearly the superstructure, which consists of the elevation and the loft where the water and air mains are carried. The Chicago road was built thus purposely to illustrate the desirability of the system to elevated work. The side elevation and section are both good representations, and were photographed by M. Barre, Jr., who is his father's assistant.

The side view of the working parts shows the elevation of the main and condensers, with the nozzle reaching the rails and bucket-rack.

The sectional drawing gives a perfectly correct idea of the car, skates, rail and nozzle, together with the section of the main and condenser.

The plan view of the car truck shows its necessarily strongly-braced construction, and the figures give the length at 354 $\frac{7}{8}$ inches between the buffers.

The side view of the car truck shows the top of the rails by the fine short line under each skate, with the bucket-rack above it upon which the water impinges to move the car.

The section of the car truck shows the governors of the flow of water, together with the rail and skate in section.

These illustrations were taken directly from M. Barre's original tracings, and with the exceptions of a few unavoidable engraver's faults, are as nearly perfect as possible, and the first correct representation ever published.

M. Barre personally corrected and enlarged the letterpress of this article, and, as no references are made to any correct account this must be assumed to be the first.

A MILLION-DOLLAR mortgage has been recorded from the Lake Roland Elevated to the Baltimore Trust and Guarantee Company. This is to secure payment of one thousand \$1,000 gold bonds, bearing 5 per cent, payable in 1942.

THE Brightwood Co., of Washington City, has given a deed of trust for \$200,000.

THE ANGELS AND THE SALT.

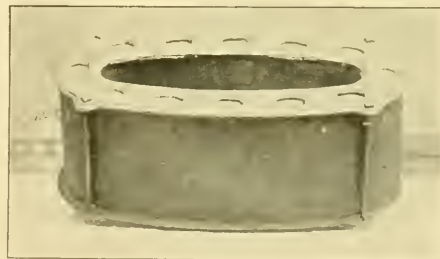
NO one who knows our good friend, M. S. Starkweather, would ever imagine he would deliberately set out to deceive the city authorities. But in the good old days, eighteen years ago, when he was superintendent of the Metropolitan of Boston, it was not given unto mortals to use salt on car tracks, as in this present enlightened period of space. The necessity however, was, if anything, greater then than now.

One night, after a big blizzard of several days duration, Superintendent Starkweather sought his couch, and as he slumbered had a dream, in which he saw the angels scattering salt along the tracks and unmolested by the cops. Awakening, he determined to make the dream a reality, in spite of the fact that anyone caught violating the ordinance was promptly brought into court. He had some cars on which he used to carry, from one part of the city to another, his trackmen when making repairs. This car carried great placards on sides and ends, to this effect: "Special Car for Employees."

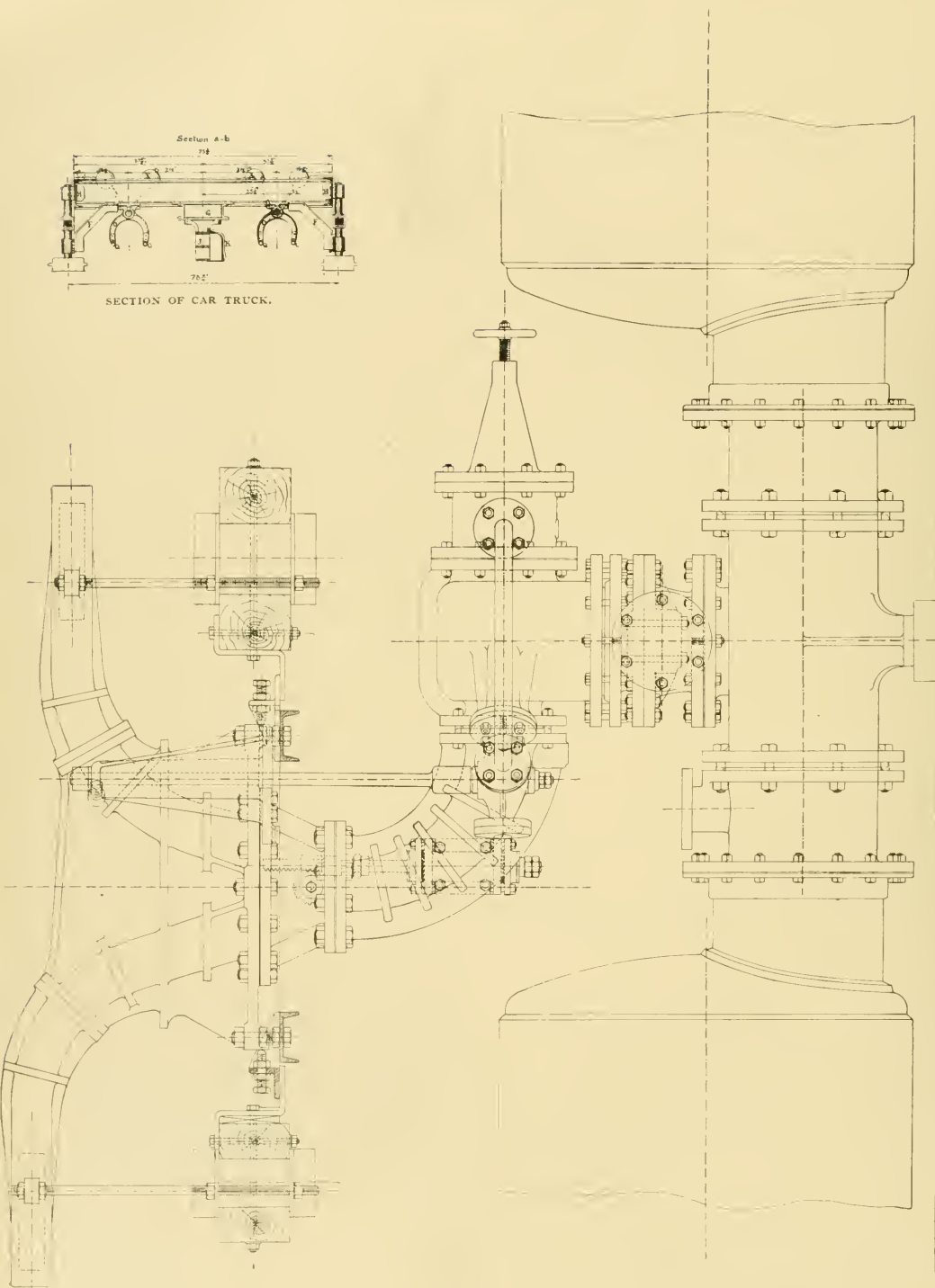
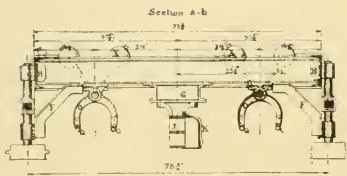
The "old man" took one of these cars, removed the seats, bored holes in the floor to extend from rail to rail, and filled her up with salt, nearly to a level with the bottom of the windows. Then taking four section men, made them lie on their stomachs on the salt, and with short iron rods each man punched—this time in the absence of the "passengaire"—the salt through the holes. The car rolled merrily up and down the street unnoticed by the powers that were, and carefully shunned by passengers. And so the good work went on, and the cars were able to get back on time.

THE AHEARN HEATER.

THE Ahearn Heater, for street car and general heating purposes is meeting with a very large sale, since its experience at Ottawa, where, as stated last month, it literally "took the cake." The car heater is so constructed that cold air enters at the bottom and passing through a series of tubes, wound with wire, is

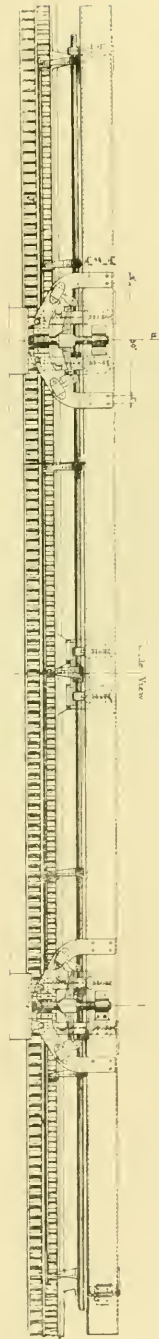


thrown off at the top, thoroughly heated. While the outer casing does not overheat, the internal arrangements are prodigiously active in converting cold into comfort. To avoid a too great concentration of heat, the tubes are not entirely wound with wire, thus avoiding possibility of deterioration of the wires. The heaters are manufactured and sold by the Railway Equipment Company, Chicago.



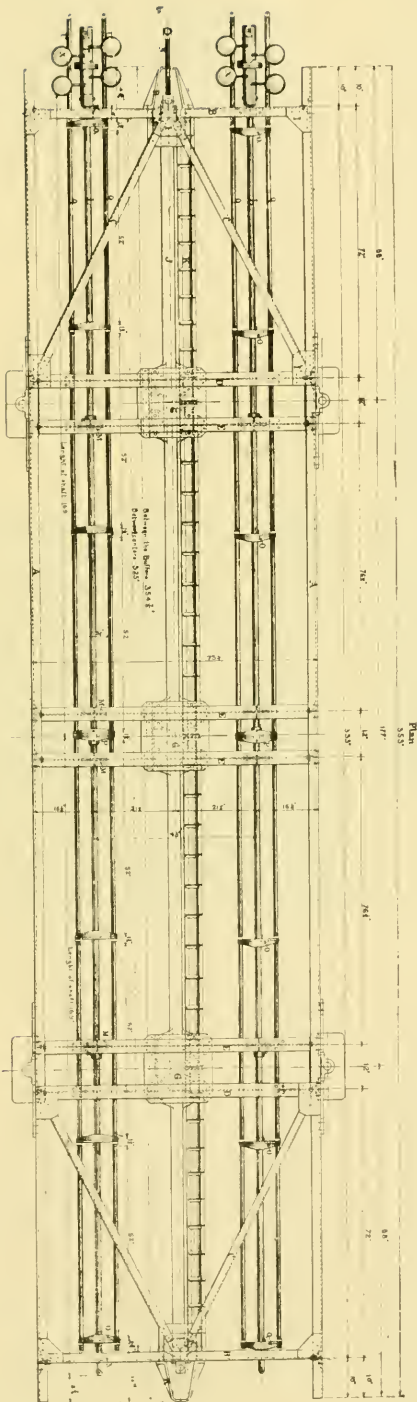
Showing the accumulators; water mains; valves; nozzles; track; and shoe, in elevation

BARRE SLIDING RAILWAY.



SIDE VIEW OF CAR TRUCK.

Showing top of the rail in the fine line at bottom; the Bracket Rack immediately above; the skates with their valves and the car sills.



PLAN VIEW OF CAR TRUCK

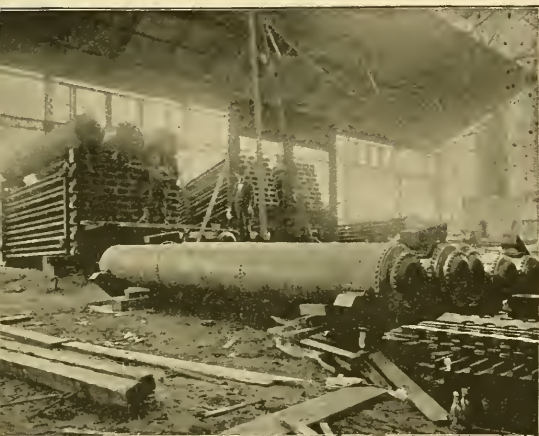
Showing the method of strengthening, together with buffers. The truck is 35 1/8 inches over all.

INSTALLING BOILERS AT WORLD'S FAIR.

THE work of installing the power plants for the great exhibit buildings is going actively forward, and our illustration shows something of the present advance in the boiler work. Of those now being set,

THE CAMPBELL & ZELL COMPANY,

the well known boiler makers of Baltimore, and whose Chicago representative is W. A. Ross, Rookery Building, are erecting seven boilers of 300-horse-power each, and two of 200-horse-power each;—a total of 2,500-horse-power. They will be set in four batteries of two boilers each and one boiler singly. The characteristic features of the Zell boiler are that the steam is all taken from the front end of the inclined water drums, where it is passed



CAMPBELL & ZELL BOILERS.

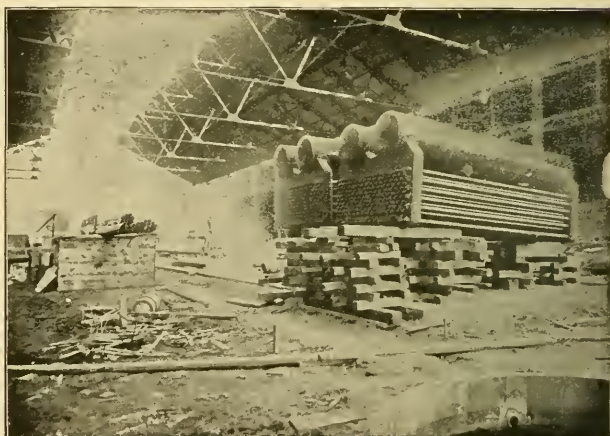
back through superheating tubes in the steam drum at the rear, thus utilizing all the gases and heat which are generated in the boiler for re-evaporating and superheating all the steam as it passes from the front end of the water drums back to the steam drum.

By inclining the water drums at the same angle as the tubes, and taking off all the steam at the front end of the water drums, and by introducing the feed water at back end of water drums directly over the vertical connection through the heaters, a perfect and rapid circulation is obtained, depositing all the sediment in the boiler through the feed water, into the mud drum first, and thus avoiding the liability of forming sediment and deposit in the tubes, to a great extent. The boiler is purely sectional, only four tubes being used in each header, thus securing the largest factor of safety in the headers. By connecting the headers together vertically, with wrought iron nipples, insures the elasticity of the wrought iron in the nipples and at the same time retains the factor of safety in the headers, by which means extremely high pressures of steam can be carried. The boiler also has no support from above, resting entirely on the foundation wall, avoiding liability to spring, sag, or drop down, and keeping the boiler walls intact.

THE HEINE BOILER COMPANY,

St. Louis, are also putting in two batteries of four boilers each, and which occupy the very economical space of 46 feet 5 inches by 17 feet 4 inches, for each battery. They are being planted almost directly opposite the mammoth triple-compound Allis engine. Each boiler shell measures 36 inches diameter and contains 171 tubes, $3\frac{1}{2}$ inch diameter and 16 feet long. Each boiler has individual stack connection, and will be fired with crude oil, using four different makes of burners, one of which is the invention of the company's mechanical engineer, Chas. F. Foster. Pressure of 160 pounds will be carried, and the set are guaranteed to evaporate 112,500 pounds of water per hour.

Three thousand is the aggregate nominal horse-power of the plant. An interesting feature of the illustration is that it shows four of these boilers, just as they left the works, all Heine boilers being shipped ready to set without further shop work. The same company are now installing eight boilers similar to those described, for the



HEINE BOILERS.—WORLD'S FAIR.

Chicago Edison Company, and two batteries aggregating 1750-horse-power for the Barre Sliding Railway, mentioned elsewhere in this issue. James H. Harris, 28 McVicker Building, is the Chicago agent.

ST. LOUIS ELECTRIC CLUB.

THE younger spirits of the electric and allied industries of St. Louis, organized on November 11th, a club. Club rooms have been engaged in close proximity to a leading restaurant, so that all electricians and their friends in the supply business may be entertained.

The club begins in a modest way, but we hope that it soon may be one of the fashionable clubs of St. Louis.

NOVEMBER.

The trees now cast their faded leaves,
The souging wind the tree top frets,
And e'en each street car tells the change—
The driver sprouts his whiskerlets.

C. L. S.



WINDSOR & KENFIELD,
PUBLISHERS AND PROPRIETORS,

269 DEARBORN ST., - - - CHICAGO.

Published on the 15th of each month.

SUBSCRIPTION, - - - TWO DOLLARS.

FOREIGN SUBSCRIPTION, - - - 20 SHILLINGS.

Address all Communications and Remittances to THE STREET RAILWAY REVIEW,
269 Dearborn Street, Chicago.

H. H. WINDSOR,
Editor.

F. L. KENFIELD,
Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of Street Railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers. Address:

THE STREET RAILWAY REVIEW,
269 Dearborn Street, Chicago.

Entered at the Post Office at Chicago as Second Class Matter.

This paper member Chicago Publishers' Association.

VOL. 2. DECEMBER, 1892. NO. 12

Please note our change in address to 269 Dearborn street.

WITH all the gain in new ideas and progress electrically which has so highly marked the present year, the science has also suffered unspeakable loss in the death of Van Depoele, Field and Siemens,—three great leaders. The life and works of each are full of inspiration to the young electricians of to-day, from whose ranks will be drawn in years to come the names of other great men.

OUR second annual review of the year with our advertisers reveals a thoroughly satisfactory condition of trade, with a splendid prospect for 1893. Not only has there been a uniform increase in amount of business done,—in some cases extremely large gains—but fully half the manufacturers of street railway supplies have built additional factories, or added largely to their former facilities.

MENTION is made in this number of the remarkable record of the Joplin, Mo., road which, during its twenty-two months operation by electricity, has never had an accident or claim for damage of any kind. The road is doing business, too, for it carried over eight hundred thousand people during the time mentioned. The Joplin road has also been unusually fortunate in its exemption from accidents arising from causes over which

no company has control, and which often creates an accident record in spite of anything and everything possible in the way of precautionary measures.

THE elevated road in the Kansas Cities, Missouri and Kansas, was this month operated by the trolley system for the first time. The business was not sufficient to pay operating expenses under the old method, and it is believed that by operating single cars during those hours of the day when travel is light, and hauling trains of two cars during the rush, that not only a shorter headway may be scheduled, but a large saving effected. It is the first elevated system in this country to be so operated, the one other road being the Overhead Railway, over the docks in Liverpool, England.

AN interesting account appears in this issue of a model steam plant, in which mechanical means supplant all the duties except that of discretion, usually required of the fireman. From the moment the coal fuel reaches the building until it is delivered in ashes in a wagon to be hauled away, the labor is performed entirely by machinery. A most important feature is the substitution of a 200-foot brick stack by one of steel 72 inches in diameter and only 55 feet high, but which with the aid of a 10-horse-power blower is made to do the duty of a brick chimney which would have cost ten times as much. While the plant in question was erected for other than railway purposes, yet the applied principles are in every way as applicable to railway power stations.

AN extremely novel means of illuminating floats for night parades was recently employed in Wilmington, N. C. As described elsewhere in this issue, the railway company took the contract for lighting all the floats of the Trades' Parade, with incandescent lamps, and also contributed one float themselves. The very unsatisfactory results which occurred in New York, on the occasion of the Columbus ceremonies, and in which the floats were lighted or rather intended to be, with storage batteries and calcium lights, could have been made successful by the plan mentioned. It is true such use of the line would completely block the tracks for cars, but when any large parade uses a tracked street the cars cannot be operated anyway, and the application opens a new field for night parades never before possible.

COMPANIES suffering from damage suits, arising from injuries to minors in jumping on and off cars as a pastime, or as more commonly termed, "hitching on," will find a helpful and eminently just decision in a recent ruling of the Kentucky court of appeals. The opinion is reported in our Street Railway Law, this month. Scarcely a road but is made to suffer from this cause, although the companies in our larger cities have the most complaint, for in smaller towns boys are more subject to parental control. We have frequently had occasion to refer to this matter, and believe the surest remedy is in the securing of an ordinance making the

jumping on and off of cars by boys who are not passengers, punishable by fine, and placing the enforcement of the law with the police department. No one can raise any objection to such a regulation, and parents, quite as much as companies, should be interested in securing the passage of such an ordinance.

A MONTHLY paper has made its first issue, published by the president, and as the organ of the Amalgamated Association of the Street Railway employes of America. In his own biography he states he has been a citizen of the United States about twelve years, and that his experience in street car work covers a period of about eighteen months, during which time he was foremost in organizing a strike. The avowed policy of the paper "shall be to always counsel the spirit of moderation in dealing with employers," and editorially it asks of presidents and managers, "suggestions as to the management of railways." We certainly are in sympathy with any effort which makes for the betterment of the army of street railway employes. Whether or not this educational labor has fallen into competent and worthy hands remains to be seen. The extremely ill-advised and reasonless action of the amalgamated association of street car men in New Orleans, in violating their contract, has done much to forfeit the confidence of employes elsewhere, and has forced managers to look upon the amalgamated association with distrust. Naturally, a manager will seek to employ men most loyal to the company and competent in the discharge of duty, and heretofore has been able to do so without the aid or dictation of orders or amalgamations. A position for which a man can become fairly competent in a week's time, can never be rated as skilled labor, and all the amalgamations in Christendom cannot make it such, or force the employment of members at higher wages than they are worth.

A FEW days ago an intoxicated laborer, with little regard for his own comfort, and less for the thousands of weary citizens who were in a hurry to get home in time for dinner, deliberately walked into a moving cable car, which resented the affront by promptly knocking the offender down. The driver and conductor of the car were immediately arrested, taken off their car, which was not allowed to proceed. Somewhat more than half an hour elapsed while a doctor was being brought, and the joint committee of "cops" and surgeon canvassed the returns, which resulted in a verdict of a broken collar bone, a painful but neither very serious nor fatal accident. The men were then released. In the meantime, which was especially mean to the fully three thousand passengers who occupied the sixty cars held by the blockade, which occurred between five and six o'clock, all outbound traffic was suspended. The aggregate loss of time to passengers was 1,500 hours. If the driver was criminally careless in running down a person, he should very properly be placed under arrest, but not under the same conditions as the driver of a delivery wagon or even an omnibus. Detention of the former means delay to hun-

dreds and thousands of citizens, while in the latter case, the driver alone, or at the most a dozen persons, are inconvenienced. Similar instances in this and other cities have frequently been brought to our attention. As the average policeman does not seem to exercise any too great discretion, and possibly is elated at such an opportunity to display a little authority, it would seem desirable for managers to secure an order from police headquarters directing that in cases of accident which seem to warrant arrest, the officer be instructed to accompany the driver on his car to the end of the trip, where a relief man can be put on the car, and the driver return with the officer. There is nothing unreasonable in this; in fact, if the police force are to protect the public, and not discriminate in the case of an individual, they could not better do so than by the plan suggested. The injured party and the law would not suffer,—neither would the public, whose rights seem often to be entirely forgotten.

MOST of the tramways in Great Britain, as well as many on the continent, are experiencing a period of very trying circumstances. Wages and provender have increased in cost, while a business depression has reduced earnings, in not a few instances to such an extent as to cause a deficit. Again, some companies are rapidly approaching the time when government expects to avail itself of the privilege of purchase, and at a price for roadway, equal to what the rail is worth as old iron. The Metropolitan system especially, is an illustration of these adverse circumstances, and, in consequence, its stock has fallen in value in two years from £3,216,000, to \$1,808,700, or nearly 44 per cent. The attitude of municipal governments throughout the British Isles has been unfriendly to tramway improvement and progress. Not only are excessive burdens constantly added from year to year to the already onerous restrictions and taxes, but any attempt on the part of the companies to introduce improved systems of motive power, are met with an army of objections which at once discouraged capital and enterprise. The result is that it is extremely difficult to enlist local capital, and this is one reason why so large amounts have been sent to this country for tramway investment. There are as many miles of rapid transit surface roads in each of a dozen American cities as are in all the English cities combined. As we have always maintained, a progressive and adequate street car system is one of the absolute necessities to a growing, prosperous city, and in such, does more to advance the value of realty than all other causes combined. With us, towns of a few thousand inhabitants are vastly better provided for in street car accommodations than the average cities of Britain with as many hundred thousand souls. Here new enterprises are encouraged by liberal franchises—although none too liberal—and the completion of a road in four months is no unusual occurrence. The result is, our citizens are whirled from any portion of a city to any other part, in a few minutes, and with a degree of comfort unknown abroad. But the restrictions which are cropping out in some of our older cities are parcel of the

narrow-minded policies which prevail in the old world, and if given a foothold will inevitably produce similar results.

A FEW days ago the executive committee of the American Street Railway Association met in Milwaukee and made all arrangements possible at this time, for the next meeting in that city. The committee express themselves as delighted with the accommodations offered, and secured the splendid exposition building for the joint service of sessions and exhibits. For the first time since the display has assumed large proportions, will both features of the convention be under the same roof, and the advantages of this arrangement cannot fail to give the greatest satisfaction to delegates and exhibitors. Heretofore the street car man gravitated from hotel to hall, and from hall to exhibit and was kept on the run most of the time, and in the course of the three days spent about as much time in going to see as in seeing. The exhibit of 1893 will be a veritable exposition of railway appliances and no more fitting place could have been secured. Everything will be on the ground floor, with ample supply of power, and space has been placed at so low a figure as to warrant a much larger display than many would otherwise feel able to afford. There will also be no difficulty in getting heavy exhibits in place, and the building is only from three to six blocks from the hotels, with which it is connected by street car lines. Notwithstanding the increased size of the building, we believe some restrictions should be placed on visitors not directly connected with street railway interests, as a protection to both delegate and exhibitor, who are the ones in whose interest alone the display is made. Exhibitors spend hundreds and in many cases several thousand dollars, and when there are managers and superintendents unable to get within several feet of the appliances, by reason of the crowd of curious sight-seers, it does not increase his comfort. We would not, by any means, exclude the public, but would either welcome them during those hours when the delegates are in attendance on the business sessions, or admit on passes, which should be in the hands of all exhibitors, and the local committee. This works no injustice to the outside public, who cannot complain at such an arrangement, and at the same time permits of a system, which seems necessary, now that the occasion has grown to such proportions. General Manager H. C. Payne and his assistants are and will do everything possible, and the general says there will be a convention many notches above all previous high water marks, and we know he will see that it is done.

ONE cannot travel always and not reach a destination sometime: and even the Rapid Transit Commission in New York, whose deliberations have been anything but rapid, has at last found a resting place; and standing on a route a good many feet underground thrust their heads out of water and announce a decision. They recommend a tunnel eleven and one-half feet high by forty-four feet wide, from the Battery to One Hundred and Sixty-fifth street, and beyond that a depressed line, with streets crossing it on viaducts and bridges.

The estimated cost is placed at from sixty to seventy-five millions. The franchise will be offered for sale on the twenty-ninth of this month. The bidding company must have a capital of fifty million; furnish a bond of two million as security against damage to property, and deposit one million in cash. Another plan suggested is to bond the city for sixty million, and lease the road to an operating company for 999 years. As underground roads are not popular in Europe, it may fairly be assumed the money will have to come from local capitalists. So many of the heaviest of New York financiers are already interested in surface and elevated roads; the fact that the enterprise will doubtless require eighty instead of sixty millions: the long haul and low fares, all combine to make the attractions to the investor none too easy. Even though the road when completed were sure of financial success, the inconvenience attending three to four years construction work is not relished by abutting property owners; so that altogether the future of the enterprise cannot be expected with any great degree of certainty. Some of the leading financiers in New York pronounce the investment an excellent one for a man who wishes to provide for his grand children and their descendants, but as offering absolutely no attractions for investors of the present generation. Russell Sage's broker tersely answers the question by asking another as follows: "If the Manhattan elevated roads, which are in long and well established working order, can pay only 6 per cent on \$50,000,000 of stock and bonds, how much can the newly established road pay on \$100,000,000 and carry passengers six miles further than its oldest competitor?"

It would be but reasonable to presume if the enterprise was a practical one financially that capitalists would not have waited thus long for a commission to discover the fact.

By the way, what has become of the rapid transit commission in Boston, and has its plans all gone to the canines?

FOR the four months ending October 31st, the Galveston City Railway shows an increase in earnings of \$11,000 over the corresponding period last year, while the expenses were reduced \$3,171; operating expenses 53.30 per cent. Substitution of electricity for horses is the explanation.

AS RELATED in the REVIEW some months ago in our description of the opening of the underground electric system of the City & South London Railway, the important feature of ventilation was wholly ignored. The Electrical Engineer, London, very emphatically takes the management to task, and draws a lesson from the expense incurred in the new Baltimore tunnel, to insure good air at all times. The Baltimore tunnel, moreover, is less than a mile in length, while the London subway is four miles. Americans who have used the English line report the lack of ventilation as almost unendurable.

KANSAS CITY ELEVATED ADOPTS ELECTRICITY.

PRE-EMINENTLY a city of cable roads, is Kansas City; that is, the one in Missouri. Kansas City Jr., which lies three miles to the west, across the Kaw river, raging in spring freshets, and shallow and sluggish during most of the year, is, though hilly, not a "precipitous city." To ride on many of the Kansas City cables is as good as a balloon ascension, for the original site consisted of alternate steep bluffs of that clay peculiar to the Missouri river throughout its course, separated by deep gulleys which at one time might with perfect propriety have been termed canyons. Topographical contour was, in a cross section, very like a solid row of the letter V—thus VVVV.

In selecting the site for the city it seems as if the early settlers made a studious and stubborn choice of apparently the most impossible portion of all the country round and set to work to teach nature a lesson by slicing off the hill tops and dumping them into the valleys just as was done at San Francisco, for in each case there were

for from five dollars a month up, but there are comparatively few empty business houses, the streets teem with people and the street railroads, that absolute thermometer of good and bad times, all report a good increase over last year and a brighter outlook for 1893.

Hence there has been little or no new construction work during the year, although a decided change has come among the people, for owners who once opposed the construction of cable roads on their street, now throng the companies' offices and beg for lines. The reason for this is the striking difference in rents between streets which are cabled and those which are not.

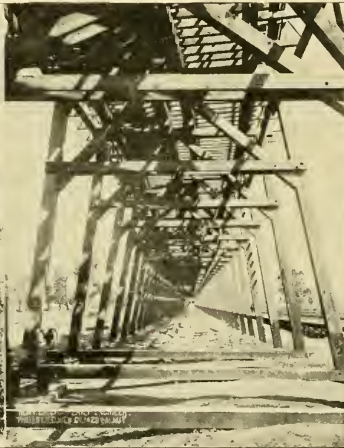
There has, however, been one important change which, while not involving any additional trackage, has radically changed the modus operandi of the

KANSAS CITY ELEVATED RAILWAY.

which is the real text of this sermon. This line connected Kansas City, Mo., with Chelsea Park, in Kan., passing



POWER HOUSE AT WEST END OF TUNNEL.



APPROACH TO THE KAW BRIDGE.



EAST MOUTH OF TUNNEL.

great stretches of almost level land so near by as to seriously jeopardise the good judgment of the early settlers. Still no one of our great cities has been the creation of any one man, and circumstances over which it had no control decreed that Kansas City should be where it is, although the present presentable condition of affairs was only secured through years of unremitting labor and the expenditure of millions of the tax-payers' good ducats.

As the world knows, the city boomed and boomed until it couldn't boom any longer, and then of course there was a magnificent "bust," in which the properties of all kinds suffered awful depreciation, and the real estate business and men were paralyzed. The impression thus created still exists in the minds of thousands who have not recently visited the place nor remember that the world moves. House rents are still at a figure which fails to pay taxes and an interest on first cost, cottages renting

through Kansas City, Kan. Here let it be remembered, that "state line" is a street in the latter city, and which but for a station so named, would never be discernible, as business and manufacture flank it on both sides.

The surface tracks of the road start at Delaware street in the big K. C., and extends west on Eighth street, a distance of 6 blocks, first mounting, then descending an 8 per cent grade. This brings the road to a great hill, through which a tunnel was cut. This tunnel is 900 feet long, 20 feet wide, 18 feet high, the arch springing from a point 7 feet above the floor. The line is straight, but has a grade of 9.8 per cent, which is still further increased to 13 per cent as the line emerges, and descends with a long sweeping curve to the Union Depot. Over the depot would be more proper, for upon leaving the tunnel the construction is highly elevated, crossing a great network of railroad tracks, with a viaduct for teams and pedestrians crossing between the

ground and the elevated tracks. It seems strange that the tunnel should ever have been built, as by a little longer and circuitous route, and purchasing a right of way, the line could have gone around the hill and made the same terminus it does now, and on much easier grades.

From the Union Depot the road is an elevated structure, running over a public street at considerable height. Passing through Packingtown with great pens full of beeves below, and more beeves bellowing above, where they are driven over the cars in covered runways fully 60 feet from the ground, the line makes straight for the Kaw, sparkling with tin cans and a great convenience to the packers. The river is crossed on the company's own steel bridge 600 feet in length with rails 20 feet above low water. This is the only part of the line which is single tracked. Having crossed the river the road continues on, across the aforesaid "state line" to "Riverview" station, where a line diverges in a southerly direction to Armordale, a distance of 3 miles; the main line continuing on to Chelsea Park, 4 miles further. At this junction is the large and handsome new Chamber of Commerce building

and arranged to admit of being converted into a compound when desired. Also one 750 horse-power compound. Ordinarily one engine will do the work. There is one engine at each end of the line shaft, which is 17 inches diameter, weight 15 tons, and carries three large pulleys each 20 feet diameter, 40-inch face and weighing 28 tons. From each a 40-inch Munson belt transmits power to the three Edison multipolar generators, of 350 kilowatts each. A Robert Poole & Son clutch at the middle of the line shaft permits of using one, two or all three generators at one time as desired. The maximum output of current will be 2,000 amperes. The switch board is conveniently arranged. In the

BOILER ROOM

are 6 Worthington pumps, and 6 Corliss vertical boilers of 160-horse-power each. Coal will be the fuel used, and four boilers will do the steaming for ordinary needs. In both engine and boiler rooms, which are separated by a fire wall, the available space was quite inadequate to the necessities of the case, but it is difficult to see how a



ELEVATED STATION ON THE "STATE LINE."

not quite completed and having at present as its only tenants the officers of the elevated road, who occupy some very attractive offices, the windows of which command a view of the road in all three directions.

After leaving the junction the line becomes a surface road on public streets, except where an occasional deep gulley requires a little bridging for two or three hundred feet.

The section first named, which passes through the tunnel, was operated by cable until the middle of last September when the driving machinery was removed to make place for the electric plant. The same power house is retained unchanged otherwise. It is located on the hillside at the lower end of the tunnel at Eighth and Bluff streets. It is four stories high on one side and two on the other. The engine room is on the ground floor, the upper story being used for a work shop, with tracks which switch out on the main line.

THE POWER HOUSE,

when the installation is complete, will contain one 700 horse-power high pressure Corliss, built at Providence,

better arrangement could be attained than has been secured. The diagram will show the plan view.

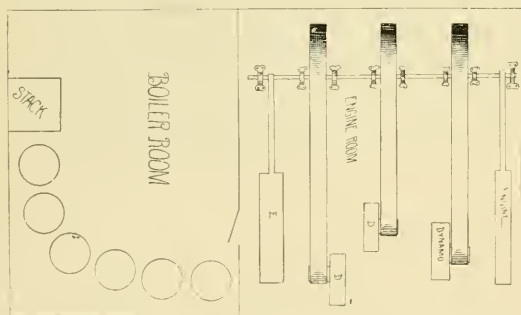
THE TRACK

has not been altered with the exception of 2,000 feet of double track, formerly laid with 45 lb. flat rail which has been displaced by the duplex rail, furnished by the Duplex Rail Company, of New York. The balance of two miles was in fairly good condition: and the four miles of 60-pound T will do duty for a long time yet. All four rails are united with cross bonding, No. 4 soft drawn copper wire and $\frac{1}{2}$ inch rivets being used for the purpose. The over head fixtures were furnished by the Railway Equipment Company, Chicago. Handsome iron center poles with brackets on either side, and ornamental combination tops to carry feed wires are used in Kansas City, on the elevated structure, and for some distance on the Kansas side. About three miles nearest the park are side poles and cross suspension. There are 35 miles feed wires, ranging from 0 to 0000. and with the other wires was furnished by the Washburn & Moen Company. The trolley wires are size 0 and aggregate

nearly 13 miles. The cars are 24-foot bodies, seating 40 passengers and carried on 8 Griffin Foundry Company's wheels. The trucks are the McGuire: the three steps on each side of both platforms are Stanwood's make;—both of Chicago. Cars complete weigh 12 tons. Each car has two 30-horse-power Edison No. 16 single reduction motors, and a speed of twenty miles an hour has been made, and will be scheduled as running time on the long stretch from the Union depot up the 9.8 per cent. grade through the tunnel and approaches.

In the tunnel an inverted trough of dressed pine was fastened to the ceiling, to suspend the wires and protect them from moisture. The tunnel will also be lighted with 30-candle-power lamps; it is, however, private property, and teams cannot, and pedestrians are not allowed to pass through except in the cars.

Stations on the L section are reached by a stairway from the street, but fares are collected on the train except at the Union Depot, where transfer is made to and from the Ninth street cable line, and where entrance is by ticket only. At all other stations, the public have free access to the waiting room, which is on a level with the car floor. To prevent passengers from crowding the platform, or getting upon the track, sliding double doors from the waiting room to the depot platform are kept locked. When a train stops, the conductor unhooks a chain which he can reach from the car platform, and counterbalancing weights pull the doors open. When the depot platform is cleared, and before giving the signal to start the car, the conductor pulls down the chain-closing and locking the doors as he found them. The



PLAN OF ENGINE AND BOILER ROOM.

operation is extremely simple, and really requires much less time to execute than the reader has spent in this brief description.

A curious feature of the change to electric power was the objection which some Kansas residents made, saying they preferred the steam dummy.

The burden of making the plans and carrying them into execution fell upon Louis P. Hall, of Baltimore, the chief engineer of the Jarvis-Conklin Company, but he made a good record in all respects with the work, and is deserving of much credit. F. J. Porter was given supervision of installing the overhead wiring, and has also performed his part thoroughly.

The elevated road is peculiar in that wood, with one slight exception, forms no part of the structure, which is composed of a series of pin connected steel trusses, 50 feet in length. Each end rests on steel columns 10 inches square and ranging from 20 to 30 feet in length. Column foundations are of brick, laid in the form of a pyramid and capped by a heavy cast iron cap securely held



BRIDGE OVER THE KAW RIVER.

by anchor bolts. The upper chord of each truss, upon which the rail is laid, is composed of two 10-inch steel channels, rolled in a single piece to the length of the span. These channel bars are separated laterally 6 inches by means of a U shaped steel plate each vertical side of which is riveted to the inner surface of the channel bar. These bent plates are spaced to 16 inches throughout the length of the span. Upon these are laid oak blocks two inches thick and $4\frac{1}{2}$ inches square with bolt holes in the rail at intervals, to correspond with similar holes in the plate. The block serves the purpose of a cushion, upon which the rail is placed, and bolted by means of the holes referred to. The rail is about two inches below the upper flange of the channel bars. By this arrangement the channel bars in addition to performing the duty of upper chord of the truss also furnish a rigid and complete guard rail, dispensing with heavy guard timbers and cross ties, thus making little obstruction to the light and greatly reducing the dead weight. This brings the two outside rails directly over the supporting columns.

THE KAW BRIDGE

is a combination, wood and steel structure, with three spans of 200 feet each. It is 20 feet above the normal water line.

The trestle approach at the west end of the bridge is wood, and 1,750 feet in length, making nearly half a mile occupied in crossing the river and flooded bottoms. A short distance further west is the 1,400 foot trestle over Splitlog creek.

HISTORICAL.

After the organization of the company for the construction of the elevated road, great difficulty was experienced in securing passage of an ordinance. For nearly

a year the franchise was presented time and again, only to be defeated. The obstructionists, however, were limited to a few personal interests. Finally, on January 6th, 1885, the ordinance passed by a vote of 8 to 4. Preparations were then actively pushed, material hurried out as fast as possible, but, owing to litigation, actual work was not begun until May, 1886. Even then frequent injunctions were secured, which temporarily suspended work on several occasions. The company then entered general condemnation proceedings, and succeeded in completing the main line, from the Union Depot to Edgerton, $3\frac{1}{2}$ miles of double track, in the remarkably short space of seven months. This section of $3\frac{1}{2}$ miles of double track includes all the elevated portion. Robert Gillam was the constructing engineer, and to him is largely due the energy with which the work was finished.

The opening occurred on Saturday, October 16, 1886, at the time when Jay Gould made his famous visit to Kansas City. Mr. Gillam had charge of the inaugural trip, which included Senator Geo. G. Vest, D. M. Edgerton, president of the company, Colonel Kersey Coates, Judge Hoag, Mrs. George Gould, and a large number of guests, prominent in Missouri and Kansas, as capitalists and politicians. The occasion gave Kansas City second place in cities having elevated roads, New York at that time being the only other one.

The opening of the Chelsea park branch was celebrated July 4, 1887; two miles double track; steam motors. The tunnel line, operated by cable from the Union Depot to Eighth and Delaware streets, was opened in June, 1888. It measured seven-tenths of a mile, and was double track. The Grand View branch, of 1.66 miles, double track, was also operated by cable.

In March, 1891, the line from Riverview to Armourdale was opened, operating with electricity. This gave a total of 20 miles single track, operating by cable, motors and electricity. During the past year the company went into the hands of a receiver, and the Jarvis-Conklin Mortgage Trust Company, of Kansas City, were appointed financial agents to protect the stockholders. This they did by securing the \$600,000 of outstanding bonds, and proceeding to institute a more economical operation, by adopting one motive power where there were three. The total length of cable was less than four miles of single track, and business not warranting the cabling of the entire system, it was decided to use electricity exclusively. The old cable power-house was used as the generating station, as already described, but newly equipped with engines and boilers.

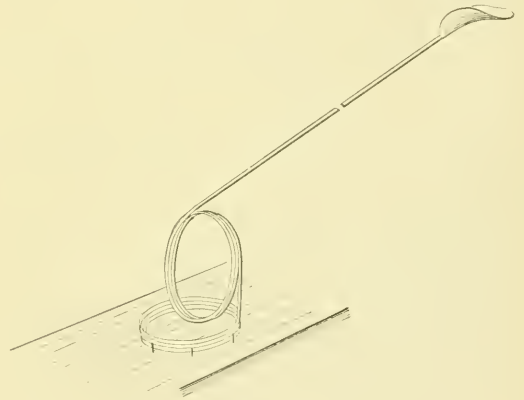
The main line was started electrically on December 6, 1892, and gives promise of a brighter future than has been its history in the past.

The officers are: D. Joshua Wilbern, President. Providence, R. I.; D. D. Hoag, Vice-President and Secretary, Kansas City, Kas.; Waterman Stone, Superintendent, and W. E. Barnhart, Auditor.

The REVIEW is under obligations to the Kansas City Times, for courtesies extended our representatives while in that city.

ILLUMINATING PARADES FROM TROLLEY WIRES.

IN Wilmington, N. C., the Street Railway Company, of which John H. Barnard is general manager, exhibited during a recent Trades Parade an extremely simple solution of the problem of satisfactorily illuminating floats for night parades. For the interesting occasion, the Wilmington Street Railway Company offered to take contracts for lighting the floats with incandescent lamps. By several this offer was accepted, and so gratifying were the results that it is most probable that hereafter this method will be exclusively employed. To obtain contact with the trolley wire, a very simple trolley was devised. A piece of stiff spring brass wire was coiled in two planes—the lowest coil being fastened to the float. The horizontal coils afforded ample side motion, while the vertical ones gave

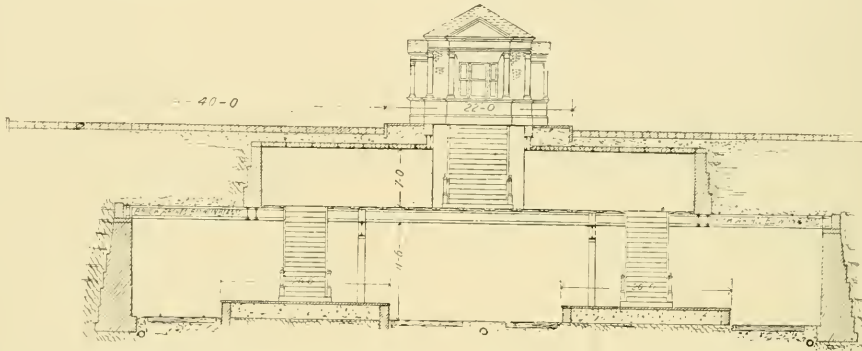


TROLLEY FOR ILLUMINATED FLOATS.

good upward pressure against the trolley wire. From this various circuits were led about the float, the lamps being connected up five in series. The ground connection was very easily obtained by a little car with iron wheels six inches in diameter built to fit the gauge of the track, which was towed under the wagon on which the float was built. Thirty 16 c. p. lamps were found to give a splendid illumination to a very large float, and this, with the simplicity and small cost of the arrangement, makes it quite certain that practically all floats shall be so lighted in the annual parade next year. As their own exhibit the Wilmington Street Railway Company arranged a float on which was seated Benjamin Franklin drawing electricity from the clouds. His kite string consisted of a light bamboo pole, on the end of which was a broad sheet copper contact shoe. This shoe was entirely hidden by the kite, while the bamboo pole was concealed by a dark colored covering, from which 14 incandescent lamps protruded. The 15th was dropped and illuminated the leyden jar. This float being built on a flat car, the ground contact was obtained through its wheels.

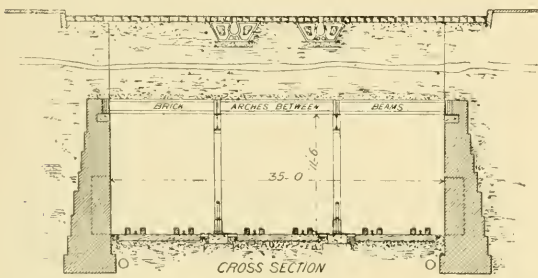
NEW YORK RAPID TRANSIT COMMISSION'S REPORT.

THE result of two years' research, thought, and deliberation on the part of the New York Rapid Transit Railroad Commission has been given to the world in the report of late date, advocating an underground railroad traversing New York in the lines of greatest travel, with ramifications and side tracks to less traveled portions of the metropolis. The conclusion above given was arrived at after much consultation with every variety of people, representing every walk of life and condition of wealth and poverty. School-teachers,



preachers, labor agitators, engineers, rich, poor, adults and infants, all appeared before the commission to advise and counsel, approve and condemn.

The plans call for a four-track electric railway, with a total length of 15 miles. The main line of which is to run from the Battery through Broadway and the Boulevard to Fort George, and thence northward to Yonkers. The road will be 44 feet wide and 11½ feet high. Both local passenger and express trains will be run on sched-



uled time at a 5-cent passage rate. There are contemplated 35 stations for passengers, and 10 express depots. There will be two loops, one from Broadway at Bowling Green to South Ferry, and back through Whitehall street Broadway, and the other from Broadway around City Hall park to the bridge entrance. The underground portion extends only to Forty-third street. From thence viaducts, half-sunk tunnels and bridges will be used. All the stations below Manhattan street will be underground. We illustrate by the three accompanying

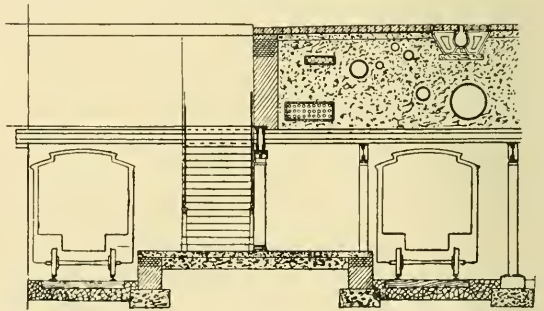
engravings the most salient points in the construction.

The specifications state that the load to be supported by the underground construction shall be estimated as 1st, weight of soil and pavement, 2nd, weight of pipes and other structures beneath the pavement, 3rd, weight of roof, 4th, live load on the street, total to be assumed at not less than 1,500 pounds per square foot of surface.

Electricity must be used, and the motors shall be sufficiently powerful to readily start a train of eight cars weighing, loaded, not less than 30,000 pounds on a gradient of 1½ feet in 100 feet of distance. The motors must maintain a speed of not less than 40 miles an hour. Should each car carry its own motor the above require-

ments must be in proportion. The rails are to be 75 pounds to the yard, and block signals are to be used.

The franchise is to run 999 years, and the company must have a capital stock of \$50,000,000 in 500,000 shares. The company must protect the city in \$2,000,000 bonds, finish the road, pay 10 per cent of the receipts, and pay out anywhere from \$75,000,000 to \$100,000,000 for the road. The franchise is to be sold December 29.



The commissioners who have completed this heavy task are: President, William Steinway; vice-president, J. H. Starin; J. H. Inman, Samuel Spencer, and secretary E. L. Bushe. The engineers most prominent are John Bogart and William Barclay Parsons. Our cuts, which are from Engineering Record, show adopted plans for various parts of the line.

THE Hopgood tramways, England, will resume service on Fridays, Saturday and Mondays!

URBAN TRANSIT AND EXPOSITIONS.

THE old story of the quarrel between the foot and the head is constantly illustrated by the very learned economists who delve into Egyptian record and averages to prove that the city makes the street railways valuable and the contention of the much harder headed capitalists who disprove all theory by boldly making a city out of a line of street railway and empty town lots.

There are cases on the other hand where events have made the street railways, with a strong presumption that without the street railways the event would not have been so remarkable.

As a case of the latter propositions we beg to submit the experience of the Philadelphia street railways during the exposition of 1876. Without doubt the exposition did much to develop interest in street railways to point out to conservative capital that avenues to returns lay through investment in urban railways. That, however, cannot be claimed as more than one of a series of events that has made street traction one of the largest businesses of the country. That event did not bring street railway traffic from a luxury to a necessity. The cable and the electric car has made the poor man's carriage.

It must be admitted that the Centennial exposition did for horse lines in Philadelphia what no exposition can do again for any city in America. It made them. It can only help Chicago roads.

In Philadelphia, Fairmount Park was three miles from Broad and Market streets, the center of the city. Four horse lines led directly to the grounds. These were the Philadelphia City, leading from the principal street: the West Philadelphia, the Hestonville and the Germantown line. The other lines were merely feeders.

These roads were heavily patronized of course. How heavily may be seen from the accompanying table.

| LINE. | 1875. | 1876. | 1877. |
|------------------------|-----------|------------|------------|
| Germantown..... | 8,247,247 | 13,338,672 | 10,314,484 |
| Hestonville..... | 6,646,336 | 9,634,689 | 4,778,166 |
| Philadelphia City..... | 8,619,357 | 13,736,706 | 7,933,957 |
| West Philadelphia..... | 8,493,721 | 15,008,950 | 9,934,816 |

The other lines not leading direct were also greatly benefitted and in reality paid better dividends in proportion from the fact that less expense was incurred in fitting cars, buying horses and paying wages to extra men.

Our table shows a decided falling off from the ante-fair traffic of the year 1877 on two roads, with an increase on the remaining two. The indirect lines show a little of the same spirit.

With the Columbian exposition, Chicago traffic is considerably different. First, the fair is further removed from the business center. Second, the cable equipment is more easily increased and maintained than a system horse traction. Besides the original cost of the horse in Philadelphia, the excessive heat of the summer of '76 made the mortality rate very high, whereas with the cable and electricity the case will be radically different and the carrying capacity of the systems very considerably greater.

Speculation in stocks was not as great as would be expected for the reason that brokers picked up every acces-

sible share at an advance of from \$10 to \$15. Where ever stocks were turned onto the market the fight was fierce.

The dividends on the exposition roads were as follows:

| | Par Value. | 1874. | 1875. | 1876. | 1877. | 1878. |
|------------------------|------------|---------|---------|----------|----------|----------|
| Germantown..... | \$50 | 6 p. c. | 6 p. c. | 18 p. c. | 16 p. c. | 12 p. c. |
| Hestonville..... | \$50 | \$1.50 | \$1.00 | | | |
| Philadelphia City..... | \$50 | \$5.00 | \$5.00 | \$5.00 | 6 p. c. | 18 p. c. |
| West Philadelphia.... | \$50 | \$9.50 | \$10.00 | \$5.00 | 39 p. c. | |

These were the returns sworn to before the auditor of state. Where dollars are shown the dividends are per share.

The fares were six cents with a transfer system between north and south and the east and west roads at nine cents.

The returns for the Columbian exposition will show two things. The first, that the metropolitan area is made more extensive by reason of our magnificent system of transit, thus accommodating visitors with better rooms, cheaper board and cheaper transportation. The great north and west sides and the southern suburban districts may easily return their quota, and the Chicago City and the Alley L on account of their directness will carry an immense business that could not be possibly handled by other means.

And secondly it will grandly vindicate the superiority of mechanical over horse traction as to cheapness, comfort and speed.

The Paris Exhibition is of little interest in the matter of rapid transit, as the Champ de Mars would not fill one corner of our great exposition grounds. The visitors of the Parisian exposition moreover were not so numerous at any one time as to require more than the very inferior horse-trams and the excellent omnibus system. Many visitors too, lived within walking distance of the grounds.

MORE SUPPLIES.

THE announcement made last month of the partnership of Harrison and Carey has blossomed into the Nuttall Railway Supply company, of Chicago. The new firm has offices at 801-802 the Monadnock, and bears the following officers: W. C. Groetzing, president; P. H. Carey, vice-president and general manager; E. H. Harrison, treasurer and R. D. Nuttall and C. J. Mayer, the well-known Pittsburg supplymen. The new firm with its power, backing, and the experienced oversight of men like Messrs. Nuttall and Mayer, together with the energy, push and large acquaintance of the splendid Chicago management, ought to make a fine record in the West.

A LOOSE gate on an electric car recently came unfastened and played a merry tat-too on the timbers of a bridge in Bay City, Mich. The passengers, mainly women, thought the car was off the track, or that electricity was playing some new and awful game with them. A consequent rush to the door wedged four fat women in the space meant for one, and stopped the exodus long enough for the conductor to explain.

A MOST UNUSUAL CONSTRUCTION.

The Pasadena & Mt. Wilson Railway;—Cable, Trolley and Storage Join Forces and Mount a 60-per cent. grade—Without exception the Steepest Railway in the World—A Tiny Mountain Brook furnishes all the Power—The road owned by one Man.

THE millenium of traction motive power would seem to be approaching, for on a lofty mountain in the far west a road is now nearing completion in which the rival claims of cable and trolley join hands, and even the storage battery becomes an indispensable link in the strange chain of combined forces. With a further disregard for the established order of things, the steam engine, boilers and belts are

air on the rapidly rising foot hills of the Sierra Madre mountains. Of this historic range one peak towers above the rest like a mighty sentinel. It is Mt. Wilson, whose bold, majestic apex rises 6,000 feet above the blue waters of the Pacific, only a few miles distant. This eminence has long been one of the most favored resorts, but the means of reaching it were so arduous that, of those whose health a brief sojourn at the peak would



TEMPORARY TRANSPORTATION DURING CONSTRUCTION.

wholly ignored, and, as if in keeping with the surrounding stupendous exhibition of nature in rugged mountain and ever widening valley, the inventive genius of man has come close to nature's heart, and a little mountain stream, which one may cross at a single step, is coaxed from its tiny channel between the rocks and made to furnish power which shall transport enraptured sight-seers to the very mountain-top itself.

The combination mentioned stands out conspicuous as the only one of its kind on the continent, and displays so ingenious, interesting and curious features that a few words descriptive of the place and the needs which have been mother to the invention, become quite necessary to a complete understanding of the work.

Seven miles to the east of Los Angeles, the metropolis of southern California, is the beautiful little city of Pasadena, and, two miles further on, the valley is lifted in the

most benefit, few have felt able to endure the danger and hardships of the journey. Notwithstanding the difficulties 4,000 visitors annually have traveled the two narrow trails which lead to the resort hotel, a veritable mecca, at the top.

The only transportation was by burros, or "Rocky Mountain canaries," as they are affectionately called a little further east. These diminutive creatures, with ears wide spreading as the sails of a windmill, and with a monotony of drab colored coats, which make them as much alike as peas in a pod, furnish sure though slow conveyance, for they seldom move faster than a walk. But they are reliable and, with utter disregard of consequences, will gather their four hoofs on a single square foot of rock, and, with a traveler on their backs, turn half around and climb in an angular direction; while the breathless rider has sought to make himself as small and

light as possible as he peers over some precipice whose walls stretch down some two thousand feet or more of sheer descent. However, the burro has had his day, save for an occasional adventurer who may make the ascent by trail, but who will be very certain to come down by rail; for the first section of the new road is already finished and in three months more the track will touch the summit. The foregoing will sufficiently suggest the difficulties which have so reluctantly yielded to the irresistible march of man.

tracked, and continues so to the summit of the cone, called "Echo Mountain." The average

GRADE IS 60 PER CENT,

and the car speed on this portion of the road is only four miles an hour, which, however, is quite enough for many people, to whom the six minutes consumed in making the ascent seems as many hours. The length of this section is 2,600 feet, with a vertical rise of 1,600 feet, making it the steepest railway in the world; the Mt. Pilatus rack



TRAVEL DURING CONSTRUCTION OF THE ROAD:—"CHANGE CARS."

The generating and transmission of power on this line present several

NOVEL AND ORIGINAL FEATURES.

The road starts with a trolley system at Alledena, a quiet little village at the foot of the mountains, and there connects with the Los Angeles Terminal Railroad. Nothing unusual in construction appears here. For the first two miles a gradual grade of 7 per cent is encountered, bringing the visitor to the Rubio Canyon, a rugged mountain gorge. Here the road is confronted by a bold, cone shaped mountain, like a huge inverted sugar bowl. Here also the character of the road

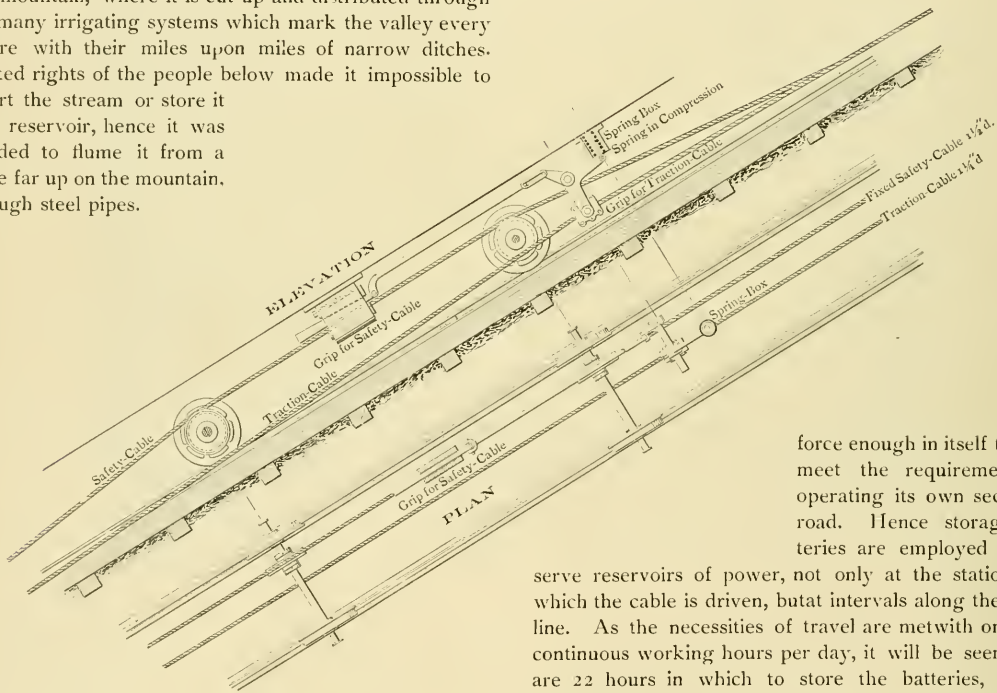
CHANGES FROM TROLLEY TO CABLE

system, but without change of cars here or at any other point on the line. Thus far the route has been a single track, T rail construction with the ordinary overhead wiring. The cable section, however, is double

road in Switzerland* being next in order, with a grade of 48 per cent. The car is raised by an endless cable, which passes around a horizontal terminal sheave at the bottom, which is carried on a weighted frame, and serves, also, the additional purpose of tension carriage. Two steel cables are employed—a traction rope $1\frac{1}{4}$ inches and a safety rope $1\frac{1}{2}$ inches in diameter. The grip for traction cable is placed beneath the front platform and the safety grip under the middle of the car. The moment the traction rope is released the safety grip instantly closes on the other rope making descent impossible, as a glance at the illustration will clearly indicate. At the top the traction rope is wound three times around a driving drum. This drum is geared to an electric motor, and here the cable, overhead wire and storage systems are united in a remarkable unity. At this station are 300 storage cells, and they play an important part. The car motor and the

(*See STREET RAILWAY REVIEW for November, 1892.—Ed.)

motor which drives the cable are shunt wound; both may be converted into generators at will, and when the car descends the incline or a grade, serve the double purpose of a brake and economy of otherwise wasted power. This energy, which is usually lost, is here carefully husbanded. The moment the car motor ceases to require energy, the conditions are reversed, and gravity is made to give back a part of the price paid in ascending. Having brought our electric cable car safely to the summit, let the reader now go back a little and seek the advantage and necessity of the storage batteries. As already mentioned, falling water is the initial power. On the line of the road is a mountain stream which never freezes and which has an undiminished flow throughout the year. It gathers its sparkling waters from melting snows and living springs on the topmost heights, and has a descent, gradual in places and precipitous in others. It follows, however, a nearly straight line from summit to base of the mountain, where it is cut up and distributed through the many irrigating systems which mark the valley every where with their miles upon miles of narrow ditches. Vested rights of the people below made it impossible to divert the stream or store it in a reservoir, hence it was decided to flume it from a place far up on the mountain, through steel pipes.



making in all three such stations on the line, at altitudes of 1,400 feet apart. The shaft of each wheel is coupled direct to a generator, and the water from the first wheel is piped to the second and discharging there to the third, where it escapes into the natural bed of the stream. As the wheels and generators are expected to operate continuously during the 24 hours, the supply of water for irrigation is unaffected. Should, however, the wheels be stopped, the water would again follow its own natural channel through the rocks, cut centuries ago. While these water wheels and generators are placed at altitudes about 1,400 feet apart, the distance between any two is several miles, and no one wheel and generator exerts

force enough in itself to meet the requirements for operating its own section of road. Hence storage batteries are employed as re-

serve reservoirs of power, not only at the station from which the cable is driven, but at intervals along the whole line. As the necessities of travel are met with only two continuous working hours per day, it will be seen there are 22 hours in which to store the batteries, during which time no other demand is made on the generators. Should any ordinary accident disable even all three generators, it is expected the batteries would still be sufficient to operate the system the necessary two hours, or one working day. In case the batteries became wholly exhausted, the full 24 hours would be required to again fully recharge them.

Turning our attention again to the cable division of the road, we find some very interesting calculations in transmission and re-transmission of electrical power, which has been worked out by A. W. Decker, the electrical engineer, who has had immediate charge of this branch of the construction. According to his calculations, 15 horse power is required to operate the cable and raise one

Although the volume of water is quite small, the vertical descent of 1,400 feet affords a pressure of 600 pounds to the square inch as it emerges through a half-inch-orifice, impinging itself in an undershot stream against the buckets of a tangential wheel. So great is the force of the escaping water, one cannot cut it with the stroke of an ax, which instead of cutting through the stream is thrown violently from the hands. At present but one of these wheels is in operation, but two more will be added,

empty car when counterbalanced by the gravity power of the other empty car in its descent. Hence under the present arrangement of driving machinery, one car must always take the descending cable in order to raise the ascending car. Should, however, the ascending car carry its full load of 24 passengers, an additional 30 horse power is necessary, requiring a total output of 45 horse power to raise a loaded car against one empty. If, however, the ascending car be empty and the descending car loaded, the conditions would reverse, and instead of drawing from the batteries the loaded car would not only establish the equilibrium but would in addition move the cable and return 15 horse-power to the batteries. This principal of return power will prevail over the whole line, so that, Mr. Decker estimates the power given back by the cars moving down grade will equal fully 40 per cent. of the total amount required to operate the system.

As to the construction of the road itself it is surprisingly free from deep cuts and trestles. In an air line from the mountain top terminus to the base of the range the distance is about $4\frac{1}{4}$ miles. The road, however, after leaving the top of the incline at Echo Mountain follows a serpentine route by easy though almost continuous grades to the summit, traversing a distance of 10 miles. The grades average only 7.5 per cent and the curves are in



STREAM THAT FURNISHES THE WATER POWER.

no case less than 80 feet radius. The line is single track with occasional turnouts, with the exception of the 2,600 feet of double track cable at the incline.

THE SCENERY PRESENTED

while making the ascent has been pronounced as unsurpassed by travelers who have been in all parts of the world. Many distinguished men have journeyed to the summit. Only recently President Elliot, of Harvard, made the trip



SCENE ALONG THE LINE.

and selected a site for the great astronomical photographic lens, of which so much is expected. He pronounced the view as unequalled by any he had ever seen. The great valley for 60 miles stretches out before the vision like a vast garden, the orange groves and vineyards dotted here and there by villages, from which steeples rise as if to catch the eye; while as a border on the west, sky and ocean meet in a rim of rich blue, tinged silvery in the centre by the sun, and bending like a crescent to frame half the picture. To the south the rocky ribs of the San Jacinto range are lost in the blue haze of the horizon.

On Echo Mountain, below the line of winter snow, the air is soft and pleasantly, uniformly cool, freed from the languorous warmth of the valley. It comes floating in gentle waves with the odor of orange blossoms and the sweet perfume of rose gardens, of eucalyptus and almond, and a thousand different flowers. Turning and looking toward the summit is presented the wildest mountain scenery, in strange and striking contrast to the peaceful picture of the valley below. The path of the road here and there in serpentine form, presents a continuous panorama of succeeding wild and thrilling scenes, shutting from the sight of the passengers an harmonious view of green orange orchards and rose gardens. The route

plunges across a saddle dividing two canyons flanked on one side by a solid wall of granite extending fifteen hundred feet below, and as many above, and upon the other by a thickly wooded slope almost as precipitous.

There is no perpetual snow in the higher altitudes of these mountains, though it lies on them during the four winter months, at times to a depth of six feet. In these



MT. WILSON.

altitudes the air is cold, light, dry and stimulating, and its invigorating influence is at once felt. It is somewhat rarefied and of phenomenal clearness. It is remarkable that the alternating red, white and blue flash-lights of the lighthouse on the island of South Catalina in the Pacific Ocean, 60 miles distant, can be seen with perfect distinctness. This point, the terminus on Wilson's Peak, will be reached in one hour after leaving Alledena.

In the scheme of the railroad is included the erection of two elaborate hotels. The first is now under way on the top of Echo Mountain, and will be an all-the-year-around house. This altitude is above the fog and below

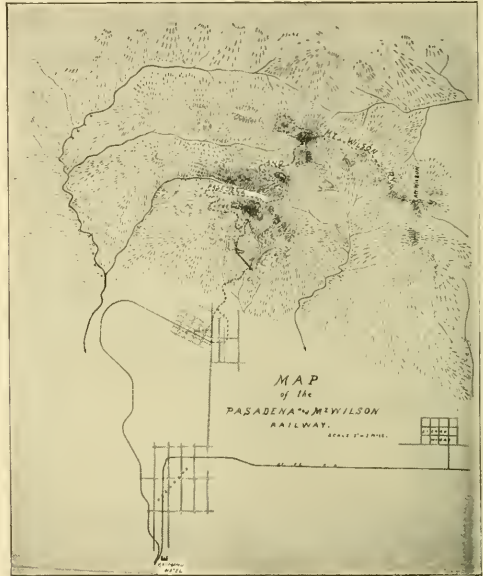


GRADING FOR THE ROAD.

the snow line, and will be especially patronized by persons suffering from pulmonary and bronchial affections. The second hotel will be built on Mt. Wilson, and will probably not be in operation during the winter months, though this will be determined later on. Besides the Harvard station on this mountain, there will also be the astronomical observatory of the University of Southern California

that will erect a lens surpassing in size that of the Lick telescope.

The total cost of the completed road and the hotels is placed at \$600,000. The construction of the first section and the first hotel is being paid for by the proprietor himself, without having placed a security upon the market. The remaining portion of the road will be built with money raised from the sale of bonds. It is estimated that the annual revenues of this road will be that of about 60,000 fares, though 20,000 will pay expenses and allow a good interest on the investment. This calculation is not prodigal when it is considered that the road will certainly constitute one of the special features patronized by tourists to Southern California, and that this tourist travel now amounts to 100,000 yearly. The income derived from this source is separate from that to be yielded by



MAP OF THE LINE.

the adjacent resident population, which amounts to 200,000 of the most active, and many of them the most cultured citizens in the land.

T. S. C. LOWE.

This article would be incomplete without a mention of the man who is the soul of the enterprise. Professor T. S. C. Lowe, who has not only planned the technicalities of the road and fathered the project, but has wholly assumed the undertaking financially.

Professor Lowe is now past his sixtieth year, and culminates a life-time of successful exploits with this mountain railway. He has successively been an inventor of mechanical devices and chemical compounds.

Professor Lowe came into public distinction first as the originator of balloon service for military observation aiding General McClellan during the civil war, which fact may partly account for his ambition to run a railway

as nearly straight into the air as possible. He came to California a few years ago, leaving paying business relations in the East. Since his coming to Pasadena his ever-active mind has brought about the building of his own beautiful residence, the establishment of public gas works and an artificial ice factory, besides owning several buildings and holding positions of financial trust.

Professor Lowe is, without doubt, one of the foremost factors in the progress of southern California, and, if a man's age is to be counted by activity, we must set down his years at thirty instead of sixty-odd.

A life of intense energy, breadth of intellect, generosity of sentiment and an unwavering trust in his science has brought Professor Lowe wealth, fame and position, socially and intellectually.

"Must the steam engine go?" asked a reporter of Edison. "Why, certainly," Edison replied, "that is what it is bought for. It ought to go the regulation number of hours per day and the regulation number of days per week, for a long time. But if you mean, 'Will the steam engine be superseded by electricity?' I would answer that it is my opinion that it will not be in my day, nor yet in yours."

We presume the trolley is to blame for the non-arrival of Biela's comet, if as some papers would have us believe, it knocks everything out.



T. S. C. LOWE.

MILWAUKEE APPOINTMENTS.

THE following changes and promotions took effect December 1, in the management of the Milwaukee street railway: Superintendent of building and repairing, A. W. Lynn; superintendent of operating department, George W. Hommel; assistant superintendent of operating department, George Kuemmerlein; superintendent of construction, H. Benson; chief and consulting engineer, J. C. Henderson, of New York; mechanical engineer, R. S. Steichman; electrical engineer, Lucius T. Gibbs; station electrician, O. O. M. Rau; auditor, W. L. Mason; secretary and treasurer, George O. Wheatcroft.

THE TROLLEY'S INVENTOR.

TWO suits in equity have been filed in the United States Supreme Court at Toledo, O., brought by Benson Bidwell and others against the Toledo Consolidated for infringement of a patent on the trolley device. Mr. Bidwell claims priority of invention under letters patent number 373,046, dated November 15, 1887. This is said by Bidwell to be a test case, and that the action is the result of two years' preparation. Electrical authority in Chicago says that there is no shadow of right in Bidwell's claim, and, consequently, manufacturers or consumers need not hesitate either to make or to buy.

The original device of the trolley with a rolling contact on the lower surface of a wire is of European origin with claimants in the Siemens-Halske firm. The first European road used a trolley contact years previous to the patents granted to Mr. Bidwell. The outcome is said, by competent authority, to be a certain defeat for the Bidwell claim. The fact that so little excitement or apprehension is occasioned argues poorly for the new case.

The tramway at Johannesburg, South Africa, took in \$10,000 in October. Three miles of additional line is proposed.

The Birmingham, England, tramways will double track throughout.

MILWAUKEE LITIGATION.

The history of the troubles of Messrs. Pfister and Vogel and the Villard syndicate would make too long an article for our space, but a glance at the history of affairs as outlined in the REVIEW for last May will give the desired facts. Suffice it to say that on the application of C. F. Pfister, Judge Johnson has appointed G. J. Melms receiver for the Hinsey line. This is the closing act of a long series of suits for possession of the line. This means the ultimate absorption of the railway by the syndicate. Mr. Melms has been for many years superintendent of the line and is thoroughly acquainted with its management.

THE ST. JOSEPH-BENTON HARBOR ELECTRIC RAILWAY.

A FEW years ago the man that would have proposed a railway between two towns would have received the investigation of an insanity expert. To-day the same proposition is hailed with enthusiasm and the promotor given a first rank in the opinion of his fellow citizens. The force that has wrought this change, and has made possible these interurban lines has again fulfilled its mission in the junction of two more cities in Michigan, namely, St. Joseph and Benton Harbor.



W. WORTH BEAN, PRESIDENT.

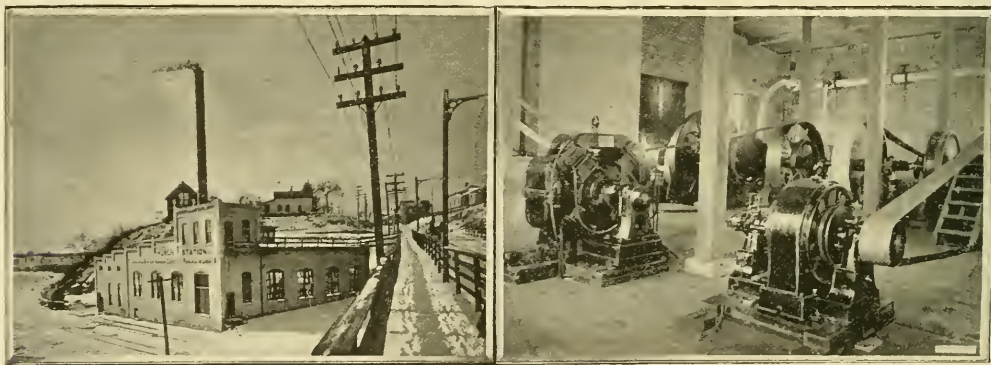
These places are situated upon the shores of Lake Michigan, and aggregate a population of nearly 12,000, of which number 8,000 live at Benton Harbor. The towns are one and three-fourths miles apart, and are rapidly becoming important as summer resorts for Chicago people. The summer traffic by boat amounts

About a year ago Mr. Bean was granted his franchise, and operations toward the installation of electricity were begun as soon as possible.

The track work and road bed were completed under Mr. Bean's direct supervision, and now show five miles and one-half of single track, or a line of three and one-half miles. One mile in Benton Harbor and the same length in St. Joseph are yet to build as traffic will warrant. The rail used is a 52-pound girder and 45-pound T rail, both made at the Johnson mills. Mr. Bean's motto that "the best is none too good" is shown in the manner in which the road bed is built. The overhead appliances were put in by the General Electric Company, and the trolley wire is No. 0 hard drawn copper with 0000 feeders.

THE POWER STATION

is situated at St. Joseph on the Vandalia railroad tracks and the St. Joseph river. The building is frame 70 by 90 feet in dimension, and one story high, with every convenience of freight passage by means of side tracks from the Vandalia to the premises. Our engraving shows the exterior of the building, with the offices at one corner.



POWER HOUSE — ST. JOE AND BENTON HARBOR ELECTRIC RAILWAY.

to an average of 1,000 a day during the months of June, July and August. The trip is four hours by water, and a thriving business is done by the steamship lines enjoying this patronage. The voyage is a pleasant one usually, and the numbers that go are ordinarily those who can spend but a day or two at a time away from the drive of city life. Benton Harbor is also of some commercial importance, and the two towns are already increasing their hotel facilities in expectation of the World's Fair patronage.

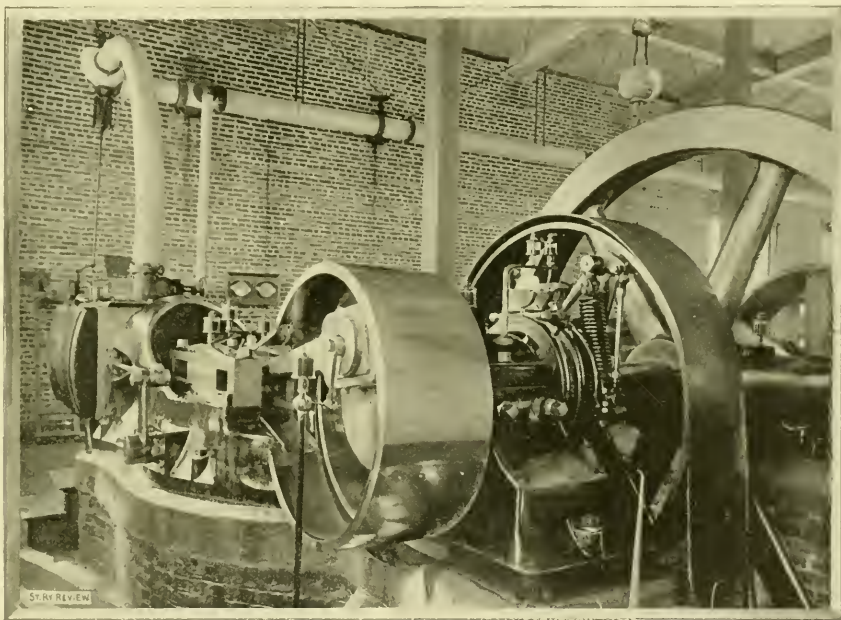
It remained with an energetic capitalist, well known at meetings of the American Street Railway Association and throughout the railway world generally, to bring the towns into notice as among the pioneers in the matter of rapid transit. W. Worth Bean is the capitalist referred to as the originator of this work, and to him belongs the honor of the installation.

The power station has for a main-spring two engines, right and left, of the William's tandem compound condensing type. The high pressure cylinders are fourteen and one-half inches, the low pressure twenty-four and one-half; stroke, eighteen inches. The high and low are butted to each other. Steam chests of high and low pressure being on opposite sides. The valve stems connect with a rocker arm which passes through the bed of the engine, giving a perfectly rigid support. The governors of the engines are so sensitive that arc lights, incandescent lights and railway generators are run from the same engine without detriment to the lights. These engines are connected directly with a six-inch shaft in two lengths, aggregating 36 feet and 7 inches, by two Eclipse friction clutch couplings of 48 inches diameter, six arms, capable of transmitting 325 horse-power at a shaft speed of 225 revolutions. The shafts are connected

in the center by an Eclipse friction clutch coupling, 42 inches diameter, six arms, which allows either shaft to be run independently. The shaft is supported by five Eclipse floor stands 42 inches high and 48 inches spread at base, and run in ball and socket self-oiling pillow blocks, 24 inches long, adjusted laterally by screws and vertically by parallel wedges, planed on both sides. There are two friction clutch pulleys 89 inches in diameter and 10-inch face, two, 78 inches diameter and 14-inch face and two, 67 inches diameter and 10-inch face. These pulleys drive the generators and dynamos. All the pulleys and couplings are fitted with the Eclipse segment and pinion shifters, secured to the floor by independent stands with a hand wheel on the shaft of same allowing the clutch mechanism to be engaged without jarring the machinery. The electrical equipment consists of two 120-horse-

725 pounds of water with 1,093 pounds of oil. Deducting 4 per cent of the steam for the running of the burner, 15.3 pounds of water may be evaporated with one pound of oil. As a comparative statement, one pound of coal will raise 60 pounds of water from 32 to 212° F., while fuel oil in the same amount will mark the same change in 90 pounds of water.

This gas-oil system reduces the crude oil to a vapor by steam pressure before it is ignited as fuel under the boiler. These burners are in four types, ranging from two to 60 gallons of oil per hour. The St. Joseph plant carries a No. 4 with two burners. The price is \$25.00. The price of oil varies, but within the limits of lake traffic it is much cheaper than coal. It is unnecessary to state that the cost of firing, boiler cleaning, grate repairs and handling is almost nothing.



THE WILLIAMS TANDEM-COMPOUND ENGINE.

power Thomson-Houston multipolar generators, type 90; two 50-arc light machines, also of the Thomson-Houston make; two 600 incandescent alternating machines, also of Thomson-Houston manufacture; Dean condenser of 500-horse-power, and two 7x10 Hughes pumps. Baragwanath's reliable feed-water heater of 500-horse-power is in use.

At this station the fuel used is hydro carbon fuel oil on the system sold by the National Supply Company, Manhattan Building, Chicago, E. E. Billow, agent. This is adopted by Mr. Bean from economic motives altogether, and for the region within low freight of the oil fields this system is maintained by its supporters to be the most efficient and economical. The device used here is known as the Reid oil burner, and is claimed to evaporate under favorable circumstances 14-

The oil will be used the major part of the year, but arrangements are also made for soft coal service.

This installation is of great interest from the fact that it is a small one, and if it proves its superiority over coal consumption will be the precursor of a number of others.

The oil is stored in a 6-foot tank, 25 feet from the boilers and flush with the surface of the soil. Snow pumps, sold by the National Supply Company, handle the oil.

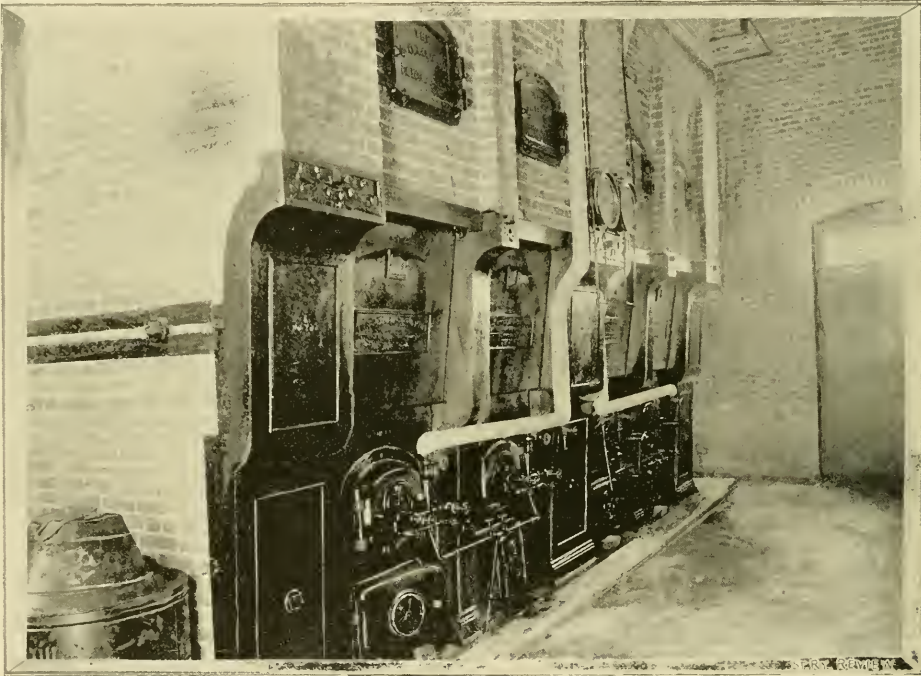
The boilers are of the Sterling water tube type, and the two aggregate 400 horse-power. These boilers are growing steadily in favor for electric power stations, and no better recommendation is possible than the great increase in the number of horse-power sold since January of the present year.

The rolling stock of the road now consists of six Brill

cars, 23 feet over all, equipped with two 15-horse-power type, water proof, single reduction Thomson-Houston motors with the series parallel controller. The trucks are made by Brill.

Altogether it can be said that the road is constructed, equipped and managed as well as any road six or seven times its size, and every detail of workmanship, direction, superintendence and management has been carefully, judiciously and thoroughly carried out.

The General Electric Company is entirely responsible for the electric equipment, which was superintended by G. K. Wheeler, engineer of the railway department at the Chicago office; B. J. Arnold, consulting engineer.



THE STIRLING BOILERS WITH OIL BURNING ATTACHMENT.

V. P. Briggs, of Beloit, represented the Eclipse Clutch works in the work of superintending the installation of the clutches, line shafting and the engines.

The present officers of the company are: W. W. Bean, president and general manager; H. C. Mason, superintendent; W. H. Hull, secretary. The directors are: W. Worth Bean, Geo. M. Bell, Benton Harbor; Edward Bryant, H. C. Mason and W. H. Hull of St. Joseph.

The management has already perfected arrangements to increase its traffic by the construction of a pavilion at the Benton Harbor terminus of the line, which has a stage 25 feet by 30 feet, strong enough to support the leading lady of any amateur company that may venture to perform there. The pavilion seats 2,000, and during June, July and August, comic opera and concerts, both home and foreign talent, will exercise its powers.

WAGES IN ENGLAND.

THE new municipal arrangements in London, which points to the absorption of the tramway system, has one very bad feature easily recognized by the capitalist as well as by the labor leaders. This difficulty is the preferring of one laborer over another, and, in fact, making a preferred class of labor to the discontent of the other workers and the dismay of the capitalists in the same and in other lines. Wherever the municipalization of the tramway interests has been accomplished there has been an eight hour law or custom inaugurated with full-time pay. The result is heavier expenses, the raising of

unskilled labor to the pay of skilled workmen, and the consequent dissatisfaction of both classes.

On the Manchester trams the average day is about 15 hours with only a space of five or ten minutes for eating dinner and supper. For this day's work the drivers are paid \$1.08, and the guards or conductors 83 and 85 cents or \$1.00, according to the length of service.

Trippers are paid for the rush trip and night trips, aggregating 8½ hours extended over a day of 16 hours, 58 to 70 cents for drivers, while conductors receive from 60 cents to as low as 41 cents.

It is very probable that a reform in the matter of wages would deter the municipalization of tramways and obviate the necessity of going to the other extreme of paying skilled labor prices of the unskilled article.

**MEETING OF EXECUTIVE COMMITTEE,
AMERICAN STREET RAILWAY ASSO-
CIATION, TO ARRANGE FOR
NEXT CONVENTION.**

THE Executive Committee of the American Street Railway Association met Wednesday, Dec. 7, at the Plankinton Hotel, Milwaukee, to make the preparatory arrangements for what promises to be, in many particulars, the most successful meeting ever held by the Association. There were present: President D. F. Longstreet, Denver; W. Worth Bean, St. Joe, Mich.; secretary W. J. Richardson, Brooklyn; Thomas McLean,

ous executive functions. In the exposition building, besides these advantages, there will be sufficient power obtainable to put in working condition any machinery that may require steam. As to this advantage, no comment is necessary.

Although no definite arrangements have been made as to the headquarters hotel, the Plankinton will undoubtedly be chosen. One other large hostelry promised 25 rooms, while the Plankinton can afford double that number, and is within four streets of the Exposition building.

The executive committee spent the following day in Chicago calling upon the various friends and acquaintances of the individual members, not forgetting the



MILWAUKEE EXPOSITION BUILDING WHERE THE NEXT CONVENTION WILL BE HELD.

New York, representing Mr. Crimmins: John R. Chapman, Grand Rapids, Mich.; Benj. E. Charlton, Hamilton, Ont., and T. J. Minary, Louisville. The stress of their executive duties precluded the attendance of J. D. Crimmins, of New York, and Joel Hurt, of Atlanta, while Dr. A. Everett, of Cleveland, was detained by ill-health.

The committee, in conjunction with Manager Henry C. Payne of the local committee, decided upon the Exposition building as the proper place to hold the exhibit of the supplymen as well as the meetings of the association. The plan will certainly meet the approval of the street railway fraternity, and will be hailed with exceeding great joy by the supply contingent. This, we believe, is the first opportunity afforded for holding both shows under the same tent, and will be conducive to the centralization of forces, and the mobilization of the vari-

ous offices of the STREET RAILWAY REVIEW. They left for their homes Thursday evening and Friday morning.

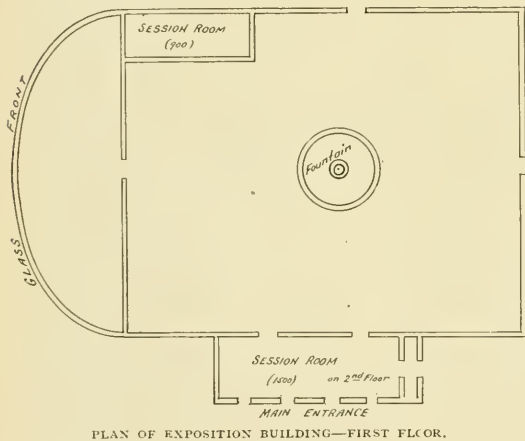
The committee in session also resolved upon the titles of the papers to be presented before the coming convention, but agreed to leave the publication of these events entirely in the hands of Mr. Richardson. The committee on standards was continued and reads as follows: Chairman and Thomson-Houston, O. T. Crosby, Utica, N. Y.; accountant, H. I. Bettis, Atlanta, Ga.; electrician and Short, E. E. Higgins, New York City; mechanic and Edison, C. W. Wason, Cleveland, O.; Westinghouse, R. W. Rippetoe, Terre Haute, Ind.

The committee, all and severally, are pleased with the work done and with the prospects of the reception of the Association in Milwaukee, and hotel accommodations.

THE LOCAL COMMITTEES

although not yet officially appointed, will probably consist of Henry C. Payne, G. W. Hommel, A. W. Lynn, L. T. Gibbs and G. J. Melms, with all of whom the street railway men are pretty generally acquainted.

The exposition building used for the annual Milwaukee exhibition has been rented for two weeks, thus giving engine builders and other heavy machinery men ample time to erect their exhibits. The plan given herewith of the ground floor, shows the convenience as to space which will be rented at 10 cents a square foot with a minimum of \$10.00. Power is obtainable in any reasonable quantity, to be paid for by all users pro rata. Electric power and steam can both be found. Secretary Richardson will receive applications for space up to a certain date, when space will be allotted. On the second or gallery floor of the exposition building is an art room



capable of seating 1,500, while on the main floor is a session room seating 900. In one of these the meetings will be held.

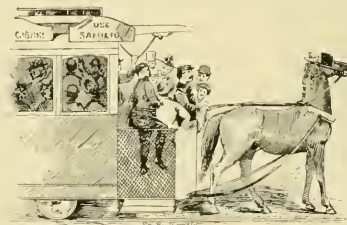
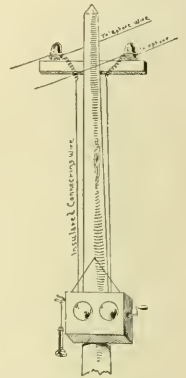
A novel and pleasing feature of the Milwaukee meeting will be the facilities offered by Mr. Payne for the active display of supplies. Mr. Payne offers any and all supply men the privilege of displaying their goods on the Milwaukee cars. Any car manufacturer may put on his cars and trucks with placards announcing their make, and run them on the Milwaukee tracks at any speed from two to ten minutes. This feature will be appreciated by every delegate and supply man, and Mr. Payne and the Milwaukee company cannot be too highly commended for this display of courtesy.

REED & MCKIBBIN, the well known contractors of New York City, will construct the South Norwalk, Conn., line. They have just finished a road at Beaver Falls, Mass., and have lines under way at Chester and Media, Pa., Brooklyn, N. Y., Paterson and Easton, N. J.

D. M. SHARPE, of Minneapolis, is the new Superintendent of the New Jersey Traction Company, of Newark.

NEW RAILWAY TELEPHONE SYSTEM AT TACOMA.

THE Point Defiance, Tacoma and Edison Railway company, operating a line of thirteen miles between Pt. Defiance Park and Edison, recently put in a telephone system in connection with its line, for the purpose of enabling the motormen to immediately notify the central station in case of accident or stoppage of cars. Every car carries a regular bridging Bell telephone and a common receiver. Two main telephone wires are run the entire length of the line. At every pole where a telephone can be attached a wire is run from each main wire down the pole to within reach of the ground. By this means the conductor of each car can easily "cut in" his telephone between the main wires. As the telephone at the main office is also "cut in" between these wires the circuit is, of course, a complete metallic one. No battery is used with the car telephone. An ordinary Blake set is used at the main office. If an accident occurs on the line the central office is notified, and the cars on either side of the break can be kept moving on time. A chart is in use showing where every car should be at a certain time. The regular running speed is from 25 to 30 miles per hour. In tapping off the wires for use at the bottom of the pole insulated wire is employed. It is run down the pole to a block where the connections are made a hook provided for hanging the telephone. The system works to perfection, and the cars kept on time to a minute. N. Lawson, the superintendent of the company introduced the plan. The poles are 130 feet apart, and the wire 15 feet from the ground. The greater portion of the line is through dense woods, sparsely settled.



The car horse gave a gentle start,
Then stopped, which ill foreboded,
And gaily spake the driver smart,
"He didn't know 'twas loaded!"

MANAGER HIPPE, of Des Moines, has given all his employes a dollar on Thanksgiving day for the past ten years. It used to take \$20 to go around, but now it's \$300.

THE LINDELL ELECTRICS' LOSS.

PERHAPS the heaviest fire ever experienced in St. Louis railway circles was the burning of the Lindell car house on the morning of November 21. The car barn was not a very old structure, oblong

year ago this barn would have accommodated the majority of the stock, but the great additions to equipment necessitated new barns a few months ago.

An alarm at 1:03 a. m. brought the fire department to a well-developed conflagration, which nothing less than a cloud burst could quench. It appears that the flames



in shape, built of brick and stone, one story high and fronting on Finney and Fairfax avenues. In this big structure were stored two vestibuled cars, twelve short

originated in one of the cars, from a lamp carelessly left burning. To this beginning the upholstery and woodwork gave quick food.



trailers, thirteen long trailers and two tank cars. Fortunately the new car barns, built a few blocks west contained the greater part of the rolling stock. To this fact the insurance companies owe their unbounded thanks. A

The report that a trolley wire caused the flames is absolutely groundless.

The burning of these cars does not interfere with the Lindell system to any great extent, but with the present

rush of orders in all the car building establishments in the country, it will probably be some time before the new equipment can be secured.

An ineffectual attempt was made to rescue cars, but only one was saved. The big motors were unwieldy and



kept back the progress of the others. Our engraving shows the wreck of the trucks with the ruined motors still attached.

The loss was about \$150,000, fully covered by insurance in several companies.

OHIO STATE TRAMWAY ASSOCIATION.

ON the sixteenth of November the Ohio State Tramway Association met at the Clarendon Hotel, Zanesville, with the following member companies represented:—

East Cleveland Railroad Company, Dr. A. Everett, L. E. Beilstein; Cleveland City Cable Railway Company, Charles Hathaway, John Koch; Woodland Avenue and West Side Railway Company, J. B. Hanna; Toledo Consolidated, Albion E. Lang; Cincinnati Consolidated Street Railway Company, E. K. Stewart, W. F. Kelly; Canton Street Railway, W. A. Lynch; Akron Street Railway Company, F. A. Seiberling; Zanesville Street Railway Company, F. A. Seiberling; Ashtabula Street Railway Company, J. A. Stewart; Cincinnati, Newport and Covington Street Railway Company, Chas. Hathaway.

President J. N. Stewart, of Cleveland, called the meeting to order at 10:30 a. m. The report of the secretary and treasurer, J. B. Hanna, showed the prosperous condition of the association and the executive committee recommended the admission of the Hamilton and Lindenwald Electric Transit Company, Hamilton; the Citizens' Electric Light and Power and Railway Company, of Mansfield, O., and changed the meeting of the association to the third Wednesday in September.

President Stewart's address followed, and the association in the afternoon listened to a valuable discussion on life guards. Mr. Lang discussed the Mekarski system of compressed air. The merits of metal and wooden poles were then discussed as were also sand boxes.

The election of officers for the ensuing year then fol-

lowed to this effect: President, A. E. Lang, Toledo; vice-president, W. J. Kelley, Columbus; secretary and treasurer, J. B. Hanna, Cleveland, chairman executive of the committee. The next meeting was appointed at Cincinnati on the fourth Wednesday in September. The meeting then adjourned.

The unconventional dinner at the Clarendon was highly enjoyed by all in the evening, and the association voted the meeting a success.

The supplymen present were: J. A. Hanna, McGuire Company, Chicago; P. K. Andrews, Brill's Chicago representative; F. A. Rodgers, Short Electric, Cleveland; E. P. Morris, General Electric, Boston; F. H. Strieby, Central Thomson-Houston, Cincinnati; J. F. Macartney, Railway Equipment Company, Chicago; F. D. Russell, Rochester Car Wheel Works, Rochester, N. Y.; W. E. Haycox, Fulton Foundry, Cleveland; H. A. Dorner, Dorner & Dutton, Cleveland; C. B. Squire, American Casualty and Insurance Company, Cleveland, and C. E. Stump, of the Street Railway Journal, New York, N. Y.



A. E. LANG.

STREET RAILWAY PATENTS.

Selected list of patents relating to Street Railway Inventions, granted during the past thirty days, reported especially for the STREET RAILWAY REVIEW by Munn & Co., Patent Attorneys, 361 Broadway, New York, N. Y.

ISSUE OF NOVEMBER 8th, 1892.

| | |
|---|---------|
| Electric Railway Switch, C. A. Stone and E. S. Webster, Boston, Mass..... | 486,658 |
| Elevated Railway, H. W. Kirchner, Denver, Colo..... | 485,700 |
| Elevated Railway System, E. Norton, Maywood, Ill..... | 485,708 |
| Street Car, J. E. Foster, Monmouth, Ill..... | 486,034 |

ISSUE OF NOVEMBER 15th, 1892.

| | |
|---|---------|
| Cable Railway, R. McClintock, J. F. Langhammer and J. W. Lowell, Baltimore, Md..... | 486,262 |
| Electric Railway Conduit, A. W. Wright, Chicago, Ill..... | 486,315 |
| Trolley for Electric Railways, A. H. R. Guiley, South Easton, Pa..... | 486,333 |

ISSUE OF NOVEMBER 22, 1892.

| | |
|---|---------|
| Street Car Curtain, A. D. Cochran, Indianapolis, Ind..... | 486,433 |
| Trolley Hanger, D. E. Lain, Yonkers, N. Y..... | 486,583 |
| Railway System, J. P. F. Kuhlman, Seattle, Wash..... | 486,718 |
| Tramway Switch, R. C. Davis and D. A. Ripley, Columbus, O..... | 486,769 |
| (Street) Car Brake, P. J. Laurence and M. F. Garretson, Wellston, Mass..... | 486,785 |
| Street Railway Switch and operating Device, H. Blanchard, Boston, Mass..... | 486,836 |

ISSUE OF NOVEMBER 29, 1892.

| | |
|---|---------|
| Trolley for Conduit Railways, B. Olbricht, Brooklyn, N. Y..... | 486,985 |
| Device for Transmitting Motion for Electric Street Car Motors, W. E. Harrington, Atlantic City, N. J..... | 487,069 |
| Electro Magnetic Pulley, W. E. Harrington, Atlantic City, N. J..... | 487,070 |
| Electric Locomotive, C. M. Conradson, Madison, Wis..... | 487,114 |
| Street Car, re-issue, F. B. Brownell, St. Louis, Mo..... | 11,289 |

ISSUE OF DECEMBER 6, 1892.

| | |
|---|---------|
| Electric Motor for Cars, C. A. Jackson, Reading, Mass..... | 487,329 |
| (Street) Switch Operating Device, J. D. Stone, Syracuse, N. Y..... | 487,457 |
| Car Fender, P. Wentzel and H. Beltzer, Boston, Mass..... | 487,547 |
| Closed Conduit for Electric Railways, A. A. Vanderpool, Newark, N. J..... | 487,654 |

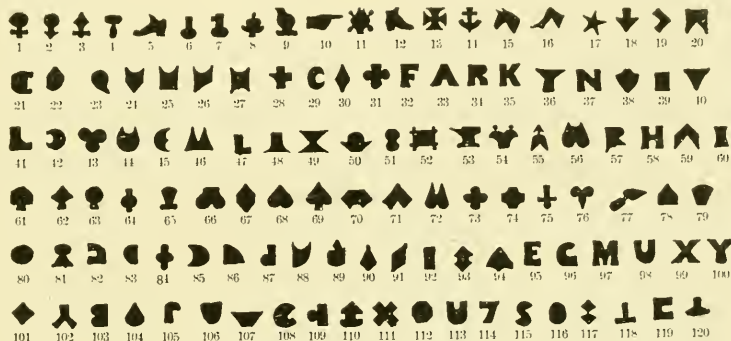
COMBINATION PUNCH AND BELL CORD SPLICER.

ONE of the most prevalent wastes of good profanity and better bell cord on our street railways comes from the ordinary methods of splicing the cord, when, in the midst of the rush trip, with the pressure of half the trip behind, a sudden pull for "two bells" breaks the cord, and time, patience and fares are lost while the repairs are being made with the usual method of tying a true love knot in the none too

The same device is also good for coupling round belts. The punch is applicable to transfer tickets, commutation tickets, or railroad tickets.

The National Fare Box Manufacturing Company, 89 West Washington street, will sell punches at a very low figure and the sleeves cost only a few cents a hundred. Numerous testimonials of managers already using the device will be sent on application.

FRANK HUNTOON has been made superintendent of the syndicate lines at Davenport, Iowa.

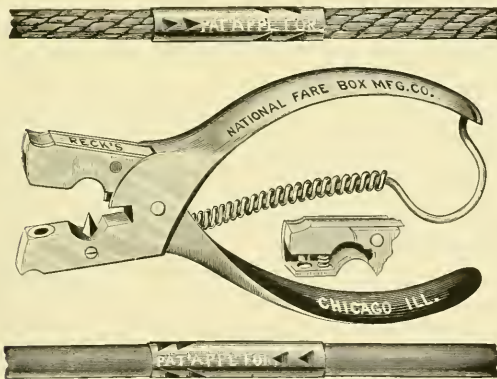


DIES FOR COMBINATION PUNCH AND BELL CORD SPLICER.

pliable cord, to say nothing of the many times when the cord is found too short and further expedients must be resorted to.

It is with the object of obviating this difficulty that the National Fare Box Manufacturing Company, of Chicago, has put upon the market a combination tool, combining

HENRY SELIGMAN, of New York, L. C. Maderia, Jr., J. P. Hsley and E. Denniston, of Philadelphia; William Henning, of New York, and H. H. Littell, of Buffalo, made a December trip west and south to look after their syndicate interests.



PUNCH AND BELL CORD SPLICER.

the functions of a ticket punch and bell-cord mender. The tool is shown in our engraving, together with the sleeve which makes the two pieces one. To mend a broken bell or register cord, it is only necessary to place the broken ends securely in the sleeve and by means of the punch make as many incisions through the metal as are necessary to secure the cord safely. The clinching barbs point inwardly from the ends of the sleeves, so that an outward strain only makes the joining more secure.



SHORT GEARLESS AT ROCKFORD, ILL

THE short gearless motor has been in successful service on the Rockford, Ill., lines, for over a year. Our photograph shows a group of "the boys."

HARTFORD railways, both city and suburban, are on the eve of consolidation. W. H. Bulkley, A. H. Peck, A. G. Loomis and W. E. Goodwin, are concerned in the enterprise.

CHARLES T. YERKES.

TO say that the name of Charles Tyson Yerkes is the most widely known in Chicago would not be far from the truth. To be the mainspring of the concern that controls two of the largest cable railway systems in the United States means more than the uninitiated readily imagine. A man in such a position, with seven thousand men employed, and 290 miles of the arteries of city travel under his supervision, means that he must be the subject of baseless criticisms, and possess unbounded resources, an utmost finesse, and combine the successful elements of a general, a financier, a politician, and the far reaching experience of street railway practice which goes to make the thorough street railway man. In short, few positions in business life demand so many highly educated and varied abilities—abilities which in most other avenues of trade would suffice for four men.

Mr. Yerkes was born at Philadelphia, June 25, 1837, of a Welsh ancestry and quaker parentage. The Yerkes family came from the mother country in 1682 and became quakers by adoption on reaching the demesne of William Penn.

According to the custom, young Charles became a student at a quaker school, to learn the rudiments, and finished his education at the Central High School of Philadelphia.

After his school days he became a clerk in the flour and commission business, and so well were his employers pleased that they presented young Yerkes with \$50 at the end of his first year, although the custom was to give no salary to apprentices.

In 1859, when he had arrived at the age of 22, he started in the brokers' business for himself, and in three years bought out a banking house at 20 South Third street. Everything that he touched turned to gold, and he soon was counted among the solid men of the city of brotherly love.

The course of business, like that of true love, does not always run smooth, and at the time of the Chicago fire several heavy and unavoidable reverses overtook Mr Yerkes. It was at this time that he began dealing in street railway stocks and bonds, and at the time of his reverses he was a large holder in the Seventeenth & Nineteenth Street Railway Company. All this went to pay his debts.

In 1873 Mr. Yerkes set resolutely at work to recoup his shattered fortune and as early as 1875 became interested in the Continental Passenger Railway Company and saw the stock rise from \$15 to \$100 a share.

In the year 1880 Mr. Yerkes paid his first visit to Chicago, and while there became interested in the Northwest Land Company, with headquarters in Fargo, Dakota.

A year later he sold out his land interests and came to Chicago to enter the banking business, in which he remained five years.

In 1886 Mr. Yerkes began the work for which he is best known and to which he has so ably applied his great

resources, that of the negotiations for the North Chicago Railway, which culminated in the installing of the cable system. The LaSalle street tunnel, which had been practically abandoned, was cabled with the first car track to cross under the Chicago river.

In 1888 the West Chicago deal was consummated and mechanical traction by cable substituted for horses.

To the energy of Mr. Yerkes, his knowledge of men, and his unremitting application, the great divisions of North and West Chicago owe their present transportation facilities. One feature alone will illustrate the extent of his plans, namely, the construction by the West Chicago cable road of a tunnel under the Chicago river, at a cost of \$1,500,000, for the exclusive use of the new Blue Island cable line.

Mr. Yerkes now resides in Chicago, in the full enjoyment of his vast wealth and a sound mind and body, with a constantly increasing circle of business connections upon which to exercise his tremendous ability.

Mr. Yerkes' wide generosity towards the great ends of science is well shown by his recent munificent gift to Chicago university, of a \$500,000 telescope, to be the "best in the world," the principle upon which Mr. Yerkes does everything. He also donated an electric fountain to Lincoln Park, at a cost of \$100,000.

As a connoisseur of art Mr. Yerkes is known to all the artists of the two continents, and his liberality is too well established in this regard to need further mention. The Yerkes collection is known far and wide, and the owner is always a liberal contributor to art exhibitions.

His magnificent brown stone residence is one of the finest on Michigan Boulevard, and his handsome horses and equipages are the envy of all admirers of fine turn-outs.

INDIANAPOLIS SALE.

THE much-sold street railway at Indianapolis is now finally in the hands of purchasers. For several weeks reports were flying about that a deal was on hand, but nobody seemed to know into just what hands the property was to fall. President Frenzel, of the Railway Company, has made vigorous efforts for some time to further the sale of S. W. Allerton's share of the stock, and had about succeeded, when Mr. Allerton stopped all negotiations by selling the major part of his holdings, together with part of the stock held by C. H. McCormick, Marshall Field, J. J. Mitchell and W. B. Walker, aggregating 80 per cent, to Pittsburg parties, headed by Murry A. Verner and Sellers McKee. The price paid was \$150 a share, and at this rate the price of the system is \$3,250,000. Bonds will be issued by the new company to the amount of \$1,100,000.

NEW ENGLAND street railways suffered from a severe snow storm on November 28. Connecticut cars were badly blocked.

W. H. ALLEN is the new treasurer of the Union road of New Bedford, Mass.



CHARLES T. YERKES.

President,

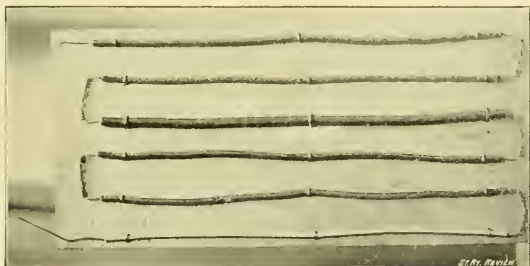
West Chicago Street Railroad Company,

North Chicago Street Railroad Company.

THE "SALAMANDER" WIRE.

ONE of the latest and most note-worthy inventions recently brought to the attention of the electrical world, and to the public generally, is an absolutely fire-proof insulated wire, manufactured by the Washburn & Moen Manufacturing Company, of Worcester, Mass.

It has been the dream of electrical experts and those interested in the promotion of electrical industries, to find some method of insulation which could be applied to an electrical conductor and insure absolute safety against the danger of fires and the consequent destruction of property



BEFORE THE TEST.

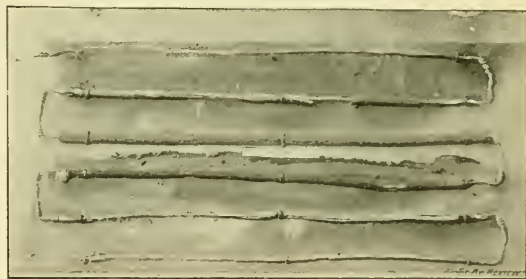
resulting from overheating. As a result of a long series of experiments, covering a number of years, the Washburn & Moen Manufacturing Company have finally succeeded in perfecting a wire, which they have most happily named "Salamander," and which is guaranteed positively fire-proof and water-proof, thus affording perfect security and protection against danger from heated or over-charged wires.

The introduction of this "Salamander" wire is very timely. The daily press frequently records fires caused by defective electric light apparatus, the City Hall at Cleveland being the latest. If the facts could be obtained, the origin of many mysterious fires reported "Cause unknown," would be found to be due to over-heated electric light wires imperfectly insulated. The manufacturers of this wire claim that the covering will not burn when exposed to a flame, and the conductor can be heated to the melting point without affecting either the fire-proof or the water-proof insulation. The copper conductor is covered first with Para rubber insulation, over that the fire-proof compound, and the whole covered with braid, dense and firm, having a smooth exterior polish, made thoroughly fire-proof.

A public test of the "Salamander" wire was made a few days ago in this city, in the presence of a representative of the Chicago Board of Underwriters, a number of prominent electrical engineers, architects, and others interested in electrical devices, to show the superiority of the salamander wire. A series of wires made up of the popular kinds of insulation now in use, including a section of the "Salamander," were fastened together and firmly attached to a board. The size of all the wires was No. 14. Brown & Sharp gauge. The circuit being completed, a powerful

electric current was turned on, equal at first to 125 amperes and gradually increased to 150 amperes. Very soon, the insulation on all the wires but the salamander began to smoke. Presently the exposed portions of the copper wire turned red—then white, and almost immediately thereafter, the covering of all except the "Salamander" burst into a flame, setting fire to the board and in some cases melting the copper wire. During this intense heat, wholly destroying the other wires, the "Salamander" showed practically no change, at no time being too hot to be held in the hand; neither had sufficient heat escaped through the "Salamander" covering to discolor the board beneath it. It was afterwards shown, when the outside fire-proof covering was removed, that the rubber insulation next to the wire still retained its elasticity and all its insulating qualities. The test was pronounced by all who witnessed it as being entirely satisfactory, and the opinion was unanimous that a safe wire had been found. Similar tests have been made in New York City and Boston before electrical experts, all of which have been entirely successful.

The manufacturers of this wire claim that it is just what is wanted for inside wiring in first-class buildings, whether public or private, and that it is invaluable for inside work in electric light and power stations. It will afford protection when used for telephone and telegraph wires where there is danger of being crossed with electric light or trolley wires. By its use, box factories, planing mills, and packing houses can be equipped with electric light plants with absolute security against fire.



AFTER THE TEST.

The accompanying illustrations from photographs show the condition of the wires before and after the Chicago tests.

HIRAM WHEELER, at the time of his death, the oldest settler in Chicago, and father of George H. Wheeler, president of the Chicago City Railway, died, suddenly, in this city, November 22. He was one of the most prominent business men in Chicago, owning several elevators and being a large operator in grain. He was also a big holder of street railway securities.

WORKMEN on the electric railway, Queenston Heights, Ontario, found skeletons of several soldiers killed in the war of 1812. Swords, bayonets and other implements of war were also discovered.

A MODEL STEAM MAKING PLANT.

Fuel and Ashes Handled Entirely by Mechanical Power—Feed Water Heated to 300°—A 55-Foot Steel Stack with the Capacity of the Ordinary 200-Foot Brick Stack—Close Regulation in Firing.

THERE has been no lack of painstaking design in the direction of steam motors. The perfecting of the steam engine has been a favorite occupation of engineers, and progress has been steady from the days of the plain slide-valve engine, through the various forms of automatic cut-offs, and so on up to compound and triple-expansion engines. Innumerable devices for saving in the use of steam have been developed, and the manufacturer, as well as the engineer, never seems to tire of additional investment if a reasonable result can be obtained therefrom in the way of economy. The boiler room, however, being less attractive—or very possibly for some better reason—has failed to receive the

The street railway users of steam will be interested in the accompanying engravings of a strictly modern boiler plant, which has been designed and constructed for Curtis, Davis & Co., manufacturers of soap and glycerine, Cambridgeport, Mass., by Westinghouse, Church, Kerr & Co., of Boston; the detail work being carried out by William R. Roney, the engineer of their stoker department. Carte blanche was given the engineers to design a boiler house to contain every practical element of economy which could bear upon the sum total of the cost of making steam; they being limited only to the horizontal return-tubular type of boiler by certain considerations outside of economy.



THE BOILER HOUSE.

same measure of attention, and as a result the economies in the cost of making steam are not so marked, nor the general practice in nearly so well settled a condition. It is perfectly obvious that the cost of making steam is parallel in importance to the cost of using it, and the minimum of cost in the production of power is only possible when both factors are given the benefit of equal skill. The makers of boilers have indeed brought to bear a vast amount of excellent work in the development of the boiler itself, both as relates to its structural features, and in large measure to its intrinsic fuel duty. Other attempts toward boiler-room economy in the matters of combustion, manipulation, etc., have been in the nature of more or less sporadic experiment, while the cost of handling the coal and ashes, amounting often to many thousand tons per annum, has been practically ignored altogether.

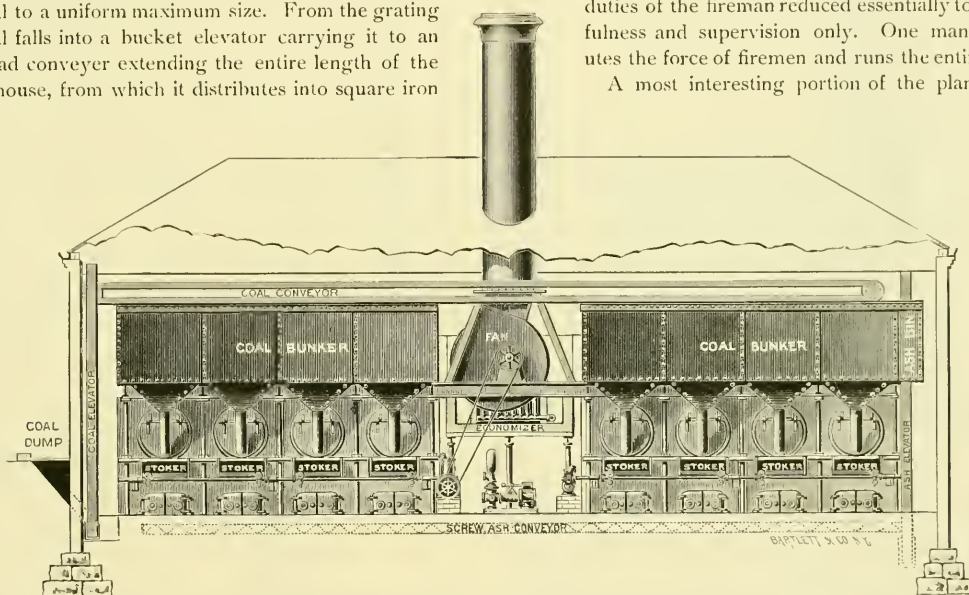
In the carrying out of this work the ornamental side of the problem was not forgotten, and the architectural design of the boiler house was prepared by Hartwell & Richardson, of Boston. It is worthy of emphasis that the owners of this plant have set a creditable example to manufacturers in general in providing a building which shall not only be adapted to the matter-of-fact work to be done in it, but shall in its mere external appearance represent with fitness the dignity which attaches to the large manufacturing interests of a prosperous country. The building is of pressed brick with trimmings of pink Milford granite. The roof is of iron trusses, covered with slate and lined on the inside with wire lath and plaster, for the purpose of preventing condensation. The fire-room floor is of concrete. An annex to the building contains a scale room for tallying the weight of

coal, and a complete wash-room for the fireman, who has now become a gentleman of leisure.

Passing to the operative portion of the plant, it will when completed consist of eight horizontal return tubular boilers of 125 nominal horse power each, to carry a working pressure of 130 pounds. These boilers are arranged in two batteries of four each in either end of the building (one battery is now in operation), the space between being utilized as a pump room. Following the progress of the coal, after it is weighed it is dumped onto a grating at the end of the boiler house, shown in the general view. The large lumps are easily broken by the teamster, the grating serving as a screen to reduce the coal to a uniform maximum size. From the grating the coal falls into a bucket elevator carrying it to an overhead conveyer extending the entire length of the boiler house, from which it distributes into square iron

large portion of the economy due to mechanical stoking, to say nothing of the extermination of the smoke nuisance to which most cities are extremely sensitive. After leaving the coking arch the coal is slowly worked down over the rocking grates into the hottest portions of the fire, and when consumed, the ash and cinder falling on the dumping grates are dropped into the ash pit. From the ash pit the ashes fall into a screw conveyer, which carries them to one end of the building where they are elevated into an ash bin and discharged as required through a spout into carts for removal. Thus, from the time the coal is dumped by the teamster until the ashes are in the cart, there is practically no manual labor employed, and the duties of the fireman reduced essentially to watchfulness and supervision only. One man constitutes the force of firemen and runs the entire plant.

A most interesting portion of the plant is the



ELEVATION OF PLANT.

bunkers having hopper bottoms. The bunkers are supported on iron girders in front of and above the boilers. From the bunkers the coal flows by gravity through swivel spouts to the hoppers of the stokers.

Each boiler is equipped with a Roney mechanical stoker, with which the public is already familiar. The stoker furnishes a continuous supply of coal to the furnace at a slow rate of feed; the quantity of coal and its distribution being regulated at will by hand-wheel adjustments on the traverse motion. The power to operate the entire battery of stokers is a small engine carried on a bracket at one end of each battery, and driving a slow-moving eccentric shaft.

The action of the stoker is first to liberate the free gases and partially coke the coal on a dead plate underneath the coking arch, in connection with an indraft of hot air through perforated channels in the firebrick tile. This portion of the device constitutes a strictly smokeless furnace, the result being obtained, not by concealing or consuming the smoke, but by actually preventing it by complete combustion from the start. Right here lies a

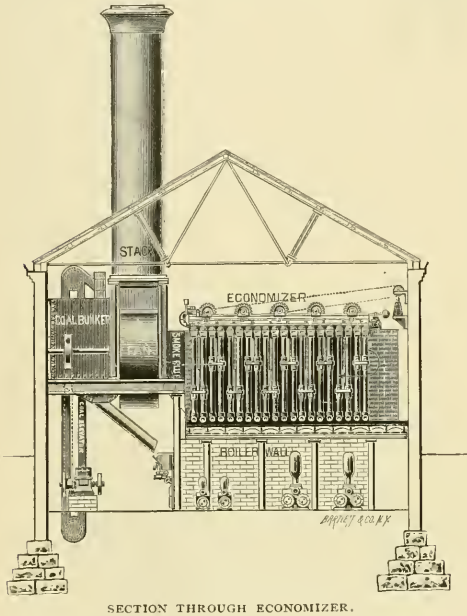
means of securing controllable draft. The usual expensive chimney stack is conspicuous by its absence, and in its place will be found a steel stack 72 inches in diameter, extending 17 feet above the ridge of the roof and showing a total height to the top of about 55 feet above the ground. This stack is lined with one course of brick merely to prevent rust, and is finished with ornamental top similar to the familiar shape on the smoke stacks of the Pennsylvania railroad locomotives. The stack having no functions, so far as the production of draft is concerned, is only of a length sufficient to deliver the gases above the roof. The stack is supported on an entablature, which in turn is carried on "I" beams over the boiler-room. On these "I" beams is a large, slow-running exhaust fan whose outlet discharges directly up into the bottom of the stack. The waste gases from the furnace pass through a Lowcock economizer, which opens into the suction of the fan. The economizer is carried on iron columns, and the whole system is overhead and out of the way, leaving a clear floor space below. A by-pass damper is provided on each side of the economizer, so

that the draft can be direct to the stack in case the economizer is temporarily out of service for repairs. A steam-cone nozzle may be set in the base of the stack as a relay in the remote contingency of any necessity for overhauling the fan. The probability of repairs is best judged by the fact that the usual speed of the fan in ordinary service is from forty to fifty turns per minute, and

the economizer being upward of 300°, and representing an amount of heat saved which would otherwise be wasted up the stack as the only means of producing a natural draft. A moment's reflection will show the comparative value of the heat thus returned to the boiler, as against the insignificant amount of steam required to run the slow moving fan. The mechanical exhaust draft in this case was not a part of the original scheme, but was finally adopted when it was discovered that the cost of the piling alone for a suitable chimney stack was more than the entire cost of the mechanical draft system, leaving the economical value of the economizer as a clear gain.

It is doubtful if any boiler plant has thus far been built in New England where every item going to reduce the cost of a pound of water evaporated into steam has been so completely considered and so practically met. We understand that Curtis, Davis & Co., being naturally somewhat vainglorious, are disposed to invite the inspection of interested parties, and owners of large power plants will do well to make this boiler house the subject of careful study.

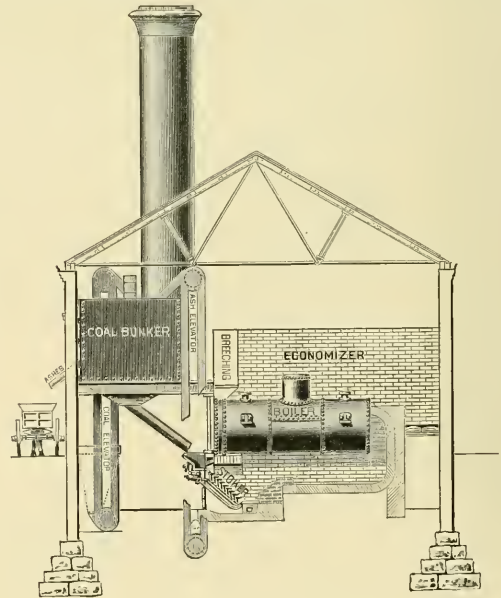
Incidentally the design of the hydraulic system, including the pumps and service line, was also made a part of the duty of the engineers, Westinghouse, Church, Kerr & Co. The pump room is located, as before mentioned, between the batteries of boilers underneath the econo-



SECTION THROUGH ECONOMIZER.

when driven at the slow speed of eighty turns per minute it is sufficient to cause a draft adequate to the most intense combustion. The motive power of the fan is a small Westinghouse engine, nominally of 10-horse power, but in fact running at so slow a speed and under such a close throttle as to develop only a fraction of that power. The draft is automatically controlled by a pressure regulator in the steam pipe to the engine, so that the speed of the fan is varied according to the steam pressure in the boilers, being in this respect the equivalent of the most sensitive steam damper. This scheme of mechanical draft is capable of producing a draft pressure equal to that of a 200-foot chimney costing ten times as much to build, and additionally possesses the feature which no natural draft enjoys, of absolute flexibility in meeting sudden demands of steam. The fireman is thus rendered independent of weather conditions, and has nothing to fear from a dirty fire after a long run, or from any of the emergencies which may throw an excessive duty upon his boiler plant without warning. He has the fire at all times wholly within his control, while at the same time the regular service is performed under the most perfect automatic regulation.

The action of the economizer is, of course, to extract all the available heat from the waste gases and return them into the boiler. The temperature of the up-take is about 100°, the temperature of the feed water leaving



SECTION THROUGH STOKER.

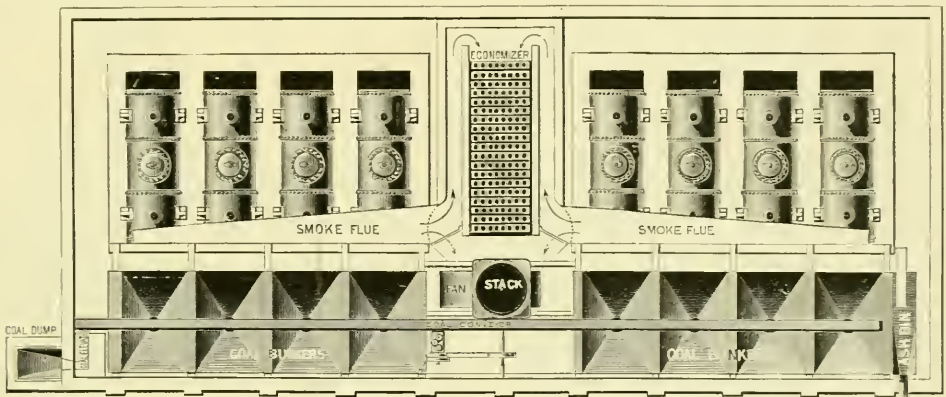
mizer, and in it are two duplex pumps of a capacity of 500 gallons per minute each. These pumps are controlled by pressure regulators, and are so connected that while one of them is furnishing the ordinary elevator service the second one is kept slowly moving, so as to be in condition for instantaneous fire service. The work of these pumps is alternated daily, and in case of fire both

can be concentrated immediately on the fire lines. In the same pump room are double boiler feed pumps, each one adequate to the entire capacity of the plant. All the hot water lines and fittings are of brass, and by-passes are provided so that the feed water can be pumped through the economizer, or direct to the boilers in case of repairs to the latter. A further system of a water meter with by-pass valves is so arranged that the feed water can be measured and pumped to either boiler independently, or to any number of boilers, or to the entire battery, at will. With a water meter in the feed line and a pair of scales at the gate, it is proposed that the condition of the entire plant, as to its evaporative duty, shall be daily logged and reported to the office, and any decline of efficiency thereby promptly and practically detected.

had horse cars the great majority could not be prevented by the most careful driving.

Superadd to this list of casualties the loss of time entailed upon every citizen using the "poor man's carriage," and the consequent inability to expand the metropolitan area, and thus give better homes and more pleasant surroundings to the thousands now cooped up on the lower end of the island, and you have a sharp, telling and concise statement of what immediate rapid transit facilities will do for the American metropolis.

One of the most idiotic observations ever made by a member of the "four hundred" was recently printed in a daily paper, bewailing the unfinished appearance of American cities, and contrasting the decayed somnolence of European municipalities with the expansion and growth of our towns and their "so-called" improvements. It is



PLAN OF BOILER ROOM.

THE DEADLY HORSE CAR.

ALL the trolley cars in the country have not equaled the record of the deadly horse car in New York, with its list of 186 victims in the week ending September 16. The list of men, women and children who have lost life and limb under the "juggernaut" (will the reader observe the ease with which the quoted expression is used?) stretches out as long as Biela's comet. In the list of 186 no account is taken of any but the most serious mishaps, and persons who have been scared out of their five wits by the apparition of a horse's hoof descending upon their devoted toes, are held innocent of the charge of accident.

As an instance of the volume of accidents, note the New York Hospital in September. The number of accident cases treated was 125, of which 60 per cent was the direct result of horse car operation. Bellevue Hospital's attendants stated that 40 per cent of their cases were "horse car cases."

A New York car driver recently stated in an interview that he knew of 30 or 40 accidents occurring in a single day. One of the most prolific causes of accident, the man said, was the slipping of horses on the wet pavement, and further remarked that as long as New York

probable that the statement "stagnation is death," discovered by Noah and re-discovered by Herbert Spencer, was originally intended to apply to the intellectual life of the "four hundred," or to the much-by-them-admired cities of the old world.

But it comes surely, if slowly, and rapid transit shall yet outstrip the knickerbocker limbs and more knickerbocker minds of a few Gothamites.

NEW YORKER.

A NEW IOWA LINE.

THE lively town of Sioux City has just opened a new line, to be known as the Leeds Electric Railway, going as it does to that suburb. The baptismal party contained, D. T. Hedges, L. L. Kellogg, A. B. Peavey, I. B. Walker, F. E. Simpson and Chas. Nostrom, with assorted aldermen, chaperoned by Lewis E. Myers, of the Detroit Electrical Works.

W. S. Harrington was the contractor for the line. Two cars and a 30-minute service is the present idea.

A NUMBER of managers of railways in small summer and winter resort towns have found it profitable to advertise the routes and time of their cars in neighboring places.

THEORY OF LEAD STORAGE BATTERIES.

OUR mention previously of M. Bidard, professor of chemistry at Rouen, and his researches into the theory of lead accumulators may be supplemented by the following digest of his article in the Bulletin Internationale de l'Electricite.

In his article the writer shows that there exists a theory which is confirmed by practice, and which fully explains the phenomena that take place in lead accumulators, and he does not hesitate to assert that this theory, when fully understood, will bring about the following improvements:—

1. The reduction of the volume and weight of the accumulators.

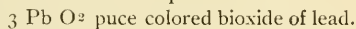
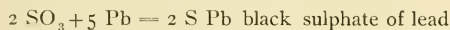
2. Easier mode of conveying the current with no alteration of the lead.

3. And, which is of capital importance, the rendering of the discharge approximating to the theoretical rendering.

First of all, he lays down as an absolute principle that the accumulator is only possible with the lead immersed in sulphuric acid, and that with other metals there can be no accumulation.

The theory of accumulators is very simple, and may be defined in a few lines as follows:—When we make a current pass through some insulated plates of lead immersed in sulphuric acid, the acid is decomposed into sulphur, which combines with one of the plates to form a black sulphate of lead and oxygen, which attaches itself to the other plate so as to produce a puce-colored bioxide of lead.

The chemical formula is established as follows:—



This reaction manifests itself to the eye by two well defined colors, black and puce. Moreover, it is indicated by analysis. In several experiments, he noticed always this important fact: after the charge, the weight of the accumulator has increased by a quantity equal to that of the sulphur and oxygen deposited on the lead, and consequently, part of the sulphuric acid has disappeared from the liquid, and we find its elements in the sulphate of lead and the bioxide of lead.

When we discharge the accumulator, the two elements, sulphur and oxygen, fixed on the lead, combine to reconstitute the sulphuric acid.

The second reaction also manifests itself to the eye by the discoloration of the two plates, which resume their original color.

These are very important experiments, and can easily be reproduced with small accumulators arranged in glass vessels so as to show the reactions described. M. Bidard says that accumulation is only possible with lead, because lead, sulphate of lead and bioxide of lead, are neither attacked nor even affected by sulphuric acid. This is not the case with copper, iron or zinc, which cannot resist the action of sulphuric acid, as it dissolves their oxides. The lead accumulator, which is the only

practical one, shows true foresight; lead is the only metal which enables both electricians to be held in two solid combinations, sulphate of lead and bioxide of lead, which are insoluble in sulphuric acid.

The lead should be as pure and as finely divided as possible. We must avoid using lead left over from castings, waste, residues, old pipes, gutters, &c.; for such lead always contains appreciable quantities of zinc, and even antimony, which give rise to inconvenient reactions and facilitate the destruction of the plates. The sulphuric acid of commerce is sufficiently pure; it contains sulphate of lead, which is separated when we mix it with water to bring it to 10°. It must be removed by deposition or filtration, in order that it may not form an adherent film on the plates, which would prevent any accumulation.

Before accumulators can be brought to perfection several problems remain to be solved. These are:—

1. What is the quantity of electricity accumulated for one equivalent of lead?

2. By what process can we obtain the most finely-divided lead?

3. The preservation of the plates, when they are not in use; cleaning without taking to pieces, in order to remove the sulphate of lead.

4. When employing sulphuric acid at 10°, under the influence of the current, there is always electrolysis of a certain quantity of water and some electricity lost; we should, therefore, try whether this accident can be avoided by using acid of greater density.

RAPID TRANSIT ON A SHINGLE.

AN apocryphal story from Pike's Peak avers that one, Ross Ward, a railroader, tobogganed down the mountain on a board three feet long, one-and-a-half feet wide and with a cleat nailed on the bottom for a keel. The keel was fitted between the rack rails of the Cog railway. Ross slid nine miles, with a descent of 8,000 feet, in 11¼ minutes. This deed was on a \$25 wager. He offers to do it again for \$6,000,000.

JAPANESE STREET TRAFFIC.

THE local transportation facilities of Yokohama are still crude, the most general means being the jinrick-sha, a two wheeled cart drawn by a colee. The fare is 15 cents per hour. A line of omnibus runs each half hour between the railroad station and the canal.

In Tokio there is a street railway company operating about 6 miles of track by horse power. The fare is 2 cents for each three-fourths of a mile.

The facilities offered now are small, but the indications are that electric railways and American machinery will soon supersede the old methods.

A DIVIDEND of one per cent on \$3,000,000 for the quarter ending September 1, was declared by the Columbus, O., Street Railway Company. This is the first dividend.

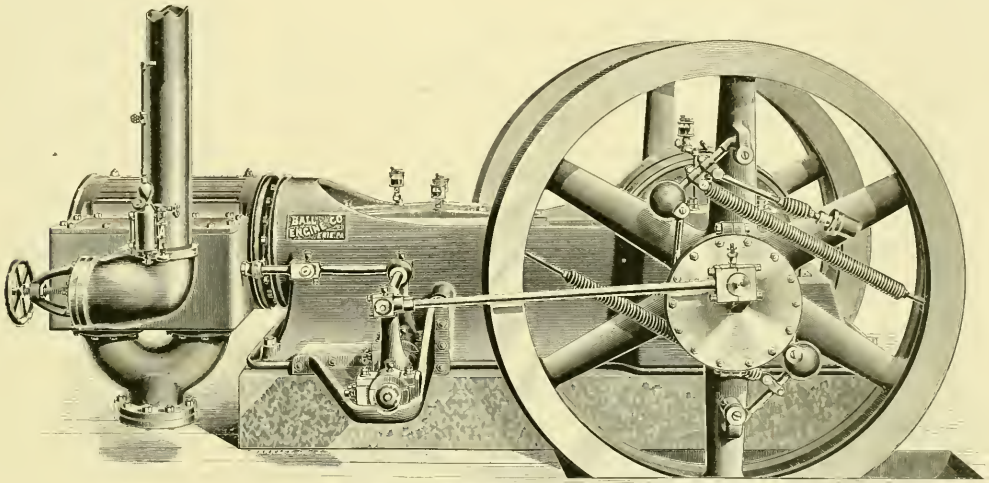
NEW HEAVY DUTY ELECTRIC RAILWAY ENGINE.

IN selecting an engine for electric railway service the character of its duties should be carefully considered.

It will be found that the work is very exacting and severe, and the engine should be adapted for heavy duty, varying load, and long continuous runs. It should, therefore, have great strength and weight, with sufficient metal so distributed as to receive the various strains and thrusts of moving parts without deflection or vibration.

The engine shown in the illustration was designed by the Ball Engine Company, Erie, Pa., especially for electric railways and electric welding, and possesses the

plete and of the best description. The regulation, by means of the improved governor, is such that the engine has shown in practice perfect regulation under conditions where the vibration in load on the generator from zero to the full capacity has occurred in less than five seconds of time. Without going into any further details, it will suffice to say that thorough workmanship and materials of the highest excellence go into the construction of the engine and every detail receives the most careful attention. The manufacturers, the Ball Engine Company, Erie, Pa., confidently offer it as, for its horse power and type, the strongest and heaviest built. Believing that the electric street railway interests require a strictly first class engine in every respect, they have designed the engine to that end and have succeeded.



NEW BALL HEAVY DUTY ELECTRIC RAILWAY ENGINE.

above requirements to an admirable degree, as may be seen by the view and the description following:—

The frame of the engine is massive and heavy and internally ribbed so as to give the greatest attainable stiffness. The crank shaft is forged out of a solid steel ingot of the best quality, and is of large diameter and great strength. The connecting rod and straps are forged out of steel ingots and are of a new design, combining strength with efficiency. The main bearings are unusually large and are so arranged that both the vertical and side wear of the liners may be taken up. The main bearings liners are genuine babbitt, carefully scraped and fitted, as they are made removeable, they can be easily and quickly taken out and replaced with new ones if necessary. The crank pin boxes are lined with genuine babbitt. The crosshead boxes are made of pure copper and tin. The crosshead is a steel casting with very large bearing surfaces and is babbitted on the four faces with genuine babbitt. The crosshead pin is tool steel, and the piston rod a fine quality of crucible steel. The oiling devices are of the most improved form and all fittings are com-

PROGRESS AT DETROIT.

FROM Detroit comes cheering reports of the progress of the changes in which the horse and mule are gradually but surely making their retreat. Jefferson avenue line has been running some time, with power from the temporary station. Of the 37 electric cars now running, 12 are from the works of the Jones' Sons, Troy, and 5 accelerators will soon be delivered by the Brownell Car Company. Only a week or two ago an order was placed for five McGuire trucks, being the second order from that company. The Woodward avenue line will be opened in a few days, the effort being to do so on Christmas day. Rapid transit for that beautiful avenue would be the most acceptable holiday present ever made the good people along that business and residence thoroughfare.

MISS PRIM—I think that men on the L road act as if they were afraid they'd lose something by being polite.

MR. GRIM—Well, they do; they lose their seats.

JUDGE MAYNARD.

AMONG the men prominent in the legal aspect of the electric railway question, perhaps the one now most conspicuous in public attention is the latest appointee to the New York Court of Appeals, Associate Justice Isaac Horton Maynard.

The immediate cause of the prominence of Judge Maynard is the recent decision in the case of the telephone versus the trolley, the text of which was published in full in our November issue. Believing our readers will be glad to know more of the jurist to whose lot has fallen the duty of a decision of so great importance to street railway interests, we take pleasure in recording a short sketch of his life.

Judge Maynard was born April 9, 1838, at Bovina, Delaware County, New York, of honorable English ancestry with revolutionary records.

The early days of young Maynard were passed on the parental farm and at the country school. After preparation at Stamford academy the young man entered Amherst College, being graduated in 1862, with a succession of honors. After graduation the law office of the late Judge William Murray was his next employment.

After admission to the bar, in 1863, Mr. Maynard practiced until 1875, when he entered upon his honorable, manly and successful political career, which included legislative honors, the county and surrogate bench, and nominations for various other offices, all at the hands of the democratic party. Since 1884 Judge Maynard has been deputy attorney-general of New York; second comptroller of the United States treasury; and assistant secretary of the treasury. All these offices have been filled with probity and faithfulness, seconded by a rare skill in accomplishing reforms.

On May 22, 1889, Governor Hill appointed Judge Maynard one of the commissioners to revise the general laws of the State. To this onerous and necessary work Judge Maynard is yet applying his mind, besides carrying forward the business attendant on the honor of the appeal bench, to which he was appointed by Governor Flower in January, 1892, to succeed Judge Ruger, deceased.

Judge Maynard has attained his eminence by industry, perseverance and integrity, and in whatever matter he was interested to that he applied the entire force of his tremendous working ability, and the electric railway

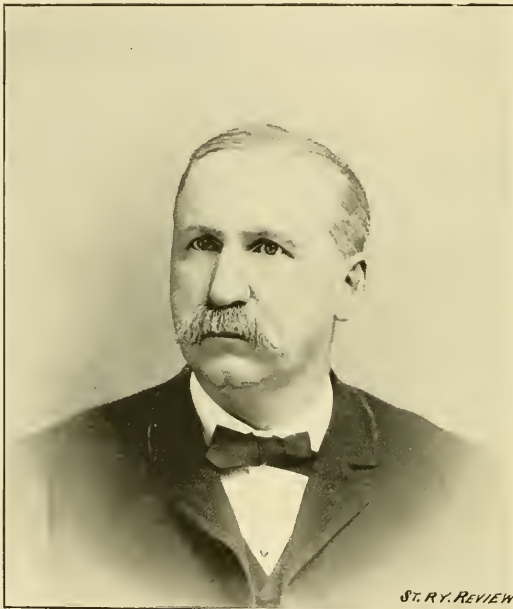
interests may be congratulated upon falling into the hands of a man willing to so thoroughly investigate its claims from such an impartial standpoint.

STALACTITE FORMATION IN FEED WATER PURIFIER.

THE idea which suggested the invention of the Hoppes' live steam feed-water purifier is both an interesting and ingenious one, as well as new. The principal was taken from the stalactite formation on the roof of caves. It was noticed by Mr. Hoppes that the greater portion of the solids left by the water in the caves were formed in stalactites, while a comparatively small amount formed on the floor of the caves as stalagmites. This fact led him to believe that the principle on which

the stalactite forms, would be valuable for purifying water for various purposes. This led to the invention of the machine which bears his name.

The manufacturers point to the superiority of the principle involved, from the fact that in actual practice about three-fourths of the solids caught in their purifier is found clinging to the under side, or bottom of the pans, while the inside of the pans show a deposit which usually averages about one-fourth of the total scale making properties retained in the machine. The manufacturers have happily applied the idea to their advertisements, as expressive of the workings of their purifier, and when our readers see a cut illustrating a plethoric condition of stalactites and a lean and ill-favored lot of stalagmites they will not need



ASSOCIATE-JUSTICE, I. H. MAYNARD.

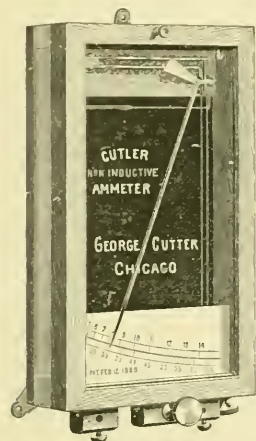
to be further informed as to the interpretation of the same.

STREET CARS AS PRIVATE CONVEYANCES IN MEXICO.

ACORRESPONDENT says that Mexican street cars can be hired for \$3.50 per day, with the privilege of stopping off at pleasure for not over two hours at a time. The wheels are so constructed that the car can be pulled out of the track to the roadside when the occupant so decrees. The little mules attached to the cars are driven at a gallop, and the driver will sell you a bath ticket, a lottery ticket, or stop the deal and go and get you a cigar. Surely this is one place where the public is accommodated.

THE CUTLER NON-INDUCTIVE AMMETER.

THE ammeters now on the market all have the objection that they depend on a magnet for their action, so that their readings are easily affected by the large masses of iron present in all central stations. And even where they can be used at a distance from the dynamo room it is found that the magnets in two such instruments placed side by side on a switchboard, will often spoil each other's readings. What is more, the accuracy of magnetic instruments is affected by a change in the speed of the dynamo, this being especially noticeable with alternating currents. For these reasons there has been a call for non-magnetic ammeters, and this seems to be met by the one designed by H. H. Cutler. It depends for its action on the difference in expansion between two fine wires, one of which is traversed by the current to be measured, while the other compensates for changes in the temperature of the room. For heavy currents a shunt is placed at the back of the instruments, so that the same small size of wire can be used. The two wires are fixed at one end and are kept



taut by flat springs carrying knife edges. A yoke resting on these bearings carries a light pointer, the leverage being such that quite a small expansion of the measuring wire will move the needle across the scale. This instrument is practically deadbeat and is not affected by any amount of iron masses near it. It is equally accurate for direct and alternating currents, and has been thoroughly tested in practice during the last six months.

Our cut shows a double scale ammeter, reading up to 65 amperes, and it will be noticed that the scale is much longer than on most instruments. The Cutler non-inductive ammeters are built in sizes ranging up to 160 amperes, to meet the varied requirements of different stations, and are put on the market by George Cutler, of Chicago.

CASH FARES SUPPLANT TICKETS AT ALBANY.

FOR some time the Albany Railroad Company suspected an excess of tickets over the number legally printed. Detectives, however, could not discover the counterfeiter, so as a last resort tickets have been abolished, and since December 1 only cash fares received. It was formerly the custom to charge 6 cents for a cash fare and 5 cents for a ticket, but now a uniform 5-cent cash fare rejoices the citizens.

WAITING ROOMS WITHOUT EXPENSE.

AN enterprising merchant at Rockford, Ill., has fitted up a reception and waiting room in his store, where his lady customers may await the electric cars. A large bell being hung in front of the store is rung to stop the car, and all the patrons vote the scheme a convenience. Some years ago the Chicago City Railway encouraged a similar plan, and at their own expense furnished chairs for a large number of corner stores at transfer points, also a neat glass sign to hang in the window which read: "Step inside while waiting for the car." The shopkeepers found the scheme a good one, as in any other which will induce people to enter the store, and report quite largely increased sales from this source. It is impractical for the railway to maintain its own waiting rooms at many points, but the above suggested plan can be inaugurated with little trouble and to the mutual advantage of public, company and merchant.

ANNUAL STATEMENTS OF MASSACHUSETTS RAILWAYS.

THE state railroad commission of the Bay State publishes the status of the following principal railways:

THE LYNN & BOSTON.

Total income, \$619,266; total expense, \$522,679; dividend, 8 per cent, \$52,000; total surplus Sept. 30, 1892, \$100,594.

NEWTON RAILWAY.

Total income, \$62,866; total expenses, \$40,225; dividend, 7 per cent, \$9,450; surplus, \$11,763.

UNION, NEW BEDFORD.

Total income, \$169,471; total expenses, \$130,490; dividend, 5 per cent, \$12,996.

BROCKTON.

Total income, \$143,560; total expenses, \$99,963; dividend, 6 per cent, \$11,904; surplus Sept. 30, 1892, \$24,576.

BOSTON & REVERE ELECTRIC.

Total income, \$6,568; total expenses, \$6,174; surplus, \$390.

WORCESTER CONSOLIDATED.

Total income, \$318,472; total expenses, \$255,495; dividend, 2 per cent quarterly, \$28,000; surplus, \$37,959.

SPRINGFIELD.

Total income, \$333,550; total expenses, \$201,601; dividend, 8 per cent, \$44,000; surplus, Sept. 30, \$37,877.

WEST END, BOSTON.

Total income, \$6,317,205; total expenses, \$4,477,783; dividends, \$1,323,360.

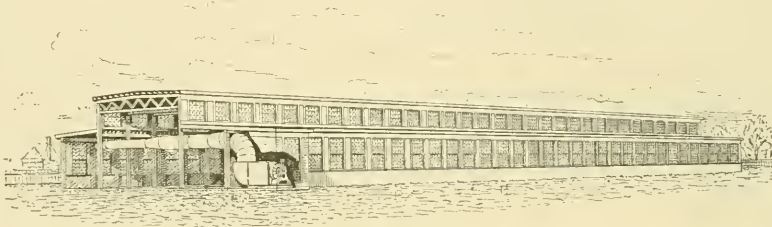
LOWELL.

Total income, \$212,570; total expense, \$182,423; dividend, 6 and 3 per cent, \$27,000.

HEATING OF RAILWAY SHOPS AND STREET CAR BARN.

WITH the steady progress toward the increasing comfort of the human race and its auxiliaries, improvements of all kinds have been introduced to aid in the accomplishment of the allotted tasks in the daily doings of the world. The memory of the young workman of the day will take him back to the time when, as he stood at his bench, his back was roasted by the excessive heat from the red hot coal stove, while his hands were so numb that he could scarcely attend to

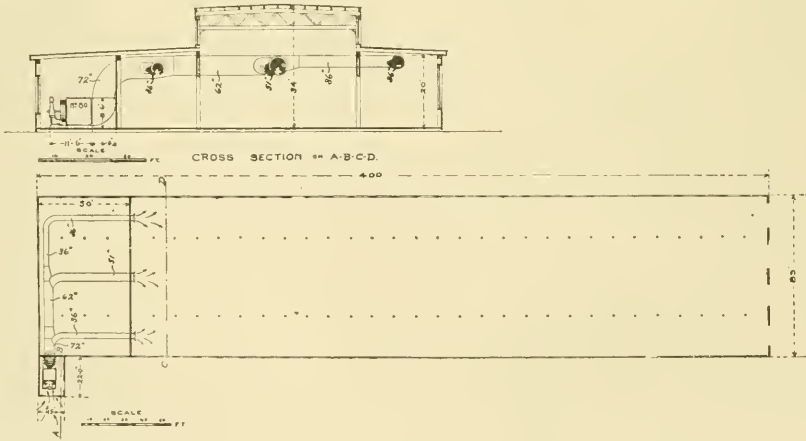
ful animal, the street car horse. As a rule, the railroad shop was an enclosure looking much like a line fence with cracks and crevices that seemed only more efficient in letting the heat out than the cold in. But in the last decade all this is changed, and man and beast alike appreciate the improvement. The electric light has put the lantern upon the back shelf, while the improvements in heating and ventilating have invaded every known form of building for whatever purpose it may be used. First, direct radiation removed the stove, and now the pipes are stepping one side for fresh warm air, and all parts of a shop or building heated alike. The mission of



END VIEW OF BUILDING SHOWING LOCATION OF HEATER.

his work, and his feet so cold that comfort was an unknown quantity in his daily accumulations. When the morning or evening hours carried the work beyond the time when Sol was ready with his glim to furnish the necessary light, the old fashioned lantern was summoned into service for one man to carry while another tried to work. In following the light of day around so as to

steam has been changed from heating the air in a compartment to heating the air for a compartment, which air having been driven onto the pipes, which were already heated by steam, is conducted to any point desired and introduced into a compartment of any kind at such a velocity as, while avoiding all draughts, causes it to circulate in such a manner that all parts of the room are



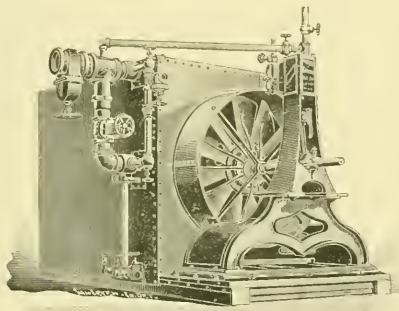
PLAN VIEW.

avoid this sort of double team work, the clocks of every laboring community were nearly worn out with the necessary setting forward and turning back; rivalling in actual practice the paper custom of our friend Captain Cuttle.

At the foot of the list for accommodations of all kinds stood the railroad shop, and way down in the basement was the street car barn, for who ever heard of warming the resting place of that generally homely but very use-

heated alike. It is readily perceived that the principle mission of this system is the constant introduction of fresh air, but the temperature of this air is easily controlled by the use of dampers or switches located at the proper places, by means of which cold air is admitted to the warm air chamber in sufficient quantity to reduce the temperature to any point wished without interfering with the quantity or quality. Plants for heating buildings of all kinds are now put in under a guarantee that the tempera-

ture shall vary but very little the year around. These plants are put into shops that are already erected, with very little piping, and in new buildings without any; the conduits being built into the walls and partitions, and the air being admitted to the shops through registers in the walls. In connection with this entirely new system of heating and ventilating railroad shops is the equally, as necessary, system of heating round houses and cleaning locomotives and cars. Until the last year the heating of buildings of this character has not been attempted, and the latter has been done by the use of steam pipes arranged around a pit in such a manner as to envelop the vehicle to be cleaned in a cloud of steam, causing the melting of the snow and ice, which falling to the bottom of the pit are from time to time carted away. In the summer time these pipes, not being in use, get out of order, and when fall comes have to be repaired or replaced, while in winter time, being used a great deal, are walked upon and broken to such an extent that as much time is spent keeping them in order as they are hours in use.



HOT AIR BLOWER.

These requirements fit as aptly to the present systems of street railway as to steam railroads. In place of the round house substitute the car house and the barns, for many systems are now changing from animal motive power to the cable or electric system, while many others will for some time sustain a duplex system, as in many instances "cross town" lines will necessarily be maintained as feeders for the main lines. The exhaust steam from the power houses should be utilized for heating all buildings, and the hot air pipes should be so arranged as to clean all cars quickly. There has been no system of cleaning electric cars that approaches this in efficiency, as the hot air is not injurious to the armatures, as water is, and the cleaning is much more thorough and effective.

As to the temperature of the barns and the consequent comfort of the animals, it can be kept at any point, insuring an even temperature both night and day, keeping the animals in perfect health, as they will dry quickly when they come in wet from rain and perspiration, avoiding chills, cold sweats and sleepless nights.

Inasmuch as the matter of keeping up steam at all hours is compulsory, the expense of cleaning the cars and

maintaining the temperature in the barns is nothing more than the interest upon the cost price of the plant.

The illustrations shown in this article show the application of the system as installed in many large manufacturing plants and buildings by Huyatt & Smith of Detroit, Michigan.

THE MOTOR AS A DYNAMO FOR BRAKING PURPOSES.

THE electrician of the Sioux City Street Railway, I. B. Walker, has devised and put in operation on some of the cars on his lines, a controlling device which converts the car motor into a dynamo, when it is desired to stop the car. This is not an emergency brake, but intended for ordinary use. A lever, convenient to the driver, works a switch which is placed in a small box attached to the side of the controlling stand of the car. A simple pull of the lever works a system of contacts, which cut out the trolley and wire motors as dynamos. The momentum, of course, is the power which revolves the armatures and the effect is to overcome the driving force, and the car slackens its speed.

The resistance of the rheostat is worked off, the less speed is required, by throwing the switch handle around as usual in starting the car. When a stop has been made or car reaches the bottom of the grade the brake lever is moved back, which cuts in the trolley current again.

Mr. Walker has also placed the braking device on his electric snow sweeper, which is also a home made affair. Taking a Lewis & Fowler sweeper, which was made to be pushed by another car—and in which way the company has used it with good success two years—he mounted two 15-horse-power Sprague motors on the floor of the sweeper car. On the car axles were placed heavy web sprocket split gears, which were connected to the intermediate pinion by a sprocket chain. This gives about the same speed to the sweeper car as required on a passenger car. The revolving brooms were already geared to the axles by bevel gears. Although at this writing no occasion has yet occurred to sweep snow, the car has been in constant use for cleaning the track of dirt, and no difficulty has been experienced in mounting an 8 per cent grade with all the brooms hard on the pavement. A nice cab has been built over the motors. The controlling switches are arranged as described above.

In San Francisco the Olympic Salt Water Company will install a water system pumping 3,000,000 gallons of ocean water daily to a reservoir 300 feet above the city base and distribute it through twelve, fourteen and sixteen-inch iron pipe. Water will be used for baths, residences, street sprinkling and extinguishing fires. All of the 3,000,000 gallons not so used will be run into the sewers for flushing purposes.

THE Association, with an avowed intention of keeping the trolley out of Newport, R. I. has dismally dissolved. The courts and the people are on the other side and the association was powerless.

NEW GASOLINE MOTOR.

IF there is anything in a name, the new gasoline motor for street car use, invented by Daniel Best, of San Leandro, Cal., ought to be a good one. In addition to building steam harvesters, street cars and field locomotives, Mr. Best has turned his attention to street car motors, and several months ago put a gasoline vapor engine in service on the line connecting San Jose with Alum Rock Park, at the foot of Mt. Hamilton. Four of the eight miles are already completed, and on the finished portion the motor has been in service about four months.

The Best vapor engine as applied on this line is a double-ender, the piston of each cylinder being connected with the main shaft. Each connects direct with the forward car axle by an endless chain. The number of revolutions per minute is 200 of the engine, and of the wheels of the car 100 per minute. The wheels are 30 inches in diameter; this gives a speed of 12 miles per hour. The speed of the engine can be varied at the will of the operator, from 75 to 250 revolutions per minute. The engine is geared to the axle of the car direct from the crank-shaft, and at one side there is an intermediate gear which drives one set of wheels in the opposite



THE "BEST" GAS MOTOR.

direction from the crank-shaft. There is but one pair of wheels working at a time; one pair run one way and the other the opposite way.

The exhaust is said to be entirely without noise, being exhausted into a perforated pipe, which encircles the top of the car but hid from view. Although no disinfecting fluid is used it is stated on good authority there is no smell, and that combustion is perfect. A water tank also on the roof, is piped to a water jacket on each cylinder, and the natural circulation of the water suffices to keep the cylinders cool. There are no copper connections; no intermediate reduction machinery.

The engine on the Alum Rock line was rated at 16-horse-power, but developed 19¾ on a brake test; and has repeatedly hauled two trailers with 105 passengers up a 4 per cent grade a mile long. On descending grades the governor automatically cuts out the fuel; and the engine connection may be thrown out of gear by friction clutches on the axles.

The motor car is 7 by 11 feet in size, and complete weighs only 4,000 pounds. It may be operated in either direction and from both ends of the car.

THE mules of the Belle City Street Railway have been sold. They brought \$7 a head.

IMPROVEMENT IN STEAM SEPARATORS.

DRY steam is growing in demand among engineers, and great advance has and is being made to perfect this feature of power production. Inventive genius has kept pace with the demand and provided separators, which may be connected into the main steam pipe to the engine and deliver dry steam, free from water, oil and dirt.

Among the various appliances for this purpose, the steam separator manufactured by the Stratton Separator Company, 32 Cortlandt street, New York, has won for itself a place in the estimation of engineers throughout the country that could only be obtained by real and undoubted merit. This separator is based upon the principle that, if a rotative motion is imparted to the steam as it enters the separator, all the liquid particles it may contain being heavier than the steam, acquire centrifugal force and are projected to the outside of the current. Practical results have, it is claimed, proved this theory to be correct, but in some cases, where high pressures of steam are used, it has been found that the water gauge on the side of the separator would show full of water while steam would blow out of the drain pipe at the bottom. While this proves the centrifugal principle of the separator, the force was so great as to hold about the interior walls of chamber a volume of water whirling so rapidly as to be hollow in the outside of the current, allowing steam to blow out of the drain pipe.



FIG. 1.

To meet this slight objection the Stratton Company have patented an improvement as shown in the accompanying cuts. It may be briefly described as a centrifugal steam separator, provided with wings or plates projecting from the interior surface of the well chamber, at an acute angle therewith, and to the course of steam or water, thus breaking the whirling body of water and allowing it to settle quietly in the bottom of the separator chamber, from whence it can be drained.

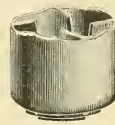


FIG. 2.

Figure 1 of the illustrations shows a horizontal view of the separator in section, and Figure 2, cross section of water chamber, showing wings or plates placed at an acute angle to current of the water as described. The Stratton Separator, long favorably known, has gained greatly by the improvement noted above, and is to-day, the manufacturers believe, without question the best and most efficient apparatus yet devised.

A MEMORIAL has been presented to the Bombay, India, tramways, for extension of facilities. The petition was signed by two thousand Christians, Hindoos, Mahomedans and Parsees.

DAMAGE CLAIMS IN BOMBAY.

A RECENT suit in the High Court, Bombay, India, is brought by the Bombay Tramway Company, against A. F. Soundy for libel. Mr. Soundy is a kicker. He is a star of the first magnitude in the profession. He ought to come to the United States and write for the *Fibune* and the *Blackmail* and the *Wail* and *Distress* and other of our latter-day journals.

He would be a glowing success. As it is, he is tried for libel: just because he says that the mixture of oi populoi in the street cars is unwholesome and disagreeable to a man of fine sensibilities and a boiled shirt.

He says that lepers ride on the cars, and others of our Aryan brethern suffering from infectious diseases, touch thumbs with the conductor when collecting fares. He also says it shocks his modesty to take a place on the car when persons with "almost no clothing" sit next to him, and that sick people to and from the hospital are disagreeable traveling companions, just because they are suffering from sore eyes, loathsome sores and with one or more of their limbs tied up in dirty rags. Now, Mr. Soundy does not object to these persons, but he does object to the conductor and inspector touching them and then touching him.

But alas!

He did it for the public good and published these statements to reform the company, and the ungrateful company sues for libel.

Come to, Soundy! Our heart yearns for thee! Almost any of our daily papers has a life job for you. Come west and grow away from your effete civilization and your libel suit.

THE DELAWARE ELECTRIC STREET RAILWAY COMPANY.

WHEN, over a year ago, James K. Newcomer, editor of the local paper at the college town of Delaware, Ohio, said that a street railway would be a good scheme the people smiled. When he said that an electric road would be the proper thing they laughed; but Mr. Newcomer went about building his road.

The result is that a substantial road bed traverses the city, upon which is laid 45-pound Johnson girder, and upon this track J. G. Brill, of Philadelphia, has five of his cars and trucks. The Westinghouse Company equipped cars with two 20-horse-power and three 25-horse-power, single reduction motors, and also supplied the 100-horse-power dynamo. The Creighead Engineering Company, of Cincinnati, did the overhead work under management of G. R. Scrogham. Power is rented.

For a town of 9,000 this is commendable enterprise, and we look forward to the financial success of the men who back the undertaking, and as for Mr. Newcomer, his is the glory already.



Old Biddy Maginnis in her stay at the city
Bewailed its bad ways with the utmost of pity,
But she said, "Ochone it's not bad they are
For I see very frequent the shrine of "St. Car."

NO PATENT ON THE USE OF CONCRETE FOR CABLE CONDUITS.

THE United States Supreme Court has handed down a decision in the claim by Henry Root for patent on the use of concrete in cable conduit construction. The Court held that the evidence showed such construction to have been in use two years prior to Mr. Root's claim for patent, hence none could be granted. As a matter of fact Mr. Root, who patented several of the most important cable devices, was really the first to adopt the concrete; but suffered a fatal delay to occur in making application for papers. A decision favorable to Mr. Root would have laid nearly every cable road in the country liable to royalty.

BUFFALO AND WILLIAMSVILLE ELECTRIC.

ABOUT two years ago the above named company was organized to connect the growing suburb of Williamsville with the city. The officers are L. F. W. Arend, president; S. H. Cowles, secretary; and L. L. Grove, treasurer; office of manager and superintendent not yet filled. Three miles of the four and one-half are already graded, and nearly two miles ballasted and ironed. When completed there will be one mile 66-pound Johnson girder, and the balance 56 pound T from the Lackawana Steel and Iron Company, Scranton. The line is practically level, having a maximum grade of but two per cent. The power house has been rebuilt from a former paper mill, and is 40x80 in the main, with an L 20x85 feet.

Equipment will be two trailers and two motor cars, 25 feet over all, with two 15-horse-power motors. John T. Noyes' Company, Buffalo, furnish one 158-horse-power compound condensing engine; the Brownell Company, Dayton, three 65-horse-power boilers; General Electric, one 150-horse-power generator, and T-H motors. Track is ballasted with crushed stone, and the road will be pushed to completion at the earliest possible date. Pleasure resorts will be established next season.

Voorhees & Witmer, civil engineers, of Buffalo, have the contract for the construction, and are doing an excellent piece of work.

TAXES to the amount of \$167,144.12 were recently paid by the Metropolitan Traction Company, of New York, to the city treasury.

STREET RAILWAY LAW.

EDITED BY MR. FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Injury to Boy Trespassing on Street-Car.

A 17-year-old boy of ordinary intelligence is guilty of inexcusable negligence in jumping on the platform of a moving car, seizing the driver's whip and whipping the mules; and there can be no recovery for his death, caused by his falling off the car, which the driver was unable to stop in time to prevent his being run over.

Lewis, J.: This is an action by the administrator to recover damages for the death of his intestate, caused by alleged negligence of appellee's servant. It appears by the evidence introduced by the plaintiff, that decedent, then about 17 years of age, voluntarily and without permission got on the front platform of a street-car in motion, seized the driver's whip, and jumping on the ground, whipped a while one of the mules hitched to the car, and then getting again upon the platform passed to the opposite side, and after whipping the other mule for some time, got upon the car step, from which he fell, was run over by the car, and thereby killed. He was at the time in no sense either an employe or passenger on the car of appellee, but a trespasser on its property and intermeddler with its business without, so far as the evidence shows, its knowledge or permission of the driver, but rather in spite of him. His fall from the car and consequent death was caused by his own recklessness and illegal conduct in jumping on and off the car, and causing the mules to go at such speed as to make it impossible for the driver, after discovering his fall, to stop in time to prevent his being run over. We do not perceive any ground upon which an action against the company could have been based if the decedent had been an adult; for his death was the result, not merely of his own contributory negligence, but wholly caused by his own illegal and inexcusable conduct. The simple inquiry, therefore, is whether the decedent had at the time sufficient intelligence to know the danger he incurred, and discretion enough to guard against or avoid it. We think the evidence is too clear to admit of a doubt on the subject, for it does not appear he possessed less intelligence, experience and judgment than boys of that age ordinarily have. We think it fully appears that his death resulted from his reckless and mischievous disposition, and not to any extent from lack of intelligence or discretion. And in view of that fact the evidence that his father had previously told the driver to keep him off the car, does not constitute any excuse for his conduct so as to create any liability on the part of the company; without its knowledge or consent he went upon the car and needlessly and wrongfully beat the mules. Therefore the rule requiring a locomotive engineer and also a street-car driver to exercise vigilance in looking out for danger to passengers and persons on the railroad track, and to use reasonable diligence to prevent injury to a person after his peril is discovered, has no application in this case, because the decedent not only assumed the attitude of a trespasser, but illegally interfered with the movement of

the car, and thereby caused his own death. As the evidence does not conduce to show actionable negligence on the part of the company or its servant, the instruction to the jury to find for defendant was properly given.

(Ct. of Appeals, Ky. Taylor's Admr. v. South Covington & C. St. R. Co. 20 S. W. Rep. 275.)

Elevated Railroad—Failure to keep Structure in Repair—Presumption of Negligence—Injury to Person by Falling of Bolt.

The plaintiff was driving along Sixth Avenue in the city of New York, in a wagon, under the defendant's elevated railroad structure. When near 39th street, an iron plate or clip, with a part of a broken bolt, fell from the structure, striking him upon the shoulder, causing the injury for which this action was brought. It appears that the bolt was about fourteen inches long, that it passed through the guard rail of defendant's road, the stringer upon which it rested, and an iron plate or clip underneath, which was held in place by a nut upon the end of a bolt; that the bolt was broken about two inches from the nut.

No question is made but that the defendant's elevated railroad was properly constructed. It is claimed, however, that it was negligently suffered to get out of repair, and that because of such negligence the plaintiff suffered the injury complained of.

It was the duty of the defendant to exercise ordinary care for the purpose of keeping its structure in proper repair so as to prevent injury to persons passing over or underneath it.

The evidence showed that the bolt was broken, and that in consequence the iron plate or clip fell upon the plaintiff. The structure was consequently out of repair, and, under the circumstances, the presumption of negligence follows.

Evidence of the track-walker that he was required to examine the track, and was, at the time of the accident, attending to his duties, does not overcome the presumption of negligence.

It is claimed that the plaintiff neglected to produce upon the trial the broken bolt. His counsel said it was lost. He had established a *prima facie* case when he rested. The burden was then on the defendant. The upper portion of the broken bolt was left in the structure, in possession of the defendant company, which could have produced it had it so desired.

(N. Y. Ct. App. Volmarr vs. Manhattan Ry. Co. 25 Chi. Leg. News 73.)

Injury to Passenger alighting when Signal is given to start—Contributory Negligence.

A street car passenger who, in attempting to alight, has reached a point where it would be difficult to turn back when the bell is rung to start, cannot be deemed, as

matter of law, guilty of negligence in continuing her descent from the car, although it started the very instant she was acting.

(Sup. Ct. Mich. *Lucas v. Detroit City R. Co.* 52 N. W. Rep. 745).

Care required in crossing Street-Car Track—View obscured—Excessive Speed.

The test applied to determine whether or not a party was negligent in crossing a steam railway track on the highway, is not the test of the degree of care required in crossing the track of a street-railway on a public street. A street-railway company is bound to exercise at least as much care to avoid collision with other vehicles as the owners of the latter are required to use.

Evidence in an action against a street railway company for injuries justifies a verdict against the company, where it appears that at the time of the accident the car was running on a down grade in a populous part of a city, at from fifteen to twenty miles an hour; that no signal was given of its approach until it was within forty or sixty feet of the crossing, and that buildings obstructed the view of one crossing the track till he was near the crossing.

(Sup. Ct. Minn. *Shea v. St. Paul City Ry. Co.* 52 N. W. Rep. 902).

Contributory Negligence—Failure to look along Track Personal Injury.

One who is driving across the track of a cable street railroad in a wagon having a hood confining his view, and fails to lean forward to look along the track, when by so doing he would have a clear view, while otherwise he can see but twenty-five or thirty feet on each side, is guilty of negligence *per se*, which will defeat his recovery for injuries from being struck by a car.

(Sup. Ct. Penn. *Whelehahn v. Philadelphia Traction Co.* 24 Alt. Rep. 688).

City Ordinance—Speed of Cars.

A limitation by City Ordinance of the rate of speed at which street-cars may be run, is not authority to run up to the limit regardless of existing circumstances and conditions.

(Ill. App. Ct. *Quincy Horse R. & C. Co. v. Gnuse.* 38 Ill. App. 212).

Rail Projecting Above Surface of Street—Person Thrown from Vehicle—Contributory Negligence.

One driving in a dog-cart at a moderate pace, who turns to cross a street-railway track to avoid some vehicles, and is thrown out by the wheels striking the rails which improperly protrude above the level of the pavement, is not as matter of law guilty of contributory negligence.

(Sup. Ct. Tex. *Houston City St. R. Co. v. De Lesdernier.* 19 S. W. Rep. 366).

Defective Pavement between Tracks—Injury to Horse.

The action was to recover for injuries to a horse, the result of a fall caused by stepping into a depression in the pavement between the rails of one of the tracks of

defendant's road. At the bottom of the depression there was the grated opening of a lateral drain leading to a sewer, and the whole arrangement was for the purpose of receiving and carrying off the surface water from a low place in the street.

It conclusively appears that the defect in the street complained of was not the result of the use of the street by defendant, nor of any act on its part, nor the omission of any duty which it owed the public. It was a defect, not of repair, but of construction, for which the city alone was responsible, and which it was not the duty nor the privilege of the defendant to remedy. The duty laid upon the defendant by the statute was "to have and keep" the space between and opposite its rails and tracks "in permanent repair." It had no authority to change the location or dimensions of the opening of the drain, nor the depth or slope of the sides of the depression connected with such opening, all of which had been determined upon by the proper authorities of the City, and constructed by the City itself in accordance with such determination. The defendant not only owed no duty to the public to improve the construction of the street determined upon and carried out by the City, but it had no authority to do so even for its own benefit; and the evidence in the case discloses the fact that the defendant and its predecessor in the franchise had always been subjected to considerable inconvenience by reason of the faulty construction in question, which they had no authority in themselves to remedy.

(Supreme Ct. N. Y. *Snell v. Rochester Ry. Co.* 19 N. Y. Supp. 496).

Passenger Injured in Alighting from Car—Request that Car be Stopped at Certain Street—Duty of Conductor.

The fact that a lady familiar with travel on a certain street-railroad, and who was injured by the too sudden starting of the car from which she was endeavoring to alight, had requested the conductor to let her off at a certain place, does not require the conductor, in the exercise of due care, to give the lady express notice of the stopping of the car at that place, nor require any other action on his part than a reasonable stop: although the making of the request might be considered with other circumstances as bearing upon the questions of negligence and contributory negligence.

(Sup. Jud. Ct. Mass. *Robinson v. Northampton St. R. Co.* 32 N. E. Rep. 1.)

THE STERLING BOILER COMPANY, of Chicago, report a very active demand for their boilers. Among the latest orders was one 200-horse-power for Beaver Falls, Pa., Traction Company; one 200 for Hyde Park Electric, Boston; one 300 for Hyde Park Electric, Chicago.

A TACOMA conductor recently found among his smaller change a half-dollar of 1840, and has been offered \$500 for it. The effect is, that conductors all over the line gaze at change with a longing eye, and one citizen of Tacoma is kicking himself vigorously, but quietly.

RICHMOND PURCHASE.

A RECENT purchase by the Richmond Railway and Electric company is the Richmond and Seven Pines railroad. This is at present a dummy line 9 miles long and a mail route. The new owners are now equipping their purchase with electricity. The road will be a valuable adjunct to routes already obtained in the city to connect the several parts of the system.

JOPLIN CARRIES THE BANNER.

LAST month we cited the case of the West End road, Rockford, Ill., which had carried 324,867 passengers in 16 months without incurring a damage claim.

C. H. Belden, superintendent of Joplin (Mo.) Electric Railway & Motor Company, now reports his road as having carried from June 1st, 1891, to September 30th, 1892, a total of 669,580 passengers; and from January 1st, 1891, to October 31st, 1892, twenty-two months, they handled 842,962 passengers and have never had an accident to any person or a claim for damage of any nature. The Joplin record is certainly a remarkable one and highly complimentary to its management, and shows a splendid discipline which has not been relaxed for a single hour. It would seem as though this was a "register which cannot be beat," and until some one can lay better claim Joplin takes the banner.

ACCOMMODATIONS FOR EMPLOYEES IN NEW YORK.

AMONG the reforms that the broad-gauge policy of President Crimmins has wrought is one that will bring to him the thorough regard of every driver and conductor in his employ.

President Crimmins on assuming the management of the Metropolitan Traction company was particularly impressed with the lack of wholesome accommodations for his employes. Reasoning that the men of contented mind and reasonably good surroundings would be better workmen, and seeing that loyalty to the comfort of the man induced in him loyalty to the corporation, Mr. Crimmins set about remedying the evils in his usual energetic manner.

To this end, rooms for conductors and drivers are established at all depot for the company, and in these rooms every convenience that is conducive to comfort is provided, such as closets, boot-blackening outfits, lavatories and chairs.

Taking as an example the Broadway depot, the conductors' room is now 75 by 25 feet in dimensions, and besides the necessities above named, games of chess, checkers and dominoes are supplied together with tables. The current magazines and papers, including the STREET RAILWAY REVIEW, are here on file. The company provides a tailor who is in daily attendance at the rooms

to sew on buttons, repair rents in coats or trousers and renovate their uniforms. This compels each man to look his best by removing any excuse for slovenly or ragged appearance on duty.

The drivers' room is 24 by 19 feet, and is kept with the same care as that of the conductors. Adjoining the conductors, room on the second floor is the dining room, with tables and comfortable chairs, where the men may eat their meals in peace and quietness without excuse for frequenting saloons or low restaurants for that purpose. The dining room is 38 by 20 feet in size.

It is the experience of large companies that proper attention to the men brings its reward in increased faithfulness of the employe and the consequent satisfaction of the traveling public.

RECENT ORDINANCES IN ST. PAUL-MINNEAPOLIS.

THE unmaidenly abandon with which the sister cities of St. Paul and Minneapolis play with street railways is shocking. Now St. Paul has ordered several miles of new railway regardless of expense or income, has called up more rolling stock and new equipment without money and without price; has joyfully toyed with the five-cent fare, and declared that St. Paul owned not only the streets but the street railways and the inhabitants of St. Paul.

Now Minneapolis is heard from. The new council with a sudden jerk has broken its record for vigorously doing nothing by monkeying with the street railway system and the transfers.

The long silence in regard to the Kuchli transfer ordinance was broken by the adoption of the measure. The ordinance was accompanied by two amendments which order the street railway company to erect a \$5,000 waiting station for passengers. This is to be erected in Bridge Square, and shall be in the care of uniformed employes, and the station lighted and warmed. The city will gather \$1,000 a year from rent of the ground upon which the station stands. New transfer stations were also ordered at several points in the city.

Another section of the ordinance provides for the disestablishment of the interurban transfers. This was the only favorable mention of the street railway company, but it probably will stand horse and horse.

It is said, by Henry Villard, that Prince Bismark, besides being a "man of blood and iron," is a man of electricity to the extent of \$50,000 in Milwaukee railway stocks.

A NEW YORK conductor named John Hill recently came into possession of \$5,000 by inheritance. Prosperity didn't agree with John, however, and a trip to St. Louis, in company with an actor, left him with \$4,000 and a social game of craps with a St. Louis sport took the rest. John is now poor and very penitent and is trying to get on the "extra list."

THE WIRT ELECTRIC INDICATORS.

THESE instruments are designed to meet the severe condition of the most exacting commercial practice in electric lighting. The intention of the designer has been to produce an electrical measuring instrument without the faults of temporary or permanent variation, mechanical defects or imperfect design so often



FIG. 1.

found in instruments of this class, and which, to quote Mr. Swinburne, "Measure nothing in particular." Whether the object has been fully, or even partly, accomplished the following description will, perhaps, enable the reader to judge.

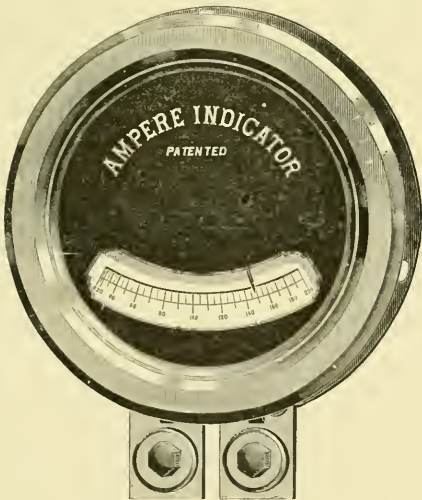


FIG. 2.

Fig. 1 is a view of the outside of a volt indicator, and Fig. 2 that of an ampere indicator. The cases are similar to high-grade steamgauge cases, and have cast-iron boxes with heavy ornamental polished bronze rims. These rims are cast, and have the "draw-file" finish so much admired, instead of being spun and buffed accord-

ing to the usual practice with work of this class. The glass front is finished in black and pure gold leaf. The case is moisture proof, dust proof and "time proof," which is a very important matter and often not appreciated.

Fig. 3 is a detached view of the armature system.

The resistance wire used in the volt indicator is one of the new alloys which have appeared the past few years. The one selected has not the highest resistance nor the least temperature variation of those tested for the purpose. It is superior to 18 per cent German silver in both qualities, and remarkably constant as regards slight change from year to year, which is the most important feature by far in this case.

It is manifestly impossible to simplify an action consist-



FIG. 3.

ing of merely a stationary coil acting on a light piece of iron free to move in response to the attraction exerted.

In such an instrument the moving parts are reduced to one, control is left to gravity, the varying strength of the field due to the coil is known to be rigidly proportional to the current in the same, and it is only required that the iron which acts as a straw in the magnetic "wind" shall be so selected, shaped, treated and acted upon, as to eliminate "magnetic memory."

Fig. 4 is a cut of the interior of the volt indicator. The action consists of an oblong spool having ends with a cylindrical curve. The armature is a semi-cylinder of thin

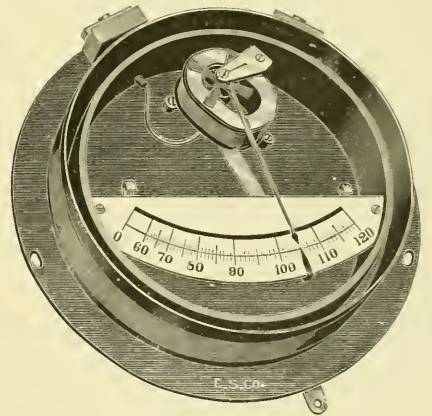


FIG. 4.

sheet iron suitably attached to a light steel spindle, with conical ends carried in jeweled cups of special shape designed to give the maximum sensitiveness. The attached pointer is made of thin bronze ribbon having the stiffness of tempered steel and formed to a V section. Aluminium was tried for these pointers at first, but it was found that, weight for weight, other materials were stiffer and more satisfactory.

Fig. 5 shows the interior of a 400-ampere indicator, the conductor consisting of a single turn. For large sized ampere indicators the "coil" or strap is cast of pure copper.

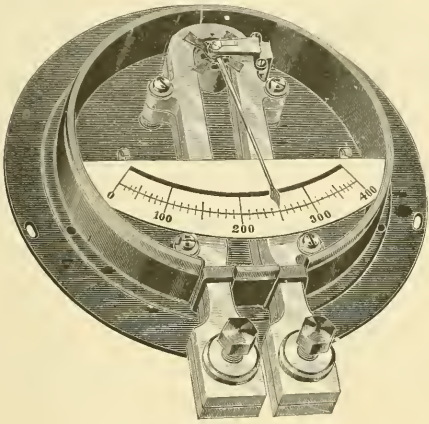


FIG. 5.

The Electrical Supply Company, Randolph street and Michigan avenue, Chicago, are the manufacturers.

SQUARE SHAFTS FOR CABLE CARRYING PULLEYS.

EVER since the opening of the Kansas City Cable railway, round shafts had been used on carrying pulleys. The result was that, when a pulley wore loose it was next to impossible to key it to last any length of time. Assistant General Manager Frank C. Peck recently hit on the plan of using a square shaft turned at the ends just enough to take the bearings. Upon this the pulley is driven, the shaft making a close fit. This enables him to replace any wheel on the spot without sending it to the shop. The pulleys used are cast iron, heavily chilled, and the groove turned down true. Mr. Peck finds they give long life, and no objectionable wear on cable, and make scarcely any noise in running.

"BIG BETSY."

A NEW car is now added to the eight varieties owned by the Oakland (Cal.) Consolidated. It was reconstructed from a 36-foot box by adding two long platforms and, in compliment of its size, has been named "Big Betsy" by the employes. On the rush trips this car is found very convenient.

JOHN H. CRANDALL, treasurer of the Newburyport and Amesbury Street Railway, is a fire fighter of renown. He recently discovered a blaze at a neighbor's house, and singed his hair badly in extinguishing the incipient fire.

ALL communications regarding, and orders for, railway line material manufactured by the Lieb Machine Works, should now be addressed to the General Electric Company, full arrangements having been made to this effect.

INCANDESCENT LAMPS FOR STREET CARS.

THE demand for a thoroughly high class incandescent lamp, especially adapted to the lighting of street cars, or for use on power circuits, has been steadily growing during the recent months. At the lamp works of the General Electric Company a series of experiments in the direction of satisfying this demand have lately been made, with entire success. The outcome of the experiments is three special types of lamp, which satisfy the exacting requirements of railway and power work. It must be borne in mind that the special requirements of a lamp destined for use in series on railway circuits differ materially from those of the ordinary lamps which are connected in multiple on low tension circuits.

The first lamp is the straight unanchored filament lamp, differing in no way in appearance from the ordinary incandescent lamp. This lamp is rated according to the amount of current consumed, and only those consuming the same amount of current should be used in any one series. In order to avoid the possibility of errors in order or ship-



FIG. 1.

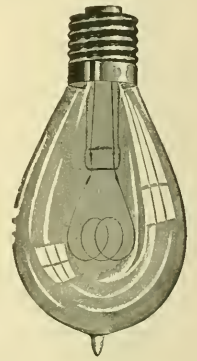


FIG. 2.

ment of this style of lamp, a special record is kept of the lamps shipped to different companies, and thus lamps of the same current carrying capacity as those they may have received on previous orders are always sent to each company.

In the anchored filament lamp the chance of breakage of the filament by sudden contact with the glass of the bulb, caused by motion of the car, is entirely obviated. The life of the lamp is, consequently, not exposed to abrupt termination or even abbreviation.

The design of the spiral filament lamp is the most novel and most pleasing. As will be seen from the cut, the filament is made in three spirals, mounted on a heavy glass center, and requires no extra support.

Great care is exercised in the manufacture of the two last named lamps in order to render the resistance exactly the same throughout each form, so that any "spiral" or "anchored" filament lamp may be used with others of similar form. Neither one, however, must be used in series with the others.

COMPRESSED AIR AS A MOTIVE POWER FOR CITY RAILROADS.

THE publication of Gen. Haupt's article on compressed air motors, in the July issue of THE STREET RAILWAY REVIEW, in which reference was made to the experiments conducted under my supervision, as chief engineer of a company in New York city, a few years ago, has brought me a great deal of correspondence on the subject.

There are two questions which I have had to answer many times, viz.: "If the experiments proved that compressed air was in every way suitable, why was it abandoned?" and, "What is the cost of operating a railroad by compressed air?"

Gen. Haupt is of the opinion, that a feeling among railroad men, that possible heavy damages from frightening horses was the principal reason for their abandonment. True, this objection was made, but, as a matter of fact, horses paid no more attention to cars so operated than they do now to cable or electric cars; and it ought to have been as easy then as later, to demonstrate that such fears were groundless. All sorts of objections were raised, and fears expressed, as to their practicability, just as there are with all new things. Some thought they could not be relied on to complete a trip without running short of power, others that they would prove too costly, a few thought their weight would injure the tracks, and one consulting engineer stated in a private report that "if the engineer in charge should resign, it would be difficult, or impossible to secure another man with equal skill and knowledge to take his place."

Any motor which carries a limited supply of power, will fail if taxed beyond its capacity. Steamships sometimes run short of coal at sea, and locomotives sometimes run short of coal or water, and have to be hauled to a supply station. Generally speaking, however, it is approximately known how far their supply will carry them, and the journeys undertaken are within the limit. Just so with compressed air. A motor which will take sufficient power for a ten mile trip, is surely to be depended on for an eight mile trip.

As for injuring the track. It must be remembered that a horse car track is laid much heavier than necessary for the cars alone, on account of the ordinary heavy traffic of the street; so that much heavier cars are permissible; but, even should the track be more costly to maintain, it is then a question if the economy, and other advantages of the system would warrant it, or the motors could be built of lighter construction, and smaller capacity, and recharged more frequently. Provision can be made for recharging anywhere en route, in as short a time as it takes to water horses. Those tested in New York City, weighed about 11,000 lbs. and could take a supply of compressed air for a ten mile trip. It was never found that they injured the track.

The proper way to have met all objections, however, was not by discussion and argument, but by a practical demonstration. Railroad men were not satisfied with a few exhibition trips of the motors, although as a general

rule the performance was considered very satisfactory, so far as it went; but they all wanted to see a railroad operated exclusively, and successfully; and until then no railroad would adopt the system. As it required capital to do this, and as the motor company had practically none, the enterprise was never carried beyond the experimental stage. It is true that this company was capitalized at \$1,000,000, but that needs explanation. Those who organized the company were men of no financial standing, and the stock was all issued to them, without payment or consideration, except the expenses of organization, and a few preliminary tests. In order to evade the law, which required that the stock should be paid for at its full par value, a valuation of \$1,000,000 was put upon some patents, which one of their number held in trust; and the stock was issued to him in consideration of said \$1,000,000 worth of patents: said trustee then divided the stock, as previously understood and agreed on, including a small percentage to the patentees. In order to provide "working capital" the stockholders assessed themselves in a percentage of their stock, which was set aside as "treasury stock" to be disposed of at whatever price it could be sold for. In this way some money was raised, but not enough to do any real business, and consequently nothing was done beyond making exhibition runs of the motors, and getting flourishing accounts into the newspapers, on the strength of which, the individual members "peddled" their stocks.

Among those who bought stock, was a gentleman of means, as well as culture and refinement, and strict integrity. In some way, he was induced to loan the company money from time to time on its notes, and this kept it alive a while longer. Indeed it began to look as if some real business might be done after all. A compressed air locomotive was built, and tested on the elevated railroad, which succeeded in hauling their four-car trains, loaded with passengers, the whole length of the road: making all the stops to receive and deliver passengers, making the schedule time, and, in fact, doing practically everything which the steam locomotives were required to do. At the end of the trip, it was found that a sufficient surplus of compressed air remained in the reservoirs to ensure against possible failure: and, as will be shown later, the economy was beyond question. For some unexplained reason, however, this success was not followed up, and eventually a sudden and complete collapse was brought about by the sudden and sad death of the gentleman referred to, in whose estate the company's overdue notes were found.

The inside workings, and manipulations, of this straw company with paper capital, would make interesting reading; but I trust enough has been said in the brief space allowable here, to show that it was not an organization well calculated to make a commercial success of such an undertaking, and is my explanation for the project being abandoned. Needless to say it was a great disappointment to me. Those desiring to investi-

gate further, can be furnished with plenty of evidence as to the practical utility of the system, and the mechanical success of the experimental motors.

I shall now endeavor to derive approximately from the data obtained during these experiments, what the cost of equipping and operating a railroad would be, and here, it must be explained, that the compressing plant used for these experiments was of cheap construction and small capacity; so that the actual cost in coal, of making a few trial trips with a single motor, is no criterion of what the cost would be with a permanent plant. Fortunately, however, the volume of compressed air used by the motors in making these trips is positively known, so that the quantity needed to operate any railroad may be computed from the mileage. The builders of air compressing machinery will then contract for furnishing the plant, and guarantee its performance.

The street motors, which were really cars having the compressed air reservoirs and machinery under the seats and flooring; used at the rate of 300 cubic feet of "free air" per mile; and when towing two regular horse cars, all with a full load of passengers, 480 cubic feet per mile. The elevated locomotive used 1,482 cubic feet per mile, hauling a train of four cars full of passengers. This might vary, more or less, about five per cent., but was practically constant. "Free air" means the equivalent volume at atmospheric pressure. The section of elevated railroad where the tests were made is eight and one-half miles long; and at the busy part of the day might run trains three minutes apart from each end of the road. This would require an air compressing plant of sufficient capacity to replenish the charge of forty motors per hour, capable of running 340 miles, equal to a volume of 504,000 cubic feet of "free air" compressed to the necessary pressure. Such a plant will cost about \$80,000, and would develop 2,500 horse power, which, at two and one-half pounds of coal per horse power, would consume 6,250 pounds of coal per hour. The builders of such machinery would probably guarantee a rate of consumption not exceeding two pounds of coal per horse power per hour. To reheat this air would require 750 pounds more, so that 7,000 pounds would be required to operate 340 train miles, being about twenty-one pounds per train mile. As a matter of fact, the coal consumption with steam locomotives is from thirty-five to forty pounds per mile, and of a quality costing about twice as much per ton as would be necessary in a stationary boiler. The cost of compressed air locomotives would be about the same as steam locomotives of the same weight, so that the first cost would be greater by the difference between the cost of air compressing plant, and the coal and water stations.

On a street railroad 504,000 cubic feet of "free" air would operate 1,680 car miles at 300 cubic feet per mile, if the motors haul no trailers; and 3,150 car miles if they haul two trailers, or at the rate of four and one-sixth pounds of coal per mile, and two and two-ninths

pounds of coal per car mile respectively. Of course it would be greater with a less number of miles operated. A railroad running only 10 motors per hour at a speed of eight miles per hour, or eighty car miles per hour, might consume as much as seven pounds per car mile, but I think even that will compare very favorably with almost any other kind of motive power in use.

An air compressing plant for this work will cost from \$8,000 to \$9,000, and a responsible builder of air compressing machinery is willing to guarantee that the horse power will not exceed 150. This in so small a plant might use three pounds of coal per horse power per hour, and with 60 pounds more for reheating the air, would make the total consumption 510 pounds of coal per hour, equal to six and one-half pounds per mile for 80 miles. It is, therefore, safe and liberal to put it at seven pounds, to allow for unforeseen losses.

I think it is safe to assume, therefore, that both in point of practical utility and cost, aside from other advantages, compressed air is well worthy of favorable consideration from practical railroad men: and that it was no inherent fault of the system which led to its abandonment by the New York parties.

I have spoken of compressed air having advantages over other motive powers in use. Some of these may be here stated:

1st. The absence of all nuisance or danger.

2nd. The capability of running anywhere that a track is laid, independent of overhead or underground connections.

3rd. A temporary stoppage of the power plant would not cause an immediate suspension of operation. Those who have been riding on a cable train when the cars came to a standstill, without knowing when they will start again, will appreciate this. Electric lines have similar trouble, as, for instance, when fuses and armatures burn out during electric storms, or otherwise.

4th. Economy.

Some may doubt this, but my figures and estimates are based upon facts derived from actual experiment and a knowledge of the possibilities. Those who care to investigate will arrive at the same conclusion. One thing which contributes in a large measure to economy of both operation and first cost, is the fact that it is not necessary to provide for the possible contingency of starting up a large number of cars on the same line at once, as with cable or electricity. The compressed air motors would be recharged in regular rotation as they arrive at the charging station.

In conclusion, it will be seen that the preliminary work and expense of experiment has been gone through with, and now there is a ripe and abundant harvest for the reapers.

ROBT. HARDIE,

439 So. Oakley Avenue,
Chicago, Ill.

THE movable sidewalk will be an attraction at the World's Fair next year.

SOME OF THE POSSIBLE USES OF FIVE HUNDRED VOLT STREET RAILWAY CIRCUITS

BY CARL K. MAC FADDEN, ELECTRICAL ENGINEER FOR TAYLOR, GOODHUE & AMES.

THE five hundred-volt constant potential circuit, such as is found in most all of our street railway plants, readily adapts itself to many uses outside of its regular work in the electrical propulsion of cars. At present nearly all of the car houses and stables of the street railway companies are lighted by means of incandescent lamps in series of five, and this generally constitutes the only illumination that is found in these places. Such arc lamps, however, as are well adapted to five hundred-volt circuits are becoming very popular with managers of street railway companies, and as a result, their use may soon be looked upon as general. The fact that arc lamps have heretofore been imperfect for street railway circuits has been the only reason that has held them back for so long. An arc lamp properly made and thoroughly adapted for five hundred-volt circuits, fills a want that the incandescent lamp can not, or at the best, very imperfectly. In boiler and engine rooms the incandescent lamps rapidly become covered with a film of dust and dirt, and although the simple suggestion may be made that the bulbs be cleaned, the fact remains that they are not, and, as a consequence, the rooms they are supposed to illuminate, have only very unsatisfactory light. The substitution of arc for these incandescent lamps may be effected in many cases with but little, if any increase in current consumption, while the increase in light will be many fold. There is also an increased demand for the illumination of barn entrances, turnouts, etc., in front of car houses, and for this purpose the arc lamp is particularly well adapted.

The street railway manager is always looking for some method to increase the earnings of his road; by canvassing among the business men, whose places of business lie within a half mile of the street railway line, he will find that many of them would be willing to pay a good price for arc lamps. These lamps could frequently be supplied at a price much below that which the local lighting company could afford to furnish them, since the cost of operating the street railway plant is increased very little by the additional load of arc lamps during the evening hours. In a majority of cases it will not be necessary to run the street circuits from the dynamo room, since the fluctuation of voltage in the street car service will not be sufficient to interfere materially with the operation of arc lamps. In exceptional cases, however, owing to insufficient feeder capacity, it may be necessary to run separate circuits from the dynamo rooms for lighting.

It will be found that the cost of wiring lamps on these separate circuits will be much lower than would at first appear, since the lamps are run 9 or 10 in series and do not have to be looped back to the dynamo room. Lamps as far distant as three-quarters of a mile from the street railway circuit may be successfully handled in this way, and in case less than ten are to be run in series, the distance can be still farther increased and the cost of lighting will still be down to a reasonable figure.

These arc lamps should be provided with an automatic cut-out, which renders it possible for one lamp to be cut out without interfering with the others in series with it. There are a number of ways of accomplishing this, and it is to be expected that it will not be long before we will have an automatic resistance box, which will tend to maintain a uniform current through this lighting circuit without regard to the lamps being cut on or out, thus allowing the usual type of series arc amps to be used in this class of work and simplifying the arc lamp to a great degree and lessening the repairs.

During the day time many street railway plants could operate to a far greater economy by having a larger load than they are obliged to carry during the light hours of the day. This is particularly true of suburban lines, whose maximum number of passengers is carried in the morning and evening hours. The load during the day could in many instances be increased by furnishing power to manufacturing establishments requiring a small number of horse-power, thus bringing the average load to a more uniform point during the entire run. The cost of an electrical horse-power can be readily obtained by tests that any well posted electrician can make, and from these figures prices can be made which should be lower than the manufacturer would have to pay for steam power furnished by himself. It would often pay such a manufacturer to abandon his steam plant with its necessary dirt and noise, and put in a motor of such size as would operate his factory. Such motors could easily be taken care of by the street railway company and should give very little trouble.

The electric motor is becoming widely known as the motive power both for passenger and freight elevators. The combination is economical in the use of current, occupies less space and does away with the steam plant, which frequently is operated simply for furnishing steam to the elevators. The five hundred-volt motor is now being built from $\frac{1}{4}$ horse-power up, and thus readily adapts itself to the handling of small machine shop work, and many of the large manufacturing establishments are taking out their long lines of shafting and putting in separate motors for each machine, and the results of this move on their part shows decidedly in favor of the electric motor. A number of street railway companies are furnishing current for the turning of draw bridges near their lines. The city of Milwaukee, having a number of these bridges, is operating them from the street railway circuit and give good satisfaction.

During the winter months the electric heaters take first place as a means of heating cars, and the many roads now using this method of heating demonstrate the practicability of the use of electricity in this kind of work. The improved heaters of to-day will be found to be more economical than coal stoves, with the additional advantage that they do not take up space in the car that could be utilized for passengers.

The above are a few of the many uses of the five hundred-volt street railway circuits, and the wide-awake managers of the street railway companies will find that there is a large field in this line of work, and that a little energy spent in canvassing their immediate territory will yield larger results than would at first appear.

NEW WATER TUBE BOILER.

THE New York Safety Steam Power Company have just put out a new form of water tube boiler, which would seem to unite great compactness and strength with large area of heating surface. Figs. 1 shows it with cover on; Fig. 2 with cover entirely removed. It will be seen that there is almost no surface area of the boiler that is not exposed to the heat. At the same time there is no difficulty in making the grate of as large an area as necessity requires. In places where boiler floor space is dear, the foregoing peculiarities are especially valuable. A boiler of 200-horse-power can be passed through a 4 by 4 foot doorway.

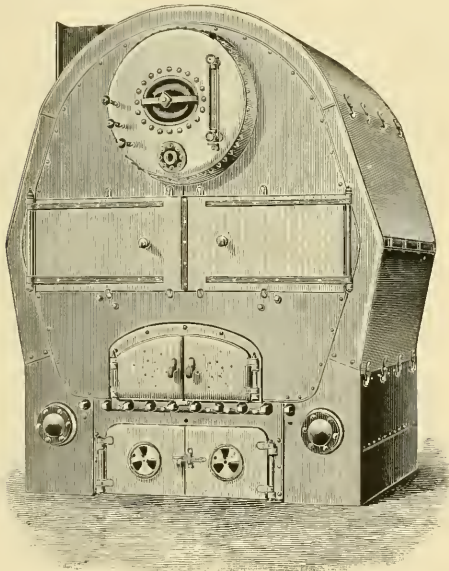


FIG. 1.

All the tubes are straight and every tube end connection is expanded into the side walls. On the outside of the walls there is a hand-hole corresponding to each tube end, and large enough to admit a tube expander. The cap is ground down to a steam tight joint. Of course the side doors can at any time be opened to admit of inspection of the caps.

The casing is lined with a heavy coat of asbestos and magnesia. The only brick required is in the foundation and around the grate, fire brick being, of course, used in the latter place. The tubes all being short there is very little expansion. One interesting feature about the boiler is the circulation, which, it is claimed, is kept

up between the top and bottom. The feed water enters at the top mud and steam drum. From there it flows down through the four water tubes in the bottom of the drum to the bottom of the boiler, thence up to the first set of tubes and then back to the steam drum. This circulation, if kept up, will keep an even temperature in all parts of the boiler, and, it is said, will prevent scale.

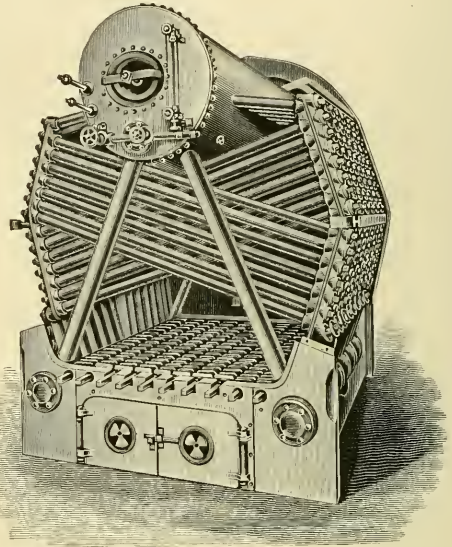


FIG. 2.

All things considered there are many desirable features, and would appear to be a very efficient and durable type in places where the scale difficulty is not too great; and on this point the manufacturers claim almost absolute freedom, owing to the rapid and complete circulation.

THE SHORT ELECTRIC RAILWAY COMPANY has opened new offices at No. 44 Broadway, New York City.

THE AMERICAN SUPPLY COMPANY, of Kansas City, Mo., have added to their former business of railway supplies, steam pumps, hoisting engines, machinery, etc.

J. W. WENTWORTH, Superintendent of the East Middlesex Company, has gone over to the Amesbury and Haverhill Company. John Sewall, of North Woburn, will succeed him.

THE STILWELL-BIERCE & SMITH-VAILE COMPANY has just been incorporated under the laws of New Jersey. The capital is fixed at \$1,000,000, and the directors named are, E. R. Stilwell, R. N. King, G. N. Bierce, of our old friends, the Stilwell & Bierce Company, with W. W. Smith, J. H. Vaile, and O. P. McCabe, of the pump manufacturers Smith & Vaile. Jas. B. Clews, of New York, and J. K. McIntire, of Dayton, O., are also interested. The new company will do business in their old lines, at Dayton, with increased capital and energy.

MEDIUM FOR RETURN CURRENT.

SO much interest is now being taken in the subject above named, we give in full herewith the discussion on this branch of the paper on "Model Electric Railway Roadbed and Underground Wiring" presented at the last Street Railway Convention. The remarks were as follows:

Mr. Pearson, of Boston: There is one point in connection with this report on track construction which has not been touched upon to-night, and which merits attention; and that is the return ground. In small towns and systems where there are few cars running, the ordinary method of returning the current through the rails and supplementary wire will be sufficient unless the distance is great. On large roads where the traffic is heavy, more return grounds than have been used heretofore will have to be installed. We found it so in Boston, and from a lack of return feeders a great deal of electrolytic action was caused in our supplementary wire, and we are now putting up a large amount of overhead copper for return grounds; I do not think it possible to put it underground, as it will corrode and rust away. There is no advantage in using iron, as the conductivity is only one-seventh that of copper.

The question has been asked me if we would run the positive or negative current through the trolley wire. Originally we ran the positive through the trolley wire, but we found that the action on the supplementary wires was too great, and we changed it and put the negative to the trolley wire. I do not imagine there will be much less effect, as it merely transfers the action to another point.

Mr. Smith, of Waterbury: I would like to ask the gentleman if he has had any experience of trouble with water pipes.

Mr. Pearson: I had not in mind any particular trouble with water pipes, but naturally, if you have a large volume of current going through the earth, it will take hold of a water pipe or a gas pipe, or any other pipe, and there will be an electrolytic action set up; and in any large railway system, if the attempt is made to use the earth for return ground by putting in ground plates in driven wells, or by putting them in the rivers and the return current is not provided with good metallic circuit, it seems to me that the current must inevitably injure the water pipes and all other pipes. The current when it leaves the car goes into the ground, and taking a water pipe may go a mile on that pipe, then leave it for a better conductor; the result being that the pipe will be corroded at this latter point.

This is all I have in mind on this matter; I simply wish to bring to the notice of the Convention something which I think must be taken into consideration in regard to the return current.

Mr. Richardson, of Brooklyn: I would like to ask the gentleman whether he has given thought to the idea of using a portion of the old rails which we have to take up, by putting them in the ground; on the basis, as he says,

that in iron there is only one-seventh of the power of transmission as of the same weight of copper. I mean to take the relative value of our old steel rails, about thirteen or fourteen dollars a ton, and using five, six, seven or eight, side by side, and making a continuous pathway for the return circuit, fastening them, of course, with the proper fastenings, so as to make a continuous conductor, not necessarily under the roadbed, but alongside of it or between that and the sidewalk, so as to provide a proper return instead of depending on gas pipes water pipes, or the earth.

Mr. Pierson: It seems to me the difficulty would be to make a joint. If you could weld the rails together or if you could solder them, I think possibly it would work; but I do not believe you could make the joints in any other way that would carry a large volume of current without heating and corrosion.

Mr. Richardson: Would that joint or joining need to be by copper plates?

Mr. Pearson: I think that would be a poor construction, as the iron and copper would form an electrolytic element, and cause corrosion even if no current was passed through the joint. The passage of the current would also heat the joint and cause further oxidation.

Mr. Richardson: One other question: Is that simply a theory, or has it been tested in practice?

Mr. Pearson: It is partly theory and partly practice. We attempted, in the early days of electric railroading, to use the rail for the return conductor, not putting in supplementary wires, and found it almost impossible to maintain a joint of any sort. Where you drive a large volume of current through the joint, oxidation takes place, and the joint soon becomes worthless. This condition will exist no matter how large the joint is made, and if you used dissimilar materials or metals, a local electrolytic action will also take place. With steel in contact with iron, the effect will be produced in a lesser degree than with copper, and it will take longer for the trouble to develop. It does not seem to me practicable to use old rails for conductors.

Mr. Baumhoff, of St. Louis: Have you compared the relative consumption of fuel with the trolley wire connected with the positive pole of the generator and the consumption of fuel when the trolley wire is connected with the negative pole of the generator?

Mr. Pearson: No, sir; we have not; it would be rather a difficult thing to do. I cannot see why it should make any difference, as the total resistance of the circuit is equal to the sum of the resistances of the various parts, and the loss in potential is proportional to the total resistance. I do not see what difference it could make whether the resistance is greater on the negative or positive side of the circuit: it is merely a question of driving the current through a certain resistance.

Mr. Ramsey: I would like to ask Mr. Pierson in this connection whether or not he thinks it worth while to consider the use of old cables, discarded

from cable roads, for the purpose mentioned? It weighs about two pounds to the foot, or about five or six tons to the mile, and may be purchased at about fifty dollars per mile.

Mr. Pearson: We used considerable cable, old steel and iron cable, in getting across the rivers and connecting our supplementary wires from one side of the track to the other, but it cuts away very fast. For instance, in one place we put in seven ropes or cables, and soldered the joints thoroughly at each end, and in less than four months they were entirely gone. If you had soil which was comparatively dry and sandy, it might do for a time: in a place where the soil was moist and salty, I doubt whether you would get enough life out of it to pay for putting it down.

Mr. Richardson: There was one thing the gentleman referred to, I would like to know, why there should be any more difficulty because of using copper plates and rivets in connecting the rails for a mile or less in length: for instance, laying eight centre bearing rails, each thirty feet long, and connecting them as specified, why should there be any more destructive electrolytic action between the copper and iron than there is with the copper bond wires which are used to connect our rails together on the surface?

Mr. Pearson: I think as a rule, in track construction to-day, we use supplementary wires as well as bond wires on the rails: the former having a low resistance as compared with the bond wires and joints; the greater current passes on the supplementary wire and does not go through the joint. If you cut the supplementary wire, and compel all the current to pass through the bond wire, there will be trouble; but as long as you have a good supplementary conductor, so that the current does not pass through the bond wire, the joint will remain cool, and there is no great tendency to oxidation, especially if tinned rivets are used.

Mr. Richardson: Do you think there would be any more heat generated with the rails four feet underground than with those at the surface?

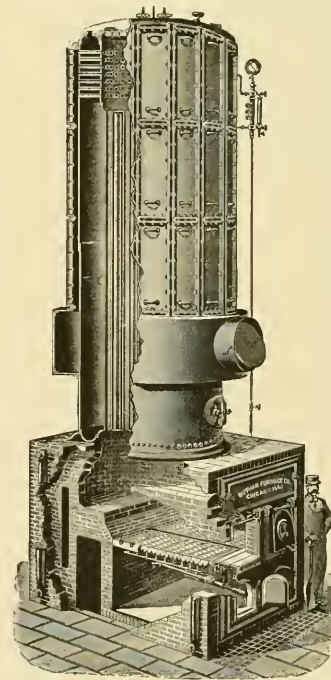
Mr. Pearson: The heat would depend on the amount of current passing and the resistance of the joint. Of course the proof of the pudding is in the eating, and the only way to decide this question is to lay the rails as you suggest, several miles in length, and lay them in such a place that a large volume of current will pass through them.

Mr. F. S. Holmes, of New York: I asked an experienced engineer, a pioneer, I believe, in street-railroad work, some days ago, what was his experience in ground plates; and he said that in case there was a sufficient number of ground plates along the line, he found that the amperes of current divided about equally between the rail return and the ground wire. Now, in an ordinary battery, the positive pole is the pole that gives and is consumed, and the negative pole is the pole that receives deposit. The construction we have to-day where ground plates are used for return currents makes the trolley wire and the various plates and supplementary wire along the

line of the railroad positive and the large ground plate at the station negative. This is wrong, because where this is done the supplementary wire and ground plates along the line are rapidly corroded, and eaten away, while the negative plate at the station is uninjured. The conditions should be reversed, the station plate being made positive and the line plates and supplementary wire and trolley negative to it. Corrosion will thus be largely confined to the station plate, which can be easily replaced, and the plates and supplementary wire along the road will remain nearly intact. Of course, to accomplish this, the current will flow out by the ground, which will be positive, and back by the trolley wire, which will be negative.

THE BUTMAN VERTICAL BOILER.

ONE of the most important requirements of a boiler for uses in many places is that it shall afford ample opportunity for cleaning. The Butman vertical boiler meets this requirement as few others do.



It will be seen that the heat passes up the flues and down the outside of the boiler. The space between the flues and shell is large enough to admit a man, thereby furnishing means for cleaning, which are all that could be desired. The outside shell is made in sections lined with asbestos, the sections being bolted together. The only external opening to the boiler is the manhole in front. It is intended that the sediment shall be deposited in the seamless ring at the bottom. The top flues act mainly to dry the steam, and it is claimed

the boiler is one of the quickest and most economical steamers made. It is manufactured by the Butman Furnace Company, of Chicago.

A WOMAN in Missouri has sued a street railway company on the following claim: "She was a passenger on the road and was accidentally carried beyond her destination several streets, when the train stopped and she alighted. While returning she was chased by a dog and in outrunning him impaired her health."

DR. ERNEST WERNER VON SIEMENS.

THE time was when the inventor was either the far separated link in the chain of events or the victim of his own genius and of the ignorance of his fellow men. One man worked in darkness and devoured his own life within the confined limits of his laboratory, only to have the child of his thought come down in some museum, to instruct lesser minds to obtain his own great idea.

The mortuary record of the year 1892, we doubt not, is without parallel in one regard. Never, within the memory of man, until the last half of our great century, have the originators of any industry seen the fruition of their toil. Now the great army of the civilizers move in one phalanx toward their ideal. The prime movers in the great advances of electricity are reaping the rewards of their brain and hands together, and their works are their monuments while yet living. So we say, that this year, bringing the sad events of the death of Van Depoele. Field and Werner von Siemens, passes into history unaccompanied. The demise of Dr. Ernest Werner von Siemens, on the sixth of December, calls up the foregoing thoughts and the events of the life of the world renowned electrician and inventor. The founder of the great house of Siemens & Halske was born December 13th, 1816, at Leuthe, in Hanover, and was thus nearing the beginning of his seventy-seventh year. When 18 he entered the service of the Prussian army, as is the custom of the fatherland, and was assigned to the artillery. So bright and promising was the young soldier, that Siemens was put in charge of the artillery workshops at Berlin. With the young man's bent for applied mechanics this gave him a fine opportunity for study and research. When 25 years old he took out a patent for electro-plating and gilding, the first result of his electrical researches. At the same time he devoted his energies to the perfecting of telegraphy, and discovered the insulating properties of gutta-percha for submarine and underground work. In 1849 he laid the first submarine torpedo exploded by electricity. The same year he severed his connection with the state and founded the since great house of Siemens & Halske. Here he devoted his wealth of research and mind to the construction of electric apparatus that covers almost completely the entire field of electrical work in its various ramifications and branches. So

successful was the venture, that soon factories were successively established at St. Petersburg, London, Vienna, Charlottenburg, France, and recently in Chicago. This last establishment and its possibilities were discussed at length in the October number of this magazine.

Dr. Siemens during his active life, besides engineering the policy of the house, was the deviser of several forms of the galvanometer, the bathometer, the hydraulic brake and a prometer. His researches as to the electrical resistance of a specified column of mercury is honored as the Siemens Unit. Dr. Siemens was largely assisted in his labors by his two brothers. Frederick designed the regenerating gas furnace. In 1874 Dr. Siemens became a member of the Berlin academy. In 1886 he presented 500,000 marks (\$125,000) for the founding of an imperial institute of technology and physics, and in 1888 accepted rank from Emperor Frederick, an honor which had been offered him repeatedly and until then declined.

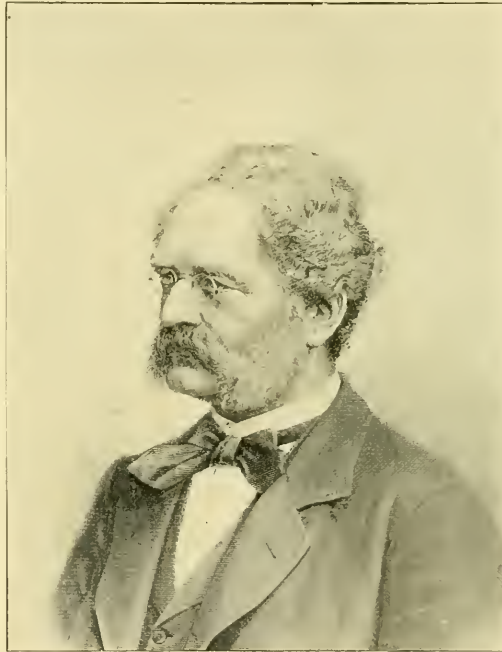
The career of Von Siemens shows a remarkable combination of inventive genius, recon-dite learning and business ability. The range of his electrical work is perhaps greater than that of any other electrician of the age, comprising in its grasp all known fields of telegraphy, electrolytic processes and dynamic work.

The first experiments in electrical propulsion were consummated in the experimental line at Paris, in 1878. After this the first practical work was installed at Lichterfelde, near Berlin. This road is still in operation. The original motor of this type is now in the German National Museum at Berlin, and may appear as part of the German exhibit at Chicago.

The contact in this road was made by trolley at first, but afterwards a stirrup was considered an improvement. Here, under the Siemens patents, the trolley question had its beginning, and these patents will prove factors in the claims of other companies. Since this time the improvements have been due to the energy of others of the house.

Von Siemens' character is adumbrated in his work, and can be read between the lines of his successes as bold, strong, original, patient, profound and generous.

Retiring from active service ten years ago, his business has been executed mainly by his two elder sons. His numerous scientific dissertations have been published in collected form, and give altogether a fair history of the electrical development of the age.



DR. W. VON SIEMENS.

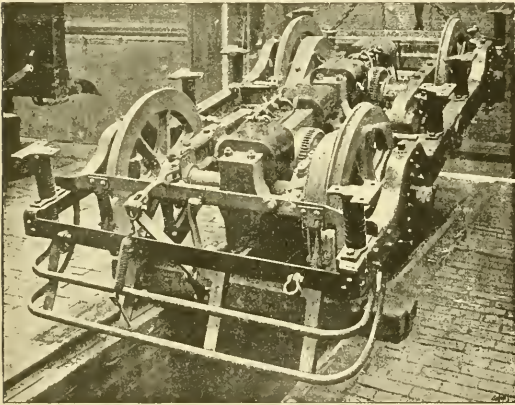
Dr. Siemens had planned to visit Chicago during the next year, but the late unhappy event has precluded the benefits which the science in America would have received from so accomplished a man. The great loss is not only to Germany, but to America and the world.

THE TROLLEY IN ENGLAND.

IT is now over a year since the Leeds electric railway was put into commission by American capital and enterprise, in the face of heavy odds and an unfriendly constituency.

Since this installation, change enough has been made in public spirit, and English capital enough interested, to put into the hands of British enterprise all future electric traction work.

Graff Baker and A. Dickinson have finally made the next step, by building and just recently opening the South Staffordshire tramways, which run through the



MOTOR AND TRUCK, SOUTH STAFFORDSHIRE.

districts of Wednesbury, Bloxwich, Darlaston and Walsall.

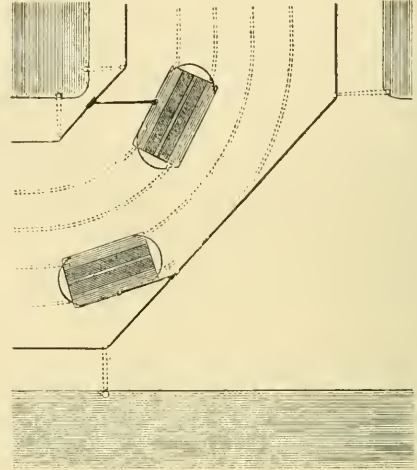
These places have had the benefit of steam trains for some time, at a great disadvantage to the working company. In 1889 the expenses per mile run were 12.09 pence and the receipts were 12.67 pence, leaving a profit of .58 pence per mile run, or equal to a half cent in American coin. This is too much for even English financing, and hence the change.

The antiquary will probably raise a howl against the desecration of the old worship ground of the Druids, but it must be confessed that our present comfort is of much more interest than that of the progenitors of our great race, or the good of future generations, that have so far done very little to benefit us.

On Saturday, November 12, the final inspection was made of the line, in the presence of a number of notables, and to the great joy of the 4,000,000 passengers who annually use these tramways.

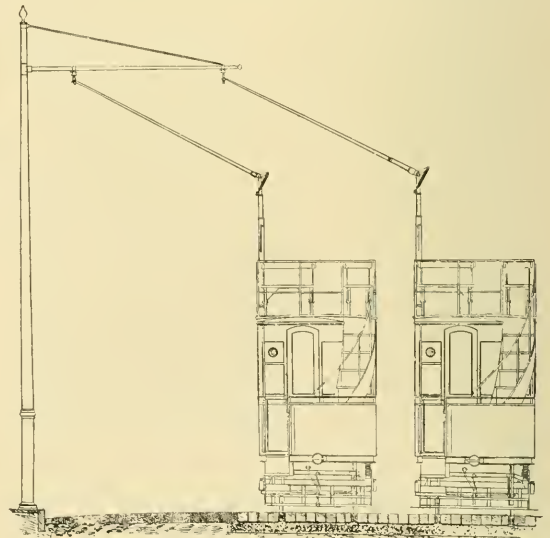
The South Staffordshire Tramway has, in all, 23 miles of track, and four million passengers are carried annually.

Alfred Dickinson, the engineer of the South Staffordshire Tramway Company, visited the United States some time ago, and returned with some new ideas of his own, which now find form in a novel overhead construction, which has been installed and tried, though it is not yet in practi-



MOVEMENT OF TROLLEY ON CURVE.

cal operation. The ordinary American form of span or bracket construction could have been installed, but Mr. Dickinson thought that if a satisfactory system could be devised that would do away with span wires entirely and in many cases necessitate only a single line of poles, it

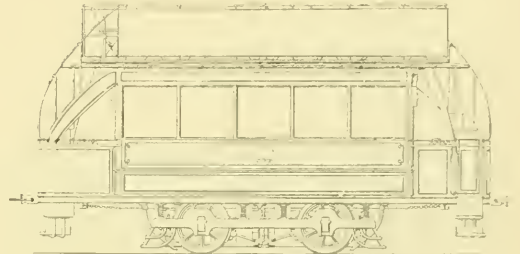


RELATIVE POSITION OF TROLLEY IN PASSING CARS.

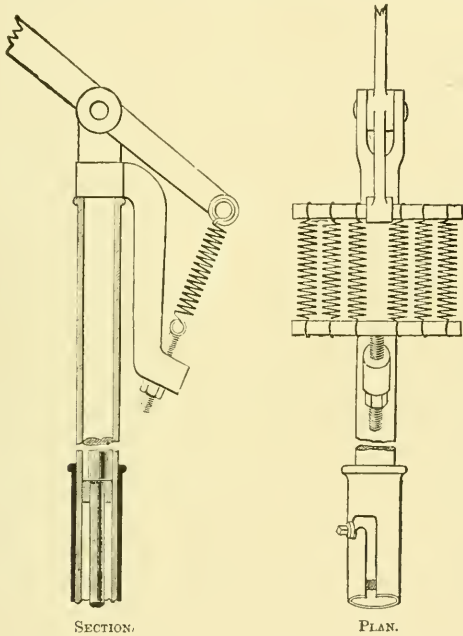
would be a step in advance. A glance at the drawings will give a good idea of the manner in which the problem was solved. Instead of being over the center of the car, the trolley wire runs on one side, at a distance that may vary from one to thirteen feet from the side of the car.

This variation is allowed by the fact that the trolley pole can swing around at any angle, being free to turn on the mast arm on top of the car. The trolley wheel can also turn at different angles with the trolley pole. It would seem that such a form would require a complicated system of automatic springs, but, as a matter of fact, the only springs used are on the short end of the trolley pole, where they serve to keep the trolley firmly against the wire. It is unnecessary to state that this makes the overhead construction vastly easier. With the common form of trolley a variation of the trolley wire, from the center line, amounting to only a few inches, is enough to make trouble. The Staffordshire system even allows the wire to "take a short cut" around curves without running off. (See illustration). It hardly seemed possible that such a system would work, and engineers seemed doubtful about

to three slow speed engines, running at 100 revolutions. The feeders are underground and are tapped for the trolley wire sections every half mile. The largest feeder has a section of .25 square inches, and is covered with bitumin (vulcanized), a layer of lead and a layer of steel tape.



ELEVATION OF TRUCK AND CAR.



SECTION.

PLAN.

its practicability, but the trial trip removed all room for doubt. Whatever defects there may be will have to be brought out by the wear and tear of every day use. The wear on the sharp turns will, of course, amount to something.

The cars are 22 feet long, with a capacity of 40 passengers. The motors are mounted on a bogie four-wheel truck, and are single reduction double magnetic circuit. They develop about 15-horse-power apiece, at 400 revolutions per minute. The above speed will drive the car about 10 miles an hour. Each car has two sets of breaks, one on the outside wheels of its truck and the other on the inside. The motors are series wound and controlled by a rheostat.

In the station there are three two-pole generators, with a maximum output of 260 amperes at 350 volts and 450 revolutions. They are driven by wire ropes, running

The trial trip was made under the board of trade inspection, the inspecting officers being Major-General Hutchinson and Major Cardew. Our illustrations are from the London Electrical Review.

The contract was made by the Electric Construction Company, Mr. Parker being the engineer.

STREET RAILWAY MAIL SERVICE.

THE plan of utilizing street railways for mail service so long advocated by the REVIEW has been adopted in St. Louis. The plan taken is to collect the mail on the car, where it is sorted by two clerks, and postmarked, cancelled and delivered to carriers without touching the post office. The line used is the St. Louis and Suburban and three regular stations for distribution are established. The car leaves the postoffice at 6:25 a. m., and arrives at the end of the trip, Cabanne, at 7 a. m., the return car leaves at 9, touching from nine to eleven carriers who, at intervals along the route, deposit their load in the car. The car runs on schedule time and reaches the postoffice at 9:33. At present three trips are made a day, but the service is so satisfactory that it will soon be increased. Post Master Harlow again follows the REVIEW in advocating a parcel express system.

THE Chicago City span wires are up on 35th and 61st streets, and the 47th street poles are being set. Twelve miles of track are bonded, 82-pound girder rails being used. It is intended to use some of the old car bodies, and car wiring will begin in a few days.

Playing Cards.

You can obtain a pack of best quality playing cards by sending fifteen cents in postage to P. S. Eustis, Gen'l Pass. Agt., C., B. & Q. R. R., Chicago, Ill.

THE NEW CONNELLEY GAS MOTOR.

LAST year the North Chicago Street Railroad Company made some experiments with the Connelley gas motor. The result of those trials was so satisfactory that seven motor cars are now in process of construction here. The North Side company is making the bodies at their shops at the corner of Fullerton avenue and Sheffield street. The Connelley Gas Motor Company, which own the Illinois right to this invention, is making the motors at their factory on South Clinton street.

The fuel intended to be used is a mixture of 75 per cent natural gas and 25 per cent of gas made on the Pintsch system. This Pintsch gas is made from crude petroleum, and a contract has been let for a gas works to manufacture this gas at the corner of Larrabee street and



FRICTION DRIVE—CONNELLEY GAS MOTOR.

Garfield avenue. The gas is to be carried in tanks on the car at a pressure of 200 lbs. when first charged.

The pressure as it enters the motor is the usual gas pressure of only a few ounces. The object of the high initial tank pressure is of course to allow a greater volume of gas to be carried. It takes only a few seconds to fill the tanks. As equipped at present the cars carry four tanks, 20 inches in diameter and 48 inches high. When the tanks are filled with gas at a pressure of 200 pounds the car will run under ordinary conditions of load about 25 miles. If it is found desirable, tanks can be put around the top and sides of the car, giving the motor a supply for an all day's run.

The motor proper runs at 180 revolutions per minute and is rated at 10 horse power. It will be explained further on how this capacity is made sufficient for starting and ascending grades. The gas on entering the cylinder is exploded by the opening of a port leading to a small burner on one side of the cylinder. The time of

explosion is regulated by a common eccentric on the engine shaft. An ordinary centrifugal governor such as is used on steam engines serves to regulate the supply of gas. An apparatus is attached to the motor for exhausting the cylinder thereby allowing gas to be taken and ignited on every revolution instead of every two revolutions as in most gas engines. The water for cooling the cylinder is made to circulate through a tank traversed with flues to facilitate cooling. The next and most essential thing in the operation of the car is the friction drive. The motor is running all the time at a uniform rate of speed, whether backing, starting or going ahead. The friction drive is made by a hard steel wheel rolling against a soft steel plate on the engine axle. The engine axle is at right angles to the axle of the small wheel. This can best be seen by an inspection of the accompanying engraving which gives a view through the car door and shows the friction gear and end of the motor. When the car starts the small wheel presses against the disc on the motor axle at a point very near the center. As the car gains headway the motorman moves the small wheel so that it bears further out toward the circumference of the disc. In this way it is plain that the car can be made to run constantly at any speed without any waste of power. The disc is held to its work by a large ball bearing. The arrangement of the friction wheels is different from that used on the motors tried last year and does away with a great deal of unnecessary strain. One great trouble with all forms of street car motors in use to-day is that the rate of working at the starting of the car is so slow that but a small fraction of their rated power can be used with the motor running all the time, this difficulty is overcome and the full power of the motor can be secured in starting. The power is transmitted to the wheels by chain and sprocket wheel. The cars are 11 feet bodies of the ordinary width. The weight complete is about four tons. It is intended to run a small dynamo in connection with a storage battery from the motor for the purpose of lighting the cars. The present motor is the result of long and careful experimenting and development, and the Connelley Company are confident they have now secured a practical, economical and reliable machine. The North Chicago Street Railroad entertain the same belief and are proving their faith by the construction of a large number of these motors.

Holiday Rates via Wabash Railroad.

The Wabash line will sell tickets for the Holidays to all points within two hundred miles of Chicago and between Chicago and Detroit, at a fare and a third for the round trip. Tickets will be good going Dec. 24, 25, 31 and Jan. 1 and 2; good returning until January 3, 1893. Ticket Office, 201 Clark street.

Good authority says that the General Election Company has bought, a storage battery patent of a Peabody, Mass. man for \$60,000. The directors of the General Electric say neither no nor yes.

REVIEW OF THE YEAR WITH OUR ADVERTISERS.

Our Second Annual Resume of what the Supply Houses have Accomplished.—A Year of Wonderful and Unprecedented Activity.—Every Branch of Street Railway Supplies Prospering except "Streeters."—Most Encouraging Outlook for 1893.

ANOTHER year has rolled around, and for the second time we make a review of what the twelve months have done for the leading dealers and manufacturers. Although 1892 counted one more day in its calendar than its predecessor, it may be fairly considered to have been offset by the distractions of a presidential election. It did not seem as though the phenomenal business in our field which characterized last year could possibly be duplicated. But it has been and more, and the promise for 1893 fully justifies the expectation that the months next before us will reach a higher mark than ever before. Supply houses are now beginning to realize the future dimensions of repair supplies, which will be much larger in '93 than '92, while new enterprises well developed guarantee an enormous output of first construction material. Business has been uniformly good, fair prices have been obtained and losses have been few and of comparatively little importance. On the whole the street railway supplymen open the new ledger with feelings of genuine satisfaction. We join in their hopes and expectations, and trust they may all be fully realized, and more.

B. F. CUMMINGS COMPANY, Chicago, have met with excellent success in introducing their safety check perforators in railway offices.

GILBERT CAR COMPANY, Troy, have maintained the high standard for which their works are known, and have enjoyed a busy, prosperous year.

THE HEALY MOTOR, Detroit, has been adopted and put in operation on several lines where it has developed surprising power and made interesting records.

SHEFFIELD VELOCIPEDE CAR COMPANY, Three Rivers, Mich., have had numerous orders for their equalizing truck, which have been promptly and satisfactorily filled.

STROMBERG, ALLEN & COMPANY, Chicago, have recently added to their extensive railroad ticket facilities special provision for printing any kind of street railway tickets.

CAR TRUCK SUPPLY COMPANY, Chicago, have made a decided success in the introduction of the Schuttler hand track drill, operated by one man. Their sales have been large.

M. S. STARKWEATHER, Boston, for many years manager of the Metropolitan railway of that city, the past year brought out his life saving fender, which has been very well received.

THE MAGIC CLEANSER COMPANY, Cleveland, entered the field April 19, but in the few months since have found a most encouraging reception for their compound for cleaning cars.

AUGUSTUS DAY, Detroit, finds the demand for his track cleaners fully three times as large as last year. The interchangeable feature brought out this season has proved a great success.

WILLIAM BARAGWANATH & SON, Chicago, have had a heavy year in feed water heaters and purifiers, and have included a large number of railway plants in their immense business.

N. W. HARRIS & COMPANY, bankers, Chicago, have been the largest dealers in street railway securities in the West, and have made this class of securities a special branch of their business the past year.

I. H. RANDALL, Boston, has added to his manufacture of advertising racks, car trucks and bodies, and has been well favored by managers with orders which have kept his facilities well employed.

THE LIMA REGISTER COMPANY, Lima, Ohio, have had their works busily and fully employed getting out the Lima register which has given such general satisfaction. Second orders have been numerous.

ELLIOT FROG & SWITCH COMPANY, St. Louis, report an increase of 20 per cent. in number of customers in '92. During the year they brought out their new and successful spring rail frog for steam railways.

EDWARD C. WHITE, New York, has enjoyed a nice and rapidly increasing business in the supply of wheels and axles. His improved sweeper with cylinder broom and plow attachment has met with good sales.

STRATTON SEPARATOR COMPANY, New York, have enjoyed a most satisfactory business during the year, and particularly so in its dealings with street railways. Their business is in a highly prosperous condition.

ILLINOIS STEEL COMPANY, Chicago, confine their street railway work chiefly to tee rail, which they roll to any desired weight. Their sales in this line have been extensive and shipments prompt and satisfactory.

ROBERT POOLE & SON COMPANY, Baltimore, have had their immense works filled with heavy and exacting orders, which have been filled according to the high standard for which their work is so well known.

JOHN H. RAWLINGS SONS COMPANY have handled an increased amount in all departments, particularly railway and lighting wires. Their wire ropes in cable railway service have made highly favorable records.

HOLMES, BOOTH & HAYDENS, whose New York agent is Thomas L. Scovil, have turned out more than ever in the varied lines of copper wires, and have had the factories at Waterbury, Conn., busily employed.

E. B. PRESTON & COMPANY, Chicago, have largely increased their line of customers, especially among street railway men. Their belts have given excellent satisfaction and second railway orders have been frequent.

ALFRED F. MOORE, Philadelphia, finds the balance hand-somely on the right side as the year closes and is pleased to report a larger demand in '92 than ever before for insulated electric wire, cords and cables.

ARTHUR D. PARTRIDGE, of St. Louis, and the Dewey electric car heater are names in which one suggests the other. The Dewey heater has made rapid progress and has been adopted by a large number of companies.

THE BATES MACHINE COMPANY, Rockford, Ill., are among the largest manufacturers of light iron working machinery in the world. Their drill and other lathes are running in several hundred more shops than a year ago.

THE ELLIS CAR COMPANY, Amesbury, Mass., have been busily engaged in car work and also snow sweepers, of which they have had large demand. Their work has been maintained in their well known style and standard.

TRAMWAY RAIL COMPANY, Pittsburg, have received a good share of the orders for iron, and have laid a goodly number of miles of their girder construction, while calls for curve and special work have been well taken care of.

M. M. BUCK & COMPANY, St. Louis, have pushed the street railway branch of their business this year, and with excellent, results. They put on the market the Superior Oil Filter, and increased warehouse facilities one-third.

T. C. WHITE & COMPANY, St. Louis, have reason to be more than satisfied with the business handled. During the year they occupied the present larger quarters, and became southwestern agents for the R. D. Nutall Company.

WASHBURN & MOEN COMPANY have had a large sale of wire for electric work, and brought out their salamander wire described elsewhere in this number. All the branches have received heavy orders for railway wire in their territory.

M. C. BULLOCK & COMPANY, Chicago, built more than three times as many Bullock-Corliss engines as were put out in '91. A large number of these have gone into railway and lighting plants, where they are making splendid records.

W. W. ALLEN, Red Wing, Minn., whose safety brake has attracted much attention, made radical improvements during the past year, and now has a track brake which he promises will hold a car on any grade and with any condition of rail.

C. F. ORR, the uniform manufacturer, of Chicago, has turned out a much larger number of railway suits this year than ever before. Every garment is cut from actual measure, and the closest inspection given every article before delivery.

RICHARD VOSE CAR SPRING COMPANY, New York, have maintained a large output throughout the year. Among large orders were 100 cable car equipments for the Broadway line, New York, and 180 cars for the Chicago city cable lines.

THE ST. LOUIS CAR COMPANY have had a big year, and have actually been so crowded with work as to scarcely know what to do with the new orders. Recent extensive additions to their shops, however, have increased their facilities very considerably.

CHAS. SCOTT SPRING COMPANY, Philadelphia, have enjoyed another prosperous year, in which their output of car springs for cable and electric cars has been greatly increased, many managers specifying them when giving orders for new cars.

THE SIOUX CITY ENGINE COMPANY have had all they could do, and shared to the full extent of their capacity the general prosperity prevailing among engine builders. They have made a specialty of railway and lighting engines with flattering results.

GARTON-DANIELS ELECTRIC COMPANY, Keokuk, Iowa, came into the field in October with the Garton arrester. Its success is such that already facilities have been greatly increased and force doubled. Force and factory will be further increased next year.

J. M. JONES' SONS, West Troy, have enjoyed a prosperous year and their shops have been filled with orders, among which was one of fifty box cars for the Union Railroad, of Providence. Their business has been highly satisfactory and promises well for '93.

STEARNS MANUFACTURING COMPANY, Erie, Pa., have been actively in the field with Gill water tube boilers, and Woodbury engines, and have contracted for complete power plants. Their railway work has given good satisfaction and shows a good increase over '91.

HOPPE'S MANUFACTURING COMPANY, Springfield, Ohio, have received a liberal share of the street railway trade and are glad they did business in the year of our Lord one thousand eight hundred and ninety-two. Indications point to an even larger output next year.

A. G. HATHAWAY, Cleveland, has had a most excellent year's business in transfer tables, wheel presses, the Roche coupler and his numerous specialties. A much larger volume of business was handled than last year and the outlooks pronounced good for '93.

THE KELLOGG IRON WORKS, Buffalo, have done an increased manufacturing business in short trolley poles, which they make in quite a variety of styles. Have also furnished iron roofs and girders for power houses, for the manufacture of which they have special facilities.

A. GROETZINGER & SONS, Allegheny, have scored an increase in the sale of "Dermaglutine" of 50 per cent. over last year. What is even more gratifying is the flattering reports from all users who express the greatest satisfaction with their rawhide gears, pinions and other goods.

ALBERT & J. M. ANDERSON, Boston, have every cause to be satisfied with the year's business, and have increased facilities to keep pace with growing demands. Several orders for insulators were shipped to great Britain and Belgium through their London agent, R. W. Blackwell.

AMERICAN CASUALTY INSURANCE AND SECURITY COMPANY have carried a large number of street railways the past year, assuming all loss by claims from damage, and also guarantee the honesty of employes. It has had a large and satisfactory business in its street railway department.

THE ECLIPSE CLUTCH WORKS, of Beloit, Wis., have figured prominently in electric railway work the past year, and have found a strong demand for their engines and clutches, and in many cases more extensive orders, including shafting and boilers. Their business has largely increased.

BEMIS CAR BOX COMPANY, Springfield, Mass., have had a heavy business throughout the year, and now have a large number of orders in hand. They brought out their No. 26 elliptic spring truck, which was well received and of which they are already building large orders for spring delivery.

THE BARCOCK & WILCOX COMPANY find a resume of their business for 1892 eminently satisfactory, having been at least double that of any previous year. The railway department of their work has largely figured in the remarkable increase, their boilers being specially adapted to that service.

GOUBERT MANUFACTURING COMPANY, New York, have a satisfied feeling as the year draws to a close, as becomes a business which shows gratifying increase and uniform prosperity. Their water-tube feed-water heater has recommended itself where installed and has given excellent results.

THE HAMILTON CORLISS ENGINE, manufactured by Hoover, Owens & Rentschler Company, Hamilton, Ohio, has gone into a very large number of new railway plants in all parts of the Union. Their business has largely increased over '91 and everything points to an even larger demand next year.

THE INDIANA RUBBER & INSULATION COMPANY, Chicago, have vigorously entered the street railway field the past year and with good success. The demand for their Paronite, especially adapted for use in power houses and car wiring has largely increased, and the factories at Jonesboro, Ind., kept busy.

POND ENGINEERING COMPANY, St. Louis, with branches at Kansas City, Omaha and Chicago, has enjoyed a prosperous year. A large amount of contracting was taken, and several new lines added to the business. During the year A. S. Love, of the main office, assumed charge of the Chicago branch.

HALE & KILBURN, have needed all the extra space secured by a additions to factories a year ago, and have carried a much larger business than ever before. In street car seats their goods can be found from ocean to ocean, and their name alone is a guarantee of a comfortable resting place while traveling.

BENEDICT & BURNHAM MANUFACTURING COMPANY, Waterbury, Conn., have been called on to furnish a large share of the bare and insulated copper wire for electrical purposes, their Benedict feed wire and hard drawn trolley wire having been in special demand. Anticipate another big year for 1893.

EASTERN ELECTRIC CABLE COMPANY, Boston, find satisfaction in the fact that their business of '92 exceeded '91 by 40 per cent, and was fully double the year previous. They have put several new lines on the market, and were obliged to increase facilities with new buildings, covering 3,000 feet of ground. They have been working both day and night for a long time, and consider the outlook for next year good.

THE ST. LOUIS REGISTER COMPANY made a self-imposed test of one year before offering their security register to the railway companies elsewhere. This test ended in October with very flattering testimonials from several roads in St. Louis. Since then the register has been actively pushed with good success.

GRIFFIN WHEEL & FOUNDRY COMPANY, Chicago, have increased their business, and have added 20 per cent. of new customers. Their works, which were burned, were fully rebuilt in three weeks and greatly improved. Among large orders was one of 1,500 wheels from a cable railway on the Pacific coast.

OKONITE INSULATED WIRE, and cables have been in such great demand the past year as to necessitate the full operation of the factories at Passiac. Notwithstanding the enormous capacity of the mills, the company have the pleasant difficulty of being obliged to crowd the works to the utmost to keep up with orders.

THE NEW PROCESS RAWHIDE COMPANY, of Syracuse, has been the recipient of the most gratifying testimonials from prominent railway managers, as to the satisfactory qualities of their famous belts. They have also very largely increased the number of customers and have every reason to be proud of the year's record.

BALTIMORE CAR WHEEL COMPANY have made wheels the year round, and the wheels were all round, too, having been carefully turned down true. Their output this year has been such as to present a very gratifying showing and, while holding old customers, their wheel has been introduced on many new roads with great success.

FULTON FOUNDRY COMPANY, Cleveland, have found the manufacture of electric car trucks in addition to their well-known wheels, a most encouraging department of their business. Their trucks are thoroughly well made and have called out some highly complimentary letters from managers in the United States and Canada.

JOHNSON ELECTRIC COMPANY, Cleveland, have developed a large business during the year and, in addition to manufacturing several lines of electric railway supplies, have had a heavy demand for rewinding armatures and general repairs to electric railway apparatus. They have built up a good business in a short time.

THE STANDARD PAINT COMPANY, New York, have increased their output 25 per cent. over last year, and have every reason to expect even a larger increase in 1893. The high standard of their goods has made them very popular with railway buyers, particularly their insulating compounds, tape and armature varnishes.

BALDWIN LOCOMOTIVE WORKS, Philadelphia, built during '92 a few less than 700 locomotives. Among the strictly passenger lines furnished was all the engines for the Chicago Alley L, two condensing compound motors for North Chicago Street Railroad, one double end motor with two pair of drivers for Stroudsburg, Pa.

THE EMERSON ELECTRIC MANUFACTURING COMPANY, St. Louis, reports an increase in sales of 400 per cent. and in customers of 200 per cent. Put on the market their trolley hanger and improved trolley crossing. J. W. Emerson retired as president and was succeeded by H. L. Parker. Increased manufacturing facilities largely.

ROBINSON MACHINE COMPANY, Altoona, has been brought prominently before street railway men this year and, though still among the younger truck builders, secured a most gratifying recognition and been well supplied with orders, many secured in the face of strong competition. It will still further increase facilities in '93.

THE AMERICAN ELECTRICAL WORKS, Providence, R. I., have had a busy year. Although '91 was a hard one to beat, the record of '92 will leave it far behind. The demand for trolley and insulated wires has kept the factories under full pressure. In July the company gave its annual clam dinner to members of the electrical fraternity.

HILL & WELLS, LaFayette, Ind., are among the additions which 1892 has made to the growing list of manufacturers. Although in the field but a month or two, they are meeting with most excellent success with their telescoping tower wagon, the invention of Mr. Hill, and will establish a few more agencies in distant parts of the Union.

THE RAILWAY REGISTER COMPANY, of which Edward Beadle, of New York, is general manager, has found its way to many new lines this year and been called for on new cars added to lines already so equipped. Its high standard has been fully maintained and patrons everywhere continue to express unbounded satisfaction.

NATIONAL FARE BOX MANUFACTURING COMPANY Chicago, sold four times as many boxes in '92 as last year. Improved appearance of box; brought out the aluminium case weighing only 14 pounds complete. Also introduced a new combined ticket punch and bell cord mending device, illustrated and described elsewhere in this issue.

THE ABENDROTH & ROOT MANUFACTURING COMPANY have actively kept the merits of their excellent water tube boiler before the street railway public, with the result that a larger number than last year have been installed in railway plants. The Chicago, Dallas, Boston, Rochester and Cincinnati branches all report a good business.

AMERICAN RAIL JOINT COMPANY, Marion, Ind., first came prominently before the street railway public in 1892. It manufactures a combination rail joint bridge, of malleable iron, samples of which attracted much attention at the street railway convention. Large orders have been since received and the company has already secured a very promising business.

C. & G. COOPER & COMPANY, Mt. Vernon, O., have been so crowded with work they were scarcely aware that the year was so nearly spent and a new one close at hand. Their cross compound condensing Corliss, for street railway work, has gone into many of the best plants erected during the year, which has been the most successful one in the history of the company.

CHAS. A. SCHIEREN & COMPANY, New York, not only have enjoyed a largely increased trade in their special lines of belting, but the year has demonstrated a growing desire on the part of railway managers to use the better grade of goods, and which are the more satisfactory while in use and cheaper in the end. Their perforated electric belting has grown more popular every day.

THE Q. & C. COMPANY, Chicago, have brought out this year one of the most valuable additions to the list of appliances which constitutes even a limited list of necessities. The Bryant metal rail saw for the rapid cutting of cold rails by power or hand. During the year fire destroyed their shops which were rebuilt to double former capacity.

DUPLEX STREET RAILWAY TRACK COMPANY, New York, have been called on to supply a large amount of rail of their special type to some of the best roads in the country. The year has been the most successful in the history of the company, and they consider the outlook for the sale of street railway supplies generally, in 1893, as especially good.

DORNER & DUTTON, Cleveland, have been obliged to triple the facilities and help in their gear cutting and truck building departments. They have enjoyed a steadily increasing business, and have taken care of their patrons in good shape. Their track cleaners have gone on to many new roads, and their business has been a highly prosperous one.

TAYLOR, GOODHUE & AMES, Chicago, opened business October 1, hence could not be expected to much more than get fairly under way. They are the general selling agents of the Burton electric heater, and western agents for a very complete line of railway supplies. They have already earned a reputation for prompt and intelligent handling of orders and have a bright future.

SAWYER, MANNING & COMPANY, New York, have sold a greatly increased amount of uniform cloths to street railways during the year, through the efforts of Chas. L. Bowler, who has charge of this department. The same reliable methods and satisfactory dealings characterize this branch of their business as has made this firm so successful as manufacturers of high grade woollens.

NUTTALL RAILWAY SUPPLY COMPANY, Chicago, saw the light in October, '92, and as western agents for the R. D. Nuttall Company, Allegheny, have a large field. P. H. Cary, vice president, and Edward H. Harrison, manage the business here, and are both young men of great popularity and business ability. They have already secured a large and constantly increasing trade.

THE AMERICAN CAR COMPANY, St. Louis, got into their new factories early in the year, and had a large amount of work already contracted. Their output has exceeded even their most sanguine expectations and steadily maintained through the year. As this is its first year no comparison is possible with former years, but the latter months have shown a fine increase over the first ones.

THE AKRON CAR COMPANY, of which the Sieberlings, of Akron, Ohio, are the prime movers, is another of the new comers of '92 having just been organized. The Akron Car Company will be brought prominently before the street railway world, and with the large acquaintance of the managers with the railway fraternity cannot fail to take a front seat among the leading supply houses.

EDDY ELECTRIC MOTOR COMPANY, Windsor, Conn., have found a remarkable increase in the demand for electric motors of a few horse-power, especially where electric railways make a business of furnishing power for commercial purposes. Their machines are specially adapted for such use, and have proved very successful. Their railway generators are guaranteed to be unsurpassed.

THE CUSHION CAR WHEEL has rolled smoothly through the year, and although the wheel is guaranteed to be noiseless every railway man has heard of it. The wheel has finished some heretofore unexampled records during the year, has been adopted in many roads and is now being tried on others with almost certain prospect of adoption. Vice-President Leach has ably managed the Chicago office.

RICE MACHINERY COMPANY, Chicago, show a marked increase over past years, and trebled their capacity. Their engines and power transmission machinery has been very favorably received by railway managers. Offices were recently moved to larger quarters in Springer building, 166-174 South Clinton street, where railway men will always find a warm welcome and much to interest.

S. D. GREENE, New York, assistant general manager of the General Electric Company, states their factories have been running full blast throughout the year, and it was even necessary to call in outside help. Believes next year will show a still further development in street railway service and a great extension of its adoption by different cities of the Union at present utilizing other systems than the electric.

SIEMENS & HALSKE ELECTRIC COMPANY OF AMERICA, Chicago, are among the new and probably largest additions to the supply trade of 1892. Without a dynamo running in this country they have already sold 20 large direct coupled dynamos, which demonstrates the appreciation American buyers feel of their method of building. Their immense factories in Chicago are now nearing completion.

WESTERN BANK NOTE AND ENGRAVING COMPANY, Chicago, have largely increased their already extensive facilities since occupying their own new eight-story building. Their work in stocks and bonds is listable on the New York, Chicago and London stock exchanges, and can be executed in as short time as is possible in such engraving. Their work in letter heads for electric railways is very attractive.

THE JOHNSON COMPANY, Johnstown, Pa., have rolled enough girder rails to connect distant parts of the country could they be all laid on one line. Business has been eminently satisfactory and the outlook is considered good in all railway supplies. Their experiments and developments in electric welding and expansion of continuous rails have been intensely interesting to all street railway people. Brought out a large number of new track devices.

STANDARD RAILWAY SUPPLY COMPANY, Chicago, has enjoyed a constantly increasing business, adding 40 per cent in number of customers. Garson Myers became president and general manager; Walter F. Newberry, secretary and treasurer. Brought out a new style Standard street car stove, and a line of steel gongs. Stoves have been introduced on 50 roads this season including many of the largest in the country. Consider business outlook, never better.

THE MCGUIRE MANUFACTURING COMPANY, Chicago, have found 1892 the busiest one since they began the manufacture of street railway trucks. During the year J. B. Hanna and D. B. Dean joined the concern as general sales agents. Many large individual contracts have been filled and a host of lesser ones from two trucks upward. Manufacturing facilities have been increased and several improvements made in the truck itself.

THE FALLS RIVET & MACHINE COMPANY, Cuyahoga Falls, Ohio, has experienced a very busy and profitable year. Their clutches have been in great demand, especially as railway managers are coming to appreciate the advantage and need of their use. The Chicago office, as well as the St. Louis and New York branches, have all done well, and 1892 marks a banner year with this progressive company.

SMITH OF NEW YORK, as everybody knows, is always up with the times in all lines of lighting apparatus. The contribution to 1892 was two new styles of double center car lamps and a new electric headlight, all of which have received many commendations. The show rooms and offices have been enlarged, and so has the output, to the extent of 25 per cent. Considers the outlook for next year excellent.

TAYLOR ELECTRIC TRUCK COMPANY, Troy, N. Y., was organized March 14, of this year and put upon the market the improved Taylor electric truck. Within three months volume of business compelled an increase of shop and men to double the original size and number. Among large single orders was one for nearly half the trucks for the Brooklyn City railroad. At present shop crowded and outlook excellent.

NEW DEPARTURE BELL, Bristol, Conn., of which John H. Graham & Company, New York, are sale agents, have had all they could do in keeping up with orders for their rotary alarm bell for cable and electric cars. A new feature this year was the overhead nine-inch bell worked by means of a depending cord. This, and the platform bell worked by pressing a button with the foot, have made fine records.

R. D. NUTTALL COMPANY, Allegheny, has experienced the most active year of its existence, having doubled their sales and increased customers 50 per cent. Brought out this year improved rawhide pinions, rawhide gear wheels, new trolley, new trolley wheels and new steel pinions. Factories were destroyed by fire but rebuilt to double former size and capacity in five weeks. Considers 1893 as promising excellent outlook.

THE DETROIT ELECTRICAL WORKS have met with good success in the sale of their Detroit motor, one of which is sufficient to a car, being geared to both axles. Their motors have gone on roads in various parts of the country, and are reported as giving excellent satisfaction. The new factories occupied early in the year were crowded with work and are still busily employed. Louis Myers was appointed Chicago selling agent.

LAMOKIN CAR COMPANY, Philadelphia, have made big progress this year and, with George Pratt as general sales agent have placed their cars in all parts of the west, often against the strongest competition. They have introduced several new features, including the vestibule platform, roof window and steel tie-plates which are used on all their cars. The works have been somewhat enlarged and the plant then kept working to its fullest capacity.

C. E. LOSS, 621 Pullman Building, Chicago, had a large amount of contract work, including 30 miles track construction and part of the overhead work for the Calumet (Chicago) Electric Railway, and 12 miles track and power house for the Hammond, Whiting & East Chicago Electric. At Robey, Ind., near this city, a contract was signed for a mile of track to be completed with 24 hours, and which was successfully performed and turned over for use the next day.

THE GENNET AIR BRAKE COMPANY was reorganized during the year, and has met with the most encouraging success in the introduction of their air brake for cable and electric cars. Their manufacturing facilities have been largely increased, and orders have poured in taxing the works to the utmost capacity. The brake has fully proved all the claims made for it, and the contracts now fully or partly closed call for several hundred sets for early delivery in '93.

GEORGE CUTLER, Chicago, finds he has done a very greatly increased business, although at closer figures than last year. Bought out Pattee lamp-hour recorder (many used as meters with motors in 500-volt circuit), Cutler non-inductive ammeter and voltmeter. Moved offices to larger quarters at 329 Rookery and shop to 313 South Canal street, where capacity was trebled. Among large orders was 400 miles Simplex braided caoutchouc wire for block signals Illinois Central railroad.

J. G. BRILL CAR COMPANY, Philadelphia, have been crowded to the utmost limits of their extensive works for the last ten months. The Brill trucks were named by buyers generally to go under the car bodies. Among large orders was 180 cars for the Chicago City Railway, being the first order for cars placed outside the railways company's own shop in fifteen years. An enormous output has come from the Brill shop, and is scattered not only in all parts of our own country but in foreign lands.

THE J. T. SCHAFER MANUFACTURING COMPANY, Rochester, N. Y., became a stock company January 1 and moved into much larger quarters May 1. Business this year fully double that of last and previous years; more than 100 per cent increase in number of customers. New devices are attachments to hydraulic press for removing and pressing on pinions, gears and armature hubs of electric motors; also screw machine for same work. Considers outlook for street railway supplies most encouraging.

E. SAXTON, the well-known constructing cable engineer, has had a busy year, having finished and turned over the Navy Yard & Georgetown and the Fourteenth street cable lines to the Washington & Georgetown cable road. The Blue Line cable, in Baltimore, is nearly completed. Although pushing the work with great energy, Mr. Saxton has carried out the work in a manner reflecting great credit to himself, and calling forth the highest commendation from the companies with whom he has contracted.

MEAKER MANUFACTURING COMPANY, Chicago, whose excellent fare registers, both portable and stationary, are in nearly every city in the country, have had an increased business this year, and are now getting out a large number needed on Chicago lines during the Fair. Notwithstanding the former excellence of their register, President Meaker effected several improvements this year, on which he had been working three years, and which gives them a machine which "can't be beat."

RAILWAY EQUIPMENT COMPANY, Chicago, have had a large and steady increase in shipments, and of new customers twenty per cent. Increased office and store-rooms and doubled manufacturing facilities. Among the large orders were: Atlantic avenue, Brooklyn; Woodland avenue & West Side, Cleveland; Kansas City Elevated; Cincinnati, Newport & Covington; Cincinnati Street; and North avenue,

Baltimore. Expect a large increase for '93 on account of consolidations and transfers of numerous roads to large and financially strong corporations.

BROWNELL CAR COMPANY, St. Louis, has enjoyed a larger business even than last year and the sales of Accelerator cars have been especially satisfactory, numbering nearly 100 cars. The record made by the accelerators in service in Chicago and elsewhere has elicited the highest possible commendation from managers. Additions are now being made to the works in a new paint shop, which will double the former capacity. Business prospect for '93 is considered very favorable.

THE SPERRY ELECTRIC RAILWAY COMPANY, with general offices at 29 Broadway, New York, has just been organized under the Ohio state laws and will manufacture under the Sperry patents. Their single motor geared to both axles received much attention and favorable comment at the recent convention. Harry P. Barr, recently of the Boston office of the General Electric Company, is secretary and general manager, and the new candidate for railway honors has already commenced an active and promising career.

MCINTOSH, SEYMOUR & COMPANY, Auburn, N. Y., have operated their works twenty-three hours daily, using three shifts of men. Their contribution of electric railway engines has been extremely large; have increased their machinery one-third; present orders sufficient to keep the works busy for five months. Their selling agents, Sargent & Lundy Chicago; J. A. Grant & Company, Boston; and the Pierce & Miller Engineering Company, New York, have all enjoyed a large and satisfactory trade in their respective territories.

THE BALL ENGINE COMPANY have operated day and night, except July and August, when no night work was attempted. Their increased output over '91 is 50 per cent. They have brought out new sizes of engines and improved all sizes. Built a shop addition 100x100, are now building an addition to foundry; erecting new boiler house and installing new boilers. Also constructed a series of testing blocks for large engines. A very large portion of their business is railway engines which go to all parts of the country.

THE LEWIS & FOWLER MANUFACTURING COMPANY, Brooklyn, whose business in the manufacture and sale of street railway supplies is one of the heaviest in the world, have had their factories crowded with work, even to such an extent as to be obliged to call in extra help. Their improvements in car building, electric sweepers and snow plows have been numerous. During the year Wm. Fowler, president, retired from the company, having sold out his interest. The Lewis & Fowler Girder Rail Company have also had a prosperous year, and done an unusual amount of special work.

THE SHORT ELECTRIC RAILWAY COMPANY, Cleveland, has increased its customers 20 per cent. They brought out a 6-pole-gearless motor, and a 39 and 50-pole railway generator. Manufacturing facilities were increased 25 per cent. Among foreign orders was a complete railway equipment for Bangkok, Siam. Official roster was changed by the resignation of E. E. Higgins, general manager, and election of J. Potter, president; S. H. Short, vice president; and Wm. Hazelton, 3rd, assistant general manager. Their outlook was never more encouraging, with the certain prospect of doubling their business in '93.

BALL & WOOD COMPANY, New York, has found the year just closing of special interest, as at its commencement they placed on the market their new automatic cut-off engine. So well was it received, the shops were worked night and day throughout the year. Improvements include a new low pressure valve for the compound engines; a new type of iron foundation box for their tandem engines and new method of casting hubs of wheels and securing them to shaft. Facilities were considerably increased. Business was not affected by political agitation, and do not anticipate the result of the election will be noticed in their line of railway supplies.

SHULTZ BELTING COMPANY, St. Louis, had to do a very large business to raise the record of last year, but report good sales, increased buyers, and splendid satisfaction rendered in railway and lighting service. Their trade abroad has been extremely satisfactory including shipments to Russia, Belgium, Sweden and England. As President Shultz says—the country is in good shape, money plenty and while some are disappointed at the results of the election, still when we sift it all down, we find we are all one great people, all interested in the prosperity of each other and our country. Things will go on as usual and we shall continue to prosper in the future as we done in the past.

PECKHAM MOTOR TRUCK & WHEEL COMPANY, Kingston, N. Y., under the executive management and push of president Peckham, has done much in the introduction of new improvements in electric motor trucks. Mr. Peckham has constantly improved his cantilever extension side frame truck until it is declared absolutely without oscillation and is one of the strongest, easiest riding and economical trucks made. Orders have been received from companies large and small, which has greatly increased the sales over last year. The radial gear and radial motor hangers prevent stain in rounding curves, and wearing parts are constructed with hot rivets. Mr. Peckham considers the coming year a most promising one.

THE ELECTRICAL SUPPLY COMPANY, Chicago, have added very largely to their list of railway customers, and have increased their sales in this department far in excess of last year. Among the new devices brought out were: Wirt electric meter; Wood's pole ratchet; Acorn sunbeam lamp; Stanley transformer; Shield brand wires; Habirshaw rubber covered wire ("best on earth;") Crocker-Wheeler motors and a long list quite as familiar to the reader. The policy of the company in dealing with railway managers has been such as to win their esteem, while the prompt shipments and excellent quality of the goods has done the rest. Manager Terry considers the outlook for street railway supplies in 1893 as very promising.

THE STIRLING COMPANY, Chicago, in this its second year, sold a total of 50,000 horse-power, being an increase of 100 per cent over last year. Changes and improvements were made in the boiler, but the principle remains unchanged. New foundry costing \$10,000 will be ready January, 15, '93; also added bending machine with 18-foot rolls, pneumatic caulking tools, etc. Largest single order was seven boilers, aggregating 2,000 horse-power, for the Minneapolis electric railway. Railway and lighting orders fully thirty-five per cent of output. In quick shipments a telegraph order from the U. S. Salt Company, Cleveland, for 600 horse-power boiler, with mechanical stokers, was built, installed and ready for steam, including brickwork and stacks, in thirty days from receipt of order. Said to be the quickest time on record.

THE GENERAL ELECTRIC COMPANY, of which Thos. P. Bailey is the popular manager of the railway department of the Chicago office, have had a most phenomenal year, increasing its customers fully 50 per cent. A large number of new and valuable appliances have been put on the market, and several additional factories and warehouses have been erected to meet the increased demand for equipment and supplies. A feature of the year has been the installation of a large number of electric lines connecting towns and cities for transportation of mail, freight and express in addition to passengers. Their city installations have extended over all the country. Mr. Bailey predicts a large displacement of steam on certain lines of railway the coming year, and considers the outlook most encouraging.

WALKER MANUFACTURING COMPANY, Cleveland, doubled their output and increased their customers to the extent of 40 per cent. There has been great demand for the Walker differential cable drum, at one time orders being entered for 18 sets. The friction clutch for cable drums has also been in strong demand; several of 1,200 horse power were built. Boiler capacity in shops increased to 900 horse-power. Among large cable orders were: portions of winding machinery for Broadway and Seventh Avenue, New York; Van Buren Street and Blue Island Avenue stations, Chicago; complete winding machinery for Baltimore Passenger Railway; and new machinery for the Washington Street plant, Chicago. Among quick work was the shipment of differential drum to Chicago one week after order was received; and the removal of 50 tons old machinery and its replacement by new without any interference of traffic of the road.

THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY have had a truly phenomenal year. Since their first railway motor in 1890 they have equipped 200 roads. Additions to Pittsburg and Newark shops proved insufficient and a large new factory was erected at Allegheny, considered one of the most complete in the country. Their single-reduction motors and multi-polar generators were highly perfected early in the year, and are making most satisfactory records. Among large buyers were the Philadelphia Traction Company; Atlantic Avenue Passenger Railway, Brooklyn; Chicago City Railway; South Chicago City Railway; Woodland & West Side, Cleveland; Birmingham & Pleasant Valley, Pittsburg; and Rochester, N. Y. Improvements in apparatus have reduced repairs to a minimum. Business of 1892 far in excess of any previous year.

WESTINGHOUSE, CHURCH, KERR & COMPANY have fully deserved the increase of 25 per cent in business over last year and the correspondingly large addition in customers. Developments were the direct-connected generator for railway work, and the new system of mechanical draft, described elsewhere in this issue, in place of chimney stacks. Shops were enlarged and now occupy all available land. Among large railway orders were ten 330 horse-power engines for Minneapolis; seven for Brooklyn and Newton; complete plants for New Haven, Camden, Williamsport, Baltimore and many other cities. The Boston office filled a rush order for a complete 500 horse-power plant for the New Haven & West Haven Street Railway. In less than ninety days the entire building was planned, erected and equipped with direct connected engines and generators and all electrical apparatus, boilers, mechanical draft and other accessories. Ground broken April 8; steam raised July 1; plant operated full capacity July 2.

CAUGHT ON THE RUSH TRIP.

American Street Railway Association.

D. F. LONGSTREET, PRESIDENT, Denver, Col.
 DR. A. EVERETT, FIRST VICE-PRESIDENT, Cleveland, O.
 JOEL HURT, SECOND VICE-PRESIDENT, Atlanta, Ga.
 W. WORTH BEAN, THIRD VICE-PRESIDENT, St. Joseph, Mich.
 WM. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn, N. Y.
 EXECUTIVE COMMITTEE—THE PRESIDENT, VICE-PRESIDENTS, and JOHN G. HOLMES, Pittsburg, Pa.; J. D. CREMINS, New York City; THOS. MINARY, Louisville, Ky.; JAS. R. CRAPMAN, Grand Rapids Mich., and BENJ. E. CHARLTON, Hamilton, Ont.
 Next meeting, Exposition Building, Milwaukee, third Wednesday in October.

Massachusetts Street Railway Association.

President, CHARLES B. PRATT, Salem; Vice-presidents, H. M. WHITNEY, Boston, AMOS F. BREED, Lynn, FRANK S. STEVENS; Secretary and Treasurer, J. H. EATON, Lawrence.
 Meets first Wednesday of each month.

Ohio State Tramway Association.

President A. E. LANG, Toledo; Vice-president, W. J. KELLY, Columbus; Secretary and Treasurer, J. B. HANNA, Cleveland; Chairman Executive Committee, W. A. LYNCH, Canton.
 Meets at Cincinnati on the fourth Wednesday in September, 1893.

The Street Railway Association of the State of New Jersey.

President, JOHN H. BONN, Hoboken; Vice-president, THOS. C. BARR, Newark, Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee, OFFICERS and C. B. THURSTON, Jersey City; H. ROMAINE, Paterson; LEWIS PERLINE, JR., Trenton.

The Street Railway Association of the State of New York.

C. DENSMORE WYMAN, PRESIDENT, New York.
 D. B. HASBROUCK, FIRST VICE-PRESIDENT, New York.
 JAS. A. POWERS, SECOND VICE-PRESIDENT, Glen Falls.
 W. J. RICHARDSON, SECRETARY AND TREASURER, Brooklyn.
 EXECUTIVE COMMITTEE.—D. F. LEWIS, Brooklyn; JOHN N. BEURLEY, Rochester.
 J. W. McNAMARA, Albany.
 The next meeting will be held at Rochester, September 19, 1893.

Alabama.

MOBILE, ALA.—Mobile will have rapid transit by December 5, and electric light by December 1.

MOBILE, ALA.—Mobile Street Railway Company and all property bought by Fidelity Trust and Safe Company of Louisville, Ky., for \$225,000.

Arizona.

PHOENIX, ARIZ.—The Northern Addition Company organized to boom land and will build a street railway. Address company.

California.

MONTEREY, CAL.—Juan Malarin has sold the Monterey and Pacific Grove Street Railway to the Cornell-Hopkins Company, of San Francisco, for \$75,000. The new company applies for four miles of new track.

SACRAMENTO, CAL.—The Sacramento Electric Light and Power Company has been incorporated by Albert Gallatin, A. J. Ralston, Horatio P. Livermore, and Joshua Barker. The capital stock is \$1,500,000.

SAN FRANCISCO, CAL.—Robert Sherwood, Henry Epstein, Jas. D. Byrnes, Chas. Goodall, et al., have had their cable road franchise recommended for passage.

SAN FRANCISCO.—Five franchises before council. San Francisco & West Shore application passed to print; also that of W. W. Connor, et al. for 100 streets; D. H. Austin, New York, is interested. City railroad wishes to extend. W. H. Fowler, et al., application passes to print. Market street cable to extend.

STOCKTON, CAL.—The California Electric Railway Company, of Stockton, has filed papers. Capital stock, \$1,000,000; directors: H. J. Corcoran, E. R. Hedges, I. S. Bostwick, Joseph Fyfe and S. D. Woods.

The road is to be run from the city of Stockton, with intermediary branches to Lodi, to the town of Woodbridge, and to Wallace, Calaveras county. The estimated length of the road and its branches is thirty-two miles. The company proposes to do a general freight and passenger business, deal in real estate, etc.

Canada.

HALIFAX, NOVA SCOTIA.—John White, of New York, and other New York men, have bought the plant of the Halifax Motor and Illuminating Company for \$200,000. They will electrify the street railway.

HAMILTON, ONT.—W. O. Sealey et al., have obtained consent of Guelph aldermen for the Guelph Electric Railway.

WINDSOR, ONTARIO.—Manager Boomer, of the Windsor & Walkerville Horse Car Line, has completed arrangements with some Detroit capitalists by which his road will be extended down the river to the Michigan Central and Canadian Pacific depots. On the Walkerville end the line will be extended a short distance, so as to reach the station of the Lake Erie & Detroit River Railroad.

CALGARY, N. W. T.—A company is applying to the Dominion Government for incorporation for the purpose of constructing a street railway in this town.

LACHINE, QUE.—The municipal council have granted to Mr. R. Bickerdike the exclusive privilege for twenty years of an electric railway. It is to be in operation not later than 1894, and will connect with the system of the Montreal Street Railway Company.

NOIRE-DAME DE GRACES, QUE.—The municipal council is considering the question of the construction of an electric railway round the Mount-Royal mountain. Offers have been received from Messrs. Conriveau, Bickerdike, Williamson and Yuile.

THE Montreal Street Railway Company have tried their new electrical street sweepers. The trial was a success and showed how easy it will be for the company to take care of the snow during the coming winter. The trial was made on St. Catherine street under the superintendence of H. Brenner, the electrical engineer. It certainly proved a success. The sweepers, without passengers, weighs nine tons and has two rotary brushes of great power with brushes in front of each wheel to keep the snow or dirt from the track.

Chicago.

CHICAGO.—The Chicago City Railway will hold a meeting of stockholders Jan. 16 to consider \$2,000,000 increase of stock.

HAZELTON Tripod Boiler Company assigns. Assets, \$50,000; liabilities, \$25,000; slow collections the cause; will reorganize.

The Desplaines Electric Railway Company, Chicago, capital stock \$2,000,000; incorporators, W. T. Griffith, Sam A. Jacobs and F. E. Brady.

CHICAGO.—Pennington & Fuller Electric Company, Chicago Heights; capital stock \$1,500,000; incorporators, J. L. McKittrick, J. A. Fuller and Lutellus Smith.

CHICAGO.—Incorporated: American Railway Construction Company, Chicago; capital stock, \$200,000. Incorporators: A. S. Littlefield, E. F. Carry and Edward A. Meysenburg.

CHICAGO.—Council has passed ordinance granting right of way to the Chicago, Blue Island and Harvey Railway Company for a street way, wires, and electric conductors in Burr Oak avenue, from the east boundary line of the village of Blue Island to Ashland avenue, thence on Ashland avenue from Burr Oak avenue to One Hundred and Nineteenth street, also on One Hundred and Nineteenth street from the east boundary line of the village of Blue Island and on other streets and roads in that section.

Colorado.

DENVER, COL.—The Tramway will extend on Gaylord or York street to Columbine.

DENVER, COLO.—The Globeville & Denver horse line is proposed by John and Rollo Read. Franchise pending.

DENVER, COL.—Geo. R. Holt, of New York, president of the City Cable is in the city, and reports are that the City Cable is to be absorbed by the Tramway Company. It is claimed that the deal is already closed and will bring the tramways to the heart of the city.

DENVER, COL.—A movement headed by property owners, Judge C. S. Holley, C. R. Fish, H. A. Brown, G. B. Allen, J. E. Wannemaker and Thos. Ward, all of North Golden, is on foot to run an electric from Berkeley to Golden. This route is the best suburban one near here, and a real estate syndicate will probably be formed.

Connecticut.

BRIDGEPORT, CONN.—The Bridgeport Traction Company have applied for trolley rights for suburban lines. Colonel Heft, James H. Beardsley, Henry Setzer, Jr., Howard Scribner, L. F. Curtis, and Bradley Nichols & Sons. Capital, \$500,000.

ENFIELD, CONN.—H. C. and L. B. Douglass of Windsor Locks, L. A. Upton and W. Goudy of Thompsonville, and David Henry of Hartford are applicants for charter to build an electric from the north boundary of Enfield through Enfield, East Windsor and South Windsor.

NEW BRITAIN, CONN.—The contract for relaying the track for an electric, and to equip the electric to Plainville has been let Wm. G. Smith, of Waterbury.

Georgia.

ATLANTA, GA.—The new Atlanta City Street Railway Company has been duly organized by Messrs. W. I. Zachry, Aaron Haas, J. B. Zachry, of Fulton; and J. R. Mell, and Clyde L. Brooks, of DeKalb. Stock, \$25,000; begins work immediately.

MACON, GA.—The Metropolitan has gone into the hands of the Macon Consolidated. E. E. Winters becomes general manager of the roads. The deal was forced by the General Electric, which now controls the situation. Road is six miles long; owns own plant.

Illinois.

DECATUR, ILL.—R. O. Rosen has finished plans for a new electric light power house. The building will be one story high, 82x40.

MARSEILLES, ILL.—The Street Railway Company has changed its charter to allow electricity. Deal still on paper.

STIRLING, ILL.—Organized; The Stirling and Rock Falls Interurban Railway Company, Stirling; capital stock, \$100,000; incorporators, E. W. Jackson, Sheridan Blacke and Robert N. Newton.

Indiana.

ALEXANDRIA, IND.—The Alexandria council is hearing a proposition from the Alexandria Land Company for an electric street railway system of ten or twelve miles. Franchise has been let and the next thing is to make it a go. Center natural gas belt.

GREENCASTLE, IND.—The Street Railway Company will build the new electric line themselves.

INDIANAPOLIS, IND.—Incorporation of the South Chicago City Railway Company; capital stock, \$200,000. Directors, V. S. Kennedy, Dwight F. Cameron and O. S. Gaither.

MICHIGAN CITY, IND.—The directors of the Lake Cities Company are: A. N. Hatch, W. C. Nichols, H. T. Hart, E. McDevitt and J. C. Devoe.

India.

CEYLON.—The chairman of the municipal council of Colombo will receive proposals for the construction of tramways, within the city, until January 31, 1893. Walker Bros., 72 Bishopsgate street, London, England, will supply any information maps or drafts of concessions.

Iowa.

TAMA, IA.—Tama and Toledo, two miles apart, wish an electric railway. Population of 7,000 to draw from.

Kansas.

ATCHISON, KAN.—The Atchison Electric Motor and Street Railway Company has elected officers as follows: A. J. Harwi, president; J. C. Fox, vice-president; A. W. Simpson, secretary; J. T. Hersey, treasurer. Stock subscription books were opened.

LEAVENWORTH, KAN.—New survey begun for the Pneumatic. H. A. Keefer, of Kansas City, will probably get contract for rails. A. B. Nettleton, will come back shortly with Mr. McNair, a capitalist of Warsaw, N. Y.

WICHITA, KAN.—An attempt to sell the electric railway by the sheriff on a \$344,000 mortgage was enjoined by stockholders who wish a receiver.

Kentucky.

COVINGTON, KY.—The Rosedale ordinance has passed the council. It is reported that equipment will be increased on existing lines.

NEWPORT, KY.—The electric railroad to the Evergreen Cemetery via the Alexandria pike, is a foregone conclusion, the right of way having been secured, the consideration being \$6,000.

RICHMOND, KY.—Ed. Rowland is the receiver of the street railway company.

Louisiana.

NEW ORLEANS.—W. J. Henning, of New York, has placed \$300,000 of New Orleans certificates with T. J. Minary, J. B. Speed, et al. of Louisville. It means a consolidation and Geo. Denegre of the eastern syndicate is also in the city.

Maine.

YARMOUTH, ME.—A petition is going the rounds for an electric to Portland.

Maryland.

BALTIMORE, MD.—The new light company will be controlled by the Traction company. Widener, Elkins, Hambleton, J. F. Morrison and R. P. McDonald, of the old Ft. Wayne are at the head of the concern. The company aims to consolidate and own the lighting interests.

Massachusetts.

HAVERHILL, MASS.—It is stated on good authority that the Haverhill and Amesbury Street Railway Company will soon apply for a location around Kenozia Lake and passing Tilton's Corner, through Groveland street to Water street, with a loop.

SPRINGFIELD, MASS.—The Danbury and State Line Railway has been organized. Directors all Danbury men except John Whalen, Edward Smith, Henry Blake, of New York. Probably steam line.

WORCESTER, MASS.—The Philadelphia syndicate has bought the 28 miles of road here. E. J. Moore & Co., of Philadelphia, handled the deal. The trolley will be introduced on the new line.

Michigan.

BATTLE CREEK, MICH.—The Street Railway Company has a new management: E. C. Hinman, president; F. J. Wilson, secretary and general manager. New schedule and better service.

DETROIT, MICH.—The Detroit Citizens' contracts for a Westinghouse, Church, Kerr & Company engine, 330-horse-power compound and two boilers.

PORT HURON, MICH.—E. J. Schoolcraft and W. L. Jenks have secured franchise in Port Huron township. Work to begin in a few weeks.

Minnesota.

ST. PAUL, MINN.—Assembly still ordering street railway lines. New line from Fairmount avenue and St. Albans street to Minnehaha.

ST. PAUL.—A. H. Wilder, Gov. Merriam, D. C. Shepard and others have conferred with Henry Villard, and it is rumored that the result will be a new electric to Minneapolis over the Northern Pacific tracks. It is also said that the meeting will result in the reorganization of the St. Paul Electric Light and Power Company.

Mississippi.

VICKSBURG, MISS.—The electric street railroad franchise granted last September to C. R. McFarland, of this city, and E. F. Fuller, of New York, has been repealed by the city council and re-enacted in favor of McFarland solely.

Missouri.

SPRINGFIELD, MO.—The Southwest Missouri Electric Railway Company, mentioned some months ago, has contracted with the Dunlap Construction Company for the electrical equipment of the Webb City & Carterville road.

ST. LOUIS, MO.—The Fourth Street and Arsenal Railway will change its power to electricity. The People's has gained an extension of time on its franchise. The City Central will make extensions, loops and connections.

ST. LOUIS, MO.—The Heman Construction Company contracts with the St. Louis, Webster & Kirkwood Railway Company for a first-class electric. First mortgage bonds issued to \$200,000. Road to be opened in six months.

Nebraska.

OMAHA, NEB.—The street railway officers say that a new line will probably be equipped before winter, to start at the intersection of Twenty-fourth and Lake.

OMAHA, NEB.—The Dundee Place Electric Line was levied upon on an execution issued on a judgment rendered in the case of the Merchant's National Bank, of Kansas City, against the Metropolitan Cable Company for \$40,000.

New Hampshire.

MANCHESTER, N. H.—General Chas. Williams now owns the Street Railway Company. The road will now be operated by electricity. Some supplies already bought.

SALEM DEPOT, N. H.—Shaw & Ferguson, of the Haverhill Electric, say that they will put in to connect several villages around here. Charter will be asked of the next legislature. The Haverhill and Amesbury will also ask for franchise in Riverside.

New Jersey.

CAPE MAY, N. J.—Cape May and Sewall's Point road sold for \$25,000 at sheriff's sale, to the bond holders of the road.

ELIZABETH, N. J.—The Elizabeth and Plainfield Street Railway Company; capital stock, \$100,000. Incorporators, James B. McGiffert, Wm. H. Peddle, J. H. Vail, Luther M. Whitaker and others. The road will be seven miles in length, will be operated by electricity, and will run from Elizabeth to Westfield.

ORANGE, N. J.—Watson Whittlesey is scheming to connect Orange and Mountclair by an electric. New Jersey Traction Company stands ready to purchase the franchise.

New Mexico.

CLAYTON, N. M.—Electric Light Company organized by E. W. Fox, G. A. Bushnell, J. B. Herron, H. C. Pickles, J. C. Hill, W. W. Boyle, S. T. North and R. P. Erviene, all local capitalists. Will run by water power.

New York.

BROOKLYN, N. Y.—The Brooklyn City will apply Dec. 19 for trolley rights in Newtown.

BROOKLYN, N. Y.—Articles of association of the Sheepshead Bay & Coney Island Railway Company are filed. Directors, Alfred Hodges, Conrad Steubenford, Jas. T. Tighe, E. F. Keane, et al.

BROOKLYN, N. Y.—W. A. Fowler, of Lewis & Fowler Manufacturing Co., and the L. & F. Girder Rail Company, has sold out, on account of ill health. D. F. Lewis is now head of both organizations.

BROOKLYN, N. Y.—Incorporated: The Kings County Electric Railway Company; capital, \$625,000, for constructing about sixteen miles of street surface road in Brooklyn. The principal office of the company will be at New Ulrecht. The directors are: James F. Casey, Albany; Michael Bergen, Paterson, N. Y.; Frank O'Rourke, George J. Bryan, George Damen, James W. Knox and P. H. Flynn, of Brooklyn; Joseph F. Sullivan and James Jackson, of New York City.

BUFFALO, N. Y.—The Niagara Car Wheel Company is organized at \$110,000. The principal office is here. Incorporators, G. W. Miller and Jas. F. Chard, Buffalo, and Chester Griswold, of New York.

CORNING, N. Y.—The Citizens' Electric Railway Company has incorporated; capital stock \$100,000; held by J. A. Seeley, B. St. J. Hoyt, C. O. Baker, Jr., and Fred Smith, of New York. To build 6 miles from Gibson to Painted Post.

HERKIMER, N. Y.—M. D. McCullen and Geo. W. Van Francken of Schenectady are trying to unite the Herkimer & Mohawk, the Mohawk & Ilion and the Frankfort & Ilion roads. They say they represent a syndicate.

NEW YORK CITY.—W. J. Richardson admits the sale of the Atlantic avenue to the syndicate. All franchises were bought, as well as track now laid, for \$3,000,000, on a basis of \$125 per \$50 share. E. W. Clark and J. and W. Seligman handled the deal.

POUGHKEEPSIE, N. Y.—The Poughkeepsie & Wappinger Falls Street Surface Railroad Company has been incorporated with a capital of \$100,000 for the purpose of constructing a road about ten miles in length, running from Market and Main streets in Poughkeepsie to Wappinger Falls. Branches to the Hudson River Driving Park and Vassar College will also be constructed. The directors are John P. Wilson, J. L. Williams, James W. Hinckley, Thomas J. Swift, Peter B. Hoyt, Frederick Barnard, L. H. Vail and T. F. Lawler, of Poughkeepsie; and H. F. Walcott, of Fishkill.

ROME, N. Y.—The subscribers for the purchase of the street railway have raised \$15,000. About \$6,000 more needed. The new company will re-equip and put in extensions. J. S. Wardwell, W. J. Cramond and G. W. Day are heavily interested.

UTICA, N. Y.—Judge Kennedy has granted an order allowing the receiver of the Utica Belt Line to purchase three new generators for the power house.

Ohio.

AKRON, O.—The Akron Street Railway Company will enlarge its powers to allow the business of supplying light and power for other businesses. This is in direct opposition to the Akron Light, Heat and Power Company.

CADIZ, O.—J. D. Ripley, son-in-law of Sidney Dillon, of New York, is promoting the Cadiz-Unionvale line, four miles electric. This gives the W. & L. E. entrance into Cadiz.

COLUMBUS, O.—Organized: The Columbus, Grand View & Suburban Street Railway Company; incorporators, F. H. Croughton, A. S. Heffner, Ed Denmead, J. Coultas; capital stock, \$50,000. Passengers and freight will be carried and the line will run to the named suburbs and the quarries.

DELAWARE, O.—The new electric here is open for traffic. J. K. Newcomer, president.

ELYRIA, O.—A valuable franchise is here ready for an applicant Electricity only.

NORWALK, O.—Citizens have raised the bonus for the Sandusky, Milan & Huron to touch here. Road to be completed by June 1, 1893.

SPRINGFIELD, O.—The latest scheme is an electric railway from Cleveland to Cincinnati. G. M. Gest, of New York, is through the State for right of way, and claims that the road can be operated cheaply by water power from the Mad River and the Erie canal.

TROY, O.—Theodore Sullivan, J. C. Barry, J. W. Morris, C. T. Ziegenfelder and Geo. W. Gates compose a company to build a street railway here. Capital stock, \$20,000. All are said to be responsible men.

WARRENSBURG, O.—People here want either the Delaware or Columbus road to extend to this place. Magnetic springs and summer resort the attraction.

Oklahoma.

GUTHRIE, OKLA.—W. D. Ford, of Pittsburg, Kas., says S. W. Lambert is buying material for the street railway; cars bought.

Oregon.

PORTLAND, ORE.—The Willburg & Sellwood electric station burned. Loss \$4,500 on lighting plant and \$1,000 on building.

PORTLAND, OREGON.—Surveyors are laying out the route for a new electric road to Portland Heights, but they refuse to say who is the principal in the matter. It is strongly suspected that a local electric company is at the bottom of the matter.

SALEM, ORE.—The Capital City Railway Company has begun extensions on State street, to connect the depot and state's prison. The new line to the asylum is completed.

Pennsylvania.

ASHLAND, PA.—Incorporated: The Ashland, Locustdale & Centralia Electric Railway Company, to connect these towns in Schuylkill County; capital, \$60,000; incorporators, J. F. Bailey, C. H. Cofrode, F. E. Bailey, all of Philadelphia.

BRISTOL, PA.—Incorporated: The Bristol and Newtown Street Railway Company, of Bucks county. The line will run through the streets of and between Bristol and Newtown, passing through Hulmeville, with a branch to Bristol Cemetery. The capital is \$100,000, and the incorporators are A. C. Milliken, Pottsville; George F. Peirson, Charles H. Davis, Edwin Chamberlain, Philadelphia, and A. W. Gilkeson, Bristol.

HAZLETON, PA.—The following road has been organized. All the parties mentioned are from Wilkes Barre: The Lehigh Traction Company, of Hazleton; capital, \$10,000. The directors are: D. L. Patrick, H. A. Fuller, D. A. Fell, Jr., G. R. Bedford and L. B. Landnesser.

LEBANON, PA.—Superintendent Conrad is making arrangements for snow plows. The Lebanon & Meyerstown will not begin construction this fall.

MCKEENSPORT, PA.—Jenny Lind street is to be double tracked by the Citizens' Company.

NEW CASTLE, PA.—Parties yet unknown, from Pittsburg have incorporated the Mahoning Street Railway Company from here to Mahoning Rights in both towns have been granted.

PHILADELPHIA, PA.—There is some talk of the managers of the Chelton Avenue Railway line extending its tracks on the east side of Germantown to Stenton avenue, which would greatly benefit the people residing in the large settlement of Somerville. The cars now run as far as Chew street. The contract has been given out for an addition to the car stable on Rittenhouse street, in order to accommodate more horses.

REYNOLDSVILLE, PA.—Chartered: The Reynoldsville & Rathmel Electric Railway Company, of Jefferson County; capital, \$25,000.

SCRANTON, PA.—H. H. Archer, of Wilmington, is the new manager of the People's.

SCRANTON, PA.—The Scranton Traction Co. absorbs the People's; capital new company, \$1,000,000. E. E. Dennister, Philadelphia, president; C. F. Stephens, Philadelphia, secretary and treasurer; H. H. Archer, resident manager. Large improvements contemplated.

South Carolina.

CHARLESTON, S. C.—Railway Company elects officers for the ensuing year: John S. Riggs, president; Frank F. Whilden, secretary and Treasurer.

Tennessee.

CHATTANOOGA, TENN.—Injunction dissolved and the Harrison Avenue Electric will now build the line planned two years ago to Sherman Heights.

CHATTANOOGA, TENN.—Lyman Allen, of the East Chattanooga Land Co., is about to close an electric railway deal with southern parties; \$75,000 promised for the line; to be finished next June.

Texas.

SAN ANTONIO, TEXAS.—C. E. Harris, the purchaser of the Alamo line is here and says the syndicate which he represents will make extensions and improvements. He says he represents heavy capitalists.

Washington.

BALLARD, WASH.—The Consolidated has been granted its ordinance.

TACOMA, WASH.—The Rapid Transit Street Car Company is organized; capital, \$700,000; incorporators, W. R. Rust, H. C. Clement, S. C. Slaughter, F. O. Meade, G. H. Wheeler, Judge Frank Allyn.

Wisconsin.

MADISON, WIS.—The City Railway has gone into the hands of Geo. A. Cooke, Henry C. Welsh and F. W. Honre of Chicago with a party of Cleveland, O., men. Extension to suburbs in spring.

MILWAUKEE, WIS.—R. Lowenbach, C. M. Sanger and Chas Lamfrom, of Chicago, have bought land at Hales' Corners and the Janesville plankroad. They will probably put in a dummy line and make a summer resort out of the land.

Wyoming.

GREEN RIVER, WYO.—The Green River Electric Light & Power Company has been incorporated and will supply that town with a regular electric system. Its capital stock is specified at \$10,000, divided into 100 shares at the par value of \$100 each. The trustees are G. W. Edwards, A. Kendal, Henry Franklin, T. S. Taliaferro, Jr., and T. J. Wyche.

Map of the United States.

A large handsome map of the United States, mounted and suitable for office or home use, is issued by the Burlington Route. Copies will be mailed to any address on receipt of fifteen cents in postage, by P. S. Eustice, Gen'l Pass. Agent, C. B. & Q. R. R., Chicago, Ill.

Canadian Excursions via Wabash Railroad.

The Wabash Railroad, in connection with the Canadian Pacific and Grand Trunk from Detroit, will run a series of cheap Holiday excursions from Chicago to Canadian points, leaving Chicago December 20, 21 and 22. Tickets will be good returning until January 10, 1893.

For railroad and sleeping car tickets, and full information, apply at City Ticket Office, 201 Clark St., or write F. A. Palmer, Asst. Gen. Pass. Agt., Chicago.

PERSONAL.

GEN. H. HAUPT, St. Paul, was a welcome visitor at the REVIEW office.

J. E. JEFFRIES, manager of the Elwood, Ind., railway, was a recent caller.

CARL K. MACFADDEN has joined forces with Taylor, Goodhue & Ames, Chicago.

GEO. R. PAXTON, of the Washington, Pa., Carbon Company, was in town recently.

C. V. DEYOUNG, the energetic travelling representative of the American Car Company, St. Louis, paid us a call last week.

C. BAYLISS, superintendent electric railway, West Superior, called at our office on his way to Massilon, O., where he is now visiting.

WM. HAZELTON, 3rd, acting general manager of the Short Electric Railway Company, Cleveland, honored us with an enjoyable visit.

W. J. RICHARDSON, secretary of the American Street Railway Association, spent several days in and around Chicago, after the meeting of the executive committee.

JAMES MCNAUHER, JR., treasurer of the Pittsburg Steel Hollow Ware Company, visited Chicago on his recent successful western trip, and favored the REVIEW with a pleasant call.

H. MC L. HARDING, manager of the New York office of Westinghouse Electric & Manufacturing Company, dropped in to see our new quarters, while passing through the city a few days since.

W. WORTH BEAN, St. Joe; Thos. Minary, Louisville; B. E. Charlton Hamilton, Ont., members of the Executive Committee, made the REVIEW a delightful call while returning from the Milwaukee meeting.

D. H. OGDEN, who has been the efficient business manager of the Western Electrician, has resigned, to become western manager of the Electrical World, in which new relation we wish him all possible success.

CHARLES HATHAWAY, of Cleveland, is a successful hunter as well as veteran street railway manager. His recent trip to Georgian Bay resulted in a big supply of venison for his friends at the Hollenden, where Mr. Hathaway resides.

WM. P. WILLIAMS, Chicago manager of the Vose Spring Company, was married December 7, at Glenwood, Iowa, to Miss Grace Greenwood Jackson. Mr. and Mrs. Williams will be at home, 4357 Berkeley avenue, after January 1. We join with the many friends in hearty congratulations.

FRED. H. DELAND, who for so long and so ably has been the western manager of the Electrical World, has resigned, and will soon issue the "World's Fair Electrical Engineering," an illustrated monthly, same size as the Century. Mr. DeLand is a bright and interesting writer, who makes a success of everything he undertakes.

D. F. LONGSTREET, Denver, President of the American Street Railway Association, made the REVIEW a pleasant call, and states the convention of '93 will far outstrip in magnitude and interest any ever held. Mr. Longstreet is a prodigious worker, and as father of the association, takes, if possible, greater interest this year than ever.

AN erroneous statement has appeared in some papers, that Geo. H. Babcock succeeds Babcock & Wilcox, as sole proprietor. The error is due to mistaking the winding up of the old business of Babcock & Wilcox, for the affairs of the Babcock & Wilcox Company, the latter being an incorporated company in which both gentlemen mentioned are stockholders.

J. R. STERLING, secretary of the Citizens Street Railway, Detroit, was a recent caller at the REVIEW office, and brings encouraging reports of the progress of construction work on his line. The company is especially fortunate in the services of Mr Sterling who, aside from being one of the most thorough and progressive street railway men in the fraternity is a Detroitier from boyhood up, and fully in touch with the needs and advance of that busy and beautiful city.

EDWARD E. HIGGINS, so well and pleasantly known to the street railway fraternity from his long and close connection with electric railway interests, has resigned his position as general manager of the Short Electric Railway Company, to enter business for himself. Mr. Higgins has opened an elegant office in the Mills Building, New York, as street railway and financial counsel, and with his long experience and ability cannot fail to make a splendid success in his chosen field, and render valuable service to any desiring reliable opinions on railway matters.

World's Fair Albums Given Away by the C., H. & D. "The World's Fair Route" From Cincinnati.

A magnificent album of World's Fair views has been published by the C. H. & D., which will be sent to any address on receipt of 10 cents in stamps. The Cincinnati, Hamilton & Dayton, in connection with the Monon Route, is the only line running Pullman perfected safety vestibuled trains with dining cars from Cincinnati to Chicago. The "Velvet" trains of the C. H. & D. are admittedly the "Finest on Earth," and the line is a representative "World's Fair Route." For tickets, rates, etc., address any C. H. & D. agent. To get an album send your address with ten cents in stamps to E. O. McCormick, G. P. & T. Agt., Cincinnati, O.

It is said that the St. Louis employes are investing considerable money in street railway bonds.

THE North Chicago Company has now a right to run the Belgian motor.

Abraham Lincoln

When leaving his home at Springfield, Ill., to be inaugurated President of the United States, made a farewell address to his old friends and neighbors, in which he said, "NEIGHBORS GIVE YOUR BOYS A CHANCE." These words come with as much force to day as they did thirty years ago.

How give them this chance?

Up in the Northwest is a great empire waiting for young, and sturdy fellows to come and develop it and "grow up with the country." All over this land are the young fellows, the boys that Lincoln referred to seeking to better their condition and get on in life.

Here is their chance!

The country referred to lies along the Northern Pacific R. R. Here you can find almost anything you want. In Minnesota and in the Red River Valley of North Dakota, the finest of prairie lands fitted for wheat and grain, or as well as for diversified farming. In Western North Dakota, and Montana, are stock ranges limitless in extent, clotted with the most nutritious of grasses.

If a fruit farming region is wanted there is the whole State of Washington to select from.

As for scenic delights the Northern Pacific Railroad passes through a country unparalleled. In crossing the Rocky, Bitter Root, and Cascade Mountains, the greatest mountain scenery to be seen in the United States from car windows is to be found. The wonderful bad lands, wonderful in graceful form and glowing color, are a poem. Lakes Pend d'Oreille and Cœur d'Alene, are alone worth a trans-continental trip, while they are the fisherman's Ultima Thule. The ride along Clark's Fork of the Columbia River is a daylight dream. To cap the climax this is the only way to reach the far-famed Yellowstone Park.

To reach and see all this the Northern Pacific Railroad furnish trains and service of unsurpassed excellence. The most approved and comfortable Palace Sleeping cars; the best Dining cars that can be made; Pullman Tourist cars good for both first and second class passengers; easy riding Day Coaches, with Baggage, Express, and Postal cars, all drawn by powerful Baldwin locomotives, make a train fit for royalty itself.

Those seeking for new homes should take this train and go and spy out the land. To be prepared, write to

CHAS. S. FEE,
G. P. & T. A.
St. Paul, Minn.

CARNEGIE LIBRARY OF PITTSBURGH
3 1812 04298 4709