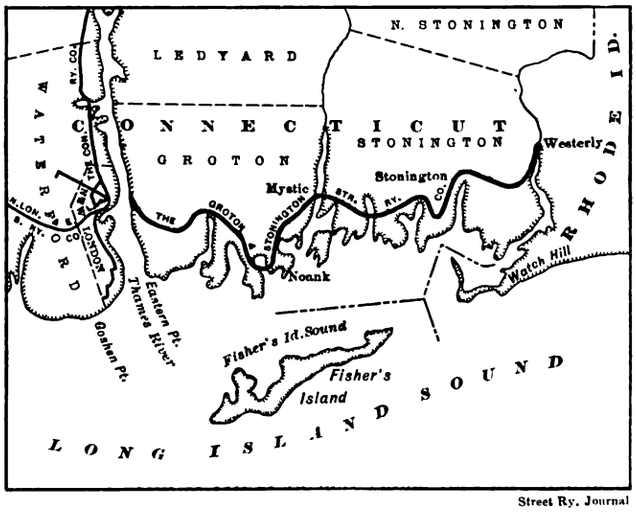
THE GROTON & STONINGTON STREET RAILWAY

When the Groton & Stonington Street Railway Company was organized in the spring of 1903 to build a line from Groton, Conn., to Westerly, R. I., it was freely predicted that the project would not pay, owing to the small population along the line and the fact that the towns to be served were already connected by a steam railroad. That there was some ground for this opinion is apparent from the population sta-



ROUTE OF THE GROTON & STONINGTON STREET RAILWAY, ALONG THE CONNECTICUT SHORE LINE, SHOWING ALSO CONNECTING TROLLEY LINES AT NEW LONDON

tistics, which show a total of about 18,000 inhabitants for the 18 miles of the route, or 1000 per mile, including the terminals. But in this instance conclusions based on such data proved misleading, for the scenic features along this line are so attractive that it has since been noted many people will travel 10 to 20 miles on connecting lines to enjoy a trip on the Groton & Stonington. Hence the tributary population may be considered as extending to within several hours' ride of the terminals to such towns as New London (17,548), Norwich (24,637) and Willimantic (8937). In fact, one of the most popular trolley excursions in Connecticut is to travel down from Willimantic by way of Norwich to New London along the west bank of the beautiful Thames River, and thence cross by ferry to Groton to continue the trip to Westerly and Watch Hill.

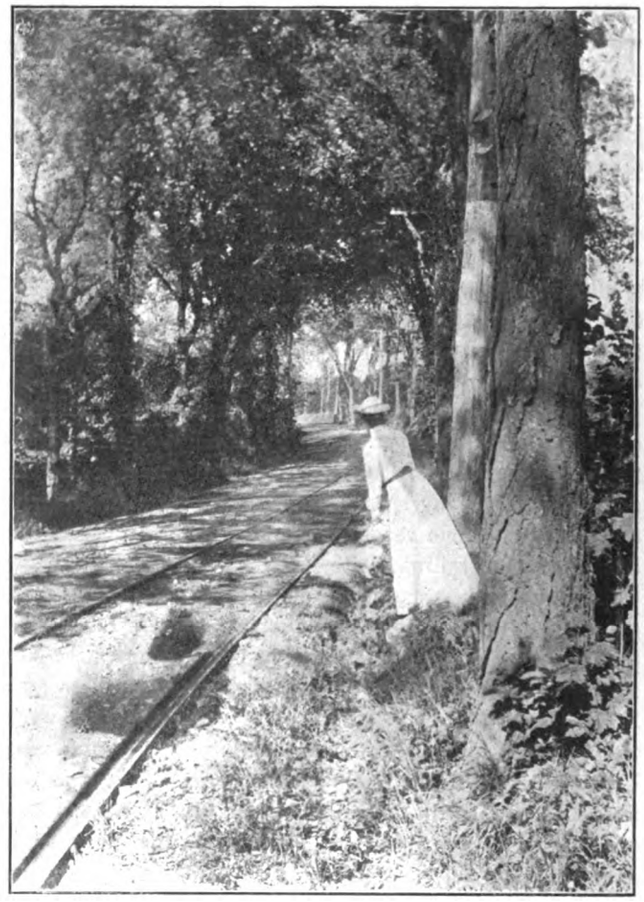
A glance at the accompanying map, while showing the irregularity of this portion of the coast line of Connecticut, conveys no adequate idea of the picturesque character given to it by the numerous estuaries of the sea, the rocky peninsulas of the islands and the quaint villages. It will be noted that the Groton & Stonington Street Railway is so laid out as practically to follow the coast. Naturally a line with such a tortuous course is not one to attract patronage by giving a high-speed service, nor was the attainment of such speed the intention of the projectors. In general the public highway is used, so that nearly all the inhabitants of the region are within easy reach of the railway. The many bays and water courses made a straighter route prohibitive from the standpoint of cost aside from the fact that much of the charm of the ride would be lost if the line did not follow the many twists and turns of the shore and climb up hill and down dale in the manner so relished by those who ride for pleasure rather than for business. Of course, as this class of traffic is of importance only for a few months, it must not be supposed that means for securing good all-year business are neglected. Connecticut towns are famous for their manufacturing industries, and the mill workers must be transported to and from their homes morning and evening. Besides this, the maintenance of a liberal and accurate schedule during the rest of the day attracts many short-distance riders.

Starting from the Groton ferry opposite the prosperous town of New London, the Groton & Stonington Street Railway passes through long stretches of quiet woods and pleasant homesteads; past the granite shaft and bust erected to John Avery, of Puritan fame; over the half-forgotten battle fields of the Pequot Indians, thence to the shipyards at Noank and Mystic; along the "rock-bound coast" and over hills from which are obtained glimpses of Fisher's Island, Block Island, Long Island and famous Watch Hill; into the quaint town of Stonington, and finally to the State line to Westerly, the home of Rhode Island's granite industry. From Westerly, connections can be made with a line running to Watch Hill.

TRACK AND OVERHEAD CONSTRUCTION

The line is single track except for five turnouts, and totals 20.7 miles for the 18 miles between Groton and Westerly. Seventy-lb. T-rails are used throughout, laid on gravel ballast on standard wood ties and double bonded with "Protected" bonds. Despite the fact that the line follows the shore highway so closely, quite a number of short trestles and bridges had to be erected in addition to the three overgrade and two undergrade steam railroad crossings. The general type of the bridge and trestle work is shown in some of the accompanying illustrations.

The overhead construction is principally of side-span type



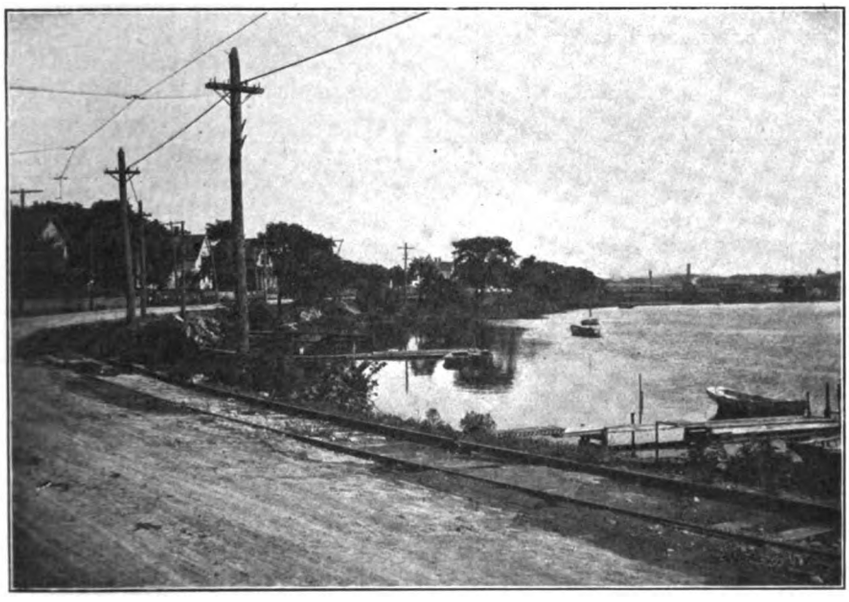
WAITING FOR THE CAR NEAR DEVIL'S FOOT HILL, JUST BEYOND NOANK

with wood poles spaced 125 ft. The trolley wire is No. 00. The poles carry a telephone wire and 500,000-circ. mil feeder cables, two running each way from the power house.

CAR HOUSE AND ROLLING STOCK

The car house is adjacent to the power station, and has six tracks, affording room for eighteen cars. For general inspection two of the outer tracks are furnished with pits and one corner of the building is walled off as a room for minor repairs. The number of cars operated by the company is too small to make it worth while to have a winding room. The company has just purchased a Wright lathe, however, which will be used for a variety of purposes, including the turning of steel wheels. This machine has a 40-in. swing on a 16-ft. bed, and will be run by a 5-hp Crocker-Wheeler motor. Owing to the many curves on the line the company has found it advisable to use on its closed cars the steel wheels made by the Standard Steel Company; on the open cars 500-lb. Griffin wheels are used with good results. The first pair of steel wheels was put on in July, 1905, and is still in service, having been returned. At present 58 wheels are in use, but the experience with them on a mileage basis has not been long enough to allow the presentation of any conclusive data.

The original rolling stock consisted of eight closed cars and the same number of open cars, all made by the Jewett Car Company. These cars are mounted on Peckham M. C. B. swivel trucks No. 18 C X, furnished with Westinghouse 68-C motors and corresponding controllers, Ham sand boxes, Barbour-Stockwell gray cast-iron brake-shoes, Climax combination arc and incandescent headlights, Wilson trolley retrievers, etc. Four of the closed cars are of the convertible type and four of the regular winter type, all being 29 ft. 4 ins. over the body and 40 ft. over all. Four of the original open cars have thirteen benches and the others fifteen benches. Owing to the heavy travel this season two fifteen-bench open cars have been added.



ON THE ROAD TO WESTERLY, R. I.

In addition to these cars the company owns a Taunton double-truck, four-motor snow plow and an old passenger car which is used for repair work. This car has been replaced by a new work-car and is now used for the express package business which the company started on Oct. 1 with three trips a day.

POWER HOUSE

The power house is located at Mystic, which is about the middle of the line. As the distance to the terminals is therefore less than 10 miles each way, and only a few hundred kilowatts capacity are required for the service, a direct-current station was deemed better than an alternating-current plant with sub-station. The building is located along the bank of the Mystic River and is constructed of brick walls resting on a natural rock foundation. The boiler room is located at a lower level than the engine room, and is 71 ft. long by 37 ft. 6 ins. wide. The equipment consists of three hand-stoked Stirling boilers, each of 200-hp capacity. In another room on the same level and alongside the boiler room are located the feed pumps and heaters which, together with the jet condenser placed in the basement of the engine room, are of the Stillwell-Bierce & Smith-Vaile type. Next to this room is installed one Green fuel economizer, containing 2304 sq. ft. of heating surface. The economizer is composed of thirty-two sections, each section containing six tubes, 4 9-16 ins. external diameter by 9 ft. long, connected at the top and bottom by headers, and provided with self-acting, triple-bevel edge scrapers, lifting bars, guards, rods, chains and improved scraper gear with positive reversing lever. It is guaranteed to show a saving of at least 8 per cent in fuel, under the consumption required when operating the plant without the economizer in service. The scrapers are operated by a 2-hp Crocker-Wheeler motor. This economizer has been installed nearly two years, and to date the company has not been obliged to make any repairs to any part of the apparatus. The Custodis chimney erected outside of this room is 11 ft. 8 ins. in diameter at the base and 125 ft. high.

A WOODLAND SCENE NEAR MIDWAY

The engine room is 110 ft. long and 50 ft. wide. At present it contains two 485-hp Cooper-Corliss cross-compound engines each connected to a 325-kw Westinghouse generator giving 600 volts d. c. at 100 r. p. m. These units are set on concrete piers resting on bed rock. It will be seen from the plan of the power station that space has been reserved for

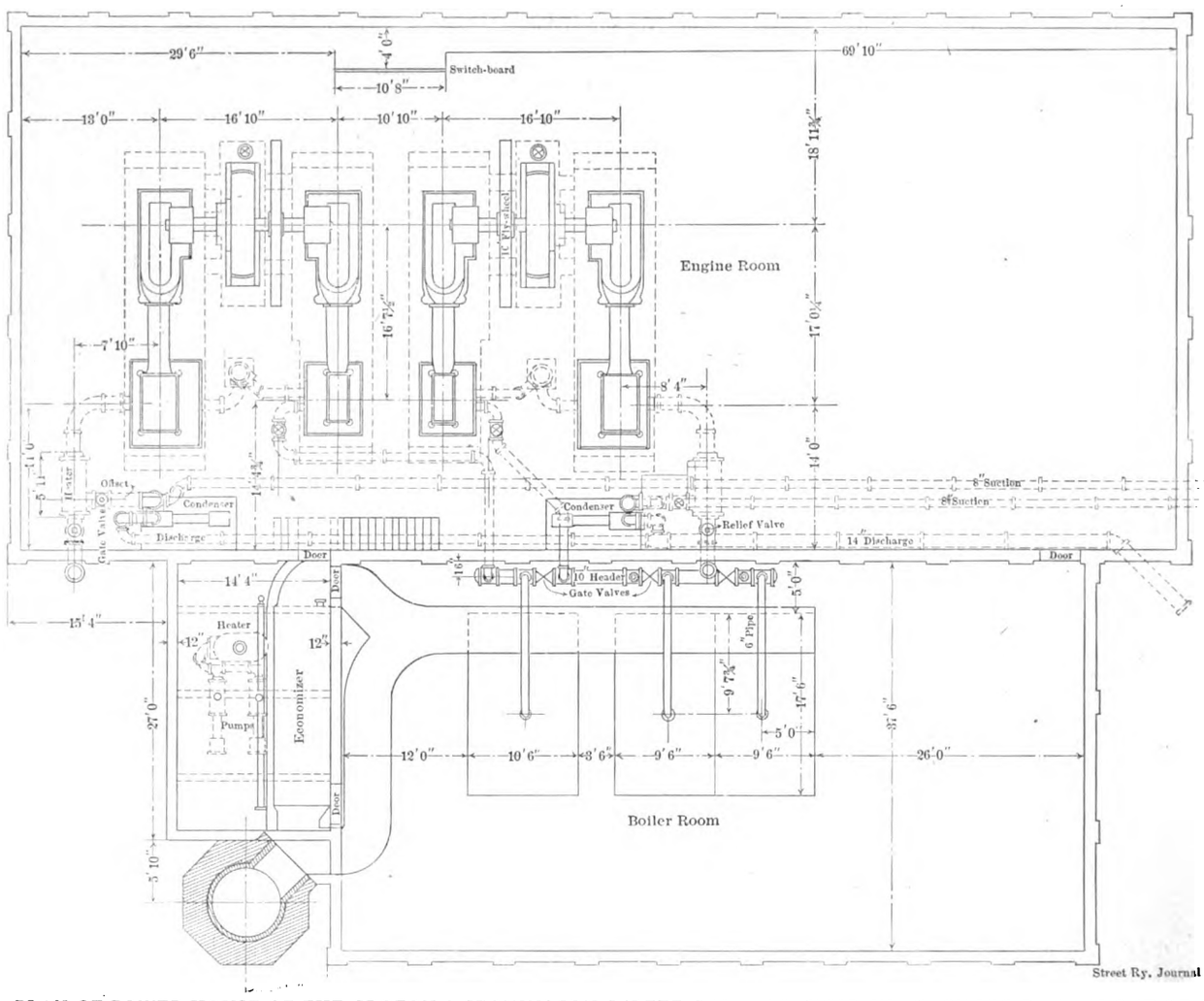
additional equipment. This free area is on the side nearest the river, where a large opening has been left in the wall. The transportation of heavy parts is effected by a Maris crane which runs the entire length of the engine room. Although rated at 15 tons this crane has frequently handled pieces weighing 19 tons.

The switchboard is composed of seven white marble panels with a total width over all of 10 ft. 8 ins. The four feeder panels are each furnished with a Cutter I-T-E 300-750-amp. circuit breaker, 700-amp. Weston ammeter and switches. On the fifth panel is mounted a voltmeter and Thomson recording wattmeter. The generator panels each carry the necessary switches, a 300-1000-amp. circuit breaker and 1200-amp. ammeter of the types mentioned. The board was built by the Crouse-Hinds Company, of Syracuse, N. Y.

	Amount
Wages	$353.48
Fuel (211.5 tons)	846.04
Water	58.68
Lubricants and waste	30.00
Miscellaneous supplies and expenses	15.00
Light	5.39
Total	$1,308.59

Wattmeter reading in kw-hours, 106,400.
Mileage, 32,531.33.
Cost per kw-hour, .012 cents.
Cost per car-mile, .0402 cents.

These figures vary considerably according to the amount of power required, but the costs per kw-hour and car-mile are fair averages.



PLAN OF POWER HOUSE OF THE GROTON & STONINGTON STREET RAILWAY COMPANY, SHOWING THE LAYOUT OF THE STEAM AND ELECTRICAL GENERATING MACHINERY AND PIPING. THE BLANK AREA SHOWN IS RESERVED FOR ADDITIONAL APPARATUS

The excellence of the apparatus installed and the careful manner in which it is maintained have kept the power cost quite low for a station of this size and load factor. The coal used is Georges Creek bituminous, which is delivered in barges alongside the station at $3.70 a ton, but as the cost of handling by mast and gaff to the coal pile is 30 cents, the actual cost at the boilers is $4. On an average the coal consumption is 4 lbs. per kw-hour, dropping, however, to 3¼ lbs. under good load conditions. The power statistics are carefully compiled on the form reproduced in one of the illustrations and afterward made up as a monthly report like the following typical one for March of this year:

DESPATCHING SYSTEM

All despatching is carried on by telephone with headquarters at Mystic. Telephone boxes are located at each of the five turnouts, at the ends of the line and at the Wequetequock Casino. The turnouts are about fifteen minutes apart. The telephones used are of the special outdoor type No. 278-A, made by the Western Electric Company. They are so constructed that the key used to open the box cannot be taken out until the telephone door is shut.

The despatcher has in his office a board containing a number of pegs corresponding to the different conductors on the line, these pegs being moved from point to point as the cars advance. When a conductor reaches a turnout he telephones

the despatcher, who then orders him to go ahead if all is well. If there has been any delay, the despatcher uses a second board which is set for a difference in time of half an hour. The conductors are given orders to wait at a turnout

POWER STATIONS DAILY REPORT.

GROTON AND STONINGTON ST. RY. CO.

.....Power Station 190

BOILERS RUN. ENGINES RUN.

No 1.....to..... No. 1 .....to.....
2 .....to..... 2 .....to.....
3 .....to..... 3 .....to.....
4 .....to..... 4 .....to.....
5 .....to..... 5 .....to.....
6 .....to..... 6 .....to.....
7 .....to..... 7 .....to.....

WATT METER READINGS.

.....Start.....Finish.....Difference.....
.....Start.....Finish.....Difference.....
.....Start.....Finish.....Difference.....
.....Start.....Finish.....Difference.....

WATER METER READINGS.

Boiler—Start.....Finish.....Difference.....
City—Start.....Finish.....Difference.....
—Start.....Finish.....Difference.....

COAL USED.

Bituminous.....lbs. Anthracite.....lbs. Total.....lbs.

CIRCUIT BREAKERS OUT

MACHINE. FEEDER.

No. 1.....to..... .....to.....
2.....to..... .....to.....
3.....to..... .....to.....
4.....to..... .....to.....
5.....to..... .....to.....
.....to.....
.....to.....

Remarks:.....

.....

.....

(Signed)

.....

Engineer.

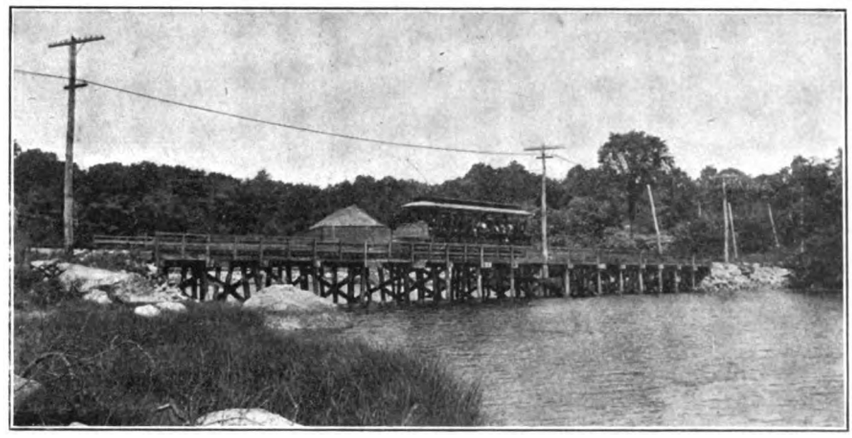
BLANK FORM OF DAILY REPORT SENT TO GENERAL SUPERINTENDENT BY ENGINEER OF POWER STATION

system according to which every record to be filed is first divided under a number of main headings, such as "General," "Executive," "Finance and Accounts," "Railways and Structure," "Equipment of Shops," "Transportation and Storage,"

Article	QUOTATIONS		Size or Kind		
Date	Name and Address	Details of Quotation	How Made	Catalog	Price List
		Price			
		Terms			
		Price			
		Terms			
		Price			
		Terms			
		Price			
		Terms			

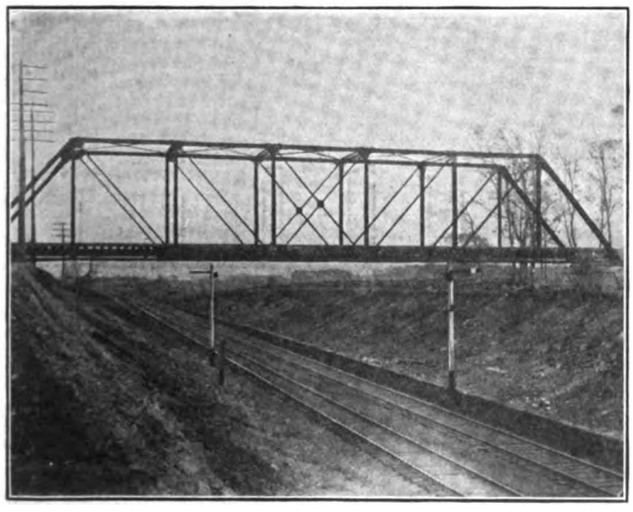
FILING CARD FOR KEEPING TRACK OF COMPETITORS' PRICES FOR SUPPLIES

"Traffic Rates," etc. These classes are each assigned an even number in the hundreds, such as 400 for "Maintenance and Equipment." The first sub-heading may be taken as "Rolling



A LONG TRESTLE NEAR NOANK, ON THE LINE OF THE GROTON & STONINGTON STREET RAILWAY COMPANY

until they meet a certain car. In case two cars are following one another in the same direction, between the same turnouts, the car going the other way is not permitted to go ahead,



OVERHEAD BRIDGE ON THE GROTON & STONINGTON STREET RAILWAY, EAST OF POQUONNOCK, CONN.

the first car holding the turnout until the following one comes in sight.

FILING SYSTEM

For filing records the company uses an adaptation of the Railroad Correspondence File Index devised for steam railroads by W. H. Williams. This is a decimal classification

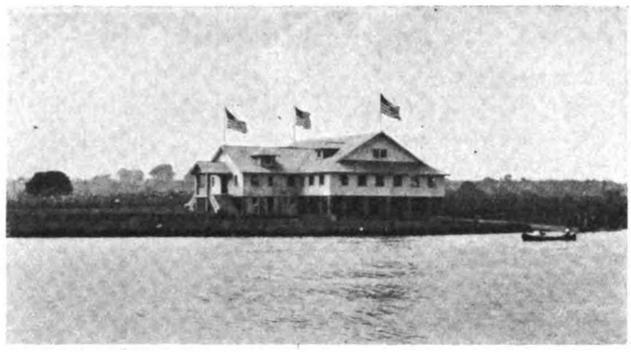
Stock," and to this a classification in the tens is given like 410. This heading in the case of electric railways can be given a sub-heading "Motors" and a number 400. The principal "Motor Parts" would come under 411.1, and anything composing these parts under 411.11, 411.12, 411.13, etc. In this way everything coming up in the work of a railway

GROTON & STONINGTON CAR CROSSING BRIDGE BETWEEN WEQUETEQUOCK AND CLARK VILLAGE

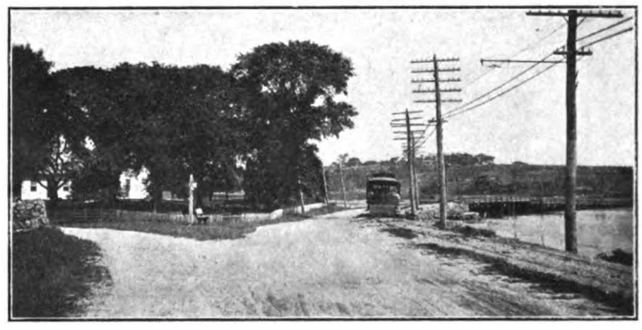
company can be classified to the smallest detail. In filing a package of data according to this system, the top of the envelope is marked in a manner similar to the following: Wheels, Rolled Steel, 410,313. In addition to this filing method, the company keeps a set of quotation cards of the type shown in one of the accompanying illustrations.

AMUSEMENT TRAFFIC FROM LOCAL SOURCES

The splendid scenic features of this line have already been mentioned, but besides this incentive for pleasure riding there is, about half way between Stonington and Westerly, a popular casino which contains the largest and finest dancing pavilion in that part of the country. This casino is not owned by the railway company, but the latter derives as much benefit therefrom as if it did, since the extra traffic induced often amounts to 500 or 600 passengers, most of whom have to ride through several fare zones. At present the



WEQUETEQUOCK CASINO—A NOTED RESORT ON THE LINE OF THE GROTON & STONINGTON STREET RAILWAY



FOLLOWING THE SHORE BETWEEN STONINGTON AND MYSTIC

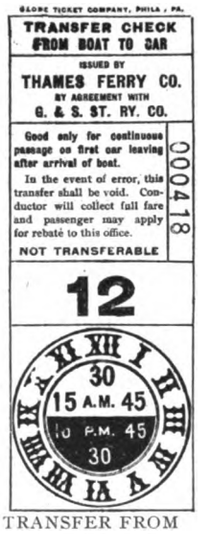
casino affords opportunities for dancing and boating only, but next season a theater and other attractions will be added. Most of the patrons are summer visitors who are glad to ride a considerable distance to reach the one large amusement resort in this territory. The only extra expense to which the railway company has been placed has been the erection of a handsome shelter near the casino, aside from the free transportation of the casino employees.

With this season the company inaugurated the scheme of giving free concerts along the line every Sunday afternoon during pleasant weather. One time the concert is given near the Westerly terminus and the next time near the New London end. For this reason a large number of passengers pay three or four fares to reach the grounds. The musicians, some twenty in number, are local amateurs who regard these entertainments in the light of an outing and are therefore willing to play for a nominal amount and their transportation. No special buildings have been erected for these entertainments, although a number of benches are placed on the grounds, the idea being to give the concert on some favorite hill from which the visitors can enjoy the beautiful scenery as well as the music.

The company also offers special cars to picnic parties at 60 cents and 75 cents a car-mile, according to the capacity of the car.

FARES AND TICKETS

The 18 miles of route operated by the Groton & Stonington Street Railway Company between Groton and Westerly are divided into six five-cent fare zones. The Groton zone, however, includes the privilege of crossing on the ferry to New London on the next boat after the arrival of a car, or vice versa. To prevent the transfer abuses common with the old ticket printed in small type, the management adopted the accompanying transfer which is too plain to admit abuse. The boat-to-car and the car-to-boat transfers are alike in their main features, but worded in accordance with their uses and differently colored.



TRANSFER FROM BOAT TO CAR

GROTON AND STONINGTON ST. RY. CO. Date_____ 190____

Trip Letter	Started from	Time	A. M. or P. M.	Ferry Transfers Rec'd	Ferry Transfers Sold	Number of Fares Registered 1st Cut.	2nd Cut.	3rd Cut.	4th Cut.	5th Cut.	6th Cut.	Employes Passes	Tickets Cash	Tickets Comp.	Tickets School	Mileage	Car Number	Register Reading	
A																	L		
																	T		
B																	L		
																	T		
C																	L		
																	T		
D																	L		
																	T		
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M																	L		
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TOTAL TRANSFERS RECEIVED — TOTAL TRANSFERS SOLD — TOTAL FARES COLLECTED — TOTAL PASSES — TOTAL FARES REGISTERED — TOTAL TICKETS — TOTAL MILEAGE

Total Fares Reg. — Tickets, Passes, & Trans. — Total Sc Fares — Total Amount of Cash Deposited

CONDUCTOR NO. NAME MOTORMAN NO. NO. NO. NO.

THIS REPORT MUST BE CORRECTLY FILLED OUT, AND DEPOSITED WITH ALL MONEY, TICKETS, AND TRANSFERS, EACH DAY.

CONDUCTOR'S DAILY REPORT

The company is now preparing a reduced rate ticket book for the run between Stonington and Westerly. These tickets will be sold in books of 80 for $3, making the fare 3¾ cents to the holder of the book. In consideration of the reduced rate, the tickets will be good between 5 a. m. and 7 p. m. on week days only. This reduction is popular with the working classes, but as most of the pleasure traffic comes on Sundays and evenings the earnings will not be appreciably affected. It is likely that the increased riding will more than make up for the reduction.

The company also sells for $1.50 a fifty-ride ticket book for school children. This is good between the hours of 7 a. m. and 5 p. m. Aside from this, a few complimentary tickets are given out and a pass good for six rides a day for thirty days. It will be noted from the accompanying reproduction of this pass that every number covers an area divided in six parts, each corresponding to a fare zone.

For the convenience of prospective patrons the company publishes a forty-page booklet, 4½ ins. x 7½ ins., containing

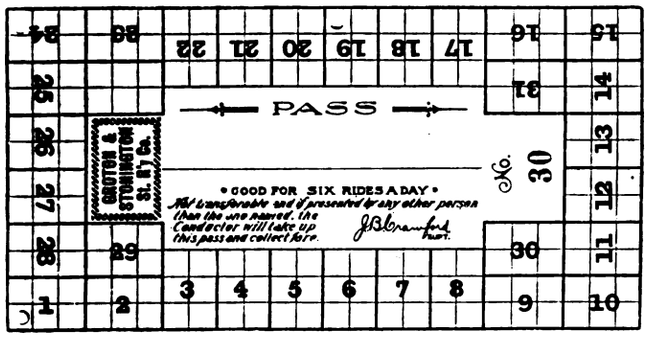
SPECIMENS OF SCHOOL AND COMPLIMENTARY TICKETS, WHICH ARE FURNISHED IN BOOKS

a brief description of the route, numerous views taken along same, and time tables of its own and connecting lines. This booklet is recognized as an excellent advertising medium, and is therefore well stocked with notices which more than cover the cost of publication. The advertisement privilege on the ferry transfer also defrays the cost of the latter.

MISCELLANEOUS OPERATING DETAILS

Many a nickel that should wander to the coffers of a railway company has been turned to other uses because the prospective passenger found no convenient place to wait for a car. The Groton & Stonington Street Railway cannot be reproached for lack of foresight in this respect. Convenient stations have been built at Noank and Stonington; comfortable waiting rooms fitted up at Mystic, Groton and Westerly, and seats and shelters placed along the roadside.

A move which met the cordial approval of the men was the adoption of khaki uniforms for the conductors and motor-



COMPLIMENTARY PASS

men during the summer months. These uniforms do not soil or show dust as quickly as the regulation blue, and as they cost only $6 the extra men put on during the rush season are not obliged to make a heavy outlay.

ORGANIZATION AND TRAFFIC STATISTICS

The Groton & Stonington Street Railway Company was organized Dec. 19, 1903; placed the line to Mystic in service on Dec. 19, 1904; to Stonington on April 8, 1905, and to the State line at Westerly on May 6, 1905. The property is largely held by local interests represented by the following officers: President, Thomas Hamilton; vice-president, B. F. Williams; treasurer, Costello Lippitt; secretary, C. D. Noyes, and attorney, C. W. Comstock. The operation of the line is in charge of J. B. Crawford, general superintendent, whose administration has proved so successful that the directors at the annual meeting last August declared a 7½ per cent dividend on the preferred stock. The company hopes next year to pay a 3 per cent dividend on the common stock if business continues to improve as in the past year. From this it is plain that the company has succeeded beyond expectations.

Comparison of the following figures for the years ending June 30, 1905 and 1906, will show that increases in the company's business (due partly to the completion of the line) have been coupled with decreases in the cost of the different traffic units:

	1906	1905
Passenger car mileage	419,910	150,902
Passenger car hours	29,444	12,789
Car earnings per car-mile	$0.266	$0.232
Car earnings per car-hour	3.794	2.74
Net earnings per mile run	0.16	0.1134
Net earnings per car-hour	3.828	1.338
Operating expenses per car-mile	0.108	0.119
Operating expenses per car-hour	1.542	1.408
Per cent of operating expense to gross earnings	40.292	61.27

LOW STEAM RATES HAVE HELPED OHIO ELECTRICS

There are fresh evidences that the 2-cents-a-mile rate enacted for Ohio steam roads by the last Legislature of that State is not working to the disadvantage of the electric roads, but rather otherwise. At first the electric railway operators feared that they would lose much of their business on the longer trips because the difference in fare was no longer greatly to the advantage of the electrics. One of the most advantageous instances for studying this effect was that of the Lake Shore Electric Railway on its 120 miles from Cleveland to Toledo. The electric line charged $1.75 for the one-way trip, while the steam road rate under the old conditions was $3.20. The 2-cents-a-mile law cut the steam rate to $2.15, or a difference of only 40 cents where formerly it was $1.45. For a time it was feared that the long-distance business would be badly affected, but the electric company held its ground, and instead of cutting rates it improved the service by cutting off fifteen minutes from the running time by putting on two additional limiteds each way and installing new cars for the service. Figures now given out by the company demonstrate that this policy was the right one and that the steam reduction was not sufficient to get the business in the face of fast and regular service and the advantage of landing in the center of the business district of the large city. It is stated that where a year ago with three limiteds each way the cars were averaging 40 cents a car-mile, with five limiteds at present they are earning 50 cents a car-mile, the number of through passengers being much more than a year ago.

That the steam roads are greatly disappointed with the results of the reduction in fare is further evidenced by the fact that the railroads are cutting out many of their slow accommodation trains. The railroad editor of the Cleveland "Plain Dealer," in commenting upon this point, says:

Managers state that there are several accommodation trains on every railroad out of Cleveland that are being operated at a loss. These trains run to cities 50 miles to 100 miles distant, and have been operated partly to accommodate the people living between these points and to keep the passenger traffic from going to the electric lines. Some of these trains, it is said, do not make money enough to come anywhere near paying the train crews. A prominent official states that the average passenger train must earn $2 per mile to be on a paying basis, and added that some of the roads out of Cleveland were operating trains day after day which have not been averaging more than 10 cents a mile, which is hardly enough to pay the brakeman's wages. The loss which these trains sustain has been made up by the increased earnings on some of the best trains, but the roads have now reached a point where they are going to cut out these unprofitable trains.