

THE ENGINEERING AND MINING JOURNAL



Entered at the Post-Office of New York, N. Y., as Second-Class Matter.

VOL. XXXIX. FEBRUARY 7. No. 6.

RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

Articles, communications, reports, documents, books—all things whatsoever belonging to the Editorial Department, should be thus addressed: **MANAGING EDITOR ENGINEERING AND MINING JOURNAL, P.O. BOX 1833, New York City.**

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

SUBSCRIPTION PRICE, including postage for the United States and Canada, \$4 per annum; \$2.25 for six months; all other countries, including postage, \$5.50 = 22s. = 28 francs = 22 marks. All payments must be made in advance.

FILE COVERS will be sent by mail for \$1.25 or delivered at office for \$1 each.

Advertising Rates.—See page vii.

Mr. C. A. Green is our accredited representative for New York.

Mr. A. B. Brown, Jr., is our accredited representative for Boston and the Eastern States. Office, Room 1, Simmons Building, 38 Water street, Boston.

Mr. J. Viennot, 150 South Fourth street, Philadelphia, is our accredited representative for Pennsylvania, Maryland, and Delaware.

Mr. O. D. Cotton, Columbus, O., is our accredited representative for Ohio, Illinois, Missouri, Iowa, Michigan, Indiana, and the Southern States.

Mr. O. J. Frost, care Boston & Colorado Smelting Company, Argo, Colo., is our accredited representative for Denver and vicinity.

REMITTANCES should always be made by Post-Office Orders or Bank Drafts on New York, made payable to THE SCIENTIFIC PUBLISHING COMPANY.

THE SCIENTIFIC PUBLISHING CO., Publishers.

R. P. ROTHWELL, Pres. HENRY M. GEER, Sec. and General Manager,
P.O. Box 1833. 27 Park Place, New York.

CONTENTS.

EDITORIALS:	PAGE.	COAL TRADE NOTES:	PAGE.
The Anaconda with a Reputation	83	Illinois	92
Our Furnace, Mill, and Factory Department	83	Indian Territory	92
Taylor & Brunton	83	Missouri	92
The Fire in the Ebervale Colliery	83	Nebraska	92
Post-Office Savings Banks	83	Ohio	92
Our Present Silver Policy	83	Pennsylvania	92
Mr. Charles Kirchoff, Jr.	83	Wyoming	93
Transfer of the United States Government Exhibits to London	83		
Mr. Noel and the Revenue Mining Company	83	GENERAL MINING NEWS:	
The Report of the New York State Survey	83	Arizona	93
Natural Gas Explosions	84	Australia	93
The Outlook for Copper	84	California	93
		Canada	93
		Colorado	93
		Dakota	93
		Idaho	93
		Mexico	93
		Michigan	93
		Montana	94
		Nevada	94
		New Mexico	94
		Pennsylvania	94
		Utah	94
		FINANCIAL:	
		Gold and Silver Stocks	94
		Boston Copper and Silver Stocks	95
		BULLION MARKET	95
		METALS	95
		IRON MARKET REVIEW	96
		COAL TRADE REVIEW:	
		New York	96
		Philadelphia	96
		Buffalo	97
		Rosston	97
		Statistics of Coal Production	98
		FREIGHTS	98
		Advertisers' Index	xii
		COAL TRADE NOTES:	
		Canada	92
		Colorado	92

THE Anaconda has the reputation of being the worst-managed enterprise in Montana.

ENGINEERS, manufacturers of mining machinery, and dealers in mining supplies will find many items of interest under the title of Furnace, Mill, and Factory in another column.

BOTH members of the firm of TAYLOR & BRUNTON, mining engineers, leave this city on the 10th. Mr. D. W. BRUNTON goes to Cuba, Yucatan, and Mexico, on professional business; and Mr. FRANK M. TAYLOR sails for England on a similar errand. During their absence, the temporary address of each will be given in our advertising columns.

A SERIOUS fire has broken out in the Ebervale colliery, near Hazleton, Pa. This colliery works the "Big Vein," standing at a high angle, and with openings all along the outcrop. There is, therefore, we fear, but

little chance of the fire being extinguished. There is also the danger of the fire being communicated to adjoining collieries, which, we believe, are connected in their underground workings.

THE Ontario Post-Office Savings Bank report shows that the deposits in December last amounted to \$599,328; withdrawals, \$472,905. The total amount on deposit at the beginning of the present year was \$16,511,825. When will our government adopt the admirable English post-office savings bank system, by which thrift and industry among the poor have been so successfully encouraged?

THE dangers inevitable from the adoption of our present silver policy are showing themselves to such an extent as to seriously alarm the solid business men of the country. In another column, will be found the two sides of this important question. Our desire is naturally to promote the best interests of our silver producers; but the interests of the whole country demand that, until some agreement be made with the other civilized governments for the establishment of a double standard, it would be the height of folly to expose ourselves to the disasters that the continued expansion of our silver coinage expose us to.

OUR readers will share with us the regret we feel in parting with our valued coadjutor, Mr. CHARLES KIRCHHOFF, Jr., who, for several years past, has been the active editor of the ENGINEERING AND MINING JOURNAL. These columns have borne abundant testimony to the zeal and ability with which Mr. KIRCHHOFF discharged his important and arduous duties; and it only remains for us to express our admiration for his professional abilities, our high esteem for him personally, and our cordial good wishes for his continued success. Mr. KIRCHHOFF returns to the editorial staff of the *Iron Age*, from which he came to us more than three years ago.

It is proposed that the United States government exhibits now in the New Orleans Exhibition shall be transferred, after the close of that exhibition, to London, to be placed in the American Exhibition that takes place in 1886; and Congress is asked to make an appropriation for this purpose. That such exhibits would do more good in a foreign country than in our own is evident. One does not advertise one's wares most profitably to one's own family. As to the American Exhibition, the scheme shows every evidence of vigorous and skillful management, and ample means. It has already engaged the support of a large number of influential persons on both sides of the Atlantic; and it promises to be highly successful. What is true of private exhibitors is equally true of the government, that having already incurred the expense of collecting and arranging exhibits for New Orleans, it can with relative economy transfer them to London, and thus reap additional benefit from them. Many private exhibitors have already determined to do this, expecting, no doubt, to compensate in this way the somewhat disappointing results of the Louisiana enterprise. We trust the government will follow their example.

MR. THEODORE NOEL, who appears to be a trustee and manager of the Revenue Mining Company, to which reference was made in our issue of January 24th, objects to our remarks, and he favors us with a copy of the prospectus of the company and a copy of the contract by which investors turn over their property irrevocably to the promoter—or, as Mr. NOEL states in his letter, "I refused to take hold of or have any thing to do or in any way become connected with this enterprise on any other terms than that I should have the *imovable* power to run it without let or hindrance, opposition or connivance of any stockholder whatever or whomsoever." [Verbatim.]

There is no sufficient data in the prospectus to indicate that the Revenue mine has any value, or what the nature of the company's title to the property is, or that Mr. NOEL knows any thing about the business of mining. On the contrary, there are not a few things that would lead to the impression that he does not, but that his specialty is the promotion of a patent medicine that is advertised in the mining prospectus.

MR. NOEL states that he knows nothing of or about the Kerber Creek Consolidated Mining Company, in the same district. We can not perceive in what our previous remarks were unjust to the Revenue Mining Company; quite the contrary, our notice was gentle, delicate, and forbearing.

THE report of the New York State Survey for the year 1884 shows that the triangulation that is to serve as a framework for a detailed topographical map of the State has been completed for about half the counties at an aggregate cost of \$108,000; that both the accuracy and the economy of this triangulation are attested by the high authority of the officials of the United States Coast and Geodetic Survey; that about \$100,000 more would finish it, but it would be comparatively useless (except to surveyors), unless the complete topographical survey and the publication of

maps should follow; that the total cost of all the work would be something over \$500,000; and that an annual appropriation of \$40,000 would complete the survey of two or three counties each year, and the whole in about thirteen years. The report is very polite toward ex-Governor CLEVELAND, whose attack, in an official message, upon the Survey as at present authorized, is tenderly though firmly refuted. The governor wanted the Survey abolished as a separate department, but said that, if it must be continued, "it would be much better to appropriate a large sum of money and speedily complete the work." This alternative recommendation the Director and Commissioners of the Survey adopt and urge. We think there is no doubt of the great and permanent importance of the work, and we are satisfied that it is in good hands. The support of the Legislature, without distinction of party, ought to be given to it.

NATURAL GAS EXPLOSIONS.

The explosions of natural gas in Pittsburg furnish an interesting comment on the report of the committee of the Engineers' Society of Western Pennsylvania, read and discussed in a joint session of that society with the American Society of Mechanical Engineers, held last May at Pittsburg. The committee urged that no pressure exceeding 5½ inches of water should at any time be permitted in mains distributing this gas for domestic consumption; and Mr. METCALF declared in the debate that, both for economy and for safety, a low pressure should be used in metallurgical works also. Among the other recommendations of the committee, were the use of automatic cut-off valves on service-pipes; the avoidance of all cast-iron pipes and fittings, the boxing of street-valves so as to permit the free escape of leaking gas, and thus prevent the accumulation of explosive mixtures; and the protection of feed-valves and burners in houses against accidental or ignorant opening by children or others. It would be interesting to know how far these warnings have been heeded by the eager sellers of natural gas.

High pressure, causing leaks, and the odorless character of the gas, preventing their early discovery, seem to be the chief sources of danger in its distribution. Concerning the latter, the testimony has been somewhat contradictory. The committee above quoted explains this contradiction by pointing out that the odor of the gas in the mains appears to be dependent upon traces of condensable hydrocarbons; that if kept in a closed vessel for a few days, it becomes absolutely odorless; and that the odor will in all probability diminish more and more as it is carried away from the wells or from the high-pressure mains. No matter how it may come to pass, if the gas is ever odorless, under any circumstances, it is evidently dangerous in high degree. But the remedy is simple. The gas should be artificially perfumed. This could be cheaply and easily done; and it is a reasonable requirement to be made of parties who are receiving from the bounty of nature the material which, under legislative franchise, they convey through the public streets and sell to consumers with great profit to themselves.

THE OUTLOOK FOR COPPER.

The disturbing element in the world's copper market is undoubtedly this country's production. From every other quarter, England's importations show only moderate fluctuations: a falling off from Spain of 2600 tons, despite the promise of increase; a gain of 3800 tons from Chili, despite the prediction of the total extinction of her copper industry by low prices; 1100 tons increase from Australia, compensated for by a decline of 1000 tons from Newfoundland. But the record of the United States for the last three years is startling: 745 tons exported to England in 1882, 9410 tons in 1883, and 17,309 tons in 1884. And this from a country which, in 1880, in order to meet an extraordinary demand of its home market, had to import Chili Bars.

Such a sudden addition to the world's supply has of necessity checked speculation by introducing a new and uncertain factor into the calculations on which speculation is based, while the steady decline in price has induced manufacturers to run on low stock. And yet the world's consumption has kept pace so closely with the world's production that the average visible supply for 1884 was 3865 tons less than in 1883, and 17,199 less than in 1880. It is, therefore, the anticipation of a still larger production from North America that alone depresses prices in the face of reduced stocks. If we should continue to increase our output at the rate of the last few years, the balance between supply and demand would undoubtedly be seriously disturbed. If, on the other hand, the tide of our copper production is at its flood, we may expect the tide of prices to rise; and there is reason to suppose that possibly the maximum of production and probably the minimum of price have been reached.

Until four years ago, the Lake Superior mines, yielding a metal of exceptional quality from an ore of native copper, were the only very large producers in the States or territories. Tennessee and North Carolina produced about 1000 tons a year, and Vermont a like quantity, and

California exported ores to the East Coast and to England. But the total quantity was so insignificant as to be disregarded in the calculations of the Lake companies, which, by pooling their sales, were able to control prices in a manner advantageous, at that time, both to themselves and the trade. The Tennessee and Vermont mines are now closed.

But in 1881 the Copper Queen, of Arizona, began supplying the trade with a brand almost equally applicable to rolling purposes with the Lake copper. For years previously, the Longfellow, of Arizona, had also put into the Eastern market a notable quantity; but it had been absorbed in the output of the Baltimore Smelting-Works, and had attracted no attention.

The success of the Copper Queen and the completion of the Southern Pacific Railroad came together, and stimulated copper mining to such an extent that, before the close of 1883, there were four smelting establishments in the territory of Arizona, turning out 12,000 tons of copper.

This copper being as serviceable to many as the Lake, and being offered always at a slight advantage, interfered with the control of the market that the Lake companies had hitherto exercised.

But though these Arizona mines have been so productive thus recently and rapidly, there is no reason to suppose that others will enter the lists in as quick succession. Those producing to-day were long known as promising properties, but were unworked until the approach of the railroad made transport of fuel and bullion feasible. Now, two parallel lines of railroad have brought every district in New Mexico and Arizona within practicable distance of the market. So that, had the Southwest territories been one vast copper mine, as speculators would fain have the credulous believe, many another mine would have been opened. But, though a dozen furnaces have been erected at a dozen different mines, none but these four establishments and one other, making argentiferous copper, are in blast to-day, or likely to be in blast this year.

Both in this country and in England, the public has been tempted by extravagant promises to invest in Arizona and New Mexico mines. In most instances when the public has yielded to the temptation, it has rued it. Of all the New Mexico copper schemes, not one has yielded any profit, or much copper either. We do not say this in disparagement of the real copper mines of the Southwest, or to check active prospecting and legitimate investigation; we but state a fact, and wish to emphasize it, though it should be unnecessary to do so, by adding that, because an operator states that a prospect is a mine, it does not therefore follow that it ever will produce any ore. Nor do we wish to be interpreted as meaning that no new mines will be opened in the Southwest. There are good properties known to exist to-day that will probably develop into mines, and fresh discoveries will yet be made; but probably these young mines will not come to maturity faster than the old fall into decay. In counting on new discoveries, we must recollect that what is true of silver and gold mines is doubly true of copper. For many years after the army of prospectors invaded the Rocky Mountains, each year was marked by some great discovery; for in a comparatively short space of time every mountain and cañon was ransacked. But ere long, discoveries became few, and for several years past have virtually ceased. A gold or silver vein is not conspicuous; but a copper lode in a desert region, where the rocks are bare and no timber clothes hill or dale, can not be hid.

A new region, still more prolific than Arizona, is Butte, Montana, and it also has begun to pour its copper into the market, already full to repletion, within the past four years, because during that period Butte has been brought within the railroad system of the West. While the Union Pacific was still 100 miles away, the richer argentiferous copper ores of the Gagnon and Parrot mines were carried to Corinth. Operations on a large scale could only be conducted when the track reached the camp. The same cause, therefore, namely, facility of transport, that operated to develop so rapidly the mines of the Southwest, simultaneously rendered it possible to open the great mines of Butte; all of which had, however, been previously worked, except the Anaconda, whose wonderful production two years ago gave the great shock to the English copper market, from which it has not recovered. This is not, however, the first instance in the history of copper where a single mine, such as the Anaconda, has visibly affected the world's supply. The Pique mine, of Chili, sprang suddenly into existence as a great producer in 1850-51, when the exportation of ore, not furnace material, from Chili, as suddenly rose from 642,114 quintals, value \$24,427, in 1850, to 2,775,556 quintals, value \$106,195, in 1851, to 10,429,764 quintals, value \$366,322, in 1852, and in 1853 to 29,912,244 quintals, value \$685,407.

It is consoling to see that in the following year (the Crimea year), in spite of the maintenance of the large product, the value of 20,471,932 quintals of ore rose to \$881,983.

Butte has for the two years past produced about 20,000 tons annually; but last year the output was not as much greater than the year before as was expected; and yet it must be remembered that Butte, like every mineral deposit in the West, is worked on a high-pressure system that aims at making the immediate output great, no matter at what waste, or no matter how much more economically the work could probably be done in the future. The result is, that the practical capacity of a mine

or district is rapidly reached. It must also be remembered that all the work heretofore has been done on the rich, partially decomposed sulphurets, which overlie the unaltered ores; and that the percentage of the ores now treated is probably so much higher than those the company will have to handle before many years have passed that the plant now capable of producing from 20,000 to 25,000 tons a year will have to be greatly augmented in size to turn out a like quantity from the deep, leaner ores.

There still remains to consider the course of the Lake Superior companies. At the present price of copper, there are probably only four or five mines that more than cover expenses. These, if they deem it best, can increase their mechanical appliances so as to handle a greater quantity of ore; but only one at the present time, the Calumet & Hecla, expresses the intention of adopting this policy of making these light profits heavier by largely increasing the output. Any gain, however, from this quarter will be nearly balanced by loss of production through the closing of a number of smaller mines, should the depression last. No new mining enterprise of any consequence now under way in the Lake District will add to this year's production, and the times are not propitious for the starting of fresh ventures.

We believe, therefore, as we have already remarked, that in this, the largest producing market of the world, the maximum of production has been nearly reached; and if so, it almost follows that the lowest limit of price has been touched; for, even more remarkable than the rapid production of the past four years, has been the complete absorption of the enormous surplus. If, therefore, this growing source of supply be checked, and the new industries that have absorbed it continue to grow, the inevitable result must be a rise in price.

THE BRITISH IRON TRADE.

The British iron trade is in a very discouraging condition, as the following table of exports for the past three years shows:

TOTAL SHIPMENTS FOR TWELVE MONTHS ENDED DECEMBER 31ST.

DESCRIPTIONS OF IRON.	1882.	1883.	1884.	Increase in 1884, compared with 1883.	Decrease in 1884, compared with 1883.
	Tons.	Tons.	Tons.		
Pig-iron.....	1,758,072	1,564,048	1,269,677		294,371
Bars, angles, etc.....	313,155	288,271	296,325	8,054	
Railroad material.....	936,949	971,165	729,236		241,929
Steel or iron wire.....	86,653	62,620	53,230		6,390
Hoops, sheets, etc.....	342,599	347,782	348,378	596	
Tin plates.....	265,039	269,375	288,708	19,333	
Cast and wrought manufactures.....	328,262	355,842	375,277	19,435	
Old iron.....	132,033	97,475	67,836		9,639
Steel (unwrought).....	172,329	73,131	56,614		16,517
Manufactures of steel or steel and iron	18,461	13,599	11,071		2,528
Totals.....	4,353,552	4,043,308	3,496,352	47,418	594,374
			Net decrease.....		546,956

The decline in exports to the United States is shown in the following table:

TOTAL EXPORTS TO THE UNITED STATES.

DESCRIPTIONS OF IRON.	1882.	1883.	1884.	Decrease in 1884, compared with 1883.
	Tons.	Tons.	Tons.	
Pig-iron.....	488,970	289,498	157,012	132,486
Bars, angles, etc.....	22,445	8,735	4,277	4,458
Railroad material.....	193,275	74,801	17,829	56,972
Hoops, sheets, etc.....	37,220	28,897	21,543	7,354
Tin plates.....	214,568	215,442	211,860	3,582
Cast or wrought manufactures..	6,774	5,152	2,523	2,629
Old iron.....	95,853	46,013	25,529	20,484
Steel (unwrought).....	131,281	28,411	14,231	14,180
Totals.....	1,195,386	696,949	454,804	242,145

The British iron trade has not only declined enormously and steadily in volume for some years, but in value also, until the business is almost without profit to those engaged in several important branches of it.

In general, our reports indicate that the iron market in Europe, though greatly depressed, has not reached the bottom yet. Iron says: In Austria, "sales are made below quoted rates." Business is "very flat" in Belgium. In France, "manufacturers are adding slightly to their stocks, and transactions of any bulk are unknown." "The German iron market is weaker, owing to slackness of inquiry, the supply of pig-iron especially exceeding the demand." "Values are still receding." In this country, there are indications that the bottom has been reached, and that the demand is improving, though prices are still very low.

Gold Coinage in New South Wales.—During the period from 1855 to 1883, the gold received for coinage at the Sydney Mint amounted to 18,633,504 ounces, valued at £51,943,991; of which 6,703,357 ounces, valued at £25,657,857, came from New South Wales, and the remainder from Queensland, New Zealand, Victoria, Tasmania, and elsewhere.

THE AMERICAN METAL MARKETS IN 1884.

Interest in the metal markets has centered during the entire year 1884 in the movements in copper, the leading metal so far as its value is concerned. The prices of lead have been erratic within certain limits, being at times subject to the suddenly changing views or purposes of individuals, while spelter has, more than any other metal, been depressed by general and special influences. The stagnation in business, in all manufacturing industries, the constant decline in almost all the leading staples of our agricultural interests, the cessation of investments in new railroad and manufacturing enterprises, the impoverished condition of many pushing firms and corporations, have all contributed to make the year one of timidity in buying and of sharp and often disastrous competition for orders. Closely allied as our metal-producing interests are with mining, they have suffered particularly from the causes that tend to render recuperation in that branch a matter deferred longer than in other industries. A mine, before it yields to the pressure of low prices, is kept struggling long after the point has been reached when profitable work under ordinary conditions ceases, by the suspension of dead-work, the neglect of repairs and of timbering, and the exhaustion of reserves. When it does succumb, it is in too many cases a wreck; and while it is drifting into that condition, it adds to the evils under which it is sinking. There has been a good deal of this, we fear, in copper mining; but we believe that the day is not far distant when the weak will have been all weeded out, and the industry arrived at a sound basis. In lead, the course of events has been far more favorable, and that metal enters the year with a fair future, though the decline of silver can not help having its injurious effect on a metal that is so closely allied with it in its extraction.

On the whole, the year 1884, with all its trials, has not been without its compensating features. We have had absolutely nothing of the wild-cat speculative element. The mining and smelting industries of the three leading metals have settled down to a quiet, conservative, business-like development of our resources. Trained skill has received greater recognition, and blatant charlatanism has been thrust aside. For a generation, expenditures have not been as closely scrutinized, or economies in every department as rigidly enforced. The result is not alone an absolute cheapening of cost, but also a relative lowering of the expenditures for production. If prices for labor, fuel, and supplies were to rise to-morrow to the higher figures general a few years since, the cost per pound of metal would be found to be considerably lower. That is an acquisition dearly bought, it is true, but it is likely to be a permanent improvement. If our miners and smelters have learnt, as we know they have, to accomplish more with a ton of fuel, more per ten-hour shift of labor, if they have forced down losses and carried up the yield, without sacrificing more than the metal is worth, even at present low prices, they have indeed accomplished something that a boom can not sweep away.

Copper.—As in past years, we have again made an effort to attain as closely correct an estimate as possible of the production in the United States, and while we have met with a good deal of encouragement, it is proper to state that we can not claim for our figures any thing beyond their value as an approximation to the truth. It is difficult, almost impossible, to gather full statistics in the short space of two or three weeks in a country in which the sources of supply are so widely scattered, and in some cases are so inaccessible. The estimate that we now submit is, however, close enough for all practical purposes of the trade.

The product of the Lake mines, according to preliminary data kindly furnished us, was as follows. We should add that in many cases the smelters' returns for December, and in some instances for November, are not yet in. In the table which we give below, every figure but one is an official estimate of the product of the mine named by representatives of the companies. The only exception is that of a mine that produces less than 300,000 pounds, and for which the exact product of mineral was known. The final official yield of ingot will, in most cases, alter the figures slightly, but it is believed that the total will vary not more, if not less, than 50,000 from the true product:

PRODUCTION OF COPPER ON LAKE SUPERIOR.

Name of mine.	1881.	1882.	1883.	1884.
Calumet & Hecla..	31,360,781	32,053,528	33,125,045	39,900,000
Quincy.....	5,506,848	5,665,796	6,012,239	5,658,006
Osceola.....	4,179,976	4,176,782	4,256,409	4,247,630
Franklin.....	2,677,932	3,264,120	3,488,708	3,748,652
Atlantic.....	2,528,009	2,631,708	2,682,197	3,030,000
Alouez.....	1,473,007	1,683,557	1,751,377	1,920,000
Pewabic.....	1,876,244	1,482,666	1,171,847	227,834
Central.....	1,418,465	1,353,597	1,268,556	1,435,000
Grand Portage.....	20,264	757,080	735,598	255,860
Copper Falls.....	669,121	597,500	804,000	954,000
Conglomerate.....	386,091	734,249	222,117	1,152,324
Huron.....	254,515	364,579	720,213	1,927,660
Hancock.....	571,897	540,775	484,006	562,636
Mass.....	467,684	737,440	659,474	481,396
Phoenix.....	409,357	537,177	512,291	572,427
Ridge.....	235,606	102,936	60,155	74,030
National.....		17,060	26,006	?
C.iff.....	79,382	66,053	10,374	37,924
St. Clair.....	125,493	87,126	125,235	175,619
Wolverine.....	884	25,623	699,622	151,763
Concord.....	28,849			
Evergreen Bluff..	966			
Flint Steel.....	4,140			
Belt.....		5,625	16,402	130,851
Isle Royal.....	47,308	35,447		
Madison.....	1,534			
Minnesota.....	24,227	10,672	6,226	?
Minong.....	15,397	21,380	3,582	?
Nonesuch.....	119,061	26,450		?
Ogima.....	16,776	4,207	3,000	?
Ash Bed.....	24,304	72,636		
Centennial.....		82,554		
Sheldon & Columbia	10,031	3,299		
Star.....	758			
Peninsula.....			829,460	1,223,700
Tamarack.....			7,435	?
Total.....	54,540,909	57,155,980	59,702,404	68,447,212

On the basis of these returns, we feel confident that an estimate of 68,500,000 pounds of ingot for the Lake Superior copper mines is a safe one. The total is below that of 70,000,000 that we put forward four or five months ago. It should be remembered, however, that the Calumet & Hecla fire reduced the output of that mine by about 1,400,000 pounds, so

that our estimate then, upon the data available, was as closely correct as circumstances would permit. For the output of the year 1883, given below, we are indebted to the courtesy of Mr. Albert Williams, Jr., Chief of the Bureau of Statistics and Technology of the United States Geological Survey. We should add, however, that the figures are not yet final:

	1884. Esti- mated.	1883. (U. S. Geological Survey, Preliminary.)	1882. (U. S. Geo- logical Survey.)
Michigan.....	68,500,000	59,702,404	57,955,980
Montana.....	40,500,000	24,500,000	9,058,284
Arizona.....	26,700,000	24,001,412	17,984,415
Colorado.....	2,000,000	1,152,652	1,494,000
Wyoming.....		962,468	100,000
California.....	1,600,000	1,600,862	826,695
New Mexico.....	300,000	823,511	869,498
Utah.....	175,000	341,885	605,880
Vermont.....	650,000	400,000	1,265,000
Nevada.....	100,000	188,077	350,000
Missouri.....	230,000	294,695	294,695
Eastern and Southern States.....	500,000	671,699	690,000
Miscellaneous desilverizers.....	950,000	782,880	125,000
	143,245,000	115,512,545	90,819,447
Imported pyrites.....	2,850,000	1,625,742	1,000,000

The Arizona figures include the returns of every large producer and nearly every small one in the territory. The Montana estimate is based upon figures reported by the greater number of the works. No data have, however, been received from the Anaconda mine, and the deficiency was supplied by the railroad returns of shipments of ore and matte for the year, allowing a fair grade for the ore. Gentlemen interested in the Butte copper trade are inclined to accept higher figures, but we fear that they are generally based on a somewhat liberal view of the grade of the shipping ore. The ore-shipments include 5000 tons 1883 product not counted in that year.

The year 1884 has witnessed a constant decline in prices, which is fairly reflected by the following summary from month to month of our weekly quotations. We have added the average prices abroad, since they have assumed an interest second only to the fluctuations of our own market, which now moves with them:

MONTH.	Lake Copper in New York. Cents per pound.		G. O. B. Western in New York. Cents per pound.	
	Highest.	Lowest.	Highest.	Lowest.
	January.....	15	14 $\frac{1}{2}$	14 $\frac{1}{2}$	13$\frac{3}{4}$
February.....	15	14 $\frac{1}{2}$	14 $\frac{1}{2}$	13 $\frac{3}{4}$
March.....	15	14 $\frac{1}{2}$	13 $\frac{3}{4}$	13 $\frac{3}{4}$
April.....	15	14 $\frac{1}{2}$	15 $\frac{1}{2}$	13 $\frac{3}{4}$
May.....	14 $\frac{1}{2}$	14 $\frac{1}{2}$	14 $\frac{1}{2}$	13 $\frac{3}{4}$
June.....	14 $\frac{1}{2}$	14	13 $\frac{3}{4}$	12 $\frac{3}{4}$
July.....	14 $\frac{1}{2}$	13 $\frac{3}{4}$	13	12 $\frac{3}{4}$
August.....	14	13 $\frac{3}{4}$	12 $\frac{3}{4}$	12 $\frac{3}{4}$
September.....	13 $\frac{3}{4}$	13	12 $\frac{3}{4}$	12
October.....	13 $\frac{3}{4}$	12 $\frac{3}{4}$	12	11 $\frac{3}{4}$
November.....	13	12 $\frac{3}{4}$	11 $\frac{3}{4}$	11 $\frac{3}{4}$
December.....	12 $\frac{3}{4}$	11	11 $\frac{3}{4}$	10 $\frac{3}{4}$

MONTH.	Chili Bars in London; average monthly price per gross ton.	Copper ore, Liverpool, 25 per cent; average monthly price per unit.	Precipitate, Liverpool; average monthly price per unit.	
			s. d.	s. d.
January.....	£ 57 0 6	11 3	11 10 $\frac{3}{4}$	11 10 $\frac{3}{4}$
February.....	56 1 3	11 0	11 10 $\frac{3}{4}$	11 4
March.....	54 15 6	10 10	11 4	11 4
April.....	56 3 10	10 9	11 2 $\frac{1}{2}$	11 8 $\frac{1}{2}$
May.....	56 10 0	11 11	11 8 $\frac{1}{2}$	11 8 $\frac{1}{2}$
June.....	54 18 0	10 6 $\frac{1}{2}$	11 3 $\frac{1}{2}$	11 3 $\frac{1}{2}$
July.....	54 7 3	10 3 $\frac{3}{4}$	10 11 $\frac{1}{4}$	10 11 $\frac{1}{4}$
August.....	54 9 6	10 1	10 10 $\frac{3}{4}$	10 9 $\frac{1}{2}$
September.....	54 4 5	10 2	10 9 $\frac{1}{2}$	10 9 $\frac{1}{2}$
October.....	53 15 7	10 1 $\frac{1}{2}$	10 9 $\frac{1}{2}$	10 9 $\frac{1}{2}$
November.....	52 5 0	9 9	10 5 $\frac{1}{2}$	10 5 $\frac{1}{2}$
December.....	48 18 3	9 1 $\frac{1}{2}$	9 11 $\frac{1}{4}$	9 11 $\frac{1}{4}$

The following figures are interesting as a basis for comparison between the year 1884 and previous years:

Year.	Chili Bars per gross ton.	Ore 25 p. c. per unit.	Precipitate per unit.
1879.....	£58 5s. 0d.	11s. 6 $\frac{1}{2}$ d.	12s. 11d.
1880.....	62 10s. 0d.	12s. 9d.	13s. 8 3-16d.
1881.....	61 10s. 0d.	12s. 6d.	13s. 10 1-16d.
1882.....	66 17s. 0d.	12s. 4 $\frac{1}{2}$ d.	12s. 10 9-16d.
1883.....	67 5s. 10d.	10s. 5 $\frac{1}{2}$ d.	11s. 1d.
1884.....	54 9s. 1d.	10s. 5 $\frac{1}{2}$ d.	11s. 1d.

We have so frequently and so fully discussed the phases of the market during the past year, as they followed one another in quick succession, that a brief summary will suffice to recall the leading events. We have not in the past been able to pass some of the movements made without criticism, and can not now find that our views demand a change. The policy apparently initiated to crush out rivals has thus far signally failed, and we believe that a calm survey of all the attending circumstances controlling the different producing regions will show that each one has points in its favor that insure to it a vitality that only the voluntary destruction of others can sap. The large Lake mines work cheaply, comparatively speaking, with low rates of wages, cheaper fuel, and splendidly appointed, skillfully managed plants. Their product stands unexcelled, unapproached in quality. The larger Arizona mines generally are working at a profit, and when it came to putting down the metal in New York would very closely press their older rivals. It is simply a question with them whether it is wiser to exhaust known ore reserves at present values. The Montana mines have a high grade, though an impure ore. Some of them are helped, to the extent of two

or three cents a pound, by the silver contents of their ore. Most of the works are well managed and well equipped, although this can not be said of all of them. Should they be sorely pressed, they must seek relief by a lowering of wages, for which there is undoubtedly room. Most of the other districts are now simply out of the race. Provided values keep at their present level, their dropping out will be fully made up by an increase from the three great districts, and it would not be a matter of surprise to see the total of 1885 outstrip that of 1884. We are convinced, however, that the increase will only be a small one with present prices, and that any sensational story of a further heavy addition to the make of the United States should be very closely scrutinized before it is accepted.

In 1884, the market opened quietly with little pressure to sell; but when it became known that in March the Lake companies had contracted abroad for the delivery of 7500 tons at 13 cents, there was more urgency in placing other kinds. In September, the Lake companies sold to home consumers at 13 cents, followed by sales of Arizona and other ingot and bars, and of Montana matte abroad. Later in the year, the Lake companies sold in France on the basis of Chili Bars, which brought about the severing of the Quincy Company from the combination, and the placing of about 1200 tons of that copper in the foreign market. Toward the end of the year, the companies made the arrangement with the consumers on the sliding-scale on Chili Bars.

The total exports of ingot copper from the United States during the calendar year 1884 were 30,000,000 pounds, while the exports of ore and matte were about 33,500 net tons. The bulk of the former, or about 18,000,000 pounds, was Lake copper, the rest being Arizona bars, and copper refined from bars and furnace material from different sources. Fully four fifths of the Montana product, if not more, was exported. In fact, English receipts indicate that the quantity was about 38,000,000 pounds, and it is well known that France and Germany received some ore and furnace material also from that quarter.

Copper Abroad.—The statistical position in England is best shown by the following Board of Trade returns of imports and exports, estimated in gross tons of fine copper:

	1881.	1882.	1883.	1884.
Imports.				
Ores, Chili.....	77	72	212	49
Cape.....	3,467	5,716	5,975	6,699
America.....			4,940	11,023
Other countries.....	9,070	8,385	7,510	6,906
	12,614	14,173	18,637	24,677
Regulus, Chili.....	3,652	4,897	2,873	4,815
" America.....		471	2,512	2,722
" Other countries.....	2,839	3,901	3,567	4,896
Precipitate, Spain and Portugal.....	19,364	18,615	24,592	22,608
Bars, ingots, etc., Chili.....	21,019	22,585	22,799	22,843
" Australia.....	9,150	8,152	9,531	9,329
" America.....			1,773	3,564
" Other countries.....	2,001	4,772	1,550	4,079
Pyrites.....	13,551	15,673	15,017	14,077
	84,190	93,279	102,851	113,610
Exports.				
English, wrought and unwrought.....	34,698	28,475	32,848	38,612
Yellow metal.....	9,940	10,892	11,918	11,602
Brass.....	3,264	3,499	3,382	3,736
Foreign, unwrought.....	13,790	12,818	11,203	10,742
	61,692	55,684	59,351	64,692
Difference.....	22,498	37,595	43,500	48,918

Messrs. James Lewis & Son have compiled the following figures estimating the stocks and apparent home consumption in Great Britain and France:

	1881.	1882.	1883.	1884.
Stocks of copper of all kinds in England at the end of the year were.....	35,306	32,623	36,803	35,530
Apparent home consumption of foreign copper.....	28,587	40,278	39,320	50,191
Production of Cornish mines.....	2,583	2,526	2,404	2,292
British ores sold at Swansea.....	435	73	65	
Apparent home consumption of copper.....	31,607	42,877	41,789	52,483
Stocks of copper of all kinds in France were.....	3,437	2,504	3,040	2,194
Import of copper of all kinds into France directly.....	16,436	13,573	20,894	18,683
Apparent French consumption (exclusive of import from England).....	19,461	14,506	20,358	19,529
Apparent French consumption (including import of English copper).....	27,270	21,528	26,435	23,421
Total English and French consumption of English copper and English export.....	112,760	113,067	121,498	136,704

The most interesting figures in these tables are, first, the heavy increase in the quantity of fine copper in American ores, which will drop back considerably this year, while the copper in regulus will probably show a heavy increase. The shipments of copper from Spain, both in precipitate and pyrites, have fallen off a little, while Chili and Australia have sent about the same amounts. While the receipts were large the deliveries grew on a corresponding scale, and stocks in England and France are lower than they were a year ago.

Concerning the capacity of the producers of other countries to resist present low quotations, we can not do better than to reprint the following from the annual report of Messrs. James Lewis & Son, of Liverpool, who say:

"The future value of copper now mainly depends upon the extent to which it can be profitably produced at the present, or a lower, level of prices. We will, therefore, take the different sources of supply and endeavor to give, as far as possible, the cost of production at each.

"CHILI.—It will be seen that the exports from Chili have been almost identical with those of the year 1882, and 2500 tons in excess of 1883. Lower prices have, therefore, not had the anticipated effect in this important producing country. This is explained by the fact that, whereas in January, 1883, when Chili Bars were at £65 10s., the rate of exchange in Valparaiso was 37d.; by December, 1884, when bars were sold at £47 5s., exchange had fallen to 27 $\frac{1}{2}$ d.—a decline in the exchange of 26 per cent, and in the value of copper of 28 per cent. As the miners do not consume many imported goods, and receive nearly the same number of dollars for the copper in their ore as they did when prices were so much higher on this side, they have not felt the effect of the

decline here. The export duty, amounting to about £1 per ton, has also been removed.

"SPAIN.—From the annual reports and balance-sheets of the three large Spanish companies, it appears that the cost of production was the equivalent of about £33 to £38 per ton for Chili Bars, crediting the copper with the proceeds of the sulphur and iron in the pyrites. As the iron is now of less value, and in future a considerably less price will be paid for the sulphur, it may fairly be assumed that the cost of production of the copper will be greater in 1885 than previously.

"CAPE.—From the published accounts of this company, the cost of production during 1883 appears to have been 8s. per unit, or, say, the equivalent of £40 per ton in Chili Bars, the ore being of exceptional quality.

"QUEBRADA.—The average price realized during 1883 for 3588 tons of fine copper was slightly under 11s. per unit, and as the loss was stated in the annual report to be £3963, the cost of production would appear to have been about 11s. 2d. per unit.

"NEWFOUNDLAND.—We understand that most of the mines that produce ore of low percentage of copper have been closed, as they can not now work to a profit.

"AUSTRALIA.—From what we can learn, copper can be raised in many cases profitably at present prices. About 10,800 tons were received in 1884, 9700 in 1883, and 9800 in 1882."

THE SILVER QUESTION.

The advocates of unlimited silver coinage met in Denver, Colo., on January 28th, and adopted the following resolutions as a declaration of principles:

First, That we are in favor of the doctrine of bi-metalism, as embodied in the laws of the United States previous to 1873, and we urge the enactment of those laws at the earliest practical moment.

Second, That in the interests of trade and commerce, we demand the free and unlimited coinage of gold and silver bullion at the present standard of coinage.

Third, That we demand the Congress shall pass an act directing the Secretary of the Treasury to withdraw from circulation all one and two dollar bills, in order to give a larger circulation to the standard dollar.

Fourth, That we condemn the Secretaries of the Treasury for their unlawful evasions of the provisions of the Bland bill, and other laws relating to the amendment, and demand that clearing-house balances and obligations of the government be paid without discrimination in gold and silver, or gold and silver certificates.

Fifth, That it is the sense of this convention that a law amendatory of the national bank act be enacted, whereby the said banks throughout the United States shall keep not less than fifteen per cent of the legal reserves in national standard silver coin, and also that the redemption fund of said banks shall be in silver coin.

Sixth, That until the Congress shall restore silver to its ancient, rightful, and constitutional equality with gold, in respect to coinage, we demand a liberal construction and faithful execution of the provisions of the Bland bill.

Seventh, That the demands and recommendations above named are based on broader grounds than any consideration of mere sectionalism or protection of a particular industry; that they are the well-nigh forgotten terms of a wise constitution, and laws under which this nation has gained its place as the foremost people of the globe; that silver needs no such protection as is extended to the pampered industries of the East; that this is a question touching the dearest interests of every human being in this broad land; and that it involves the question of whether the debt-paying medium of the nation shall be so changed as to increase the value of notes, bonds, mortgages and other fixed incomes and depreciate the value of all other property, and also involves the proper execution of our constitution and our laws.

The above resolutions give the views of those interested more or less in the production of silver, and it is perfectly natural that they should advocate any policy that would promise a better market for their product. Unfortunately for this interest, "it takes two to make a bargain," in silver as in other commodities, and the rest of the world does not want silver at the price our legislators have put upon it. The consequence is, that we can not use the silver we have coined, and there is a very serious danger that the public may commence hoarding gold, which, combined with the fact that our foreign payments have to be made in gold, renders it possible at any time that gold would go to a premium, and it would then surely disappear from general circulation, and we should find ourselves practically with a single standard, and that in a depreciated silver coin.

In discussing the House bill for the retirement and recoinage of the trade dollar, which, as amended by the Senate, provides for the suspension of the coinage of the standard silver dollar, Senator Morrill, of Vermont, directs attention to some of the dangers to which the present silver policy is leading us. His remarks, it is needless to say, are worthy of the most serious consideration. He said:

The Senate amendment contemplated renewed efforts to secure by concert of action with countries of the Latin Union a larger use of silver on a fixed and common ratio with gold.

Mr. Morrill defended the Treasury Department from the charge of not having given the silver dollar a fair chance to circulate, and cited statistics to support his contention. The trouble with the silver dollar, he said, is that, like the "bad penny," it would not stay in circulation. The people were not ready to receive and hold it. Paper money was much more convenient. There were some difficulties in the way of securing the concurrence of other nations for a larger use of silver, but not so much as heretofore; and if the present bill should become law, the incoming administration would, no doubt, endeavor to carry it out in good faith. It was the opinion of the Director of the Mint that our efforts in securing the co-operation of other nations would be aided if the coinage of silver dollars were suspended in advance of those efforts, instead of making the suspension contingent, to take effect, if at all, only in August, 1886. Mr. Morrill concurred in this opinion. He did not mean that co-operation of even many nations would add to the value of silver any more than would naturally arise from supply and demand. If the supply ever largely exceeded the

demand, the intrinsic value for commercial purposes must go down. Neither law nor sentiment could enable silver to escape the effect of the laws of trade.

DANGERS OF THE SITUATION.

I would by no means be an alarmist, Mr. Morrill said, and while, even with our present laws in force, we might not fall upon silver coin alone as the standard of the money of the United States in the present year, possibly not in the next, yet the fixed line we are now pursuing, it must be admitted by all, leads in the end, whether near or remote, to no other possible result. A calamitous harvest, a failure of the wheat or cotton crop, or the dreaded presence of some pestilence might bring the disaster on us speedily, in spite of our considerable power of resistance. Whenever our foreign exchange shall call for large shipments of gold, our resources to maintain both the gold and the silver standard will be put to a crucial test.

It may be said that there are no breakers ahead, and that masterly inactivity is the true policy. Every business man in the country knows that the first moment any considerable difference in value shall appear in commercial transactions between gold and silver, or when gold shall command a premium, that moment a great contraction will follow, gold will disappear, and the business of the country will be conducted without it. The net gold in the Treasury, deducting gold certificates, November 1st, 1883, was \$158,039,000, and on January 29th, 1885, it had been reduced to \$129,700,000. Thus, while gold in the Treasury appears to diminish, the receipts are diminishing also in large measure. Nothing but gold was formerly used in the lawful payment of duties on imports, but it is now far otherwise.

In seven years, with unprecedented effort, about forty-one millions of the silver dollars had been pushed into circulation. We have coined within the same time and piled up in the Treasury in addition thereto \$150,000,000 more; and could we be equally successful hereafter as we have been for seven years, it will require twenty-five years to exhaust our present stock. The amount of silver certificates issued up to December 31st, 1884, was \$133,168,291, and of these \$23,302,380 were held in the Treasury. This queer form of paper money is rapidly increasing, and appears to be usurping the place of United States notes as well as the national bank notes, but it is by far the most expensive paper currency ever invented.

For the present, silver certificates can be used in the payment of customs duties, and thus far serve the purposes of the best standard of money; but beyond this use, they can only command the value of the silver nominally represented, which is all the government in the last resort promises to redeem them with. It would seem to be very undesirable that this kind of currency should be indefinitely expanded and forced into the hands of those who may not know that they hold a promise of the government that may ultimately prove much less valuable than that of United States notes.

THE EXISTING DEPRESSION.

The depression that now pervades so many of our industrial interests appears even more conspicuously throughout the leading nations of the world. Money was never cheaper, but confidence in any business enterprise for the time is lost. The vital spark in business industries is the solid and unchanging character of the money in circulation. The financial world is always timid when a skeleton in the closet is suspected. At present, the coin and paper money in circulation are very abundant.

Mr. Morrill submitted a statement from which it appeared that there had been since 1878 a very extraordinary expansion of the money in circulation, being from \$1,005,686,408 to \$1,723,947,855, an increase of \$718,261,447, or over \$100,000,000 each year.

NO DEMONETIZATION DESIRED.

In conclusion, Mr. Morrill said: I do not wish to demonetize silver or to reduce the amount in circulation, but I would make it safe and practicable to increase the amount held in our financial institutions as well as in the hands of the people. The present bill and amendments are intended to provide against any untoward combination or event that shall leave us with only one of the precious metals to support our standard of money. We greatly need them both. It may be far off, it may never happen, but if we should be at any time driven to the single standard of silver, it would be a great disaster, affecting the value of property and of all investments. The blow, should it ever happen, would strike with the greatest severity upon the workingmen of the country, who would suddenly find their wages largely reduced by the cheaper mode of legal tender payment. The employes of the United States are better paid than in any European country, and the *London Times*, in speaking on this subject September 11th, 1883, says: "With regard to the remuneration of labor, assuming the produce of labor to be 100 in Great Britain, 56 parts go to the labor, 21 to capital, and 23 to the government. In France, 41 parts go to labor, 36 to capital, and 23 to government. In the United States, 72 parts go to labor, 23 to capital, and 5 to government." This shows that for any depreciation of the currency that may at any time arise, the laboring men of the country must bear the brunt of the loss. Capital will lose something and the government will also lose something by the loss occasioned through the cheaper currency with which customs duties must be paid; but labor will lose nearly three times as much as both capital and the government. Of all the measures that may affect the welfare of laboring men there are none more insidious or more disastrous than those that lower remuneration for labor in a depreciated currency or a currency below that of the standard value throughout the civilized world. We can not too carefully guard against such a far-reaching disaster.

Telephoning Long Distances.—A partially successful test of telephoning long distances was given on February 5th, at the Postal Telegraph Company's building in this city, by the Long Distance Telephone Company, Webster Gillett's patent. Connection was made with Meadville, Pa., a distance of 509 miles, and the result was very satisfactory. Later, Chicago, over a thousand miles by wire measurement, was connected and worked nicely at first, but later something got out of order and the results were not so good. We hope full success will attend the next tests.

MAK'S PATENT AUTOMATIC CUT-OFF VALVE.

It is now many years since the mechanical world was astir through the introduction of the Corliss cut-off valve, which, modified and improved, has maintained its position as a first-class cut-off valve actuated by "trip" motion. It marked an era in the construction and economy of the steam-engine, through the application of a principle that would indeed seem difficult to improve upon; but we lay before our readers drawings and description of a new cut-off valve, the invention of Mr. James H. Mak, of Denver, Colo., that is actuated on an entirely new principle, and which, through various and severe tests, has proved itself to possess advantages beyond the expectations of its inventor and advocates.

To describe the principle of its action, we can not do better than quote from the preamble to the patent specification No. 308,181, dated November 18th, 1884, which runs thus:

"When steam (or gas) at any pressure passes through an orifice into any lower pressure, its velocity is due to and varies approximately as the square root of the difference of pressures. When this difference is small, if then the orifice be that of a valve free to close, but kept open by its own weight or a spring, it is evident the valve will not remain open, when the difference of pressures on either side of itself produces a force greater than that tending to keep it open. The valve is in equilibrium when these forces are equal and opposite, and the velocity of the steam at the moment of equilibrium is therefore definable.

"By introducing such a valve between the slide-case and the cylinder, so that the velocity of the steam shall just produce equilibrium about the valve at the moment of maximum piston speed, the valve will close and give an instantaneous cut-off at about half-stroke. To effect the cut-off earlier than half-stroke, the phenomenon of equilibrium has merely to take place at some previous moment, which may be accomplished, 1st, by an increase in the speed of the engine; 2d, a decrease in the area of the valve; and 3d, a decrease in the load on the valve.

"From a study of the first of these causes, it appears the valve, when once adjusted, should be an automatic regulator of speed, and this is actually the case to a certain extent; but in practice it will be found necessary to adopt one of the other causes.

"Locomotive, marine, and other engines that require regulation of power at varying speeds can be fitted with mechanism by which the area of the valve or the load on it can be altered at pleasure, and so vary the point of cut-off to suit circumstances. In other engines requiring regulation of speed, any governor can be applied to actuate the cut-off valve or its load."

The particular design of valve preferred is shown in section in the accompanying cut. It is constructed on the differential principle, for the double purpose of increasing the area for the passage of steam and decreasing the weight of the valve. It is simply a hollow bobbin of steel or other suitable material, that slides on a tube arranged so that the steam for the supply of the upper seating passes through the valve itself. This week we illustrate a horizontal engine with sectional views, showing its application to a pair of vertical balanced piston-valves, arranged and driven in a somewhat novel manner, and for which application has been filed for letters patent. The principle is, however, precisely the same, whether the application be to flat or cylindrical valves, working either horizontally or vertically, namely, the steam, in passing toward the cylinder, passes through the top and bottom seatings of the valve; and if the area presented for the passage of the steam be not large enough for the maintenance of initial pressure within the cylinder, the steam will become throttled at some point in the stroke. In other words, there will be a slightly reduced pressure within the valve chamber, the excess of external pressure tending to raise the valve.

It will thus be seen, if the weight of the valve on its effective area (the difference between the areas of its two disks) represents a pressure downward less than the excess of external pressure upward, the valve will be closed by the steam at a velocity approximately equal to the influx of steam, thus producing an instantaneous cut-off.

The exact point of cut-off is determined solely by the position of the valve (the amount of opening) in relation to the speed of the engine, and it is merely necessary to raise or lower the stop on which the valve rests (normally) to effect earlier or later cut-offs.

We shall also give at some future date its application to that class of engines known as the single-acting (trunk piston engine). It is, however, equally applicable to beam-engines or inverted cylinder-engines. The principle is applicable to a valve of any design.

The use of a piston-valve and eccentric with an independent cut-off that requires no mechanism for its action will present to the engineer points for careful study that will soon convince him that they are a simple and good means for obtaining the conditions necessary for the successful working of an economical high-speed engine. By means of a piston-valve, the lead, the exhaust, and the amount of compression can be adjusted to suit the exigencies of any particular engine without considering the point of cut-off of the main valve.

By a correct proportioning of ports and port-openings, we can arrive at the finest possible admission and back-pressure lines, and at the same time, by the instantaneous action of the cut-off valve, we have a perfect cut-off and expansion line. Further than this, whereas Professor Thurston, in his recent treatise on *Stationary Steam-Engines*, has recorded "the reintroduction of the positive motion classes of valve gear and expansion gear" for high-speed engines, to which the "drop cut-off" was no longer applicable, we are now recording exactly the reverse, namely, the introduction of a non-positive and automatic cut-off valve that is applicable to low, but especially to high-speed engines.

The Hendey & Meyer Engineering Company of Denver, Colo., has taken up the manufacture of these engines, one of which is now successfully running its works. It is a horizontal 10-inch by 15-inch, making 225 revolutions a minute, from which the indicator cards appended were taken.

Twenty-four Hour Dials.—European horologists have begun to place on watches, etc., the hour-hands of which make two circuits in twenty-four hours, dials with figures so arranged from 1 to 24 that those for the day hours are shown on an inside circle and those for the night hours on an outside circle, after the manner first popularly introduced in this country.

PUMPING MACHINERY.—II.*

By E. D. Leavitt, Jr., Cambridgeport, Mass.

MINE PUMPING MACHINERY.

One of the earliest steam-engines, of any size, introduced into America, was erected about the year 1763, at the Schuylkill copper mine, situated on the Passaic River, in New Jersey. All its principal parts were imported from England; and a Mr. Hornblower (the son, it is believed, of the well-known engineer of that name) came to this country for the purpose of putting up and running this engine.

At the time when the manufacture of the engines for the Philadelphia Water-Works was commenced, and as late as the year 1803, we find five engines, in addition to the one above mentioned, noticed as being used in this country: two at the Philadelphia Water-Works; one just about being started at the Manhattan Water-Works, New York; one in Boston; and one in Roosevelt's saw-mill, New York; also a small one, used by Oliver Evans to grind plaster of Paris, in Philadelphia. Thus, at the period spoken of, out of 7 steam-engines known to be in America, 4 were pumping-engines.

In the coal regions of Pennsylvania, a simple, high-pressure, single-acting Bull engine has been extensively adopted; the dimensions usually run from 36 inches to 80 inches diameter, and a very common stroke is 10 feet. At the Empire shaft, in the Schuylkill coal region, there is a very fine pair of these engines, with 80-inch cylinders, working 24-inch pumps. The stroke of both steam-pistons and pumps is 10 feet. These Bull engines are placed either vertically or on an incline, as is most convenient for the workings. The water-valves are made either double, triple, or four beat, according as the pumps are large or small; and the beats are usually flat, and faced with leather. Many flap-valves are also in use. These are frequently arranged on conical seats, and work very well. The Bull engines, from their strength and simplicity, give very little trouble, working year after year with astonishing freedom from accident and slight cost of repair. No attempt is made to economize fuel, which consists mainly of culm, which would otherwise be wasted. Of late, direct-acting steam-pumps placed under ground have found much favor with mine operators, on account of their portability and small first cost. They usually range in size from 8-inch steam and 5-inch water cylinders by 12-inch stroke, to 30-inch steam and 14-inch water cylinders by 36-inch stroke. Great numbers of these pumps are in use all over the United States.

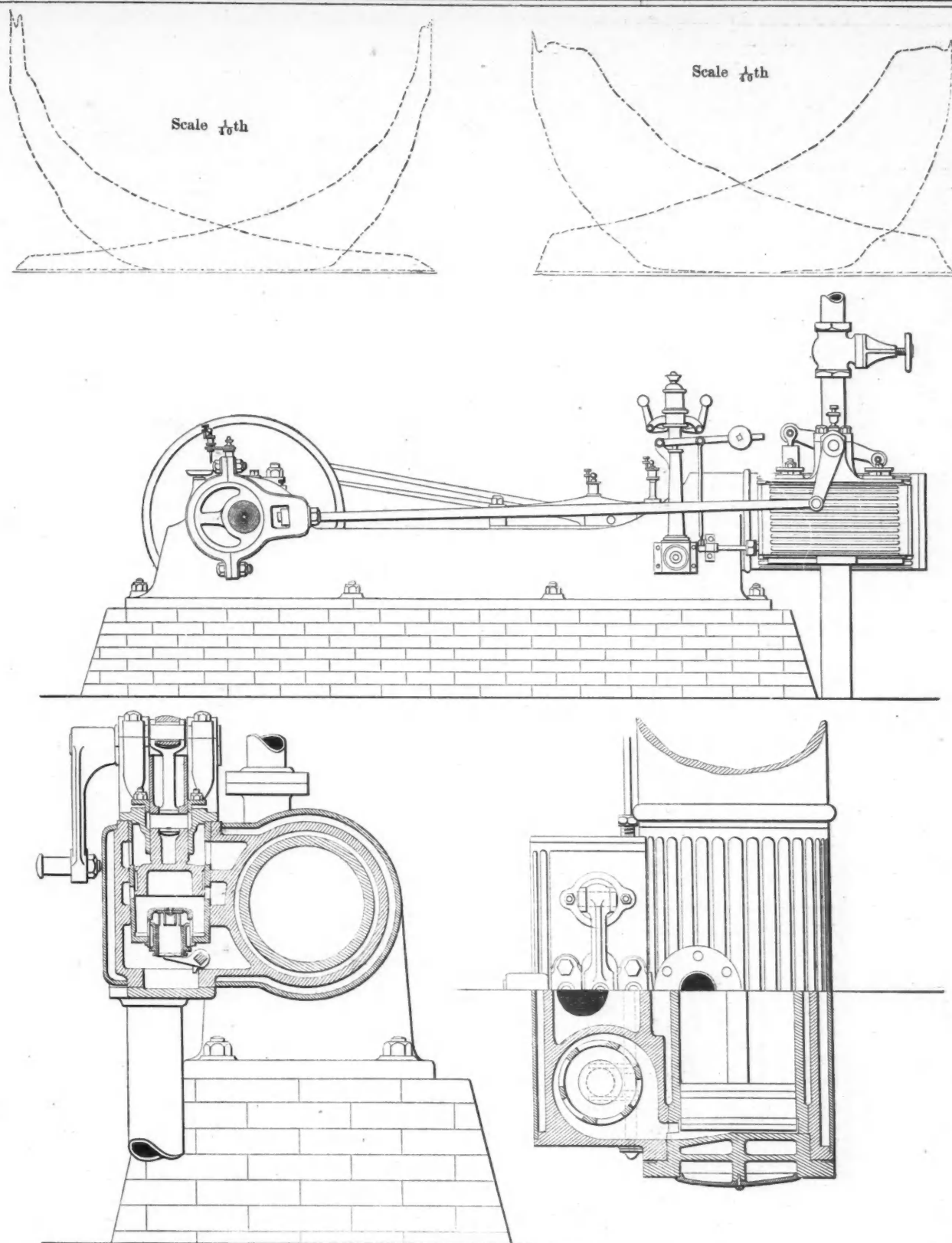
A pumping-engine that is remarkable for its size and peculiarities of construction is located at the Lehigh zinc mine, at Friedensburg, Pa. It was designed by Mr. John West, the company's engineer, and built by Merrick & Sons, of the Southwark Foundry, Philadelphia. It is a beam and fly-wheel engine, the steam-cylinder being 110 inches in diameter, with a stroke of 10 feet. There are two beams on the same main center, from the outer end of which a double line of bucket-and-plunger pumps is operated. The crank-shaft is underneath the steam-cylinder; and there are two fly-wheels, one on each end of said shaft, the crank-pins being fast in the hubs of the same. There are two connecting-rods, which are attached one to each end of an end beam-pin 28 inches in diameter. The main center and crank-shafts are also 28 inches in diameter; each of the two plunger-holes is 24 inches by 30 inches in section; and all the working parts are in proportion to those heretofore mentioned.

Perhaps no mining district has ever had to contend against greater difficulties in pumping than have faced the engineers at the celebrated Comstock lode, Virginia City, Nev. The mines are of great depth, in some instances 3300 feet; and the water is hot, rising to 160 degrees Fahr. The machinery collected at this location is of great variety and magnitude. There are many Davey engines, both horizontal and vertical. The Union and Yellow Jacket shafts have compound fly-wheel engines of very great power; the former having a beam, and the latter being horizontal, with cylinders placed side by side, and pistons connected to a massive cross-head, from the ends of which connecting-rods lead to crank-pins located in the hubs of the fly-wheels, which are overhung upon the ends of the main-shaft. From the center of the cross-head, a link runs to the main pump-bob, which operates a double line of 16-inch pumps, 10-foot stroke. The steam-stroke is 12 feet. Depth of shaft, 3300 feet.

The pumping machinery used in the iron and copper districts of Michigan usually consists of Cornish plunger-pumps, which are operated by geared engines; the latter making from 3 to 16 strokes to one of the pump's.

The largest plant of this type yet erected is that of the Calumet & Hecla copper mine, at Calumet, Mich. There are two lines of pumps, varying in diameter from 7 inches to 14 inches, and with an adjustable stroke varying from 3 feet to 9 feet. The object of the adjustable stroke is to diminish the capacity of the pumps in the dry season. Each line of pumps is driven from a crank placed on a steel spur-wheel shaft 15 inches in diameter, making 10 revolutions per minute. The mortise spur-wheels have a diameter of 22½ feet at the pitch line, with two rows of teeth, each 15 inches face. The pitch is 4.72 inches. Engaging with the mortisewheels are pinions of gun-iron 4 feet 6 inches in diameter, placed on steel shafts 12 inches in diameter, and making 50 revolutions a minute. The 12-inch pinion-shafts are driven through mortise-wheels 12 feet in diameter, and 24 inches face, by pinions 3 feet 9 inches diameter, which make 160 revolutions a minute. The pinion-shafts are driven through a wire-rope transmission from an engine located 500 feet distant. The rope-wheels are 15 feet in diameter, and make 160 revolutions a minute. The engine is 4700 horse-power, and, in addition to driving the pumping machinery, does the hoisting and air-compressing for the Calumet mine. In the same building with the mine pump-gearing, is a duplicate arrangement for operating the man-engines. In order to operate the mine-pumps and man-engine for the Hecla mine, it was necessary to use rock-shafts, which are made of gun-iron, and hollow; they are 32 inches in diameter outside, with 4½ inches thickness of metal. The pump rock-shaft is 39 feet 4½ inches long over all, in two sections, and weighs 40 tons. There are rockers placed on each end of this shaft, one of which is connected with a crank on the mortise-wheel shaft, and the other with the surface-rods that work the pump-bobs.

* A paper read at the Montreal Meeting of the British Association.



MAN'S PATENT AUTOMATIC CUF-OFF VALVE.

These rods are of Norway pine, 12 inches by 12 inches in section, and 1000 feet long. There are two bobs, one above the other, with axes at right angles, each weighing about 25 tons. The connection from the upper bob to the lower has hemispherical pins and brasses to accommodate vibrations in right-angled planes. The slope of the main pump is 39 degrees, and the machinery has been designed to raise water from 4000 feet depth. The pumps are of the usual Cornish plunger-type, with flap-valves. There is an auxiliary engine of the Porter-Allen type, for driving the pumps and man-engines when the main engine is not working. It makes 160 revolutions a minute, the same as the rope-wheels. The seeming complication of this arrangement is due to the fact that it had to be adapted to existing works, for increased depths, and put in without interfering with the daily operation of the mine.

The Calumet & Hecla Mining Company has also an extensive pumping plant at its stamp-mills, which are located on the shore of Torch Lake, about 4 1/2 miles from the mine. There are located here 8 pumping-engines; two of which have a capacity of 20,000,000 gallons a day, and the third 10,000,000 gallons a day. The water is elevated between 50 and 60 feet, and is used for treating the stamped rock. Two of the engines are of the inverted compound beam and fly-

wheel type; and the third is a geared pump, which has a horizontal double-acting plunger, 36 inches in diameter by 6-foot stroke, driven from the crank of a spur-wheel shaft.

The spur-wheel is 12 feet diameter, 24 inches face, and contains 96 teeth. The pinion engaging with it has 27 teeth, and is fast on the fly-wheel shaft of a Brown horizontal engine, having a cylinder 18 inches in diameter, and stroke of 4 feet. The steam pressure used is 110 pounds per square inch; and the engine has a Buckley condenser. The pump-valves are annular, of brass, faced with rubber, and closed by brass spiral springs. Their external diameter is 6 inches, and the lift is confined to 1/2 inch. There are 91 suction and 91 delivery valves at each end of the pump. The maximum speed of this pump is 26 double strokes a minute.

The largest of the compound engines is named Ontario, and has a vertical low-pressure cylinder 36 inches in diameter, and an inclined high-pressure cylinder 17 1/2 inches in diameter; the stroke of both being 5 feet. These are inverted over a beam, or rocker; and the pistons are connected to opposite ends of the same.

The beam-attachment of the main connecting-rod is made to a pin located above and midway between the pins for piston connections.

The main center of the beam and the crank-shaft have their pedestals in the same horizontal plane. The throw of the crank is five feet. There are two differential plunger-pumps, having upper plungers 20 inches in diameter, and lower plungers 33 inches in diameter, with a stroke of 5 feet. These pumps are vertical, and placed beneath the engine bed-plate, to which they are attached by strong brackets. The pump under the low-pressure cylinder is worked directly from its cross-head by an extension of the piston-rod. The other pump is worked by a trunk connection from the opposite end of the beam. The radius of the beam is but 50 inches, but the connections to it are made very long by links.

The lower plungers work through sleeves in diaphragms located in the center of the pumps. In these diaphragms, the openings for the delivery-valves are made. These valves are similar in construction to those previously described for the horizontal plunger-pump. Their diameter, however, is but 5½ inches, instead of 6 inches, and there are 72 suction and 72 delivery-valves for each pump. It will readily be seen that the action of these pumps is similar to that of the bucket-and-plunger; each pump having one suction and two deliveries for each revolution of the engine. The Ontario is designed to run at a maximum speed of 33 revolutions a minute; and the service required of it is to run regularly 144 hours a week, without a stop, which is performed with the utmost regularity.

The differential pump was invented and patented, many years since, by a party named James Ramsden, in Pennsylvania, who designed it for an ordinary house-pump. It was subsequently reinvented by the writer, who first ascertained that he was not the original inventor upon applying for a patent. A pump of this description was run at the Hecla mine for several years, at a speed of 500 feet a minute; and its performance was in every way satisfactory.

DIRECT-ACTING STEAM-PUMPS.

This class of pumping machinery deserves a prominent place, as the number in use vastly exceeds those of all other types combined. The first consideration will be given to the Worthington, which is the pioneer of its type; having been invented by the late Henry R. Worthington, and patented in 1844. Mr. Worthington's first pump was designed for feeding boilers. His first water-works engine was built for the city of Savannah, Ga., and erected in 1854. The second engine, which was the duplicate of the Savannah engine, was erected at the city of Cambridge, Mass., in the year 1856, and was guaranteed to deliver 300,000 gallons in twenty-four hours at an altitude of 100 feet. It had a high-pressure cylinder 12 inches in diameter placed within a low-pressure cylinder 25 inches in diameter; the low-pressure piston being annular. The double-acting water-plunger was 14 inches in diameter, and worked directly from the high-pressure piston-rod; the stroke of pistons and plunger being 25 inches. This engine was tested in 1860, with the result of a duty equal to 70,463,750 foot-pounds per 100 pounds of coal. Subsequently, a test made by Mr. Frederick Graff, of Philadelphia (long prominently connected with the Philadelphia Water Department), and the late Erastus W. Smith, of New York, developed a duty of 71,278,496 foot-pounds per 100 pounds of coal, which long remained the best record in the United States. In 1863, Mr. Worthington brought out, at Charlestown, Mass., his crowning success, the duplex engine, which fairly deserves to be placed first among the hydraulic inventions of this century. This engine has since been more extensively duplicated for water-works purposes than any other, with the possible exception of the Cornish.

ANNUAL FINANCIAL STATEMENTS.

The following companies have no indebtedness:

Arizona Southern Development Company. C. T. Bowen, President.
Big Bend Hydraulic Company. John M. Little, President.
Bonanza & Union Tunnel and Mining Company. J. M. McIntosh.
Boreel Mining Company. Augustus Ebert, Secretary.
Carnochie Consolidated Mining Company. L. H. Stevens, Secretary.
Chrysolite Silver Mining Company. R. W. Raymond, President.
Crystal Gold Mining Company. William V. Alexander, President.
Galveston & Santa Fé Coal Company. Edward R. Johns, President.
Gold Cup Mining and Smelting Company. G. W. Crane, Secretary.
Hope Mining Company. Clinton B. Fisk, President.
Iron Silver Mining Company. Homer A. Hoyt, Secretary.
Leadville Consolidated Mining Company. Augustus Ebert, Secretary.
Little Chief Mining Company. Abraham L. Earle, Secretary.
Minas Prietas Mining Company. William N. Olmstead, Secretary.
National Mining and Exploring Company. George T. Jackson, Secretary.
New Pittsburg Mining Company. Edward Earle, Secretary.
North Star Mining and Smelting Company. Lewis Crooke, Secretary.
North Star on Sultan Mining Company. Webster R. Walkley, Secretary.
Ojima Mining Company. Samuel M. Carter, President.
Pantano Gold and Silver Mining Company. W. K. Laverty, Secretary.
Plymouth Consolidated Gold Mining Company. W. Van Norden, President.
Second National Gold Mining Company. William Man, Secretary.
Small Hopes Consolidated Mining Company. Augustus Ebert, Secretary.
Sombrette Mining Company. William N. Olmstead, Secretary.
Uncompahgre Mining Company. J. T. Stevens, President.
United Gregory Mining Company. George C. Magoun, President.
Vermont Slate Company. Hugh W. Hughes, President.
Yedras Mining Company. William W. Olmstead, Secretary.

A Customs Decision.—A case having been presented to the Treasury by manufacturers of bichromate of soda against the admission of bichromate of potash at a duty of 25 per cent *ad valorem*, it was held by the Treasury that the article was properly subject to duty under the tariff of 1883 at the same rate as is imposed upon bichromate of soda—3 cents a pound. The special agents of the department recommend that the back entries on which 25 per cent duty had been imposed be readjusted at the duty of 3 cents a pound, but the Secretary has decided against this proposition.

By-Products from Smoke.—The smoke from the charcoal-works at Elk Rapids, Mich., which was formerly wasted, is now manufactured into chemicals by being blown by immense fans into a purifier, from which it eventually comes in the form of an acid that is as clear as amber. From the acid are produced acetate of lime, alcohol, tar, and gas. Each cord of wood contains 28,000 cubic feet of smoke; 2,800,000 feet of smoke handled every twenty-four hours is said to produce 12,000 pounds of acetate of lime, 200 gallons of alcohol, and twenty-five pounds of tar.

THE AMERICAN INSTITUTE OF MINING ENGINEERS.

That prolific publishing house, the office of the Secretary, has issued this week circulars No. 3 and No. 4 of the series of 1885, which are specially interesting.

Circular No. 3 contains the usual information on the subject of the annual election of officers, and incloses the following list of nominations: For President, James C. Bayles, New York City. For Vice-Presidents John Fulton, Johnstown, Pa., Richard Pearce, Denver, Colo., C. A. Stetefeldt, New York City. For Managers, C. A. Ashburner, Philadelphia, W. E. C. Coxe, Reading, Pa., E. Gybbon Spilsbury, Hale Mine, S. C. For Treasurer, Theodore D. Rand, Philadelphia. For Secretary, Rossiter W. Raymond, New York City.

Since there are this year just as many nominations as vacancies to be filled, and since nothing has been made public in the way of opposition, it may be presumed that the election, which takes place at the annual meeting, this month, will pass off without bloodshed; and that the labor of ascertaining the result will not be so exhausting to the scrutineers as it was at the Cincinnati meeting, a year ago. The renomination of Mr. Bayles is a timely departure from a bad habit into which the Institute had fallen, of changing its president annually. The rules provide that after three consecutive years at most, the president shall not be eligible for immediate re-election; and such a provision is doubtless wise. But it was never intended by those who shaped the policy of the society, that it should go to the other extreme, and dismiss each president just as he had become familiar with the duties of his office.

The names suggested for vice-presidents and managers seem to us very well chosen, in that they are the names, without exception, of men who have shown an active interest in the Institute and have made valuable contributions to its proceedings, while they are also distributed among the professions represented by the Institute, and among the different mining regions, and yet are not so widely scattered that most of them can not be relied upon to perform the first duty of a councilman, namely, help make a quorum.

Circular No. 3 gives the following provisional programme of the forty-first (annual) meeting, to be held in this city:

Tuesday Evening (Feb. 17).—Opening session at eight P.M., at the hall of the Academy of Medicine, No. 12 West Thirty-first street.

Wednesday Morning.—Session at Columbia College, where opportunity will be given to inspect the collections and library.

Wednesday Afternoon.—Visits to various points of interest.

Wednesday Evening.—Session in the Hall of the Academy of Medicine.

Thursday.—Excursion to Brewster's, N. Y., to visit the Tilly Foster iron mine.

Thursday Evening.—Subscription dinner.

Friday Morning.—Closing session at the Stevens Institute of Technology, Hoboken, where opportunity will be given for the inspection of collections, shops, etc.

Friday Afternoon.—Visits to various points of interest.

Friday Evening.—Reception at the house of Hon. Edward Cooper, No. 12 Washington Square, North.

Chairman of Local Committee.—Mr. David Williams, 83 Reade street.

Secretary.—Mr. William H. Wiley, 15 Astor place.

Hotel Headquarters.—Park Avenue Hotel, 4th Avenue and 32d and 33d streets. Special rate for members, \$3 per day. Address, for rooms, Mr. Henry Clair, at the hotel.

The Secretary also announces the following papers:

Tin Ore Deposits of the Black Hills of Dakota, by W. P. Blake, New Haven, Conn.

Note on Tantalite and Columbite in the Black Hills of Dakota, by W. P. Blake, New Haven, Conn.

A New System of Ore-Sampling, by D. W. Brunton, Denver, Col.

The Iron Ore Range of the Santiago District of Cuba, by J. P. Kimball, Bethlehem, Pa.

Notes on the Treatment of Nickel and Cobalt Mattes at Mine la Motte, Mo., by James M. Neill, Mine la Motte, Mo.

The Patience of Copper and Silver, as Affected by Annealing. By H. M. Howe, Boston, Mass.

Hematite of Franklin County, Vermont, by Alfred F. Brainerd, St. Alban's, Vt.

A New Regenerative Hot-Blast Oven, by John C. Long, Mechanicsburg, Pa.

The Water-Gas Incandescent Light, by R. W. Raymond, New York City.

A Water-Gas Open-Hearth Furnace, by N. Lilienberg, New York City.

Cost of Gold Mining and Milling in Nova Scotia, by W. I. Pierce, New York City.

The Clapp-Griffiths Process, by Robert W. Hunt, Troy, N. Y.

The Flow of Air and other Gases, by F. W. Gordon, Pittsburg, Pa.

Fire-Brick Hot-Blast Stoves, by Victor O. Strobel, Alleghany, Pa.

Combined Concentration and Amalgamation, by Walter McDermott, New York City.

Plan for a Bessemer Converting-House, without a Casting-Pit, by L. G. Laureau, New York City.

Notes on Taylor's No-Bosh Furnace, by Edgar M. Cook, Pottstown, Pa.

Note on the Use of Explosives in the Blast-Furnace and of Water-Spray for Cooling in Blowing-Down, by W. J. Taylor, Chester, N. J.

The Etta Tin Mine of Dakota, by E. N. Riotte, New York City.

The subscription dinner is to take place at Delmonico's, and we understand that the committee having it in charge are determined to make it equal or superior to any of its predecessors. They have "taken a large contract," if such is their resolution. But they are veterans, and know whereof they speak.

Shunting Locomotives as Fire-Extinguishers.—The shunting locomotives in the Prussian service are to be provided with a fire-extinguishing apparatus, by which they can be converted into fire-engines at a short notice. This arrangement has already been tried in a few cases, and has proved itself of so much service that it is now to be applied universally.

FURNACE, MILL, AND FACTORY.

Ottokar Hofmann, mining engineer, of San Francisco, has recently reported on the property of the North Mexican Silver Mining Company, whose mines are situated at Cusiuhiriachic, Mexico. The data concerning the mines are very meager; but Mr. Hofmann's experiments on the amalgamation and lixiviation of the ores are of great interest.

The Candelaria Company, of Pinos, Zacatecas, Mexico, has recently made a contract with an American company to drain its mines. The contract price is said to be \$60,000. These mines are said to be in bonanza, and are worked by tributers, who receive one twelfth of the ore produced. This selected ore is said to run \$500 a ton.

Mr. Mathey, formerly of the New York Metallurgical Works, is operating smelting-works in Chihuahua, using old slag-dumps as a flux for purchased ores. We understand Mr. Mathey proposes refining his silver bullion and shipping it in the form of coin directly to China through San Francisco.

E. Gybon Spilsbury, mining engineer, Manager of the Haile gold mine of South Carolina, is preparing for the erection of a 200-ton mill, in addition to his present 50-ton capacity.

The Blake Crusher Company, of New Haven, Conn., has taken the contract to erect and run the new 200-ton mill of the Haile Gold Mining Company, South Carolina, using its new crushers, revolving screen, and Krom steel rolls for the fine crushing; the maximum size to pass through a 60-mesh screen. Provision is made to dry in the Stetefeldt-Hasenclever shelf furnace, if necessary.

Messrs. C. H. Nicholls & Co., of this city, are doing remarkably good work with their Harrischoff copper furnaces. This firm is the largest sulphuric acid producer in America, and, we believe, the second largest in the world. The present capacity of its works at Laurel Hill is 150 tons a day.

Messrs. Becket & McDowell, contracting engineers, of this city, have recently booked several large contracts for mining machinery to go to Mexico.

Mr. J. R. Robinson, General Manager of the Santa Eulalia mines at Chihuahua, Mexico, is in New York. Mr. Robinson's works now have a capacity of 50 tons a day; but having completed eight miles of railroad to Chihuahua City, he proposes greatly to increase his output, either by furnishing works to be established by others at that point or by building works there.

Mr. F. Gregoire, of Zacatecas, Mexico, has recently sold his Musquital del Oro mines to an English company. The price is said to have been \$350,000, and a small interest in this property is reserved. The property has a ten-stamp mill, and a large addition (100 stamps) is, we understand, to be made.

Mr. Maxwell, formerly manager of the New Idria quicksilver mines, and now manager of the El Oro Mining Company, of El Oro, Mexico, is improving the concentrating plants of his works, and he has opened some new ore-bodies in the mines. These mines were formerly very productive in high-grade ores, but were finally allowed to fill with water. The draining of them has reached a depth of about 500 feet, with several hundred feet still to go. The mines are said to have a large amount of ore in sight. This is an American company.

Alexander Jacot, of the City of Mexico, has recently purchased a 20-stamp concentrating mill from Messrs. Becket & McDowell, contracting engineers of this city. It is intended to ship and not treat the concentrates.

The Walker & Pratt Manufacturing Company, of Watertown, Mass., shut down January 31st.

At a meeting of the iron manufacturers of the Mahoning Valley, held at Cleveland, Ohio, January 30th, it was resolved that, in view of the high wages West and the low prices East, it would be advisable to close down all the mills in the valley from the middle of February until June 1st.

The receivers of the Malleable Iron-Works are in negotiations with the New Haven Railroad Supply Company, of New Haven, Conn., with the view of locating at Youngstown, Ohio.

The real and personal estate of the Bolt and Iron Company of Toronto, Limited, will be sold at auction at Toronto, Ontario, February 10th.

Negotiations for a consolidation of the Joliet Steel Company, with works at Joliet, Ill., and the Union Steel Company, with works at Chicago, Ill., have been going on for some time past. Experts in the iron busi-

ness have made an appraisal of the two plants with the object of consolidation; but nothing will be settled until the subject is submitted to the stockholders in joint meeting. Such a meeting, however, has not yet been called. The Union Steel Company has decided to put the works in thorough repair, and to alter them to produce Bessemer rods by the direct process. It will probably require at least three months to make the repairs. The works will begin operations whether a consolidation is effected or not.

The proprietors of the Baldwin Locomotive-Works in Philadelphia have for some time past been looking for a site in the country for their immense shops. They have just bought the Shearer farm, near Perkiomen Junction. It is beside both the Philadelphia & Reading and Pennsylvania Schuylkill Valley Railroads.

In Pennsylvania, about twenty-five iron and steel establishments have just resumed operations.

Work at the Clymer Iron Company's furnace at Mount Laurel, Pa., has been suspended, owing to the falling in of the wall.

The Woods Run Mill, of Oliver Brothers & Phillips, started up in all departments February 4th.

The Westinghouse train signal has been adopted for all passenger trains by the Pennsylvania Railroad Company. The signal has been in use on some of the company's trains for nearly a year. It is simple and effective. A tube containing air at a pressure of fifteen pounds runs from a whistle in the engineer's cab to the rear of the train. The whistle is so arranged that, if the pressure in the tube is diminished, it will sound and warn the engineer to whistle "down-brakes," and reverse his engine. In each car of the train, is a valve under control of the brakeman, which, upon being opened, allows the compressed air to escape from the signal-tube. The action of the valves upon the whistle in the engine-cab is instantaneous. If an accident happens by which a car is detached from the train or the train breaks apart, the effect is, of course, the same as opening a signal-valve; the pressure is lowered and the signal sounds. The adjustment of this tube from car to car is done on the same principle as that by which the air-brake tubes are coupled, and takes far less time than it does to connect the bell-ropes. The same air-pump compresses the air for the brakes and the signal-tube.

The Court of Appeals of Canada has just confirmed the decisions of the Recorder's Court and Superior Court fining an iron manufacturing firm for not consuming the smoke from its furnaces in conformity with the Montreal city by-law, under which a penalty was inflicted.

The Glendower Iron-Works at Danville, Pa., started up February 4th.

The Riverside Iron and Steel Company of Cincinnati, Ohio, has been incorporated with a capital of \$300,000.

The Edgar Thomson Steel-Works, at Braddock, Pa., resumed operations February 3d.

The Last Chance mill, in Colorado, was begun in the middle of October last. Within but a little over ninety days, it was in complete operation. Mr. Henry Bolthoff, of Hendrie & Bolthoff, Denver, Colorado, has given every detail of the construction his personal attention. When the steam was turned on and the machinery started, not a thing was found to be wrong. Not a pulley was misplaced or miscalculated, not a belt was too long or too short. Every thing went like clock-work. The mill contains the following machinery: A crusher, two sets of rolls, three sizing-screens, four Hartz jigs, two of two compartments and two of three compartments, four Rouse concentrating-tables, a 35 horse-power boiler and engine, and various elevators, troughs, etc., for conveying the ore from one place to another automatically. Recently, about six tons of concentrate were shoveled out of the hoppers of the jigs, and it proved to be a remarkably clean product. That the jigs did their work so readily and perfectly is due largely to the favorable kind of ore the Last Chance mine produces. No particular bedding was required, as the ore soon bedded itself.

LABOR AND WAGES.

At a meeting of the Central Labor Union, held in this city, February 1st, the Labor Bureau at Castle Garden was discussed, and a resolution was passed that a committee be instructed to draw up a circular to be sent to all the newspapers in America and Europe, setting forth that the conditions of life in the new world have changed within the past ten years; that all the

public lands have been given away; that hundreds of miners in Pennsylvania and Ohio are starving; and that there are thousands of able-bodied men idle in all the cities of the Union.

The miners of the Tuscarawas Valley, Ohio, have accepted the 10 cents reduction proposed by the operators.

The Ohio State Miners' Union has issued an address for a reduction of 10 per cent all over Ohio in coal mining. This practically ends the Hocking Valley strike, as it brings the rate to sixty cents in that district and to fifty cents in most districts of the State.

A reduction of 10 per cent in wages went into effect February 2d, at all the mines operated by the Lehigh and Wilkes-Barre Coal Company, Pa. The reduction was accepted by the miners.

The annual report of the Employés' Relief and Beneficial Association of the Cambria Iron Company, Pa., shows aggregate receipts of \$18,674, made up of \$16,693 dues from members and \$1981 of a donation from the company. The disbursements foot up \$17,294, leaving a net balance in the treasury of \$1380.

RAILROAD NEWS.

The annual statement of the Delaware, Lackawanna & Western Railroad for the year 1884, presented at a meeting of the directors held in this city January 30th, shows that the gross earnings were \$31,311,992, a decrease of \$1,507,614, as compared with 1883; the operating expenses were \$23,008,156, a decrease of \$84,902; the net earnings were \$8,303,845, a decrease of \$1,422,714; the interest, rentals, and taxes paid were \$5,113,322, an increase of \$116,379; the cost of betterments was \$385,032, a decrease of \$687,784; and the amount paid in dividends was \$2,096,000, the same as in 1883; the surplus in 1884 was \$709,490, as against \$1,610,797 in 1883. The Buffalo extension earned \$258,000 over the guaranteed interest and dividends.

The Beach Creek, Clearfield & Southwestern Railroad was extended to Philipsburg, Pa., February 2d; and the Philadelphia & Reading road has begun to run through trains from Philadelphia and connecting trains from New York.

About sixty persons have been discharged by the Philadelphia & Reading Railroad Company, and work in the construction department of the company has virtually ceased. It is stated that under the recent order of the United States Circuit Court, little work can be done.

The New Jersey Board of Assessors of the valuation of railroad and canal property is busy revising the assessments. The Board sent to State Controller Anderson, January 30th, a number of revised returns, the most important of which was one concerning the Central Railroad. The aggregate assessed valuation was originally \$39,672,222. The adjusted amount is \$38,756,838. The tax for State uses on tangible personal property has been reduced to \$34,337, and the tax on real estate used for railroad purposes other than main stem has been reduced to \$39,173. The total tax, originally \$282,388, has been reduced to \$271,840. The tax on the main stem has not been reduced, nor has a penny been taken off the tax on the franchise. Some of the other roads have not been so fortunate in securing reductions. The difference in the amounts of some of them is so small that it will hardly be sufficient to pay the lawyers. The aggregate assessed value of the Delaware River road has been reduced \$40,000; that of the Dover & Rockaway road, \$150; that of the Hackensack, \$1350; that of the Highbridge, \$385; Long Branch & Sea Shore, \$16,667; New Jersey & New York, \$5086; New Jersey Southern Railroad, \$850; New York & Atlantic Highlands, \$600; Philadelphia & Atlantic City, \$43,297; Philadelphia & Reading, \$9680; South Branch Railroad, \$9700; Tom's River & Waretown, \$800; West End, \$381; and Williamstown & Delaware River, \$910.

The joint delegates from the London committee of security holders of the Denver & Rio Grande Railroad Company have issued their report on the financial and physical condition of the road after a visit of several weeks to Colorado. They found the physical condition of the line better than might have been expected, considering the severity of last winter, but recommend an expenditure of from \$2,500,000 to \$3,000,000 during the next three years.

According to the recent decision in the Court of Claims, the Union Pacific Railroad is indebted to the government in the sum of \$960,000.

The annual report of the Huntington & Broad Top Mountain Railroad and Coal Company, presented at the annual meeting, February 3d, shows the earnings for the year had been \$333,560.75, of which \$155,902.37 were derived from coal, \$8829.75 from coke, \$95,649.45 from merchandise, and \$48,252.27 from passengers. The expenses were \$157,836.22, leaving net earnings of \$175,724.53. This is a decrease, as compared with the previous year, of \$45,326.24.

COAL TRADE NOTES.

CANADA.

The annual report for 1884 of the Minister of the Interior shows that the sales of land in the Northwest territories show an increase, while the homesteads and pre-emptions exhibit a diminution as compared with 1883. No less than 361 applications for mineral lands other than coal lands were received chiefly in the Bow River country, and some few applications for petroleum rights on the Red Deer River. Although 370 applications were received for coal locations, only two companies are as yet doing much work. The Saskatchewan Coal Company, near Medicine Hat, delivered 6000 tons at Winnipeg at \$7.50 per ton, and the Northwest Coal and Navigation Company, on Belly River, produced 9000 tons. Grants of land have been made to the Manitoba & Southwestern Railroad, the Manitoba & Northwestern Railroad, and the Northwestern Coal and Navigation Company. The geological and natural history survey has had eighteen parties out extending their examinations through various parts of the country. A great deal of work has been done in the analyzing department, and Dr. Dawson is giving special attention to the examination and classification of the coal discoveries.

COLORADO.

EL PASO COUNTY.

The El Paso Coal Company has been incorporated with a capital stock of \$25,000. The company has just opened up a very good vein of red ash coal, about three miles north of Colorado Springs, from which an excellent quality of coal is now taken. A switch will be run to the mine from the Denver & Rio Grande track, and active work will begin at once.

ILLINOIS.

From the reports of the State inspectors, the following summaries as to the volume of business done for the year ended July 1st, 1884, are taken:

Counties producing coal.....	49
Mines and openings of all kinds.....	741
Employés of all kinds.....	25,575
Tons of coal mined (1884).....	10,101,005
Value of the same at the mines.....	\$13,164,976
Value per ton for the State at large.....	1.30

The number of mines and openings of all kinds, including numerous small enterprises for local trade, and several "strippings," is given as 741, as against 639 last year; but this apparent increase is largely owing to the fact that we have embraced and enumerated here every place where coal in any appreciable quantity has been brought to the surface. An increase of 1636 is also noticeable in the number of employés of all kinds, which is possibly owing to a more exact enumeration. The average value per ton at the mines for the State at large, as computed from the estimates made in each locality, is for this year \$1.30. Last year, the average obtained in the same manner was \$1.46, and that for the year preceding was also \$1.46, with a difference of some remote decimals, while the estimate made by the United States census officials for this State in 1880 was \$1.44 per ton. The average for this year consequently shows a falling off of 16 cents a ton, or 11 per cent from the average price realized throughout the State for the two years immediately preceding. A similar decline is observed in the average for the price of mining. Last year, an average made up from the different prices paid in all parts of the State was 90 cents a ton. This year, a similar computation gives an average for the State at large of 82 cents. This, of course, is alike removed from either extreme, the lowest price paid being nominally 37½ cents a ton and the highest \$1.50, though by far the greater number of tons are mined at the lower rates. The record of violent deaths and serious bodily injuries suffered by those engaged in mining is very much smaller this year than last. For the year 1882, forty were killed, or one for every 227,891 tons of coal mined; for 1883, fifty-five killed, or one for every 192,887 tons of coal; and for 1884, forty-six killed, or one for every 219,587 tons of coal. For the

three years, this gives us an average of one death for every 210,109 tons of product.

INDIAN TERRITORY.

An explosion of gas occurred February 2d, in a coal mine near Savanna, Indian Territory. There were several hundred miners working in the mine at the time of the explosion. Three are reported killed outright, eighty-nine seriously burned, and forty-two slightly burned and otherwise injured.

MISSOURI.

The City Council of Kansas City has passed an ordinance granting to Pittsburg and Kansas City people the right to lay mains for the utilization of natural gas from wells that have been sunk in West Kansas City. The gas will be used for heating and manufacturing purposes.

NEBRASKA.

The citizens of Brownville, Nebraska County, have put down a bore-hole 1000 feet 10 inches in depth, starting from the surface 919 feet above the sea. The surface rocks at Brownville are Upper Carboniferous. At 93 feet, a seam of coal 8 inches thick was found; another, of 14 inches, at a depth of 242 feet; and a third, of 10 inches, at 375 feet. A fourth seam of 30 inches of fair quality of coal was found at 820 feet in depth. Nothing further was met with, the rocks being shales, limestones, and sandstones, of the Lower Coal Measures. At 243 feet, a bed of sandstone 20 feet thick was found containing water impregnated with salt and other minerals in solution. The water flowed out at the top of the bore-hole.

OHIO.

NATURAL GAS.

The committee appointed at a meeting of manufacturers and business men, recently held at Youngstown, to examine into the project of natural gas, has been energetically at work upon the matter. It has ascertained the probable expense of building a pipe line from Butler County, Pa., to that city. At present, it is investigating as to what it would cost to put down several test wells in the city, it being thought that an abundance of gas can be secured there without piping it in from another State. A company has offered to lay a pipe line from Butler County to the Mahoning Valley and sell the gas to manufacturers and to others who may desire it. The proposition is under consideration.

PENNSYLVANIA.

ANTHRACITE.

The Stanton coal mine, at Wilkes-Barre, operated by the Lehigh & Wilkes-Barre Coal Company, is again inundated to a depth of eight feet. In addition to strong pumps, large boxes have been placed upon the hoisting-cages, and the water is removed as rapidly as possible. It will take several days before work will be resumed.

The Phoenix mine, near Pittston, was reported on fire in the third vein, February 2d. The fire originated in an opening leading to the Barnum shaft, and has been burning fiercely for the past two days. Though it is expected that the flames will be conquered in a day or two, there is no telling what damage has been done nor how far the fire may extend.

Packer colliery No. 3, of the Lehigh Valley Coal Company, at Shenandoah, which suspended on January 1st, has resumed operations.

The No. 2 slope of the Ebervale Coal Company was reported to be on fire February 3d, and it is feared that it will be a total loss. The flames spread with terrible rapidity, and within an hour after they were first discovered had reached the mouth of the slope and set fire to the breaker. In spite of the utmost efforts, the flames have spread through the greater portion of the workings connected with No. 2 slope, and work has been concentrated on preventing communication with No. 1 slope.

Reports dated February 5th state that the fire in No. 2 slope of the Ebervale Coal Company is still burning, and the situation is unchanged. The pumps and rolling stock have been removed. The flames are advancing toward No. 1 slope, and strenuous exertions are making to save it. It is now more than probable that the mine will have to be flooded.

E. P. Wilbur has transferred to the Lehigh Valley Company and the latter to Elisha A. Packer nearly 500 acres of coal land in Schuylkill and Carbon counties. Packer gives a \$200,000 mortgage on the land, on which he is to pay monthly 15 cents per ton for all coal mined and shipped; these monthly sums to be applied semi-annually to the interest and principal. If

in any half-year these monthly sums do not cover the interest and at least \$5000 of the principal, the deficit is to be made up. All the coal mined on the land is to be shipped east over a branch that the Lehigh Valley Company is to build from the Mahanoy branch to the colliery, and thence over the Lehigh Valley, and connecting and forwarding lines preferred by it to the exclusion of all others. E. A. Packer is to pay \$1 per ton for all coal sent over the roads without the consent of the Lehigh Valley, except that he may sell 25 per cent of the product at the mine for Western shipment, and the purchasers may designate other roads for shipment if the Lehigh Valley Company does not itself want to buy the coal.

BITUMINOUS.

Representative Schnatterly has introduced a bill in the State Legislature to revise the mining laws of the State so far as they relate to the bituminous coal region. His bill stipulates that the revision be made by a commission of eighteen, six operators, six miners, and six inspectors.

The validity of the store order under the Schnatterly bill was tested in the Alleghany County courts last week, and the result is a verdict for the operators.

COKE.

The total amount of the executions, with costs, now standing upon the records of Westmoreland County against the firm of B. F. Rafferty & Co., figures up \$79,683.77.

The coke-works of the Isabella Furnace Company, at Cokeville, about a mile from Blairsville, have started up again, having been idle for more than a year, occasioned by the burning of the crusher. It is stated that negotiations are making for the purchase of the Isabella Coke-Works by the Cambria Iron Company.

The Dunbar coal mine, which caught fire about two months ago through an explosion of fire-damp, and which has since been banked shut for the purpose of smothering the fire, was opened last week, revealing the fact that the fire, instead of being extinguished or diminished, is worse than ever.

Presley H. Moore, one of the owners of the Redstone Coke-Works, has purchased the coal and 50 acres of the surface of the 150-acre Clement farm, situated one mile north of Uniontown, for \$17,000. It is possible that coke-ovens will be erected this year.

NATURAL GAS.

An explosion of natural gas occurred at Pittsburg, January 31st, by which twenty-one people were injured. The cause of the explosion was a big leak in the huge main of the Penn Fuel-Gas Company, which runs along Butler street, close to the curb. It has been decided by the managers to lay an entire new line of low-pressure mains, covering all the trunk lines of their system. In this way, it is said, all danger of explosions will be averted. The high-pressure mains will be laid along the banks of the river, thus removing them from the thickly populated districts of the city.

The Supreme Court, at Philadelphia, February 2d, reversed the decision of the Common Pleas Court of Alleghany County in the case of the Penn Fuel-Gas Company and others against the commonwealth. The decision of the lower court allowed exclusive privileges to the Penn Fuel-Gas Company. The Supreme Court awarded a *venire de novo*. The decision destroys the monopoly and puts the Westinghouse Company and other companies in Pittsburg on an equal footing and with equal privileges.

Natural gas has almost revolutionized the manufacture of chimneys at Evans & Co.'s factory at Pittsburg. After considerable trouble, the proper heat has been secured in the furnace, and glass is made in 18 hours, instead of 24, as required by coal. A working turn heretofore of five hours' duration is now only four. Not a particle of coal is used in the works.

Several representatives from counties lying in the great natural gas belt of Northwestern Pennsylvania were in session at Harrisburg, January 28th, discussing the advisability of preparing a bill to provide for safety to life and property in the use of natural gas for heating, lighting, fuel, and manufacturing. The result of the conference was the drafting of such a measure, which is now in the hands of one of the Alleghany delegation. It was thought best to withhold the bill from presentation for a few days, in the hope that some idea outside of those already embodied would be suggested. In its present condition, the bill provides that any corporation, firm, body politic, or individual furnishing natural gas for heating, lighting, or manufacturing purposes in any building of any kind,

shall first thoroughly odorize it, so that any escape from leakage, faulty condition of pipes or connection can be detected by means of such odorization. The violation of this is in a subsequent section classed a misdemeanor, punishable with a fine of \$3000 or imprisonment for a period of not less than a year, or either or both, at the discretion of the court. The advisability of compelling councils in cities and towns using natural gas to appoint a gas inspector was discussed, but finally thrown aside on the ground that it was not feasible in all cases.

WYOMING.

The shipments of coal from Rock Springs for the past year amounted to 310,867 tons.

Active developments are making in the oil-fields in Powder River Valley. The Colorado & Wyoming Land and Oil Company has a well 800 feet, and the New York Company is drilling two wells, one about 600 and the other 400 feet deep. In all of the wells, some oil and plenty of gas have been found, but in none of them has the third or oil-bearing sand been reached. Neither company was prepared for winter operations, and the work of drilling has been stopped until spring.

GENERAL MINING NEWS.

ARIZONA.

Mr. Henry G. Hanks, State Mineralogist of California, has informed us that he has assayed the ore, reported to contain tin, from the recently discovered ledge on Cave Creek, and finds that it contains no tin.

GILA COUNTY.

OLD DOMINION.—At the recent annual meeting, the following trustees were elected for the ensuing year: George A. Pope, of Baltimore; A. Harnickell, of New York; S. P. Tenney, of Boston; Balch C. Pierce and J. G. Hannah, of New York. The result of the business for the past year has been quite satisfactory. The payment of fixed charges on the funded debt is provided for by profits made, and for the coming year there will not be the outlay for new plant, additional land, old claims, lawsuits, and interest, which in 1884 amounted to the sum of \$120,000. The rate of interest is reduced to six per cent, and the holders of obligations are in perfect harmony with the stockholders, who showed their confidence in the management, by voting against publication of details of the business, believing that at the present time of sharp competition and war in the copper business a company should keep its affairs to itself, and thereby act as partners in business with one common interest. The newly elected board is evidently much more satisfactory to the stockholders than the outgoing one. A railroad from the Atlantic & Pacific to Benson (the terminus of the Guaymas Railroad) is in process of construction, and is to go through Globe. The report of Dr. Trippel, the General Superintendent at the mines, was submitted, and proved to be most satisfactory, showing that matters at the other end of the line were well cared for. The total amount of freight—coke, copper, bullion, and supplies—handled for the Old Dominion Copper Company, for the year 1884, was 8884 tons, or about 24½ tons a day throughout the year. An exchange says: "The tonnage, although large, is but a tithe of what it would be if the company enjoyed the advantages of transportation by rail to Globe. It has it in contemplation, when rail connection is secured, to greatly increase the output of copper, which necessarily implies a corresponding increase in the consumption of coke, which now has to be hauled by wagon a distance of 130 miles at a cost of \$35 a ton."

GRAHAM COUNTY.

The Arizona and Detroit Copper companies made a reduction of 10 per cent in the wages of all employes February 1st. The new incline tramway at the Longfellow mine is completed, and shipments of ore from the mines on Longfellow Hill have begun.

PIMA COUNTY—QUIJOTOA DISTRICT.

Messrs. Patton, Towne, and Cutler, connected with the Bonanza Company, have been at Quijotoa. They have examined the Harshaw mill, to let a contract for hauling the same. The compressors are running steadily. Negotiations are pending for the purchase of the Devon mine; \$100,000 is the sum asked. Western papers are constantly giving the most rose-colored reports of this camp, which they term "the sun-kissed land of ours." The foundations for the boom that we predicted in the JOURNAL a few weeks

ago are carefully laid, and the manipulators are preparing for a large deal.

AUSTRALIA.

Fresh discoveries of silver are continually made in various parts of New South Wales, several being of great richness. The population of Silverton, which a couple of years ago had no existence, now exceeds 5000. Capital to a large extent has been subscribed for working the mines, and Silverton is likely to become one of the largest and most flourishing towns in the colony. The quantity of silver ore raised at the mines at Silverton to the end of September, 1884, was 5115 tons, valued at £116,590. Mitchell's Creek, the center of another silver field in New South Wales, is in future to be called Silver City. The first silver smelting-furnace in Australia has just been constructed at the Sunny Corner silver mines. Four years ago, these mines could have been purchased for £2000. Now the proprietors, it is said, have refused an offer of £200,000.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

Reports for the week ended January 24th:

CONSOLIDATED PACIFIC.—In cross-cut 130 feet below tunnel level to cut Pacific ledge No. 2, a vein of quartz was encountered. The vein has none of the characteristics of No. 2, and it is thought to be a separate vein.

NEW STANDARD.—All but five creditors have signed for a trust deed of the mine for a period of six months. R. K. Colcord is to take the management, and will require an indemnifying bond that all bills must be paid as contracted. The miners are to receive their pay first. In mean time, if the indebtedness be squared, the property will revert to the owners.

STANDARD CONSOLIDATED.—During the week, the men employed consisted of 32 miners, two carmen, 4 laborers, 1 blacksmith helper, 1 fireman, 1 watchman, at \$4 a day; 1 blacksmith, 1 pump-man, 1 shift-boss at \$5 a day; and 1 foreman at \$250 a month. There were extracted and shipped to the mill 576 tons of ore, and received 770 ounces of crude bullion.

SAN BERNARDINO COUNTY—CALICO DISTRICT.

There is a likelihood of some interesting litigation over the boundaries of some of the Calico mines since their value has been demonstrated by development. Several lawsuits are on the tapis.

SUE.—The tunnel at the foot of the falls, which has been steadily pushed ahead on two wings, during the past two months, is in 220 feet on one course, and has struck a body of good ore. This tunnel is not less than 1000 feet below the main shaft on the apex of the mountain, which is over 125 feet deep in first-class ore, and there are surface indications where ore has been taken out the whole 1500 feet length of the ledge.

CANADA.

PROVINCE OF QUEBEC.

JOHNSON.—This company has been organized with a capital stock of \$250,000 for the purpose of carrying on mining operations, with headquarters in the township of Thetford, county of Megantic.

COLORADO.

BOULDER COUNTY.

LADY FRANKLIN.—A strike is reported.

CLEAR CREEK COUNTY.

CAMPBELL SMELTING-WORKS.—The company is out of funds, and work has been stopped.

LILY.—This company, recently incorporated, is preparing to work its property extensively. The company has purchased the old Sunshine mill to treat its ores.

RED ELEPHANT.—Much improvement and development-work is going on to place the mines in good condition for extensive work. About 50 men are employed, and nearly every lessee has encountered paying mineral. A contract has been let to sink and timber the Schwartz shaft a farther depth of 50 feet.

DOLORES COUNTY.

HILDEBRAND.—This company, which owns the Eliza Jane, the Lucky Boy, and other claims, has bought a ten-stamp mill to work the ore of its Golden Eagle claim at Ophir. It also intends to put up a tramway.

PASADENA.—The material for a water-jacket furnace is to be purchased soon.

EL PASO COUNTY.

DOMO.—The company is doing considerable prospecting on Cheyenne Mountain, near Colorado Springs.

FREMONT COUNTY.

COLORADO COPPER COMPANY.—With a capital stock of \$50,000, this company has been incorporated. The principal offices are in Cañon City.

GILPIN COUNTY.

NINON & BONANZA TUNNEL COMPANY.—New air-compressors and steam-boilers have been received and placed. The erection of 50 stamps is contemplated. They will be erected east of and adjoining the main building.

LAKE COUNTY.

The Leadville Herald publishes the following:

Ore of higher grade than in the upper workings is found below the lime strata on Iron Hill. In the A. Y. and Minnie mines, important discoveries of this character have been made.

FOREPAUGH.—The property is leased, and, after lying dormant for months, is worked again. A good grade of mineral is hoisted and shipped to the Harrison works and Royal Gorge smelter. It averages the lessees from 40 to 46 ounces to the ton. Two shifts are worked, and prospecting-work is going on from the lower levels.

ROBERT E. LEE.—The leases have all expired, and work is suspended for the present, waiting the decision of the company as to renewal. Several of the leases have proved profitable; others, not so.

SILVER CORD.—About fifty tons of ore are shipped daily. The amount will be increased soon. The working force is yet small.

WOLFE TONE.—The shaft has been cleared of water, and operations can now proceed. A similar pump will be placed, in a short time, about 200 feet below the first one, when the mine will be able to handle all the water liable to be encountered in sinking several hundred feet below the present workings. The neighboring properties will also be benefited. Ore-shipments will begin as soon as necessary preparations are completed.

PARK COUNTY.

LAST CHANCE.—The concentrating mill has started up, and is running smoothly. The operators of course find a few things that will have to be added, but the main details of the mill are perfect and reflect credit upon the builders, Messrs. Hendrie & Bolthoff, of Denver.

NESTOR.—The mill has been closed, owing to some difficulty among the lessees.

SAN JUAN COUNTY.

NEW YORK & SAN JUAN MINING AND SMELTING COMPANY.—The striking miners have resumed work at \$3.50 a day, including board, with the understanding that their wages will not be reduced this winter.

DAKOTA.

LAWRENCE COUNTY.

FATHER DE SMET.—The superintendent reports, under date of January 18th, as follows: Inclosed please find express company's receipt for bar No. 200, containing 921.75 ounces of gold, the result of the run of the mill for the first half of this month. At the mine, every thing continues running along well. We are producing the usual amount of ore at every point. The grade has fallen off some in the last week, but is doing better now, and will make an average showing for this month. West cross-cut, third level, is making good headway, and, so far, is over 30 feet in fair milling ore, with no indications of foot-wall yet.

IDAHO.

BAY HORSE.—The first shipment of refined bullion has been made, and will be followed by regular shipments, while the lead will be retained to use in the furnaces in smelting.

MEXICO.

TRINIDAD.—It is reported that the English company owning this mine, located on the western slope of the Sierra Madre in the State of Sonora, has decided definitely upon the erection of reduction-works of 300 tons capacity. Local papers state that it is doubtful whether sufficient ore can be produced to keep such works in operation. In all probability, the company intends to purchase ores from neighboring mine-owners in addition to the business of mining and working the product of the Trinidad.

MICHIGAN.

GOLD AND SILVER MINES.

TEAL LAKE GOLD AND SILVER EXPLORING COMPANY.—For the purpose of exploring on section 25-48-27, and adjoining sections, for gold and silver, under an option from the Michigan Land and Iron Company, this company has been organized. The option runs three months, with privilege of renewal to the holders. The royalty to be paid, in case a paying mine or mines should be developed by the company, is 10 per cent on the gross product. It is intended to begin exploratory work as soon as this can be pro-

cutted to advantage. The property lies east of the Ropes, and south of the Berringer-Thurber exploration.

IRON MINES.

LAKE SUPERIOR.—Recent discoveries in this hematite mine with the diamond drill have revealed a large body of ore. In point of quality, the ore is identical with that in the main workings of the mine, it being truly a continuation of the same vein as found there, but at a point several hundred feet farther to the southeast. Crossing the formation, several holes have been put in, showing a width of from 200 to 500 feet. The ore, a hard hematite, can be easily worked, not requiring that attention in timbering needed in softer ores.

MICHIGAN LAND AND IRON COMPANY.—Over fifty options for leases have been given by the company during the past two weeks, to parties who will explore for gold and silver.

MONTANA.

GALLATIN COUNTY.

YELLOWSTONE MILLING COMPANY.—The machinery for the company's new quartz mill has arrived.

SILVER BOW COUNTY.

CHATTANOOGA.—The property has been leased for eighteen months, one fourth of the ore extracted to go as royalty to the owner. The mine was also bonded for eight months for \$15,000 to the same parties. The main shaft is down about 90 feet, another down 45 feet, and one about 14 feet on a 12-foot vein of ore, which assays about \$19. The gold product of ore is about \$7 per ton; the rest is silver and copper.

MARGARET ANN.—The mine has been drained, and sinking the main shaft resumed.

MONTANA COPPER COMPANY.—The company was ready to resume operations January 26th, but the men refused to resume at reduced wages.

MOUNTAIN CHIEF.—The mine has been bonded for twelve months for \$20,000.

PARROT.—Three hundred tons of ore are produced daily. The new smelter continues to run satisfactorily.

NEVADA.

The Silver Convention met at Carson, February 1st, and a permanent State Silver Association was organized. A memorial has been prepared for presentation to Congress asking for unlimited coinage of silver.

ELKO COUNTY.

GRAND PRIZE.—The mine and mill have been shut down, on account of lack of fuel, until spring.

ESMERALDA COUNTY.

MOUNT DIABLO.—The company has a favorable contract with the Carson & Colorado Railroad Company, and has begun to haul ore to the old Northern Belle dumps for shipment to the mills at Bellville. The mills were to begin to crush this ore February 1st.

EUREKA COUNTY.

RICHMOND CONSOLIDATED.—Three furnaces are running in full blast, two of which have a daily capacity of 50 tons, the other 60 tons. Ore is shipped to them from the Richmond mine and several outside properties.

HUMBOLDT COUNTY.

PARADISE VALLEY.—The machinery and all other material for the mill have been purchased, and are shipping to the mines. When the company gets well to work again, it is the intention to further prospect the Wild Goose claim by going into the lower level (No. 4 tunnel) of the Paradise, now in 800 feet, and drift 500 feet and cut the Wild Goose 700 feet deep.

STOREY COUNTY—COMSTOCK LODGE.

CHOLLAR.—The Supreme Court has granted the writ of prohibition prayed for in the case of the Chollar Mining Company vs. Wilson, Judge. It is held that "a majority of the stockholders" and "the holders of the majority stock" is the same thing. Both are used in the act. This is held to be decisive of the cause. The argument as to results is entitled to little weight. The suit was originally brought to prevent any change in the officers of the company.

KEYES.—The mine, which had been closed down pending repairs to the hoisting machinery, has started up. The new management is preparing to settle the liabilities.

SIERRA NEVADA.—The annual meeting was held at San Francisco, January 21st. The receipts during the year, including three assessments, amounted to \$270,839; the total disbursements to \$256,513. Cash on hand, \$14,451. The developments made in the mine during the year present nothing of special importance. A petition was presented by Mr. Carrere protesting against the stoppage of work below the Suro Tunnel level, and stating that he had positive information that

a paying ore-body could be found around the 2100 level, and that he had in his possession ore from that level that he had assayed and proved to be paying ore. Mr. Fish stated that Mr. Mackay had authorized him to offer any body \$5000 to find the ore-body. If any one believed that an ore-body was covered up, he would be given all the facilities for investigating the matter, and would have access to the mine and be provided with the necessary help. A bond, however, must be filed to pay the expenses of prospecting, if such an ore-body was not discovered. M. W. Fox and Pierre Carrere were appointed such a committee to go to the mine and prospect for the alleged covered ore-body. They were authorized to appoint a mining engineer as a third member of the committee.

NEW MEXICO.

GRANT COUNTY.

PIÑOS ALTOS GOLD AND SILVER MINING COMPANY.—The company offers to reduce free gold ores of the Gold District as follows: For lots of ore from 20 to 100 tons, \$5 a ton, and over 100 tons, \$4 a ton. At present, the mill is closed.

OLD MAN.—Hoisting-works are erecting. It is stated that there are from 12,000 to 15,000 tons of ore on the dump valued at about \$18 a ton.

PENNSYLVANIA.

LEHIGH COUNTY.

The zinc mines in Friedensville closed down February 2d. The mines were operated by Osgood & Co., New York.

UTAH.

BEAVER COUNTY.

COMET.—A dispatch from Paris directs the continuation of work. A meeting of stockholders is to be held in Salt Lake City on the 28th, and plans will then be perfected to prosecute work in a practical manner.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Feb. 6.

Dullness rules supreme at the Mining Exchange, and the transactions made present no interesting features. Prices have been firm. The Board of Managers of the Produce Exchange, February 5th, unanimously adopted rules for the control of transactions in pipe line certificates, and the rules will go into effect February 7th. There will then be three exchanges in this city in which speculation in oil can be carried on. The rules provide for a committee of five to govern the business in pipe line certificates and to superintend the clearance of contracts. Dealings are to be in certificates of 1000 barrels each, and an original margin of 10 per cent can be called for by either party to any transaction.

The financial statement of the Father de Smet Mining Company, presented at the annual meeting held in San Francisco, February 5th, shows that the affairs of the company are in a prosperous condition. The total receipts during the year amounted to \$474,552.94, and the total disbursements to \$234,200.70, leaving a net profit of \$240,352.24. The company has paid \$200,000 in dividends, and has at present a cash balance on hand of \$30,290.73. A very small business is generally done with this stock, and no sales are reported this week; the price is steady, and varies from \$4.50@\$. The shares of the Homestake Mining Company, which has paid regular monthly dividends for the past half-year, also show occasional sales; a lot of 100 shares was sold this week at \$10.50.

Horn-Silver has again been a prominent feature of the market, and sales amounting to 5885 shares are recorded; the price has ruled lower, and closed at \$2.45. No sales were made to-day. The company is preparing a statement, which will probably be issued to the stockholders within a few days, explaining the reasons for the passing of the dividend. Heavy pumping and hoisting machinery is erecting, and it is said that the mine is not looking well, especially in the eighth level, so that the management deems it but prudent to defer dividends for the present and devote the money to more extensive exploration of the mine.

The price of Standard Consolidated has been steadily increasing, and during the week went as high as \$1; the sales amounted to 3960 shares. This is probably due to the reported improved condition of the mine. Telegraphic advices from San Francisco show that the following directors were elected, at the annual meeting held there February 2d: Joseph Tate, G. H. Warren, Jr., W. H. Oscanyan, all of New York; Albert P. Brayton, John Mason, Thomas C. Grant, A. Pettibone, all

of San Francisco. At a subsequent meeting of directors, February 5th, Mr. A. Pettibone was elected President, Joseph Tate Vice-President, J. W. Pew Secretary, and H. C. Manning Assistant-Secretary. The company's New York agency will be at the office of E. St. John Hays & Co., No 11 Pine street. The company's annual report has not yet been received. Bodie and Bulwer have been quiet. The former's price ranged from \$2.05@\$.2.30, closing at \$2.30; and the latter from 7@10c., closing at 6c. Plymouth Consolidated comes to the front with its twenty-first dividend of \$50,000. The payment of dividends began in June, 1883, and now amount to \$1,050,000. The stock is moderately dealt in, and the sales this week amounted to but 2355 shares at from \$15.50@\$.16.25. Quicksilver Common appears on the list with a sale of 700 shares at \$5 a share.

The largest business has been done in the Comstock shares. Consolidated California & Virginia has been the favorite stock, and shows a business amounting to 4520 shares; the price has ruled steady at from 12@15c.; and that of Suro Tunnel at from 11@12c., with sales of 7200 shares. Savage, Mexican, Union Consolidated, Sierra Nevada, and others show occasional small transactions. Among the other Nevada stocks, Albion Consolidated was the most prominent, selling steadily at from 8@9c., showing transactions amounting to 5100 shares.

The business of the Colorado stocks present no specially interesting feature. Red Elephant, Little Chief, Chrysolite, and Amie show the largest business. Silver King and Alice were steady; the former sold at from \$4@\$.4.25, and the latter at from \$1.95@\$.2.

The total sales amounted to 59,315 shares, against 91,075 shares for the preceding week, showing a decrease of sales of 31,760 shares. A complete summary of the market will be found elsewhere.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report that the oil market during the past week has been dull, stationary, and without feature. The highest price was 69 $\frac{1}{2}$ c. and the lowest 68 $\frac{3}{4}$ c. It is remarkable that the range of prices has been so small. There are five wells due on the frontier of Thorn Creek, and as they are located, it is probable that the result of these developments will determine the character and fertility of the field.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Jan. 31	\$.69 $\frac{1}{4}$	\$.69 $\frac{1}{4}$	\$.69 $\frac{1}{4}$	\$.69 $\frac{1}{4}$	1,772,000
Feb. 2	.69 $\frac{1}{2}$	.69 $\frac{1}{2}$	.68 $\frac{3}{4}$	.68 $\frac{3}{4}$	2,074,000
3	.68 $\frac{3}{4}$	.69 $\frac{1}{4}$	.68 $\frac{3}{4}$	.69	1,708,000
4	.69 $\frac{1}{4}$	.69 $\frac{1}{4}$	.69	.69 $\frac{1}{4}$	866,000
5	.68 $\frac{3}{4}$	.69 $\frac{1}{2}$	.68 $\frac{3}{4}$	.69 $\frac{1}{4}$	1,755,000
6	.69 $\frac{1}{2}$	.69 $\frac{1}{2}$	.69 $\frac{1}{2}$	.69 $\frac{1}{4}$	1,263,000
Total sales					9,438,000

MEETINGS.

The annual meetings of the following companies for the election of trustees and the transaction of business will be held at the times mentioned:

Counellsville Gas-Cool Company, No. 333 Walnut street, Philadelphia, Pa., February 23d, at twelve o'clock M.

Cranberry Iron and Coal Company, No. 237 South Third street, Philadelphia, Pa., February 17th, at twelve o'clock M.

J. L. Mott Iron-Works, Nos. 88 and 90 Beekman street, New York City, February 16th, at three o'clock P.M.

Locust Mountain Coal and Iron Company, No. 222 South Third street, Philadelphia, Pa., February 24th, at twelve o'clock M.

Laffin & Rand Powder Company, No. 29 Murray street, New York City, February 10th, at twelve o'clock M.

Moreno Valley Gold Gravel Mining Company, Metropolitan Hotel, New York City, February 10th, at two o'clock P.M.

DIVIDENDS.

Atlantic Mining Company, of Michigan, has declared a dividend of 50 cents a share.

Big Bend Hydraulic Mining Company, of California, has declared a dividend (No. 21) of \$6000, payable on and after February 5th.

Navajo Mining Company, of Nevada, has declared a dividend of 25 cents a share.

Philadelphia & Reading Railroad receivers will purchase on February 11th, at the rate of five per cent per annum, the interest and coupons of the McNeal

tract divisional coal land mortgage bonds due on the 1st prox.

Plymouth Consolidated Mining Company, of California, has declared a dividend (No. 21) of \$50,000, payable on and after February 5th. Total amount of dividends to date, \$1,050,000.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF JANUARY AND FROM JANUARY 1ST, 1885.

Table with columns: NAME OF COMPANY, Location of mines, Paid during month of January, Since January 1st, 1885. Lists companies like Adams, L., Bellevue-Idaho, Big Bend Hydraulic, etc.

S., Silver; L., Lead; G., Gold.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

Table with columns: NAME OF COMPANY, Jan. 30, Jan. 31, Feb. 2, Feb. 3, Feb. 4, Feb. 5. Lists companies like Albion, Alpha, Alta, Argenta, etc.

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Feb. 5.

The transactions in copper stocks the past week have been confined principally to Quincy, which in the early dealings showed considerable weakness, and declined from \$28 to \$26. With a pressure to sell the stock, the market, however, absorbed all the lots offered, and good buying orders advanced the price to \$29, which was bid for it to-day.

In silver stocks, there is but little doing, and quotations are in a great measure nominal. Catalpa, 30c. bid, 23 1/2c. asked. Dunkin, 19@20c. "Cusi," \$1@1.05. Bowman declined to 10c., with sales at 8c. and 9c., seller 60. In miscellaneous stocks, American Electric

and Illuminating Company common was steady at \$2 1/2. Water meters, dull and heavy.

3 P.M.—At the afternoon Board, there were no sales of copper stocks. Calumet & Hecla was strong at \$156 bid, \$157 asked. Franklin, \$6 1/2@6 3/4. Osceola, \$9 1/2@10. Quincy, \$28 1/2 bid. Atlantic, \$6 1/2 bid. Bowman, 9@11c. Dunkin, 19@20c.

BULLION MARKET.

NEW YORK, Friday Evening, Feb. 6.

Table with columns: DATE, London, N. Y., DATE, London, N. Y. Shows gold and silver prices for Jan. 31 and Feb. 3.

* 49 1/2 @ 49 1/2.

BULLION PRODUCTION FOR 1884.

Table with columns: MINES, States, Month of December, Year from Jan. 1st, 1884. Lists mines like Adams, Alice, Andes, Belcher, Belmont, etc.

Total amount of shipments to date.....\$22,828,006

* Official. † Assay value. ‡ Not including value of lead and copper; G., gold; S., silver; L., lead; C., copper; Z., zinc. — No bullion produced. Silver valued by the different companies from \$1.05@1.29-29 per ounce; gold, \$20.67.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains 4 per cent. During the week, the bank gained £302,000 bullion, and the proportion of its reserve to its liabilities was raised from 45 1/2 to 46 1/4, against 40 1/2 per cent at this date last year.

Purchase of Silver.—The Treasury Department, February 5th, purchased 387,000 ounces of silver for delivery at the New Orleans, Philadelphia, and Carson mints.]

United States Assay-Office at New York.—The following is a statement of business for the month ended January 31st, 1885:

Table showing Deposits of gold, Deposits of silver, Total deposits, Gold bars stamped, Silver bars stamped.

PAYMENTS.

Table showing Treasury drafts, Post-office drafts, Disbursing accounts, Assay-Office, Interest accounts.

Balance.....\$148,634,650.61

Table showing Balance to credit Treasurer, United States, Balance to credit disbursing accounts, Balance to credit Assay-Office, Receipts for customs in the month of January, 1884, Receipts for customs in the month of January, 1885, Decrease, 1885.

METALS.

NEW YORK, Friday Evening, Feb. 6.

Copper.—This metal shows a greater degree of firmness than last week, and prices are a little better. The Lake pool price for February is 10 80c., but it is actually bringing 11@11 20c., though both Chili Bars and Best Selected, in London, have receded slightly from last week's quotations.

Cables to-day quote Chili Bars £47 10s.; Best Selected, £52 16s., as against £48 7s. 6d. and £53 10s. last week.

The pool sales abroad, which are made at £4 above the average for the month of Chili Bars, are still discussed. It is said that the Rothschilds are the buyers, and the price in London is held at £3 above the figure obtained by the Calumet & Hecla.

There appears to be a strong opinion among gentlemen in the trade that the pool could have done much better with its product and have maintained prices stronger here had it sold abroad directly to consumers through a competent agent of their own, rather than to sell its entire shipments to a speculator who advances the price, as reported now, £3 above the pool price, and who is less interested in getting the best attainable prices, than the company itself would be; and the company loses also the advantage of being brought into direct communication with the consumers.

In our editorial columns, we give a general review of the outlook for copper and in another column the full est production statistics of this metal that have yet been published in this country. The data for these figures have been collected with infinite diligence by our late editor, Mr. Charles Kirchhoff, Jr.

We quote Lake at 11@11 1/4c., and other brands 10 1/2@11c.

Tin.—The market is quiet and a little irregular, owing to fluctuations in London quotations. Cables to-day quote spot Shorts quiet at £76 10s., and three months £77—a slight decline from last week. The quotations vary daily. The stock of tin on hand in this market the first of the present month is estimated at about 1500 tons, with an additional 500 tons afloat.

We quote Straits 17 1/2@17 3/4c.

Lead.—We hear of rather more business doing in this metal. Sales aggregating about 1000 tons at 3 70c., which may be taken as the present quotation and 3 65c. bid for Common or Corroding. We shall next week publish full statistics of our lead production for 1884. The figures will show that it was less than in 1883 by several thousand tons. The probabilities for the present year are, that the output will not exceed that of 1884. If it should fall much below that, or if a better demand should spring up from a general revival of business, lead would probably soon rise to 4c. or 4 1/2c. Unfortunately, either of these contingencies is too far in the dim distance to be clearly discerned.

Messrs. John Wahl & Co., of St. Louis, telegraph to us as follows to-day:

Lead firm, but quiet. Refined is held at 3 50c., Common at 3 45c. Sales amount to two hundred tons. Desilverized lead held at 3 50c.

Messrs. Charles Raht, the well-known copper broker, C. W. Tarbell, of Lucius Hart & Co., Norman Freemant, Alfred G. Smith, D. W. Fenton, of the Erie Preserving Company, and C. J. W. Alburts, spelter

broker, were elected members of the Metal Exchange, February 5th.

Spelter.—The market is quiet but firm at 4'45@4'50c. Cables to-day quote £14, with slight fluctuations.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 6.

American Pig.—The pig-iron market continues dull, with but little doing, and the orders are nearly all for immediate consumption. The only relief to this monotonous report is, that some of the furnace companies who had a regular established trade, state that their customers have ordered as much and some more iron this year than last. The Thomas Iron Company intends blowing in another furnace soon, but there are so many furnaces idle that this encouraging ray can scarcely pierce the prevailing gloom.

We continue to quote \$18@18.50 for No. 1 Foundry; \$17@17.50 for No. 2; and \$16@17 for Gray Forge.

The question of reducing the cost of fuel and transportation in some cases is attracting attention, but the general feeling is, that the trade is likely to be very quiet for some time to come, and that any great improvement is to be looked for after the opening of navigation.

The following are the Metal Exchange furnace statistics: Coke furnaces—January 27th, in blast, 65; out of blast, 128; total, 193. Stock on hand, January 1st, 1885, 188,835 tons; December 1st, 1884, 156,936 tons. Anthracite furnaces—In blast, 4; out, 22; total, 26. Stock—January 1st, No. 1, 1021; No. 2, 688; February 1st, No. 1, 1353; No. 2, 1012; Bessemer Forge and lower grades, January 1st, 4601; February 1st, 1905. Total, January 1st, 6310; February 1st, 4270. Bituminous furnaces—In blast, 4; out of blast, 22; total, 26. Stock—All grades, January 1st, 20,037 tons; February 1st, 19,492 tons. Charcoal furnaces—Stock, all grades, January 1st, 21,821; February 1st, 21,984 tons.

Scotch Pig.—There have been no arrivals this week, owing to the recent storms, and, in fact, this trade has dwindled to insignificant proportions, though freights are now free, the steamship lines now offering to carry as ballast, yet the low prices of American irons have almost closed this market to the Scotch brands. We quote Coltness, \$21.50; Langloan, \$21.50; Gartsherrie, \$21; Summerlee, \$20.50; Eglinton, \$19. At the Metal Exchange, the following cables have been received to-day: Coltness and Langloan, 54s. 9d.; Summerlee, 51s. 6d.; Gartsherrie, 51s. 9d.; Glenarnock, 48s. 6d.; Eglinton, 42s. 9d.—a slight decline throughout the list from last week, but the fluctuations in Scotch irons have scarcely exceeded 1s. @2s. in the past year.

Spiegeleisen.—We hear of some sales of foreign spiegel at figures below the regular quotations, which are \$26@26.50 for 20 per cent, and \$30 for 30 per cent spiegel.

Steel Rails.—The business has been confined to Western mills, and prices are unchanged. We hear of an important contract taken by a Western mill at \$29, delivered at Chicago. We quote \$26@27 at Eastern mills, with a certain firmness, though no indication of any higher prices.

Old Rails are quiet, and, as in every thing else, the buyer has the advantage. We continue to quote \$16@17.

Philadelphia. Feb. 6.

[From our Special Correspondent.]

This week's indications continue of a favorable character. Manufacturers and iron brokers have wind of a few large transactions, which are likely to be closed. Two or three railroad companies will probably become large buyers. There are more rumors on the street this week than there have been, as to probable transactions, but nothing very definite can be traced up. The sales of pig-iron during the past week have not been up to one or two recent weeks, but still there is enough selling to keep prices firm, especially for standard brands; in fact, not much else is moving, as the makers of standard brands are willing to meet buyers' views, if orders are large. The quiet movement continues, and the prospects are, that this month will move a fair amount of iron on a basis of \$18@17.50 for No. 1 Foundry, and for No. 2 \$17@16.50, with Gray Forge averaging \$15.50. The movement in forge iron has been fair, in consequence of the increasing activity in rolling-mills. Southern

iron is selling in a moderate way, and the agents representing Southern furnaces expect to find place for a good deal of Southern iron.

Foreign Iron.—Very little is done in Bessemer, and quotations are nominally \$19@20.

Muck-Bars.—More Muck-Bars are selling at about \$27.50@27.75.

Merchant Iron.—Several good orders for merchant bar have been placed in country mills. The city mills are gathering up a little more business, but all in small orders, and the prices paid for it range from \$1.70@1.80. Country mill-owners report more inquiry for common iron. Two or three Pennsylvania car-works will receive a portion of the order for 400 cars, given by the Chicago & Northwestern Company.

Nails.—The activity in nails continues, and prices are quite firm at \$2.10@2.15, with prospects that still higher prices for small lots can be obtained. Inquiries for car-load lots are more frequent.

Sheet-Iron.—There is a quiet movement in sheet-iron, and prices are steadier.

Wrought Pipe.—Quotations are without any change, and the movement is fair.

Merchant Steel.—A steady movement for merchant steel, mostly for tool purposes, is reported.

Plate Iron.—Several additional orders have just been placed, and negotiations are pending for additional business, which indicates the coming of the long-expected improvement. Plates are \$2@2.10. Several lots of flange and shell iron have been ordered. The Baldwins have received an order for twenty-seven locomotives, for a Western railroad, and negotiations are pending for engines for two or three other roads.

Steel Rails.—There is a large amount of business said to be in sight, but makers are not willing to accept the terms at which the business can be secured, and this accounts for the rather sluggish condition of the rail market. Quotations are \$27.50@28.

Old Rails.—Quotations continue at \$17@18, with only a moderate business.

Scrap.—Several hundred tons of scrap of all kinds were bought this week, and delivery has begun.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 6, 1885.

Anthracite.

The demoralization that the coal kings' "fighting million" dynamite bomb created last week is subsiding, and there is greater calmness in the trade and a somewhat better feeling. There is even a rumor that these gentlemen propose rescinding the fighting million resolution, so as to take away at least one avowed reason for withholding contracts.

We may quote prices f. o. b.: Stove, \$3.70@3.90; Chestnut, \$3.20@3.30. Broken and Egg are still obtainable, as for some time past, at \$3, though quotations are somewhat higher.

Some of the coal roads are reducing freights, and all the roads will probably have to do so. Wages, too, will be reduced, and as the probabilities are, that improving business will allow of a somewhat larger output this year than last, and as several of the more expensive collieries will probably not be worked, the companies will be able to make a fair profit at even lower prices than are now nominally ruling. Low-priced coal is necessary to stimulate the revival of many branches of trade, and in conceding this to manufacturers, the companies will best promote their own interests.

The Reading trouble is still an important and uncertain factor in the coal trade, and the opinion is frequently expressed, even among representatives of rival interests, that the Reading's troubles, like those of the British in the Soudan, have been greatly aggravated by vacillation. A bolder and firmer policy would have given the road the full quota to which it is entitled, and that would have greatly helped the company. Now the condition of the company is a constant menace to the trade.

Bituminous.

There is more doing in this coal than in anthracite, though but few large orders have been placed during the week. By the pool arrangement that was announced by us several weeks ago, the Pennsylvania Railroad was to receive 55 per cent and the Baltimore & Ohio 45 per cent, these companies taking care of the Vanderbilt-Gowen and the Norfolk & Western interests. The pool prices that we announced three weeks ago were fixed at \$2.70 per ton at Baltimore, \$2.80 at Philadelphia,

\$3.25 at New York, and \$3.50 at Boston. The pool to go into force in March, but to cover season contracts. The pool, or combination, is supposed to be in full force, and theoretically these prices are like "the laws of the Medes and Persians," which change not, but practically the Pennsylvania Railroad bituminous combination is no better than the anthracite combination which the Pennsylvania Railroad, for high moral reasons, declined to enter, and the actual prices at which contracts for these coals are made are but a distant shadow of the pool rates.

The Elk Garden Company has taken a contract for season's delivery, it is said, at under \$3. And we are reliably informed that the Cunard Company has made a contract for a Vanderbilt-Gowen coal by which, if the coal prove satisfactory, the company is to receive its season's supply at a price below \$2.80 a ton alongside in this harbor.

How can these things be under a cast-iron combination? We have not been able to learn the solution of this interesting conundrum.

Philadelphia. Feb. 6.

[From our Special Correspondent.]

The individual operators in the Schuylkill region met to-day to divide up among themselves the 24 per cent allowed them by the Reading Coal and Iron Company. The meeting was reported harmonious, but, judging from the curt replies made to inquirers concerning the proceedings, there must have been some difficulties to adjust. Hitherto, the Reading determined the apportionment for the operators; but this time they insisted individually on more than could be crowded into 100 per cent, and the result was, the Reading took 76 per cent and flung the other 24 over to the individuals, and let them fight out the matter of percentages among themselves, which has been done.

Meetings have been held here with reference to rate fixing, and it was expected that definite results would have been reached by Saturday; but the probabilities are, that nothing definite will be accomplished until there is some business to be done. The Reading is opposed to fixing rates far in advance of the advent of demand. To-day, an effort was made to secure vessels to deliver three cargoes of coal in Boston, but only one vessel could be found, 500 tons capacity, and it asked the fancy and touch-me-not figure of \$1.50. There are about 100 vessels tied up in the neighborhood of Cooper's Point, where they will stay until rates improve. The vessel-owners complain about last year's rates; but the present prospects are, that they will be no better during the coming season. There is an occasional inquiry for a large lot, but in a general way anthracite has been dull for a few days. Stocks in Eastern markets are reported as rather scarce. Several large Eastern consumers have inquiries on file here; but thus far, it has been found impossible to make acceptable rates. Stove coal is rather scarce. There is, in fact, no price for coal. Each buyer must make his own rates. Broken and Egg have sold in moderate-sized lots at \$3@3.25 alongside here, and Stove at \$3.90@4 for White Ash. Lykens Valley, of which there is none to be had, is quoted at \$5.50.

As to what the Pennsylvania Railroad will do, no one, of course, knows, but the tenor of expression in the coal offices among those who are not in the habit of expressing incorrect opinions is, that that company will not jeopardize its bituminous coal interests by increasing this year's production materially over last year's. This will be acceptable to the bituminous operators, who have been disturbed by the possibility of having war carried into Africa. The trade is far from settled. It is, of course, a little too soon for heavy orders. Pea and buckwheat are offered at very low rates. The local trade is fair and steady, and manufacturers are buying freely for present needs. An improvement in the local and line trade is regarded as near at hand; but as a rule, all consumers, large and small, hold to the belief that it is better to be nearly out of coal than to risk heavy contracts.

The bituminous interests are quietly awaiting developments. Favoritism is still working to the positive disadvantage of a good many operators. They are not in confidence with the pool, but believe it will be disregarded by one side or the other. No new developments in the neighborhood of Phillipsburg. The production of the Clearfield region for the past week was 47,621 tons, against 50,375 tons for the same week last year; and 228,996 tons up to date since January 1st, against 243,083—a decrease of 14,087 tons over last

NEW YORK MINING STOCKS. DIVIDEND-PAYING MINES. NON-DIVIDEND-PAYING MINES.

Table with columns for company names, highest and lowest prices per share (Jan 31 to Feb 6), and sales volume. It is divided into Dividend-paying and Non-dividend-paying mines.

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 37,195. Non-dividend shares sold, 22,120.

year's shipments to the same date. With all the present dullness, there is more confidence over the situation.

Buffalo. Feb. 5.

[From our Special Correspondent.]

Your last number contained all the points relative to the position of the trade in anthracite coal; and since then, no new developments have been made manifest here.

Manufacturers are cautious, and their establishments are worked only for immediate requirements. Stocks are still large, but it is necessary to maintain assortments, and when certain lines run low, they must be replenished to meet the calls of customers.

The bituminous coal traders and the coke dealers report nothing new in their business.

A meeting of soft coal producers seeking a market in and through Buffalo was held last Thursday in this city, at the Coal and Iron Exchange. Representatives were present from the Clearfield Coal Company, Falls Creek Coal Company, Oak Ridge Mining Company, Eureka Slope Colliery, Hamilton Coal Company, Northwestern Mining and Exchange Company, Northwestern Coal and Iron Company, L. M. Ormsby Coal Company, Gosford Coal Mining Company, Churchill Coal Company, Arnold Coal Company, International Coal Company, and others, on invitation of Col. Ensign Bennett.

Our city line of the Lehigh Valley Railroad is fast approaching completion, and in a few weeks its connection with the New York, Lake Erie & Western Railroad tracks at East Buffalo will be an accomplished fact.

Uncle Sam's soldiers are still holding the fort (or barn) that is supposed to guard the piece of land or dock property at the foot of Erie street desired by the Lackawanna Railroad Company for extending its coal-shipping trestles. The cause of the difficulty is thus described by a local journal: "Just east of the shipping-trestle is located the engine-room, a building that sets back some twelve feet from the edge of the dock. Eighteen feet of this dock, from the easterly end of the engine-room, is held by the United States government, the strip being thus only twelve feet deep. Back of the engine-room have been located several pockets that were used in connection with the city trade until the removal of this department across Joy street. About a week ago, the railroad company began work to rebuild the old city trestle, so as to make it available for the shipping business. To do this, they would have been obliged to make use of the government strip mentioned. Complaint was made to Major Maguire, who has charge of the government property in this city, and a detachment of troops from Fort Porter was ordered to the scene—the battle-field, so to speak. Being assured by Agent McWilliams that work would at once be suspended, the soldiers left after being on the ground only a few hours. A day or two since, the Lackawanna people again began operations on the trestle, and again complaint was lodged with Major Maguire. After advising with the Secretary of War at Washington, a detachment of regulars was dispatched from the fort, who are now quite comfortably "encamped" in a shed at the rear of the engine-house, which is not an elegant structure, but in respect to ventilation it is as 'sanitary' as any ultra-scientist could wish for. However, it is provided with a large drum-stove, and the men are allowed to use as much Lackawanna coal as they please, and so they manage to get along nicely. Uncle Sam sends them from the post abundance of fresh rations, and they have plenty of blankets to smooth over the hard places in their board-bunks. The men are on duty two hours at a time. Sergeant Sullivan says they are having quite a picnic, but he regrets that their presence has thrown out of work a dozen of laborers and carpenters. Mr. J. J. McWilliams, the general coal agent for the company, said last night that the trouble would be settled by the middle of this week, and that the Lackawanna would secure the property in dispute."

Boston.

Feb. 5.

[From our Special Correspondent.]

A very small movement in anthracite coal continues. The volume of trade could not well be less at this season. A moderate pocket trade, together with demands from some of the large dealers who buy throughout the winter, seems to keep the steamers fairly busy. But the general cargo demand is light. The fortnight of real winter which we have had has caused a very good output of coal by the retailers, but as the early winter was very mild, stocks have not been heavily reduced.

The addition of a million tons to the total production for 1885 is not considered of much consequence here, and will not be until it is seen that the allotment plan holds together. It is not having any real test now, as there is no great desire to exceed the limit of mining on the part of any company, during this quiet period. The prospects are, that the field of anthracite consumption will be still further invaded, the coming year, by bituminous, which promises to be sold at unprecedentedly low prices.

Our f. o. b. quotations are nominally unchanged, and are as follows:

At New York, Stove, \$3.85@4; Egg, \$3.20@3.50; Broken, \$3.20@3.40; Pea, \$2.25; Nut, \$3.45@3.60. At Philadelphia, \$3.90@4 for Stove; \$3.25@3.50 for Egg; \$2 for Pea; \$3@3.15 for Broken. Special coals, \$4.75@5 for Broken, \$5.35@5.50 for Stove.

The bituminous branch of the market is claiming the lion's share of attention just now. The pool is unsatisfactory to all concerned for the time being, and there is a decidedly mixed state of affairs. Cumberland coal is fixed by the pool at the same price south of Cape Cod as in Boston, which is considered decidedly objectionable, and Clearfield dealers dislike the pool on all accounts. As for the outside coals, they are not in the pool at all; at least, their agents here are not aware of it, and their movements certainly do not indicate it.

The first and only large contract is that of 20,000 tons for the Providence Railroad, water freight. This was secured by one of the outside interests, the Vanderbilt-Clearfield people, and is their first large contract. The price is set very low on the street, but it is not divulged by the contractors. The bottom pool price is \$3.50 delivered, but unless the pool regulations are changed, it is likely to hold together but a very short time. Outsiders like the Norfolk & Western are believed to be selling at \$3.25, delivered in cargo lots for trial.

It is said that about 8000 tons have been sold in this way, including a cargo to the Boston & Maine Railroad. Some of the interests represented in the pool are in favor of putting prices down to \$3.25, delivered immediately, and make it impossible for the outside coals to gain a foothold here in the Boston market. As it is, bituminous coal opens at the lowest figure ever known in the history of the trade, and it is yet to be seen that even \$3.50 is obtained. The large consumers are having their ideas worked down by the reports concerning the anthracite market, and they seem to think \$3 to \$3.25 delivered a fair price, forgetting that bituminous coal hardly pays expenses at \$3.50. Last year, the bulk of bituminous was sold between \$3.60 and \$3.90 delivered.

We quote \$3.60@\$3.70 delivered, for cargo lots. Freights are unchanged, but continue firm. We quote:

New York, \$1@\$1.15; Philadelphia, \$1.25@\$1.50; Baltimore, \$1.25; Newport News, \$1.20@\$1.25; Richmond, \$1.25@\$1.35; Cape Breton, \$1.55@\$1.60; Bay of Fundy, \$1.30@\$1.40.

There is a little more movement in the retail trade at unchanged figures. We quote:

White ash, furnace and egg..... \$5.25@\$5.50
 " stove and nut..... 5.50@ 5.75
 Red ash, egg..... 6.00
 " stove..... 6.25
 Lorberrry, egg and stove..... 6.50@ 6.75
 Franklin, egg and stove..... 7.50
 Lehigh, furnace, egg, and stove..... 5.50@ 5.75
 nut..... 5.75

Wharf prices, \$4.50 for Broken, \$4.85 for Stove.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended January 31st, and year for January 1st:

Tons of 2240 lbs.	1885.		1884.	
	Week.	Year.	Week.	Year.
D. & H. Canal Co.	35,052	198,683	73,313	233,267
D. L. & W. RR. Co.	50,121	239,064	74,290	334,420
Penna. Coal Co.	8,089	60,743	18,177	75,898
L. V. RR. Co.	10,433	85,088	21,172	100,973
P. & N. Y. RR. Co.	1,624	9,459	2,574	14,198
North & West Br. RR.	*	80,444	*	56,242
L. V. RR. Co.	12,394	234,419	74,109	329,262
S. H. & W. B. RR.	*	6,659	*	13,119
P. & E. RR. Co.	14,011	532,716	164,955	721,059
St. Line & Sul. RR. Co.	1,809	6,735	1,202	6,437
Total	133,333	1,454,010	429,790	1,884,875
Increase				
Decrease		430,865		

* Reports not received.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1880..... 1,981,541 tons.
 " " " 1881..... 1,819,921 "
 " " " 1882..... 2,100,480 "
 " " " 1883..... 2,106,329 "

The decrease in shipments of Cumberland Coal over the Cumberland & Pennsylvania Railroad and branches amounts to 3,212 tons, as compared with the corresponding period of 1884.

Belviders-Delaware Railroad Report for the week ended January 31st:

	Week.	1885.		1884.	
		Year.	Year.	Year.	Year.
Coal for shipment at Coal Port (Trenton)	120		916		
Coal for shipment at South Amboy	4,517	43,063	38,203		
Coal for distribution	4,520	56,658	68,331		
Coal for company's use	2,952	18,589	20,049		
Total	12,109	119,826	126,583		
Increase					
Decrease			6,757		

Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended January 24th, and year for January 1st: Tons of 2000 pounds.

	1885.		1884.	
	Week.	Year.	Week.	Year.
Gallitzin & Mountain (Alleghany Region)	3,496	13,961	2,349	9,267
West Penn. RR.	155	437	1,285	12,418
Southwest Penn. RR.	25,862	110,903	39,961	147,726
Penn. & Westmoreland Region, Pa. RR.	4,582	18,134	4,277	15,125
Monongahela, Penn. RR.	1,013	4,908	1,139	5,435
Pittsburg Region, Pa. RR.			30	47
Snow Shoe (Clearfield Region)	271	1,551	417	1,737
Total	35,379	149,894	49,358	191,755
Decrease		41,861		

FREIGHTS.
 Coastwise Freights.
 Per ton of 2240 lbs.
 Representing the latest actual charters to February 6.

Ports.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria	.90		
Annapolis			
Albany			
Baltimore			
Bangor			
Bath, Me.			
Beverly		1.50@1.60	1.00
Boston, Mass.			
Bristol			
Bridgeport, Conn.			.55
Brooklyn		1.30	
Buffalo, N. Y.			
Cambridge, Mass.			
Cambridgeport			
Charleston, S. C.	1.00	1.25	
Charlestown			1.00
Chelsea			1.00
City Point			1.00
Com. Pt., Mass.			1.00
E. Boston			1.00
East Cambridge			
E. Greenwich, R. I.			.75
Fall River			.76@.75
Galveston		2.25	
Gardiner, Me.			
Georgetown, D. C.	.90		
Gloucester			
Halifax			
Hartford			
Hackensack			
Hudson			
Lynn			
Marblehead			
Medford			
Millville, N. J.			
Milton			
Newark, N. J.			.80
New Bedford			
Newburyport			
New Haven		1.25	.60
New London			.70
New Orleans			
New-Berne			
Newport			
New York		1.25	
Norfolk, Va.	.75		
Norwich			.75
Norwalk, Conn.			
Pawtucket			
Philadelphia			
Portland, Me.		1.50	
Portsmouth, Va.	.75		
Portsmouth, N. H.			1.15
Providence			1.25
Quincy Point			
Richmond, Va.			
Rockland, Me.			
Rockport			
Roxbury, Mass.			
Saco			
Sag Harbor			
Salem, Mass.			1.00
Saugus			
Savannah		1.50	
Somerset			
Staten Island		1.10	
Trenton			
Troy			
Wareham			
Washington	.90		
Weymouth			
Williamsbr., N. Y.			
Wilmington, Del.			
Wilmington, N. C.		1.25	
St. Thomas, W. I.			
Key West, Fla.			

* And discharging. † And discharging and towing. ‡ 3c. Per bridge extra. § Alongside. ¶ And towing up and down. † And towing. ** Below bridge.
 We know of no vessels loading for Eastern ports excepting one to Providence at \$1.20. Large vessel, 900 tons, offered yesterday for Boston at \$1.25, but was not chartered.
 Yours, C. K. SCHULL, Supt.
 PHILADELPHIA.

WANTED.—EMPLOYMENT IN MANAGEMENT of lead, silver, or copper mine or reduction works, by mining engineer of ten years' experience. Three years in Mexico; speaks and writes Spanish; best references.
 H. F. WILD, Concord, Mass.

TORREY & EATON,
 Instruction in Assaying and Practical Milling.

The undersigned have made arrangements for the use of the New York Metallurgical Works of E. N. Riotte and of the New York Ore Milling and Testing Works, in which Messrs. Fraser & Chalmers's machinery is used. They will be assisted by able experts in the various departments. To those who are unable to avail themselves of the regular four years' course of the School of Mines, Columbia College, a good opportunity will be offered to prepare for immediate work in the field.

TORREY & EATON,
 For terms and course of study, address
H. G. TORREY,
 U. S. Government Assayer,
 Opens Nov. 15th. 30 Wall Street, New York.

Comparative Statement of the Production of Bituminous Coal for the week ended January 24th, and year for January 1st:
 Tons of 2000 pounds, unless otherwise designated.

	1885.		1884.	
	Week.	Year.	Week.	Year.
Cumberland Region, Md.				
Tons of 2240 lbs.	33,555	112,879	35,469	117,907
Barclay Region, Pa.				
Barclay RR., tons of 2240 lbs.	4,697	16,372	6,002	25,389
Broad Top Region, Pa.				
Huntington & Broad Top RR., of 2240 lbs.	2,700	8,634	4,644	14,080
East Broad Top, Clearfield Region, Pa.				
Snow Shoe	3,948	15,866	4,306	16,917
Karhaus (Keating)	686	3,321		
Tyrene & Clearfield	52,216	210,995	55,302	199,641
Alleghany Region, Pa.				
Gallitzin & Mountain	9,330	35,268	10,961	40,842
Pittsburg Region, Pa.				
West Penn RR.	4,677	20,265	8,641	30,659
Southwest Penn. RR.	2,145	7,951	3,507	11,632
Pennsylvania RR.	3,305	13,068	6,363	20,877
Westmoreland Region, Pa.				
Pennsylvania RR.	16,081	88,385	19,789	93,139
Monongahela Region, Pa.				
Pennsylvania RR.	3,577	14,127	3,156	11,163
Total	137,117	547,031	158,142	582,345
Decrease		35,314		

ASSAYERS' SUPPLIES.
 (Established 1848.)

Balances and Weights, Furnaces, Scorifiers, Cope's, Crucibles, Tonges, etc.
A LARGE STOCK. Also, CHEMICAL APPARATUS OF ALL KINDS.
 Trial orders solicited. E. B. BENJAMIN,
 Barclay and 12 Vesey Sts., New York.

HEADQUARTERS. ASSAY SUPPLIES.

BATTERSEA SCORIFIERS,
 BATTERSEA CRUCIBLES,
 BATTERSEA MUFFLES,
 BATTERSEA CLAY FURNACES, ETC.

The Battersea clay assay articles are now acknowledged the best.

TORREY & EATON'S SUPERIOR COPELS.

They are made from the ash of cow-horns only. The burning, grinding, and other features of preparation of the ash are most carefully attended to, and each lot is inspected by Messrs. Torrey & Eaton, U. S. Assayers, N. Y. The manufacture of the cupels is under their personal supervision. These cupels are not only superior to the ordinary kind, but we guarantee their arriving in perfect condition at their destination.

Judson's Patent Steel Sectional Assay Furnaces.

These are rapidly superseding every other form of iron or steel assay furnace. For description see our catalogue.

C. P. ACIDS, FREIBURG TEST LEAD,
 BORAX, LITHARGE, SODA ASH,
 BALANCES AND WEIGHTS,
 FLASKS, FUNNELS, BEAKERS,
 AND EVERY NEEDED THING.

Illustrated catalogues sent free on application.

RICHARDS & COMPANY,
 398 BOWERY, OPP. SIXTH ST.,
 NEW YORK.

MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc. 1881. Scale, one inch to thirty-three miles. Colored, 24x17 inches. Pocket form, \$1.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch: 10 miles. Size, 26x30 inches. Pocket form, \$1.50; as a wall-map, \$2.

SAN JUAN MINING REGION (COLO.).—Stockler's Map of San Juan Mining Region, compiled from U. S. Surveys and other Authentic Sources. 1881. Shows county boundaries, district boundaries, wagon-roads, trails over mountains, passes from river basin to river basin, continental divide, timber-line (11,000 to 11,500 feet above sea-level), etc. Scale, 1 inch to the mile, or 1 = 63,360. 28x38 inches. Pocket form, stiff paper cover, \$1.50; or as a wall map, \$1.50.

THE SCIENTIFIC PUBLISHING CO.
 27 Park Place, New York,
 O. Box 1833.