

# THE ENGINEERING AND MINING JOURNAL



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THE Royal Prussian Academy of Mines, of Clausthal, celebrates its seventy-fifth anniversary from the 9th to the 11th of June of this year, and it is to be hoped that not only the present but also many past students will take part in the festivities. The committee will be most thankful to receive the addresses of old students who have not as yet received invitations. All communications to be addressed to Herrn Bergrath KÖHLER, Clausthal.

A WELL-INFORMED and reliable correspondent gives on another page some valuable "points" to those who have heard of the Honduras "boom" and are thinking of seeking fortune there. The plain and interesting story will cause no surprise to those who have gone from our own country to seek a better. It may be generally accepted as a fact that gold fields always look richer from a distance than they do when we reach them; and it is equally true that there are very few countries where the pursuit of fortune in mines can be so successfully conducted as here in our own land and under our own laws, imperfect as some of these may be. After reading our correspondent's letter, we expect to see a perceptible lowering in the intensity of the Honduras boom, and no doubt when those who go return, OSSIPPEE will receive many thanks from those who remained at home.

THE *Railroad Gazette* is so able and reliable a paper upon all matters in its own department of the profession that we were somewhat surprised at the manner in which it treated the subject of steel rail manufacture in a sermon it preached April 23d, taking as its text the wonderful records of the North Chicago, Steelton, and Joliet mills, given in these pages April 10th.

The *Gazette* is in error in attributing to the method or rapidity of manufacture the undeniably poor quality of some of the rails made at one or two of our mills. Nor is our contemporary more fortunate in attributing to our manufacturers an indifference as to the quality of their products, provided they sell. The assertion, which is true only in part, that "modern rails are very much inferior to those made in olden days," measures quality solely by durability, without considering the causes of failure. It is well known that many roads are still using rails of almost as light sections as when the rolling-stock and the car-load were scarcely more than half as heavy as they now are. Under these conditions, rails of the same quality would not now last nearly so long as they then did. If rails were used now as heavy in proportion to the loads they have to carry as were those "in olden days," a large number of the examples upon which this "common notoriety" rests would disappear. These ill effects of the insufficient rail section in use on many roads are intensified by the preference given by some to very soft steel, a preference based upon investigations made some years ago by one of our most distinguished experts, but whose conclusions were exaggerated by some of the railroad managers.

The present method of rolling directly from the ingot down to rails at a single heat, and which makes the extraordinary records we have announced possible, is by some competent experts considered to be calculated to give a more dense and stronger bar than the old method of gradual reduction and intermediate reheating. If the question be simply one of working down, which appears essential to good results in steel plates, then, since our modern ingots are larger than those of the "olden days," the reduction of area in rolling is greater than it formerly was.

The poor quality of some rails that has given occasion for the *Gazette* sermon is pretty well understood to be due to the stock used, and not to the method of manufacture. Some of the lake ores are unsuited to Bessemer steel work, and others are on the "border-land." Too large a proportion of these ores have, in some cases, been used, and there may also have been a very high proportion of manganese as an antidote for sulphur.

It is not necessary now to discuss this question, but we trust the *Gazette* will correct its deductions from our text.

ELECTROLYTIC COPPER TUBES.

We receive in a private letter the following interesting information concerning a new and very promising application of the electrolytic deposition of copper. The principle appears capable of a wider application than simply to this method of producing tubes, and it will certainly prove interesting to many of our readers.

"Messrs. ELMORE & Co., electrical engineers, of London, have made most important improvements in depositing copper in various forms, and you will no doubt be surprised to hear that they are making copper tubes by the depositing process. They take a hollow tube of type metal coated, on the parts where they want the deposit, with bronze powder, and insulated on the others. They impart a slow rotary motion to the type metal core while suspended in the bath, and so soon as the deposit begins to form, a burnisher is applied by a light pressure to the side of the cylinder. This burnisher has a motion parallel with the axis of the cylinder, moving backward and forward, up and down the cylinder. The combination of the movement of the cylinder around its axis and of the burnisher parallel with it has this effect, that it disposes the crystalline deposit in a fibrous mass with the fibers leading in a screw-like manner around the axis of the tube.

"Perhaps the most extraordinary thing about it, is that the specific gravity of the copper is higher than that of any other form of copper I know, and they claim that the strength exceeds that of hard-drawn copper."

## THE HIGHEST FURNACE AND MILL RECORD.

The following statement of the work of the South Chicago Furnace and mill plant, for which we are indebted to Superintendent POTTER, settles, for the present at least, the question of supremacy in favor of these works.

The record is one that a few years ago would have been deemed impossible by every one in the business. We commend its study to our esteemed English contemporary, *Engineering*:

## TWENTY-FOUR HOURS' WORK OF SOUTH CHICAGO PLANT, APRIL 26TH, 1886.

Blast Furnace Department.		Tons.
No. 5 Furnace, direct metal.....		214
No. 6 " " ".....		185
No. 7 " " ".....		241
No. 8 " " ".....		216
Total direct metal.....		856
Cupola metal.....		236
Total metal converted.....		1082
Bessemer Department.		Tons.
1st turn, 8 hours, 40 heats.....		385
2d " " 8 " 32 ".....		310
3d " " 8 " 31 ".....		295
Day " 12 " 59 ".....		570
Night " 12 " 44 ".....		421
Total 24 hours, 103 heats.....		991
Rail Mill Department.		Tons.
Day turn, 12 hours, 1863 rails, 60 pounds per yard.....		479
Night " 12 " 1443 " " ".....		380
Total, 24 hours, 3246 rails, 60 pounds per yard.....		859

The work of the Bessemer department for the week ended April 24th, 4772 tons, is the largest week's work ever turned out of a single plant with one pit. The following large twenty-four hour products were made during that week: 906 tons; 856 tons; 916 tons; and 881 tons.

Mr. POTTER has well earned the foremost place.

## THE SUPERIORITY OF AMERICAN MANUFACTURES AND OF AMERICAN ENGINEERS.

Our esteemed and able contemporary, *London Engineering*, in a recent issue, publishes the following:

## "SUPERIORITY OF AMERICAN GOODS.

"The New York ENGINEERING AND MINING JOURNAL never loses an opportunity of asserting the vast superiority of American manufactures, American processes, American engineers, and every thing else American, over the corresponding productions of England. We have once or twice drawn attention to statements and remarks our contemporary has printed to this effect, and on some occasions we have had sorrowfully to admit that a good deal of truth existed in what we quoted. In a recent number, the ENGINEERING AND MINING JOURNAL comments on the 'fact that American tools, locomotives, bridges, stamp-mills, furnaces, etc., are deservedly preferred everywhere to English, and are purchased in many English colonies.' The patriotic and irritated reader of such statements as the above, naturally asks first of all, 'Are they true?' and then, if they are true, even to a small extent, 'Why do our makers let them remain true?' It must, indeed, be time for our manufacturers to wake up when we see on all sides accounts of the Germans cutting us out in our home markets, and then hear as well that Americans are doing the same in our colonies. It was some little consolation to some of us, not long since, to read that an American railroad had ordered 10,000 tons of English rails at considerably higher price than would have been paid for American rails, because the experience of that railroad had been to the effect that the American works could not supply a good article, and that our English rails were well worth the extra price. Here, we thought, was a case of something American not being 'deservedly preferred' to something English, even in America itself. But what is the use feeling superior if the other side will not admit your superiority? In the same number of our contemporary from which we quoted the sad statement as to our colonies, reference is incidentally made to the order for English rails; but we have not the bliss of seeing the simple reason, which we supposed caused the order, admitted and confessed. It is darkly suggested that 'this famous transaction was suspected at the time to be actuated by less direct and simple motives,' but no hint is given as to what these motives were. So we must give it up in sadness. When American goods are bought anywhere, they are 'deservedly preferred' to English. But when Americans order English rails, it is not because they can not get as good at home, but because the 'transaction is actuated by less direct and simple motives.'"

We sympathize with our contemporary in its sorrow, while we respect its frank honesty in acknowledging the truth of what we have stated concerning the superiority of some American manufactures. But in suggesting that some of its or our readers may wonder how it comes to be true that in many directions the Americans excel the engineers of all other countries, it raises a question perhaps broader than it intended. In the first place, we modestly do not assert "the vast superiority of every thing American over the corresponding productions of England." There are many, very many, things we have to learn from our European rivals, and we deem it our duty to our American readers to point them out, as our columns abundantly testify we do; but it is our pleasure, as well as our duty, to call attention to those branches of engineering in which we have become superior to others, and especially when such superiority is in a field in which many suppose we are still, or until recently have been, behind some other countries.

Having had a pretty wide experience with engineers and engineering on both sides of the Atlantic, we believe it a fact—that will be admitted by those who have had a like experience with the engineers of different countries, and the opinion of others is worthless—that American engineers are, as a class, more ingenious and fertile in resources, quicker to

perceive "the eternal fitness of things," and to adopt without prejudice the best means to attain the desired end; and that they will usually, with the same means, especially if these be very limited, do better and more economical work than the engineers, as a class, from any other country. And these facts are due to their environment; the necessity for attaining ends with scanty and unusual means; the high prices of labor and material, which have forced on them the adoption of labor-saving appliances in every industry, and have stimulated intelligence and ingenuity; to the freedom from the bonds of tradition and the worship of precedent; and to that restless energy and ambition, born of as well as creating the wonderful progress in every thing in this new country people by a free and intelligent population.

If the American engineer surpasses the English in these and some other desirable qualities, the English equally surpasses the continental engineer, who is still more the slave of precedent and tradition, and has still less opportunity for the development of ingenuity and originality.

Almost any hardware store in England or in the English colonies will furnish the proof of the superiority of American tools, and the large foreign orders of such manufacturers as the Baldwin Locomotive-Works and the Dickson Manufacturing Company furnish the most substantial testimony, from English colonies as well as from other countries, to the superiority of American locomotives.

*Engineering* itself, on another page of this same issue (April 16th), gives illustrations and descriptions of the Hawkesbury Bridge, New South Wales (the contract for which went to an American company), which, we believe, will convince any engineer of the truth of our assertion as regards bridges. The vastly greater experience of Americans in the extraction of gold and silver from their ores easily accounts for their unquestioned superiority in this department of engineering. The results obtained in lead smelting in Utah and Colorado; copper smelting in various parts of the West, as frequently recorded in our pages, and especially the work here in New York harbor, where HERRESHOFF is smelting roasted pyrites at the rate of 150 tons a day in a single furnace, and at a cost believed to be below \$1 a ton, are results unequaled in any other part of the world. In copper smelting, which has generally been looked upon as peculiarly a Swansea industry, and in ore concentration, for which the Germans have usually been quoted as furnishing the highest examples, American engineers are now doing better and more economical work than was ever before produced. In high duty pumping-engines, where are we to look for well-authenticated records to equal those of the Corliss and the Gaskill pumps, of which we gave examples in the ENGINEERING AND MINING JOURNAL of April 17th?

With regard to the steel rail contract to which reference is made, we beg our esteemed contemporary to correct its statement. The ENGINEERING AND MINING JOURNAL has never said that "this famous transaction was suspected at the time to be actuated by less direct and simple motives." This statement must have been taken from some of our contemporary's irresponsible American exchanges. We have said that the Chicago, Burlington & Quincy Railroad, giving this small part of its orders to English makers, had stipulated for the use of a certain proportion of charcoal pig and hammered blooms, and if it had paid the same price to an American works, it might also have obtained a special rail.

It is not to be denied that one or two American mills have made a poor quality of rails; but most of our mills make an article of quite a good quality as any that comes from Europe. The same company has given its later orders to American mills, in one case only, stipulating that a certain amount of foreign Bessemer pig shall be used. It is not at all probable that any important American steel rail contracts will go to Europe while the prices in Europe and America and our import duties remain as they are. Nor is there any probability of the tariff being reduced on this article at present.

The important question to our British cousins is not the matter of a few orders, whether large or small, but it is the fact that American engineers—and we use the term in the widest sense of the manufacturer or producer as well as the manager of engineering works and appliances—is producing better and more economical results in most fields of engineering than any of his European rivals, and this fact is due to causes that are permanent, and that will in the future increase more and more the superiority that American engineering works have already attained. These same causes exist to a certain though less extent in some of the British colonies (perhaps we should say English colonies, for under the present ideas of "home rule" that appear to control the British government there appears every probability that before long the "United Kingdom of Great Britain and Ireland" will be resolved into its primitive elements), and they will soon become the active rivals of the mother country. There, as here, the higher wages paid will not necessarily mean a higher cost of the article produced; for it is a well-established fact that our workmen, and, after a few years' residence, even our imported workmen, perform much more in their day's labor than is done by the same classes in Europe.

This is perhaps "cold comfort" for our esteemed contemporary; but



we believe both the facts we have mentioned and the causes we have given for them are well established and undeniable.

CORRESPONDENCE.

[We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested. All letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.]

The Honduras Boom—Antidote.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Rumors have reached Honduras that a boom is under way in many of the mining camps, in which this country is held forth as an El Dorado where the "busted" miner can make his fortune, as did the Forty-niners in California. Much attention has been given to placer deposits on the Guayape River, and extravagant reports are circulated in the various newspapers of the wealth of Olancho.

I have made two trips to Olancho and the Guayape River, and while I have not found them barren of gold, I desire to seek your aid in preventing a rush to that district, which, in the present condition of the country, would only lead to failure, misery, and sickness.

To have twenty thousand men in Honduras in six months from now—and I have heard that number suggested as possible—would put the country back fifty years. There is no use for them, there is no food for them, there is no transportation for them, and I believe I can say, speaking relatively, there is no gold for them.

For two hundred years, the Spaniards and the natives have been washing gold in the Guayape River, which runs through the Department of Olancho. They have washed with a *batea*, doing a little sluicing, and feeling satisfied if they got 25 cents a day. Women are now washing there who are glad to get two dollars a month for their labor.

I do not believe that there is a rich place accessible where a poor man could make wages washing. The Osgood outfit spent a long time looking along the river for placers, but never got any thing. I understand, although I have not seen their work, that two men, an Englishman and a Frenchman, are working in the vicinity of Bejau. They have sluices up, but are not making an enormous thing out of it.

Honduras offers a large tract of mineral land, placer and other; but a poor man can not come here and expect to wash enough gold to pay his way. I say this earnestly, and have many to support me, and most sincerely trust that no man who is not abundantly able to buy a mule or two and keep himself for six months should start for Honduras.

HOW TO GET THERE.

A man coming here via Puerto Cortes, which is the nearest port to the gold-fields, must travel eight days by mule till he reaches Olancho; and when he gets there, he will not find gold all ready to wash out in a pan, a cradle, or even a sluice. The natives are not savage, and many of them can beat the best American miner in panning and in the use of mercury, and their knowledge of ores and minerals is wonderful.

You can get no outfit in Honduras, but must buy pans, shovels, picks, steel, hammers, explosives, fuse, blankets, tents, saddles, and, in fact, every thing in New Orleans. At Puerto Cortes, you take the railroad to San Pedro, where mules are taken to Olancho. Bring your United States bills with you and the merchants will give you about 33½ per cent premium.

Cargo mules are worth \$60; saddle mules, from \$100 to \$200.

In traveling over the country, it is not necessary to pack many provisions with you. There are many ranches and pueblos where corn, tortas, beans, eggs, chickens, coffee, sugar, dried beef, etc., can be had. Flour there is none, consequently cakes made of ground up corn are used as bread.

COST OF THE TRIP.

New Orleans to Puerto Cortes, \$30. Puerto Cortes to San Pedro, \$3 by the railroad. By the steamboat that goes from Puerto Cortes up the Uluá River to Rio Pelo, \$4. Rio Pelo is one day's journey from San Pedro, and for men with plenty of stuff it is better to take the boat that connects with every alternate steamer at the port.

Men who intend to walk, unless they know exactly where they are going, had better stay at home. Tramping in the cool mountains of Colorado is very different from going through the coast swamps and the hot table-lands of the interior. Olancho is clear from underbrush, and comparatively easy to prospect.

Finally, let me urge most seriously upon you the idea that none but men with a good "stake" should come to Honduras. Miners can not compete in the few working mines with natives at 50 cents a day. They can not find rich placers to work by hand. They will suffer privations, get the fever, and perhaps die.

**The Fitzgerald Accumulator.**—Mr. Desmond Fitzgerald has improved his secondary battery so far that we may expect to hear of its practical application. The negative plates are formed entirely of peroxide of lead in the form of hard slabs, so that the action takes place throughout the whole mass; suitable terminals of an inoxidizable material being provided for the slabs. This arrangement, says *Engineering*, obviates the necessity of having perforated lead plates to contain the peroxide. It is stated that 16 ampère hours are obtained from every pound weight of these plates. The positive element consists of spongy lead in a new form, which admits of the plates being bent or rolled without damage to them. Some 27 ampère hours per pound weight are obtained from these. A one-horse-power cell recently sent to Paris gave 10 ampère hours, or 20 watt hours per pound of plates; the total weight of the cell, every thing included, being 75 pounds. Mr. Fitzgerald has also found that sulphate of magnesia, or Epsom salts, has a remarkable power of fixing peroxide in the "forming" process, and is greatly superior to the ordinary acid electrolyte. This reduces the first cost of the batteries considerably.

IRON ORE FREIGHT POOL.

The *Iron Trade Review* announces the formation of a freight pool by the roads engaged in carrying iron ore from Lake Erie ports to the various iron districts tributary thereto, from May 1st. The roads that have thus far joined the pool are: The Pennsylvania, the Lake Shore & Michigan Southern, the Baltimore & Ohio, and the New York, Lake Erie & Western. The Columbus, Hocking Valley & Toledo has not yet joined, but is expected to do so. Mr. J. A. Kingsbury has been elected Pool Commissioner, and has established his head-quarters in Cleveland. Monthly tonnage settlements have been decided upon, and other details have been satisfactorily arranged. The following table of rates to points consuming Lake Superior ores is official:

	Per gross ton.		Per gross ton.
Akron, O.....	\$0.85	Mingo, O.....	\$1.50
Alleghany, Pa.....	1.50	Monday, O.....	1.50
Bellaire, O.....	1.50	Moxahala, O.....	1.50
Benwood, West Va.....	1.50	Newburg, O.....	.50
Bessemer, Pa.....	1.50	New Castle, Pa.....	.85
Brier Hill, O.....	.85	New Straitsville, O.....	1.50
Buchtel, O.....	1.50	Niles, O.....	.85
Canal Dover, O.....	.85	Olyphant, Pa.....	2.00
Columbus, O.....	1.50	Orbiton, O.....	1.50
Dunbar, Pa.....	1.72½	Pittsburg, Pa.....	1.50
Etna, Pa.....	1.50	Rankin, Pa.....	1.50
Everson, Pa.....	2.00	Scottdale, Pa.....	2.00
Fairchance, Pa.....	2.00	Sharon, Pa.....	.85
Floodwood, O.....	1.50	Sharpsburg, Pa.....	1.50
Girard, O.....	.85	Sharpsville, Pa.....	.85
Greendale, O.....	1.50	Shawnee, O.....	1.50
Gore, O.....	1.50	Steuensville, O.....	1.50
Hezleton, O.....	.85	Struthers, O.....	.85
Hubbard, O.....	.85	Summit, Pa.....	2.00
Johnstown, Pa.....	2.15	West Middlesex, Pa.....	.85
Kittanning, Pa.....	1.50*	Wheeling, West Va.....	1.50
Leetonia, O.....	.85	Winona, O.....	1.50
Lowellville, O.....	.85	Youngstown, O.....	.85
McKeesport, Pa.....	1.72½	Zanesville, O.....	1.50

The effect has been to largely stimulate the shipment of surplus ores from the docks to the furnaces before the higher rates go into effect. For the week ended April 7th, the shipments by rail from Cleveland were 16,151 tons; April 14th, 16,770 tons; April 21st, 21,375 tons. No doubt the same proportion holds good at other ports as well.

THE PRODUCTION OF MANGANESE ORES IN THE UNITED STATES IN 1885.

We are indebted to Mr. Albert Williams, Jr., Chief of Division of Mining Statistics and Technology, for the following special report, made by Mr. Joseph D. Weeks, of Pittsburg, on the production of manganese in the United States in the year 1885. This abstract is printed in advance of its appearance in the volume of *Mineral Resources of the United States for 1885*, in answer to frequent requests from those interested in this industry, concerning which so little has been available, and is also a recognition of the fact that the value of such statistics consists largely in their publication at the earliest moment possible.

The production and value of manganese, manganiferous iron, and argenteiferous manganese ores in the United States for 1885 were as follows in tons of 2240 pounds:

ORES.	Tons.	Value per ton.	Total value.
Manganese ores—Virginia.....	18,745	\$9.01 +	\$168,942
Georgia.....	2,580	5.19	13,390
Arkansas.....	1,483	4.00	5,932
All other States.....	450	4.48 +	2,017
Total manganese ores.....	23,258	\$8.18 +	\$190,281
Manganiferous iron ores—Virginia.....	3,237	5.35	17,318
Total manganese and manganiferous iron ores.....	26,495	\$7.83 +	\$207,599
Argenteiferous manganese ores—Montana.....	4,263	10.00	42,630

In the foregoing table, under the head of manganese ores, are included those ores that contain the equivalent of 70 per cent of binoxide, or 44.25 per cent of metallic manganese. This is the standard of manganese required by the English chemical works. All ores containing less than this are in this report regarded as manganiferous iron ores, though some of them approaching the standard are used in the manufacture of ferro, and all are used for their manganese. The argenteiferous manganese ores are only used for their contents of silver; the manganese, however, serving a useful purpose as a flux.

In the following table, is an estimate of the production of manganese ores—that is, those ores containing over 44.25 per cent of metallic manganese—in the United States since 1880. This table is to be regarded only as an approximation, though doubtless a very close one:

PRODUCTION OF MANGANESE ORES IN THE UNITED STATES, 1880-1885—TONS OF 2240 POUNDS.

STATES.	1880.	1881.	1882.	1883.	1884.	1885.
Virginia.....	3,661	3,295	2,982	5,355	8,980	18,745
Georgia.....	1,800	1,200	1,000	.....	.....	2,580
Arkansas.....	.....	100	175	400	800	1,483
All other States.....	300	300	375	400	400	450
Total.....	5,761	4,895	4,532	6,155	10,180	23,258

The production of spiegel and ferro-manganese in the United States in 1885 was 30,955 long tons, as compared with 30,262 tons in 1884. Assuming 40 per cent manganese as the dividing line between spiegel and ferro-manganese, and that all the ferro-manganese made in the United States was made at the Edgar Thomson Steel-Works, the production of spiegel in 1885 would be 23,737 tons, and of ferro 7218 tons.

**Tensile Strength of Ice.**—Herr Fruhling, of Königsberg, has given the tensile strength of ice at 23 degrees Fahr. as between 142 pounds and 233 pounds per square inch. Its compressive strength, found by cubes of over 2 inches at the same temperature, varied between 61 pounds and 204.8 pounds, a mean being 148 pounds per square inch. The small boy knows perfectly the average transverse strength of ice in thin sheets, and that without any elaborate investigation.

\* To Pittsburg; local rate beyond.



## WORK ON THE NEW CROTON AQUEDUCT.

The city of New York derives its water supply from the Croton River, forty miles away from the heart of the city, in Westchester County. This stream receives the drainage of 362 square miles of broken country, at an elevation of from 120 to 1000 feet above tide-water.

The new aqueduct will be almost entirely in rock tunnel, and runs in a nearly straight line from the great Croton dam to the city, and is intended to have a capacity of from 220 to 250 million gallons a day.

The aqueduct has its bottom at the dam 140 feet above tide, 26 feet below the surface of the present lake, or 60 feet below that of the proposed lake, and will descend on a regular gradient of seven tenths of a foot in a mile, for about 28½ miles, to a point where the conformation of the surface is such that the gradient can not be followed without coming nearer to the surface than the tunnel theory followed will permit of. A rapid descent at the rate of 10 feet in 100 is made, until an elevation of only 7.6 feet above tide is reached, and the former gradient of 0.7 foot per mile is resumed for nearly four miles until the point of crossing the Harlem River to Manhattan Island is reached. As the bottom of the river is of gravel to a depth of about 100 feet below tide-level, it is proposed to make another rapid descent at the rate of 15 feet in 100, and then pass under the river at a depth of about 160 feet below tide, rising on the other side to the normal grade.

The sectional area of the new aqueduct is required by the specifications to be at least 201 square feet. This area will convey with a current of one mile an hour 190,520,986 gallons a day. With a velocity of flow in the conduit of 2½ feet a second, or 1.7 miles an hour, the discharge will be 324,751,680 gallons a day.

The design of the work provides for two methods of construction: One a circular conduit, 14 feet in diameter; the other, with an invert of 12 feet span and one foot versed sine, side walls of a curved batter 5.73 feet high, and a semi-circular arch of 13.6 feet span.

Along the bottom of the excavation, a drain is made, and the irregular spaces between the masonry lining and the ragged rock excavation are filled with material excavated from the tunnel, well packed in. The thickness of the brick lining will be 12 inches on an average.

There will be only about 3000 feet of open-cut, all the rest of the aqueduct being through solid rock. In some places where the character of the rock warrants it, no masonry lining will be used.

The construction of the aqueduct tunnel has been begun at several points at one and the same time by sinking thirty-two shafts; the tunnel is building now from the first twenty-four shafts only, the contracts for the other eight having been let a short time ago. These shafts vary in depth from about 60 to 387 feet, and are provided with hoisting-cages.

The method of opening the tunnel is by what is called the American or "center-cut" system. In this system, the work is divided into two parts, the first being the driving of the heading, and the second, breaking the bench; the heading is the full width of the tunnel and of a height of from 7 to 8 feet, in this case 16 by 8; the bench being then 16 feet wide and 8 feet high.

The number of holes drilled in the heading for one round or blast is on an average twenty 9-foot holes, from 1½ to 2 inches at the bottom; the wedge or center-cut needing about eight holes, and the side-rounds the remaining twelve. This number may increase or diminish with the character of the rock. It is to be understood that, in the American system of tunneling, a wedge is first blasted out from the center of the face of the heading, leaving then the sides to be blasted out right after it. The drill-holes are all ranged at equal distances from the center line of the tunnel. The eight center-cut holes are divided into two sets of four each, in two lines that slope slightly downward toward the sides of the tunnel, giving the back of the wedge a somewhat trapezoidal shape. The side-round holes are divided into four sets of three holes each. The two sets of center-cut holes form the faces of the wedge, and they are supposed to meet inward to form the edge of the wedge. The two top holes incline upward and strike the roof of the tunnel, the two bottom holes incline downward and strike the bottom of the tunnel, while the four middle holes go in straight.

The accompanying illustration shows four Rand drills on their columns, drilling the holes for the center wedge.

The first side-round holes, consisting of two sets of holes with three in each, point horizontally somewhat toward the center, the individual holes having somewhat the same inclination vertically as the center-cut holes. The second side-round holes point horizontally toward the walls of the tunnel, thus squaring off the heading. Usually they are all loaded at once, connection with the battery being made first for the center-cut, and that fired first, after which the side holes are connected and fired.

The bench is fired usually with the center-cut. On the bench, from six to four holes, from 8 to 10 feet deep, are drilled for each shift. The bench is kept at an average of 20 feet from the heading.

Blasting is done each shift of ten hours, 150 pounds of high explosives being used for the heading alone, on an average, and 50 pounds on the bench. The broken rock from the bench is loaded directly into the mine cars, while that from the heading is loaded into wheelbarrows running on a board platform laid on pipes stretched across, and the wheelbarrows dump the rock into the cars. Thus the *débris* is quickly and expeditiously got out of the way. The number of men employed to do this work ("muckers," as they are called) has a great influence on the progress of the work, as can easily be understood. The cars run on tracks to the shaft, where hoisting-cages take them to the surface to dump their contents.

The number of power drills used in the headings varies with the different shafts. On Messrs. O'Brien & Clark's work, only three or five Rand drills are used respectively in each heading of the different shafts, that is, two or four in the heading proper and one on the bench. The average progress made in a week varies with many circumstances, such as the number of shifts worked per week, the number of drills used, the number of men employed to remove the *débris* (or muck), and accidents or delays in the work caused by soft or seamy rock.

The following examples of work done with the Rand drills show both the perfection to which these machines have arrived and the skill with which they are handled:

On Section 7, shafts 13, 14, and 15, two No. 14 Rand slugger drills are used, mounted on columns at the heading, and one No. 14 drill at the

bench, and about twelve muckers employed. By these means, they fire ten or eleven times in thirteen shifts, and they consider from 40 to 50 feet of tunnel a week as the average. At one time, last December, in shaft 13, with five No. 14 Rand drills, an advance of 81 feet, 16 by 16, in one week, was made through as hard rock as has been encountered, with thirteen muckers working thirteen shifts in the week.

At shaft No. 14, 63 feet of 8 by 16 heading were made in one week with two No. 14 Rand drills.

One No. 14 Rand drill drilled, at shaft 13, 54 feet of holes in five hours through hard rock, counting the stops.

Shaft 20, in August, 1885, won the \$300 in prizes offered by Messrs. O'Brien & Clark, for the fastest driving. This record, which has not been beaten yet with the same number of drills, was as follows:

Twenty-four miners working the north tunnel of shaft No. 20, in gangs of twelve men at a time, drilled and cleared 254 feet of tunnel, 16 feet by 16 feet, in the month from July 15th to August 15th, 1885. This is said to be the fastest piece of mining work ever accomplished. Machinery used, Rand "Slugger" drills and Rand air-compressor.

There are 24 Rand compressors and about 200 Rand drills employed in the aqueduct.

The accompanying beautiful illustrations, made from photographs, show some features in the progress of this great work, and the Rand drills with which so large a part of it is being done.

The above notes and engravings are taken from a new illustrated catalogue of the Rand Drill Company, a work so full of interesting information given in an original and beautiful form that no doubt the demand for it will quickly exhaust the first edition.

We shall have occasion again to refer to the records of some of the excellent work done by the Rand drills and compressors that are given in this catalogue.

## OFFICIAL REGULATIONS FOR THE MANAGEMENT OF FIERY MINES IN PRUSSIA.

Fiery mines are defined as those in which fire-damp has been found during the last two years, and the regulations permit independent divisions of workings to be considered as separate mines. Fiery mines, in all cases, must have two openings—one for the entry and the other for the exit of the air.

The second division, on ventilation, provides for mines being divided into districts independently ventilated. The exclusive use of natural ventilation, and ventilation by means of boiler chimneys, is inadmissible, and the ventilation caused by furnaces is only allowed when these furnaces are fed with fresh air. Open fire kibbles are forbidden.

The quantity of air is regulated, and must consist of 53 cubic feet per ton of coal drawn daily. If this quantity is not sufficient to reduce the estimated fire-damp to 1½ per cent of the general current, it must be increased. If, however, the proportion of fire-damp and carbonic acid in the return air does not exceed 1½ per cent, the quantity of fresh air may be reduced to 35 cubic feet per ton of coal worked; but in all cases, the quantity must at least amount to 70 cubic feet per workman.

The escape of gas from old workings must be prevented either by hermetically sealing or by the ventilation of those workings.

On the ventilation being stopped, or suffering serious disturbance, the workmen must be withdrawn at once, and shall only return to their work when the removal of the danger has been proved.

As soon as any part of the workings is found to be dangerous from the presence of gas, the workmen shall fence off the dangerous part and leave it, warn their comrades, and report to the first official they meet.

The third division applies to blasting. Powder and slow-acting explosives are forbidden in fiery mines, where only rapidly acting explosives, such as dynamite, are allowed; and the use of dynamite is prohibited when more than 3 per cent of gas can be detected by the ordinary safety-lamp.

Twelve yards from the shot-hole, there must be a total absence of gas before the shot is fired; and stemming holes with coal-dust is forbidden.

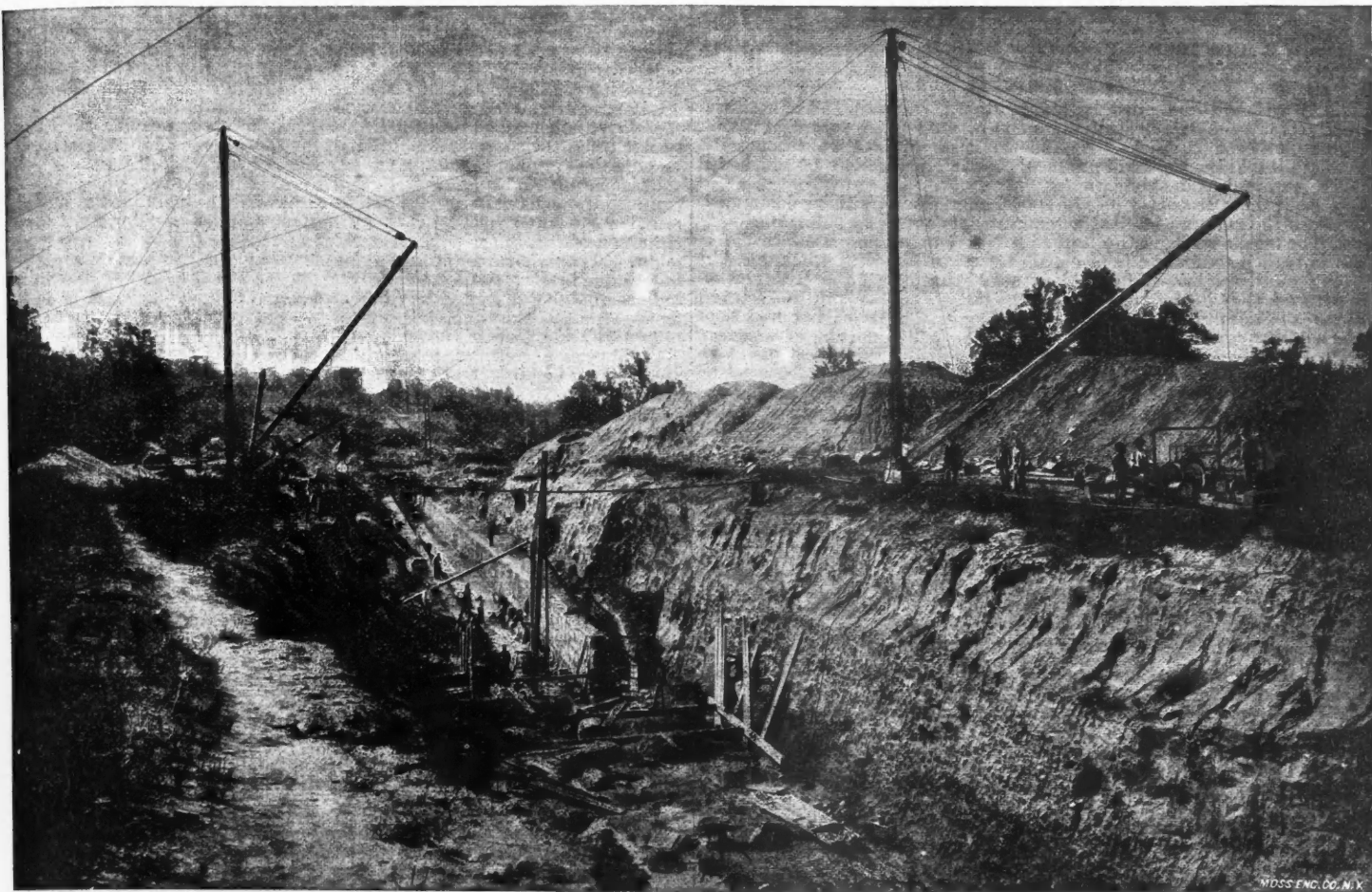
The fourth division deals with lighting; the use of naked lights in fiery mines is forbidden, and only safety-lumps or incandescent lamps are allowed. In the intakes, however, open lamps may be used in the shafts and their approaches.

**Blasting Operations on the Panama Canal.**—M. de Lesseps, who has recently returned from a visit to the Panama Canal Works, personally assisted at the explosion of a mine in a hill of hard rock some thirty meters high, situated at Gamboa, near the middle of the isthmus. The hill barred the course of the canal, and it had to be removed. Last year, about the same place, a blast operation disengaged 20,000 cubic meters of material. On this occasion, 30,000 cubic meters were broken up by the explosion. To avoid projecting the *débris* too far and damaging the works, the engineers employed as explosive a mixture of two parts of dynamite and one part of powder. The formula employed for the charge, as given by M. Bunau-Varilla, the engineer, was,

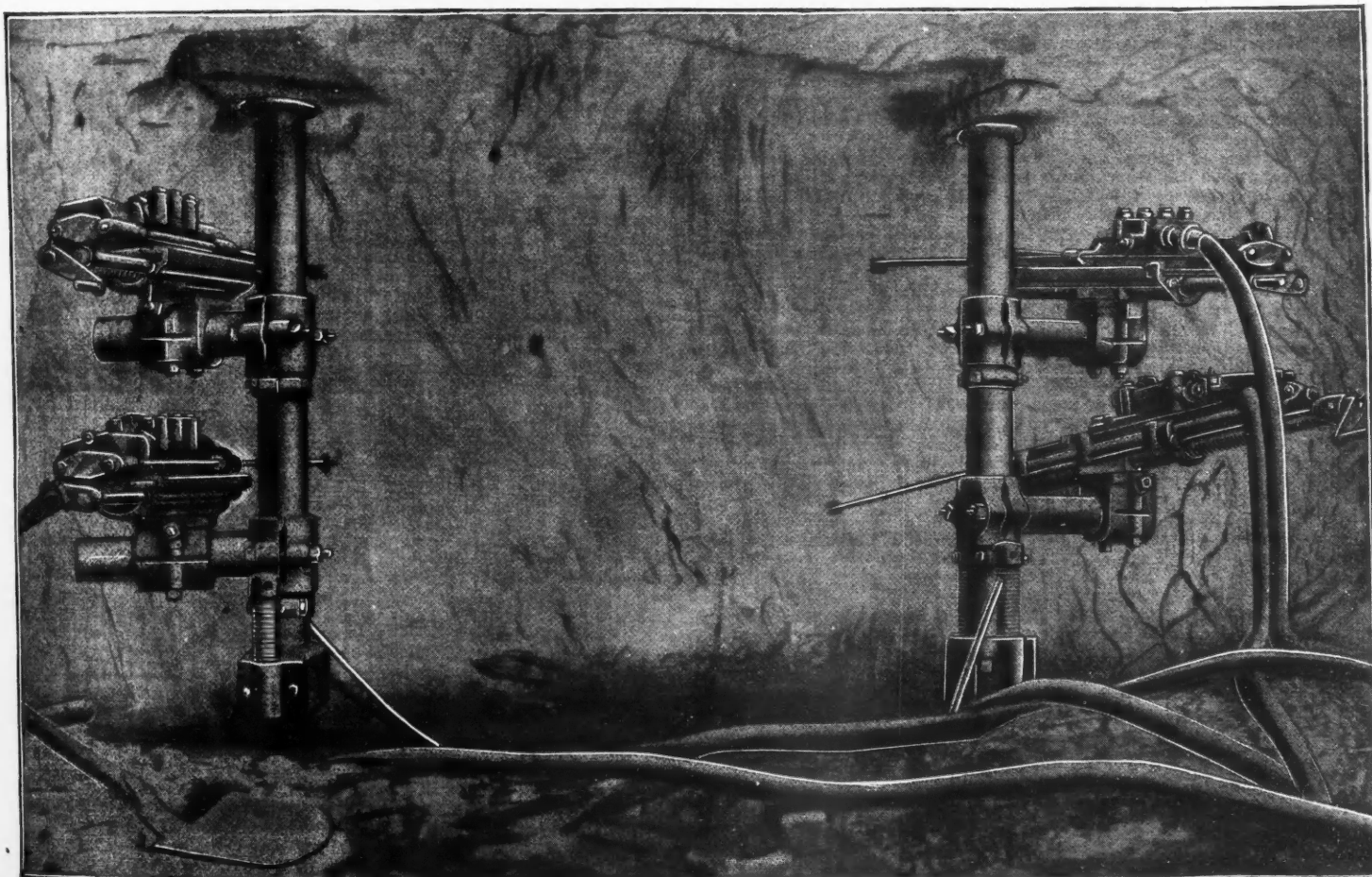
$$C = R^3 6 G K,$$

where  $C$  is the charge,  $R$  the radius of mean resistance,  $G$  a coefficient of hardness varying from 1 m. to 2.50 m. (the value 2 m. being adopted), and  $K$  a constant = 0.18. The charge consisted of pockets of dynamite, the intervals between being filled with powder in grains of 0.0025 meter diameter. The space below the charge was filled with sand-bags. The *bourrage* was executed in masonry. The length of the front of attack was 55 meters, and three galleries were opened perpendicularly to it, each gallery being one square meter in section, and running 18 meters into the hill with chambers at the ends. The firing was arranged in such a way that the three fuses were simultaneously fired by an electric current. All the conductors were inclosed in an iron pipe 0.025 meter in diameter, and running from the center of the charge through the *bourrage* or filling. The explosion was completely successful, and reflects much credit on the engineers, including M. Galtier. Wicks were also installed in the galleries in order to insure the explosion, in case the electric fuses failed; but they were not required, as the explosion answered to the signal. M. Bunau-Varilla is a young engineer who has associated with him as director, M. Boyer, an engineer of the Ponts et Chaussées.





OPEN CUT AT SOUTH YONKERS, NEW YORK—NEW CROTON AQUEDUCT.



METHOD OF MOUNTING FOUR RAND DRILLS ON TWO COLUMNS.

FROM A PHOTOGRAPH TAKEN IN THE TUNNEL, A QUARTER OF A MILE FROM THE SHAFT, BY ELECTRIC LIGHT AIDED BY MAGNESIUM LIGHT.



PROPOSED STANDARD SPECIFICATIONS FOR MATERIAL AND WORKMANSHIP OF IRON AND STEEL STRUCTURES.

[As amended at the Pittsburg Convention of Bridge Manufacturers and Engineers, Pittsburg, March 16th.]

WROUGHT-IRON.

1. All wrought-iron must be tough, ductile, fibrous, and of uniform quality for each class, straight, smooth, free from injurious flaws, buckles, blisters, or cracks. As the thickness of bars approaches the maximum that the rolls will produce, the same perfection of finish will not be required as in thinner ones.

2. No specific process or provision of manufacture will be demanded, provided the material fulfills the requirements of this specification.

3. The tensile strength, limit of elasticity and ductility shall be determined from a standard test piece, not less than  $\frac{1}{4}$  inch in thickness, cut from the full-size bar, and planed or turned parallel; if the cross-section is reduced, the tangent between the shoulders shall be ten inches, and the area of minimum cross-section in either case shall be not less than one half of a square inch and not more than three quarters of a square inch. Whenever practicable, two opposite sides of the piece are to be left as they come from the rolls, but the finish of opposite sides must be the same in this respect. A full-size bar, when not exceeding the above limitations, may be used as its own test-piece. In determining the ductility, the elongation shall be measured, after breaking on an original length of eight inches, which length must include the curve of reduction on both sides of the point of fracture.

4. All iron to be used in the tensile members of open trusses, laterals, pins, and bolts, except plate iron over 8 inches wide and shaped iron, must show by the standard test-pieces a tensile strength in pounds per square inch of—

$$52,000 - \frac{7000 \times \text{area of original bar}}{\text{circumference of original bar}}$$

$$51,000 - \frac{4000 \times \text{area of bar}}{\text{circumference of bar}}$$

with an elastic limit not less than 26,000 pounds per square inch, and an elongation of 18 per cent.

5. Plate iron must show by the standard test-piece a tensile strength of 46,000 pounds per square inch, with an elastic limit not less than 28,000 pounds per square inch, and an elongation for plates, 24 inches wide and under, of 10 per cent, and for plates over 24 inches wide, of 5 per cent, and when used in tension, members shall show an elongation of 12 per cent.

6. All shaped iron and other iron not hereinbefore specified must show by the standard test-pieces a tensile strength in pounds per square inch of—

$$49,000 - \frac{7,000 \times \text{area of original bar}}{\text{circumference of original bar}}$$

with an elastic limit of not less than one half the strength given by this formula, and an elongation of 12 per cent for bars  $\frac{1}{4}$  inch and less in thickness, and of 10 per cent for bars of greater thickness.

7. All places, angles, etc., which are to be bent hot, in the manufacture must, in addition to the above requirements, be capable of bending sharply to a right angle at a working heat without sign of fracture.

8. All rivet iron must be tough and soft, and pieces of the full diameter of the rivet must be capable of bending cold until the sides are in close contact without sign of fractures on the convex side of the curve.

9. All iron specified in clause 4 must bend cold 180 degrees, without sign of fracture, to a curve the inner radius of which equals the thickness of the piece tested.

10. Specimens of full thickness cut from plate iron, or from the flanges or webs of shaped iron, must stand bending cold through 90 degrees, to a curve the inner radius of which is one and a half times its thickness, without sign of fracture.

11. *Number of Test-Pieces.*—For each contract, four standard test-pieces and one additional for each 50,000 pounds of wrought-iron will, if required, be furnished and tested by the contractor without charge, and, if any additional tests are required by the purchaser, they will be made for him at the rate of \$5 each; or, if the contractor desires additional tests, they shall be made at his own expense, under the supervision of the purchaser, the quality of the material to be determined by the result of all the tests in the manner set forth in the following clause:

12. The respective requirements stated are for an average of the tests for each, and the lot of bars or plates from which samples were selected shall be accepted if the tests give such average results; but if any test-pieces give results more than 4 per cent below said requirements, the particular bars from which they were taken may be rejected, but such tests shall be included in making the average. If any test-piece has a manifest flaw, its test shall not be considered.

13. The inspection and tests of the material will be made promptly on its being rolled, and the quality determined before it leaves the rolling-mill. All necessary facilities for this purpose shall be afforded by the manufacturer; but if the inspector is not present to make the necessary tests after due notice given him, then the contractor shall proceed to make such number of tests of the iron then being rolled as shall have been agreed upon, or, in the absence of any agreement, as provided by Section 11, by a sworn inspector, and the quality of such material shall be assumed to be satisfactory.

14. A variation in cross-section or weight of rolled material of more than 2½ per cent from that specified may be cause for rejection.

STEEL.

15. No specific process or provision of manufacture will be demanded, provided the material fulfills the requirements of this specification.

16. *Test-Bars.*—From three separate ingots of each cast, a round sample bar, not less than  $\frac{1}{4}$  inch in diameter, and having a length not less than twelve diameters between jaws of testing-machine, shall be furnished and tested by the manufacturer without charge. These bars to be truly round, and shall be heated to a cherry-red after rolling, and arranged to cool uniformly, and from these test-pieces alone the quality of the material shall be determined as follows:

17. All the above-described test-bars must have a tensile strength within

4000 pounds per square inch of that specified by the purchaser, and an elastic limit not less than one half of the tensile strength of the test-bar, and for steel having a tensile strength of 60,000 pounds per square inch, an elongation of not less than 20 per cent in a length of 12 diameters, with a reduction of area at the point of fracture of not less than 35 per cent, decreasing to 12 per cent elongation and 25 per cent reduction of area as the tensile strength increases to 90,000 pounds. In determining the ductility, the elongation shall be measured after breaking on an original length of twelve times the shortest dimension of the test-piece, which length must include the curve of reduction on both sides of the point of fracture.

18. *Bending Test and Reduction of Area.*—Finished bars must be free from injurious flaws or cracks, and must have a workmanlike finish, and round or square test-pieces cut therefrom, when pulled asunder, shall have reduction of area at the point of fracture as above specified, and that having 60,000 pounds tensile strength measured by the test-piece from the ingot must bend without crack or flaw 180 degrees to a curve having a radius equal to half its shortest dimensions, and that having 90,000 pounds tensile strength must bend 180 degrees to a curve having a radius equal to twice its shortest dimension.

19. For each contract, four such tests respectively for reduction of area and for bending, and one additional of each for each 50,000 pounds of steel, will, if required, be made by the contractor without charge; and if the purchaser is not satisfied that the reduction of area-test correctly indicates the effect of the heating and rolling, such additional tests for tensile strength, limit of elasticity, and ductility as he may desire will be made for him on test-pieces conforming to the provisions of clause 3 at the rate of \$5 each, or, if the contractor desires additional tests, he may make them at his own expense, under the supervision of the purchaser, the quality of the material to be determined by the result of all the tests in the manner set forth in the following clause:

20. Except for tensile strength, the respective requirements stated are for an average of the tests for each, and the lot of bars or plates from which samples were selected shall be accepted if the tests give such average results; but if any test-pieces give results more than 4 per cent below said requirements, the particular bars from which they were taken may be rejected, but such tests shall be included in making the average. If any test-piece has a manifest flaw, its test shall not be considered.

21. Rivet steel shall have a specified tensile strength of 59,000 pounds per square inch, and test-bars must have a tensile strength within 4000 pounds per square inch of that specified, an elastic limit of not less than one half of the tensile strength, an elongation of 25 per cent in twelve diameters, with a reduction of area at the point of fracture of 45 per cent, and be capable of bending double, flat, without sign of fracture on the convex surface of the bend.

22. The inspection and tests of the material will be made promptly on its being rolled, and the quality determined before it leaves the rolling-mill. All necessary facilities for this purpose shall be afforded by the manufacturer; but if the inspector is not present to make the necessary tests, and the contractor is not notified by the purchaser before the material leaves the mill what number and character of tests will be required, the quality of the material shall be assumed to be satisfactory.

23. A variation in cross-section or weight of rolled material of more than 1½ per cent below and 3 per cent above that specified may be cause for rejection.

CAST-IRON.

24. Except where chilled iron is specified, all castings shall be of tough gray iron, free from injurious cold shuts or blow-holes, true to pattern, and of a workmanlike finish. Sample pieces 1 inch square, cast from the same heat of metal in sand-molds, shall be capable of sustaining on a clear span of 4 feet 6 inches a central load of 500 pounds, when tested in the rough bar.

*Cement for Leather Belting.*—The *American Engineer* says: One who has tried every thing says that in an experience of fifteen years he has found nothing to equal the following: Common glue and isinglass, equal parts, soaked for ten hours in just enough water to cover them. Bring gradually to a boiling heat, and add pure tannin until the whole becomes rosy, or appears like the white of eggs. Buff off the surfaces to be joined, apply the cement warm, and clamp tightly.

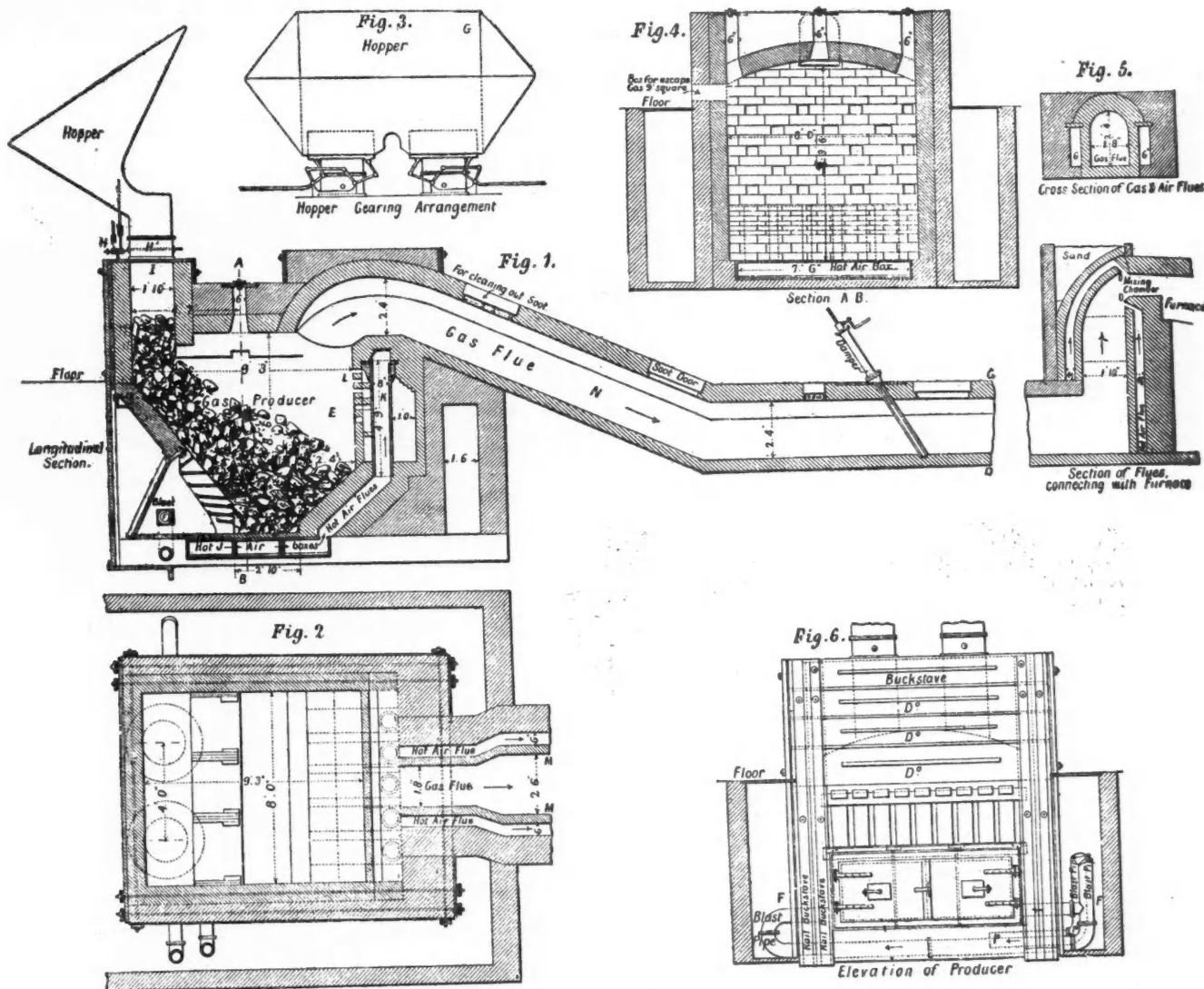
*The History of the Barometer.*—At a meeting of the London Meteorological Society on April 17th, according to the *Engineer*, the President, Mr. Ellis, gave an historical sketch of the barometer. After remarking on the accidental nature of the discovery of the instrument in the year 1643 in its best form, in ignorance for some time of its value for purposes of meteorological inquiry, he gave a brief account of many early kinds of barometers, the first endeavor being, in consequence of difficulties experienced with the ordinary mercurial form, to enlarge the scale of variation; attempts that, in general, introduced other errors and inconveniences. The desire to experiment on elevated positions induced the construction of an early form of portable barometer; one such, with cistern completely closed, leaving the air to communicate through the pores of the wood, having been made above two hundred years ago. The president further described various points in the arrangement of the Ramsden, Gay-Lussac, and other barometers, including also mention of some modern patterns of long-range barometers, standard barometers, and such barometers as are more commonly used. The practice of driving out air from the mercury by heating or boiling appears to have been in use early in the last century. Engraved plates, indicating the weather to be expected with different heights of the mercury, have been longer used, at least as early as 1688. As regards correction for temperature, De Luc in the last century adopted a temperature corresponding to 54.5 degrees Fahr. as that to which to make reduction, because corresponding nearly to the average of observations, such reduction being now made to the natural zero, 32 degrees Fahr. Reference was made to the employment of water—as in the well-known Royal Society barometer—and other liquids instead of mercury; also to various kinds of floating and other barometers not at all or not entirely mercurial, and to metallic barometers, history of recording barometers or barographs, and the application of photography and electricity to recording purposes.



SMITH-CASSON'S GAS PRODUCER AND FURNACE.

We take from *Engineering* the accompanying illustrations and description of the furnace and gas producer introduced by Mr. R. Smith-Casson: Fig. 1 is a longitudinal section showing the arrangement of producer with gas and air flues. Fig. 2 is a sectional plan, Fig. 3 shows the hopper gearing, Fig. 4 vertical section taken on the line A B on Fig. 1, Fig. 5 a section of the flues, and Fig. 6 a front elevation. The fuel is supplied to the producer-chamber E by means of the hopper G, the gear for working which is shown at H H' on Fig. 1 and in Fig. 3. The fuel is gasified in the chamber E, the amount of air necessary for partial combustion being introduced through the grate-bars shown. The air required to burn the gas in the furnace is introduced by means of a blower or fan through the pipes F shown in Figs. 1, 2, and 6. It passes into the hot-air boxes J, Figs. 1 and 4, and thence passes to the hot-air flues, shown in Fig. 1, to the pipes K. These pipes are protected from the direct heat of the incandescent fuel by the fire-brick screen most fully shown in Fig. 4; but this has a number of bricks left out, so that the hot gases can circulate around the flues K at the back. From these flues, the air passes to the two flat flues, which run parallel with the gas-flue N, as shown in Fig. 2, and by the cross-section, Fig. 5. The hot air and producer gases are brought

furnaces was taken in order to test the quantity of slack consumed per ton of iron rolled, and the waste of iron in the furnaces. The quantity of iron put into the furnaces was 22 tons 13 cwt. 1 qr. and 24 lbs. The finished iron rails rolled amounted to 19 tons 4 cwt. 3 qrs., while there were 2 tons 1 cwt. 3 qrs. and 7 lbs. in ends of bars. The waste in the furnace was thus 1 ton 6 cwt. 3 qrs. 17 lbs., or 3 tons 8 cwt. 2 qrs. and 24 lbs., including ends of bars, or a percentage of 15.15. The quantity of fine slack consumed per ton of iron rolled amounted to 4 cwt. 3 qrs. 34 lbs. The following results were obtained at the works of Messrs. John Russell & Co., Limited, of Walsall: 10 tons 16 cwt. of pig-iron were charged into the furnaces, which produced 10 tons 1 cwt. 2 qrs. and 26 lbs. of puddled bars; the loss being 14 cwt. 1 qr. 12 lbs. Seven hundred-weight of scrap bars were also made. The fettling used per ton of iron made was: Puddled mine, 2 cwt. 0 qrs. 17 lbs.; purple ore, 1 cwt. 0 qrs. 27 lbs.; and bull-dog, 3 qrs. 23 lbs. The screenings consumed per ton of iron made were 14 cwt. 2 qrs. 23 lbs. Two gas heating-furnaces at Messrs. John Russell & Co.'s works produced 206 tons 15 cwt. of 6½ inch and 6¼ inch strips in ten turns' work, and on some of the turns the make reached nearly 24 tons. The average output was about 20 tons per turn, including roll-changing and other delays. These gas furnaces are about 10 feet by 7 feet 6 inches, and the time of each heat is about 45 minutes,



SMITH-CASSON GAS PRODUCER AND FURNACE.

together to produce combustion at the point where the air and gas-flues meet at the junction with the furnace as shown in Fig. 1. Sufficient blast to give an outward pressure in the body of the furnace is used, from 1 ounce to 1½ ounces per square inch being found ample for the purpose. The air may be heated by the arrangement of flues to a temperature of from 800 degrees to 1500 degrees Fahr. before it is brought in contact with the gas, thus insuring immediate and perfect combustion of the gas. The arrangement also does away with the probability of carrying over to the furnace any impurities from the fuel that direct-heating furnaces are liable to. The further advantages claimed for this system are, that almost any degree or character of heat may be obtained as desired, varying between a cutting and highly oxidizing blast to a mild but penetrating soaking heat. Malleable iron may be melted, or, if required, gently raised to a dull heat in the same furnace. These conditions are said to secure a higher quality of metal together with a materially increased output. The escaping gases offer greater advantages for steam generation than in ordinary furnaces, as the combustion being more perfect, soot is not deposited. Common slack may be readily burnt, and the producer may be added to existing furnaces with very little alteration, the wall plates not requiring to be disturbed.

The Casson gas producer and furnace has been in successful operation at several iron-works. The following figures are given as the results of its working: At the Round Oak Iron-Works, one turn's work at two

thus getting from eight to nine heats a day of twelve hours. The increased yield and freedom from wasters in these strip heating-furnaces is said to form a very important item in the cost of making gas and steam-pipes. Messrs. Philip S. Justice & Co., No. 55 Chancery Lane, are the agents for the inventor.

• **Seismic Events of 1884.**—Professor Fuchs's record gives 123 shocks of earthquakes, distributed in time as follows: Winter, 57 (December, 19; January, 28; February, 10); spring, 24 (March, 13; April, 7; May, 4); summer, 21 (June, 5; July, 9; August, 7); fall, 21 (September, 8; October, 1; November, 12). Those deserving individual mention are, March 24th, in Upper and Central Slavonia, where in Diakovar and other places numerous buildings suffered injury; April 22d, in England; May 13th, in Crevassa, where a church and other buildings were destroyed; May 19th, on the Persian Gulf, in which 200 persons fell victims by the overthrow of their houses; August 10th, in the eastern United States; and the Spanish earthquakes in December. In regard to the last, Dr. Fuchs believes the centrum was not a point, but a line parallel to the Sierras Tejada and Almirajara; nor does he think they were of greater importance than those of Belluno in 1873, of Agram in 1880, and of Chios in 1881. There was very little volcanic activity throughout the year, and that only in *Ætna*, *Vesuvius*, and *St. Augustine*, in Alaska.

## SEPARATION AND DETERMINATION OF COPPER, CADMIUM, ZINC, NICKEL, ETC.\*

By A. Carnot.

Copper, cadmium, zinc, nickel, cobalt, manganese, and iron may occur in certain ores and in a number of industrial alloys. Their successive separation in analysis presents great practical differences by reason of the analogous properties of their salts.

The methods of separation about to be explained are principally founded upon the use of sodium or ammonium hyposulphite, and on that of sulphureted hydrogen in solutions successively acidified by sulphuric or hydrochloric acid, by oxalic acid, and, lastly, by acetic acid.

The precipitation of copper by sodium hyposulphite in a boiling sulphuric solution was first recommended by Flajolot as a means of separating it from zinc and nickel. Much more recently, Vortmann found that the same reagent effects the separation of copper and cadmium with great exactitude.

The author has satisfied himself of this fact, under different conditions that appeared preferable, and making use of ammonium hyposulphite, which, in comparison with sodium salt, has the advantage of not introducing a fixed alkali.

The solution containing copper, cadmium, and other metals diluted to 200 or 300 c. c., is acidified with from 10 to 15 c. c. hydrochloric acid, heated to boiling and mixed with hyposulphite, added in successive portions until the precipitate, instead of becoming at once a deep brown from the formation of copper sulphide, remains for some time white and milky, from the liberation of sulphur. When the liquid is cleared by boiling, the precipitate is collected on a filter. It contains all the copper as  $Cu_2S$ . It is dried, the filter is burnt, mixed with powdered sulphur, and ignited in a small crucible traversed by a current of dry hydrogen (H. Rose's apparatus). The sulphide is weighed, containing 79.87 of copper. The cadmium may be precipitated by sulphureted hydrogen or ammonium hydrosulphate.

The separation of cadmium and zinc is effected by an analogous operation, care being taken that the solution contains no other free acid save oxalic acid, and that the precipitated sulphides are not mixed with oxalates.

It must be observed, to this end, that the zinc is precipitated as simple oxalate, scarcely soluble in ammonium chloride, while the cadmium forms in presence of ammonia a double oxalate, easily soluble in the same reagent. If we add beforehand 10 parts of ammonium chloride to one part of metal, we may completely prevent the precipitation of cadmium by oxalic acid or ammonium oxalate. The operation may be thus conducted, whatever are the relative proportions of zinc and cadmium.

The solution, supposed to be acid and but little diluted, is exactly neutralized with ammonia. An excess of sal-ammoniac is then added, and about 2 grams oxalic acid in solution, and the whole is boiled for some minutes. If the zinc is in notable quantity, and forms a crystalline deposit of oxalate, it is separated by decantation and washed with a hot solution of ammonium chloride. If it is in very small quantity, there may be no deposit to separate. The solution containing all the cadmium and a little zinc, diluted to 200 or 250 c. c. and raised to a boil, ought not to give any further precipitate. There is then added at once or in several portions ammonium hyposulphite, acidifying afresh, if needful, with oxalic acid, and it is kept at a boil as long as the orange precipitate of cadmium sulphide appears to increase.

Each fresh addition of the reagent gives rise at first to a milky white precipitate of sulphur, which gradually turns orange. We ascertain that the precipitation is complete by decanting a portion of the liquid through a filter, adding a little more hyposulphite and oxalic acid, and boiling again. It ought to give merely a white turbidity, and finally a light yellow deposit of sulphur.

The sulphide of cadmium thus formed is dense, not bulky, easy to wash by decantation, and is totally free from zinc.

It is re-dissolved in dilute boiling nitric acid, the solution is evaporated to dryness in a small tared capsule, re-dissolved in a little dilute sulphuric acid, evaporated again, calcined below a red-heat, and weighed as cadmium sulphate containing 53.84 per cent of metal.

The zinc is found entirely in the oxalic solution and in the first crystalline precipitate. The latter is calcined separately and converted into zinc oxide. The zinc in the solution is precipitated by a current of sulphureted hydrogen. The whiteness of the precipitate shows that the liquid did not contain a trace of cadmium. It is filtered, dried, the filter burnt, and the whole ignited in a small Rose's crucible traversed by a current of dry hydrogen sulphide. The zinc sulphide, the sulphide that may have been formed during the combustion of the filter, and the oxide derived from the decomposition of the oxalate, are all brought to the state of sulphide containing 67.13 per cent of zinc.

**Measurements of Electro-Motive Force of Zinc-Copper and Lead-Platinum Couples.**—From a large number of determinations of the electro-motive force of the currents yielded by zinc-copper and lead-platinum couples in various simple saline solutions, B. C. Damien—*Ann. Chim. Phys.*—finds that the electro-motive force as a rule decreases with the time the couple is immersed. In the case, however, of the zinc-copper couple in solutions of the chlorides, the electro-motive force at first slowly increases. The electro-motive force of the current yielded by a zinc-copper couple in a solution of magnesium sulphate is very constant, scarcely varying 0.017 volt during twelve months, and is not appreciably affected by changes either of the strength of the solution or of temperature. By introducing an exterior resistance of 20,000 ohms, the current becomes practically invariable, even when the couple is kept in circuit. The author proposes to employ this couple for the generation of currents of standard strength. The zinc-copper couple yields currents whose electro-motive force is almost identical for members of any class of salts containing a given acid, but varies greatly with a change of acid. Amalgamation of the zinc slightly increases the electro-motive force at first, but it decreases more rapidly than is the case when unamalgamated zinc is employed. The current obtained from a platinum and amalgamated zinc couple in dilute sulphuric acid has its maximum electro-motive force when its solution contains 30 per cent of acid.

\* *Comptes Rendus. cil.*, page 621.

## SACCHARINE, THE NEW COAL-TAR SUGAR.

For a year past, it has been known that a sugar about 230 times sweeter than the best cane sugar was made from coal-tar. We have ourselves tasted it, and can testify to the fact. The manner of its production and its nature have not, however, been generally known. The following paper, read by Ivan Levinstein before the Society of Chemical Industry, February 2d, 1886, will therefore prove of interest:

Saccharine was discovered by C. Fahlberg, a chemist residing in this country. The chemical name of saccharine is benzoyl sulphonic imide.

Fahlberg commences with toluene, a hydrocarbon present, as you are probably all aware, in coal-tar. This toluene,  $C_6H_5$  ( $CH_3$ ), he converts into its two monosulphonic acids, and transforms these by treating them with phosphorus-pentachloride ( $PCl_5$ ) into the corresponding toluene-sulphonic chlorides. Of these two toluene-sulphonic chlorides—namely, the para and the ortho—only the ortho compound, which is liquid (the other being solid), is suitable for the production of saccharine. By the introduction of the amido group of ammonia, this ortho-toluene-sulphonic chloride is then converted into ortho-toluene-sulphamide, which finally yields, by oxidation, the benzoyl sulphonic imide or saccharine.

Saccharine presents the appearance of a white powder, and crystallizes from its aqueous solution in thick short prisms, which are with difficulty soluble in cold water, but more easily in warm. Alcohol, ether, glucose, glycerole, etc., are good solvents of saccharine. It melts at 200 degrees C., with partial decomposition; its taste in diluted solutions is intensely sweet, so much so that one part will give a very sweet taste to 10,000 parts of water. Saccharine forms salts, all of which possess a powerful saccharine taste; it is endowed with moderately strong antiseptic properties, and is not decomposed in the human system, but eliminated from the body without undergoing any change. It is about 230 times sweeter than the best cane or beet-root sugar.

According to Dr. Stutzter, of Bonn, who has carefully investigated the physiological properties of this substance, saccharine, taken into the stomach in the quantities in which it has to be added to food as a sweetening material, has no injurious effect whatever on the human system. Stutzter has given to dogs about 5 grams a day, without observing any ill effects in them, and when we consider that 5 grams are equal in sweetening power to rather more than 2½ pounds of sugar—a quantity far larger than any one would like to consume in a day—his view seems amply corroborated by this fact alone; but, in addition to this, patients suffering from diabetes have now been treated for several months in one of the principal hospitals in Berlin, as I am informed, without their feeling the least inconvenience by its use. Physicians must be glad to find in saccharine a substance by means of which diabetic persons may enjoy food that has hitherto not been admissible in their case.

Saccharine does not belong to the class of carbohydrates, and does not possess nutritious properties. Dr. Fahlberg combines glucose with starch sugar, and thus obtains a compound which he calls "dextro-saccharine," which, as far as the taste is concerned, is scarcely distinguishable from the best sugar. The quantity of "saccharine" used is in the proportion of one part to from 1000 to 2000 parts of glucose. Now, if we look at the price of saccharine, which is, I believe, at present about 50s. a pound, we shall find that even at this price such a mixture would be very considerably cheaper than real sugar, but we must bear in mind the fact that there is great likelihood of the process of manufacture of saccharine being considerably cheapened; the expensive phosphorus-pentachloride may probably be replaced by a cheaper compound, etc.

The solubility of saccharine in ether might probably be useful in detecting its presence when mixed with sugar.

This discovery offers a new and important use for coal-tar, and saccharine promises to become a very important rival to sugar.

## PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent-Office.

GRANTED APRIL 20TH, 1886.

- 340,101. Feeding Fuel. John T. Corbett, Aurora, Ill.  
 340,102. Fire-Box for Boilers. John T. Corbett, Aurora, Ill.  
 340,110. Hot-Blast Conduit. Frederick W. Gordon, Philadelphia, Pa., Assignor to Gordon, Strobel & Lauenau, same place.  
 340,142. Concentrating and Amalgamating Machine. Harrison B. Meech, Cleveland, Ohio.  
 340,161. Tunneling Apparatus. Charles Soosmith, New York City.  
 340,162. Process of Preparing Soil for Tunneling and Excavating. Charles Soosmith, New York City.  
 340,163. Hot-Blast Oven. Victor O. Strobel, Alleghany, Pa.  
 340,223. Mode of Forming Compound Plates of Nickel and Silver or Platinum. Maurice L'Epine, Paris, France, Assignor to the Firm Société de Laminage du Nickel, same place.  
 340,231. Process of Converting Natural Gas into Illuminating Gas. John McKay, Titusville, Pa., Assignor of one half to Walter B. Roberts and Erastus T. Roberts, same place.  
 340,232. Process of Treating Natural Gas. John McKay, Titusville, Pa.  
 340,251. Quarry-Drill Frame. William L. Saunders, Jersey City, New Jersey.  
 340,266. Means for Preventing Leakage in Gas-Mains. George Westinghouse, Jr., Pittsburg, Pa.  
 340,267. Pipe-Joint for Gas-Mains. George Westinghouse, Jr., Pittsburg, Pa.  
 340,268. Pipe-Joint for Gas-Mains. George Westinghouse, Jr., Pittsburg, Pa.  
 340,276. Explosive Compound. Max Bielefeldt, Kolk, near Cologne, Germany.  
 340,282. Gas-Making Apparatus. Ellsworth S. Bryant, Alexander W. Finlayson, and George R. Couls, Detroit, Mich.  
 340,302. Bagasse-Burner. George W. Fisher, St. Louis, Mo., Assignor of one half to the Fulton Iron-Works, same place.  
 340,330. Method of Making Sheet-Metal Pipe. James E. Leadley, Nyack, New York.  
 340,384. Method of Sinking Shafts through Quicksand. William S. Smith, Chicago, Ill.  
 340,411. Process of Treating Mineral Oils. Charles L. Baillard, Rouen, Department of the Seine Inférieure, France.  
 340,450. Pressure Regulator for Proportional Gas-Meters. Frank Moore, Pittsburg, Pa.  
 340,453. Gas-Engine. Nathan E. Nash, Westerly, R. I., Assignor of one half to Robert H. Staley, Jersey City, New Jersey.  
 340,460. Method of Preparing Molds for the Electro-Deposition of Metals. Lewis H. Rogers, Kansas City, Mo.  
 340,465. Machine for Making Lead Pipe. Christopher C. Tracy, Brooklyn, Assignor to the Colwell Lead Company, New York City.  
 340,472. Ore-Crusher. Thomas Archer, Jr., Gateshead-on-Tyne, England.  
 340,496. Hydraulic Air-Compressor. James B. Erwin, Milwaukee, Wis.  
 340,499. Process of and Apparatus for Distilling Hydrocarbon Oil. Herman Frasch, London, Ontario, Can.  
 330,504. Method of Amalgamating. Benjamin S. Harbach, Philadelphia, Pa.  
 340,524. Cut-off for Natural Gas Pipes. George Russell, McKeesport, Pa.



## FURNACE, MILL, AND FACTORY.

Messrs. John Mason & Co., manufacturers of wire rope, have removed from No. 43 Broadway, where they have been located for the past twenty years, to No. 52 Dey street.

Mr. A. T. Chur, sole agent for the United States for the "Abernant" Dinas fire-bricks and cement, has removed to the Potter Building, corner of Beekman street and Park Row, Room No. 88.

William Hasenzahl, of Cincinnati, Ohio, has an order for one of his diamond bit drills to go to Shanghai, China. A sale of one to C. L. & A. S. Keck, of White Haven, Pa., is also reported.

Messrs. Oliver Brothers & Phillips, of Pittsburg, have, it is said, closed a contract with the proprietors of the Allen furnace at Sharon for a long term, and will probably order a resumption of work at the plant soon. The furnace is in excellent order, and can be blown in on short notice.

The sheet mill at Beaver Falls, Pa., lately purchased by Anderson, McKee & Co., has started up, after being idle for two and a half years.

Robert Hare Powell's Sons & Co., who own furnaces at Saxton, in Central Pennsylvania, will build new furnaces this summer adjoining their present ones, and have, it is said, obtained a loan from the Union Trust Company of Philadelphia for that purpose. A mortgage for \$750,000 on the furnaces, coal and ore lands, and mining rights of the company in Huntingdon and Bedford counties, to secure the loan has been recorded.

The Bethlehem Iron Company, Bethlehem, Pa., is erecting at its works a Davis-Colby desulphurizer. This apparatus has been in successful operation at the Katahdin Iron-Works, at Katahdin, Maine. The object of the Bethlehem Iron Company is to desulphurize its Cuban ores.

The Wisconsin Liquid Fuel Company, of Milwaukee, has been organized with a capital of \$25,000, to manufacture retorts, engines, boilers, and heaters for manufacturing gas from petroleum.

The Canonsburg Iron Company, Canonsburg, Pa., has applied for a charter of incorporation under the changed name of the Canonsburg Iron and Steel Company.

The suit begun by the National Tube-Works Company against Ripley & Kimball, of St. Louis, Mo., over two years ago, has just been dismissed by the plaintiff. The action involved nearly \$60,000. The suit grew out of certain differences regarding a contract for the sale of goods, and has been contested for two years. According to the *Age of Steel*, it has been settled by the payment of an amount that, without adding any interest, will be equivalent to the offer made by Ripley & Kimball at the time the suit was brought, less a sum that will about cover their expenses in the case from that time.

The contract for the erection of the new Bessemer steel-works at Germantown, near Homestead, Pa., has been let to McIntosh, Hemphill & Co., of Pittsburg, and they are now letting sub-contracts. Work has begun.

The agents of the Port Henry Steel and Iron Company in this city, Messrs. G. M. Stetson & Co., No. 69 Wall street, are introducing the company's Clapp-Griffiths steel ingots.

The new puddling-mill of Lindsay, McCutcheon & Co., Alleghany, Pa., caught fire from a furnace smoke-stack on the 28th ult., and was completely destroyed. Loss, about \$10,000.

Works for the production of Mitis castings are, it is stated, to be erected at Pittsburg, Pa.

The claim of the Pennsylvania Steel Company against the Reading Railroad Company for \$107,919, on account of steel rails, has been referred by the United States Court to Special Master Dallas.

## PROPOSALS.

The Indian government has put in the budget for the current year an appropriation for more than \$41,000,000 for new railroads and public works, while the Indian Midland Railroad Company has been formed, with a capital of £3,000,000, and the Mahratta Company has raised £600,000 for a new railroad.

In Australia, it is proposed to build a new road from Perth to the port at Fremantle, about 270 miles. Work has begun.

These and other works in the colonies offer a field for the introduction of American machinery. The

recent contract for the Hawkesbury bridge in New South Wales for £327,000, which was given to the American Union Bridge Company, has called attention to the fact that in railroad work American engineers can underbid Europeans as well as furnish better work.

The Office of Building for State, War, and Navy Departments, Washington, D. C., will receive proposals until May 12th for furnishing, delivering, and putting in place the lathing and lathed iron partitions, using corrugated or flat sheet-iron laths, in the west and center wings of the Building for State, War, and Navy Departments, in Washington.

Col. John M. Wilson, U.S.A., Office of Public Buildings and Grounds, Washington, D. C., will receive proposals until May 3d for furnishing and placing in position, in all about 865 feet, more or less, of iron water-pipe, with necessary fittings, in various reservations.

State of Ohio Adjutant-General's Office, Columbus, will receive proposals until June 1st for furnishing the State with 20,000 bushels of coal, free from slate, slack, and dirt; to be increased at the option of the Adjutant-General. The proposal will include delivery at the State-House; the coal to weigh 80 pounds to the bushel.

S. Crispin, Colonel of Ordnance, Commanding Frankford Arsenal, Philadelphia, Pa., will receive proposals until May 26th for supplying 10,000 pounds pig-tin, Straits or equal.

P. G. Wood, First Lieutenant Twelfth Infantry, A.A.Q.M. Fort Niagara, New York, will receive proposals until May 25th, for the construction of a system of water-works at Fort Niagara.

## LABOR AND WAGES.

The meeting of the Executive Board of the Miners and Laborers' Amalgamated Association, held at Pottsville, Pa., on the 28th ult., was the most important held for years. The Executive Board last fall ordered the enforcement of eight hours' work on May 1st. The advisability of carrying this into effect was discussed, and it was finally decided to await the action of the miners in the upper anthracite coal-fields. A resolution was passed forbidding members from taking more than one contract at a time, this to go into force on May 1st. Arrangements were made to secure a full representation from the anthracite regions to the State Convention at Altoona, in June.

It is stated that on the 1st inst. the Kanawha coal miners, West Va., will strike, as the operators have refused to give the price demanded. The New River miners will not strike. The suffering and destitution among the coal miners in the Elk Garden and the George's Creek regions are terrible. For a year past, nothing has been done in the mines, and hundreds of families are without the commonest necessities of life.

An adjourned meeting of the coal operators and miners of the St. Louis District, Ill., was held at St. Louis on the 26th ult. The committee appointed at the last meeting to determine upon a final agreement as to what should constitute a just price for mining coal, and to fix the wholesale and retail price for the same, submitted a report, which states that  $2\frac{1}{2}$  cents a bushel weighing 80 pounds, or  $2\frac{1}{4}$  cents a bushel top weight, should be paid by hand operators, and that the minimum selling price shall range from  $6\frac{1}{4}$  cents to 10 cents a bushel. These prices were unanimously adopted. A committee of three miners and three operators was appointed to arbitrate and settle all future differences that may arise.

The Lucy furnaces at Pittsburg resumed operations on the 23d ult., the strikers agreeing to go back to work pending arbitration.

The employes of the National Foundry and Tube-Works at Scottdale, Pa., struck last week for an advance of wages, and the works have been closed down.

The wages of the employes of the Lehigh Zinc and Iron Company, at South Bethlehem, Pa., have been advanced 10 cents a day from May 1st. The workmen in the yard will receive an advance of 5 cents a day.

The strike that began at the Coleraine Iron-Works, at Redington, Pa., on the 17th ult., has ended, Superintendent Carter giving the men the advance asked for and a regular pay-day. The laborers will now receive

\$1.10 a day instead of 90 cents, and furnacemen \$1.40 a day instead of \$1.25. Work has been resumed.

The employes of the Lynn Zinc-Works at Pittsburg, Kansas, struck for an advance of from 10 to 25 cents a day.

For the present, the State troops will remain at the Greenwood mine, Ky., as the free striking miners and others openly assert their intention to destroy the camp the moment it is not under military protection.

At a meeting of the Third Pool coal miners, held on the 26th ult., it was decided to call a convention of railroad miners to meet in Pittsburg, Pa., on the 3d inst., to take some action looking to the stoppage of shipment of coal to the Eastern markets.

Oliver Brothers & Phillips' South Tenth Street Rolling-Mill at Pittsburg was closed down on the 27th ult., because of a strike of some workmen, who claim that, when the advance in wages was made recently, they were not included. They want an increase of from 10 to 15 per cent.

## TRANSPORTATION NOTES.

The statement of business of the Philadelphia & Reading Railroad and Coal and Iron Companies for March, 1886, as compared with the same month in 1885, shows an increase of gross earnings of \$403,524, an increase in expenses of \$337,493; an increase in net earnings of \$66,031.

The statement for March of the Norfolk & Western Railroad Company shows: Gross earnings, \$277,307.23; expenses, including taxes, \$156,375.37; net earnings, \$120,931.86, showing an increase of \$34,760.40, as compared with the same period of last year.

## COAL TRADE NOTES.

The Acting Secretary of the Treasury on the 28th ult. sent to the House of Representatives a response to the resolution inquiring the effect of the law allowing a drawback on bituminous coal imported and afterward consumed for fuel on board vessels propelled by steam, and whether the law is evaded by British coal men. The department, he says, has not been able to learn that the law is evaded in any manner by the British coal dealers.

## ILLINOIS.

The Castle Mining Company has been incorporated at Mattoon, Coles County, to carry on a general coal mining business; capital stock, \$9000.

The Chicago Diamond Prospecting Company, employed by the city of Hillsboro' to prospect for coal oil and gas, struck to-day, at a depth of 436 feet, a vein of coal. Prospecting for oil and gas will be continued until a depth of 800 or 1000 feet is reached.

## KENTUCKY.

The Breckenridge Company, Limited, has been formed with a capital of £500,000, 50,000, £10 each, and £75,000 of 8 per cent mortgage debentures, for the purpose of acquiring the entire capital stock of the Cloverport Oil and Coal Company. This company owns property consisting of about 6000 acres of land, of freehold tenure, situate in the counties of Breckenridge and Hancock, with mineral rights under a further and adjoining tract of land of about 1600 acres. The property is about nine miles from the town of Cloverport, which lies on the banks of the Ohio. From this river to the property, a railroad has been constructed. At the river itself, are the necessary landing stages. Upon the property, is a seam of rich cannel coal. The seam has been opened at various points by levels running into the hillsides. Reports have been made by Mr. Rathbone, of the firm of Bainbridge, Seymour & Rathbone, of London.

## NEW YORK.

While drilling for salt at Pearl Creek, a vein of bituminous coal was struck at a depth of 500 feet. This discovery is in what is known as the Warsaw Valley, fifty miles south of Rochester. Preparations will be made at once to sink a shaft. No coal has been discovered before within a radius of 100 miles from the locality.

## OHIO.

At a meeting of the bondholders of the Ohio Central Coal Company, held in this city on the 26th ult., an agreement between the main line and the Mineral Division interests was completed. A new company is to be formed with a share capital of \$1,500,000. The coal tracts are to be again united, after separation by

foreclosure, and in the new company the main line bondholders will receive 60 per cent and the division bondholders 40 per cent of the new bonds, while the stock will be divided evenly. The meeting was harmonious, and the agreement was considered by those present an extremely just one. The success of the scheme was fairly assured by the assent of those present at the meeting.

Mr. Harry Biggers has entered suit at Youngstown against the Foster Coal Company, asking damages in the sum of \$30,000 for injuries received on December 5th, 1885, by the explosion of a boiler, which is said to have been in an unsafe condition known to the company.

#### PENNSYLVANIA.

##### COKE.

At a meeting of the Connellsville coke syndicate at Pittsburg, Pa., the price of coke was advanced to \$1.50 a ton for furnaces, \$1.60 for dealers, and \$1.75 for foundries. Heretofore, the price has been \$1.35 for furnaces and dealers, and \$1.50 for foundries. The increase will take effect on May 1st.

Negotiations are in progress for the consolidation of the Anchor, Atlas, and Uniondale coke-works at Dunbar. The Anchor works are owned by Laing & Davidson, and comprise 100 ovens; the Atlas consists of 80 ovens, and is owned by the Dunbar Coke Company; the Uniondale numbers 76 ovens, and is owned by J. M. Reid. Each works embraces a great area of workable coal, easily and cheaply mined.

The Central Connellsville Coke Company has applied for a charter. The capital stock is \$500,000.

J. M. Schoonmaker & Co. have concluded the purchase of 3000 acres of coal land between the Standard and Hecla coke-works about the middle of the coking coal belt, Mount Pleasant. The coal that has not yet been developed is on the line of the proposed extension of the Youngwood branch of the Southwest Pennsylvania Railroad.

#### GAS AND OIL NOTES.

Exports of refined, crude, and naphtha from the following ports, from January 1st to April 24th:

	1886. Gallons.	1885. Gallons.
From Boston .....	1,351,311	1,868,973
Philadelphia .....	36,896,055	29,961,129
Baltimore .....	3,624,033	2,826,438
Perth Amboy .....	718,086	
New York .....	112,880,149	102,162,308
Total exports .....	155,649,634	136,818,838

#### PENNSYLVANIA.

The Westmoreland & Cambria Gas Company last week brought in two very large gas wells at Grapeville station. The wells are on the Brown and Henry farms, and are said to be very large.

The Carnegie Gas Company has every thing ready to begin work on the construction of the main line of that company from the Daum well, near Murrysville, to Braddock. The eight-inch line from Braddock to Homestead has been finished.

From a review of the course of the market of the Philadelphia Company (Natural Gas), we learn that the stock that was freely offered last August at 50, in November went up to 63, then declined in February to 52½@53, advanced again to 60, and is now quoted at from 49@50, with the prospect of a still farther downward movement.

The Alleghany gas-works is now successfully using water-gas mixed with coal-gas for illuminating purposes, 14 per cent of the former being mixed with 86 of the latter. The light is equal to 18 candle-power.

#### WYOMING.

The Twin Creeks Oil Company has been incorporated with a capital stock of \$100,000, 10,000 shares, to prospect for oil in this territory. The principal office will be at Cheyenne.

#### GENERAL MINING NEWS.

##### ARIZONA.

##### GRAHAM COUNTY.

DETROIT COPPER COMPANY.—The smelter is running smoothly, and turning out the usual quantity of bullion. The concentrators are housed, and are rapidly approaching completion. When finished, they will add materially to the product. Work at the mine continues satisfactory.

##### YAVAPAI COUNTY.

TRINIDAD & CASTLE CREEK.—This company has come into full possession of the Burger mill, and has acquired a half-interest in the Castle Creek smelter,

and purchased outright the mining claims of Bob Groom and those of Groom and the Osborn Brothers. The company already owns valuable prospects, gold and copper, on Castle Creek, and this purchase gives it an assurance of ore sufficient to operate its mill constantly throughout a year. The company intends placing a ten-stamp mill in addition to the five-stamp mill just purchased from Burger. The Castle Creek District is situated in the extreme south edge of Yavapai County.

#### CALIFORNIA.

##### SAN BERNARDINO COUNTY.

It is rumored that Denver capitalists intend to erect large reduction-works at the Needles on the Colorado River. It is also said that, at the same time, a railroad will be built, commencing at the Needles and running to Providence, thence to Soda Lake, and continuing farther north to other mining districts.

ORO GRANDE.—It is the intention to add fifteen more stamps to the mill.

##### SIERRA COUNTY.

ALASKA.—The mine has been drained to the 400-foot level, and work on that level is progressing.

YOUNG AMERICA.—All the necessary machinery of an addition of ten stamps to the company's mill has been purchased and will be put in at once. The showing under ground is getting better every day. The ledge in the lower tunnel is looking fine, and a splendid body of ore is opening out in that quarter.

##### COLORADO.

Official figures from the Denver Mint show the mineral output for Colorado in 1885 to have been as follows: Gold, \$5,000,000; silver, \$13,500,000; copper, \$700,000; lead, \$3,361,000; total, \$22,561,000.

##### CLEAR CREEK COUNTY.

SEVEN-THIRTY.—Some excellent ore is shipped from this mine. Large quantities of lead ore are taken from the 210 and 240-foot levels east, and a fine vein of dry ore is worked in the 80-foot level east. Thirteen levels in all are now driving.

STEVENS.—The last shipment last month of 66 tons brought nearly \$4000, and 100 tons of a similar grade await shipment at the mine.

##### DOLORES COUNTY.

GRAND DUKE.—The company will soon resume operations at the Forest mine, and a large amount of development-work will probably be done this season. The Forest shows a large vein of ore, averaging over 50 per cent lead and 25 ounces in silver, from which large amounts of ore have been shipped. The company will at once begin to ship this ore to the Grand View smelter.

GRAND VIEW.—The company has an enormous amount of ore on hand, and large shipments are daily received. The smelter will blow in as soon as a supply of coke can be obtained: it is delayed by the bad condition of the roads.

##### LAKE COUNTY.

The Leadville *Herald-Democrat* reports the following:

AMERICAN MINING AND SMELTING COMPANY.—This company has taken a lease on a great area of ground on Rock Hill, and will begin at once sinking a new shaft to mineral.

AMIE.—The lessees about No. 2 shaft are shipping considerable iron ore, evidently of fair grade.

DENVER CITY AND LEE BASIN.—Mr. Robert Bumen, the general manager, states that he has secured an extension of the obligations of the companies, and will push development-work on both properties. The Katy and Midnight lodes on Little Ella Hill, and the Midnight mill site, have been sold for \$40,000 to a St. Louis company. The mines belonged to Mr. Conrad Hanson, of Leadville.

IRON SILVER.—The concentrating mill of this company is nearly completed and ready for action. The water for the mill is drawn from Big Evans Gulch, above the town of Evansville, and carried for several miles in a ditch, around over Breece and Iron hills. It is estimated that water can be run through this ditch after May 15th. The material to be run through the mill is the better portion of the stuff contained in the large waste-dumps, situated below the main or south incline of the Iron mine.

KATY.—The Katy mine discloses quite a large body of ore. Its principal development consists of a shaft 115 feet in depth. The new company has already begun the erection of a shaft-house and other improvements.

LEADVILLE CONSOLIDATED.—The sinking of the new

shaft of this company, on Carbonate Hill, has been temporarily suspended, owing to the flow of surface water.

LEADVILLE TUNNELING, MINING AND DRAINAGE COMPANY.—The project of draining the deep mines on Fryer and Carbonate hills, by means of a long tunnel driven under the city of Leadville, to which we have already referred, is daily gaining in favor. The company has obtained the Alice placer, which covers a large portion of the eastern part of Leadville, and the squatters on ten lots have been bought out, so that territory was secured for surface improvements. A shaft has been started, 4½ by 9 feet in the clear, and is already down over 30 feet. This shaft is the first of a series, from which headings are to be driven both ways, to expedite the driving of the tunnel. All the right of way necessary has not yet been secured on the line of the tunnel, which is to start from California Gulch below the American Smelter, and run in a direct course for the Little Sliver and Forepaugh mines. If the privilege can be obtained without difficulty, the tunnel will be driven as projected; otherwise, the course will be altered to suit emergencies. It is understood that assessments are to be levied as the work advances.

MORNING STAR.—Developments from the McHarg shaft have disclosed the ore-body in another place, 75 feet from the one previously reported.

ST. BERNARD.—The suit for an injunction, brought by Thomas Burke *et al.* against Peter Finnerty is now before the District Court at Denver. This injunction was first filed by Burke *et al.* on February 27th, 1885. The plaintiffs demand that Finnerty shall account for the distribution of 36,500 shares of the capital stock of the St. Bernard Mining Company. They further desire to receive a proportionate share of the capital stock of the Adams Mining Company, instead of their share of the stock of the St. Bernard Mining Company. The plaintiffs further desire that there shall be an accounting given by the defendant of all profits realized by him on account of the shares above named, and pray that the Adams Company be restrained from paying any dividends on the capital stock issued to defendant in place of the shares issued heretofore. The capital stock of the St. Bernard Mining Company is placed at \$1,000,000, divided into shares of \$10 each. A decision has not yet been made.

##### MONTROSE COUNTY.

A company has been formed in Salt Lake City (where the principal office will be) with a capital of \$400,000, 40,000 shares, to purchase and operate the Rock Creek placer mining claim, 160 acres.

##### PITKIN COUNTY.

DIXON MINING AND SMELTING COMPANY.—This company has been incorporated at Aspen, with a capital stock of \$300,000; J. E. Boss, agent.

DURANT.—The request made of the District Court to be allowed to run levels, cross-cuts, and stopes in the Aspen ground, to prove the walls, has been denied, as affidavits introduced by the Aspen people proved that the latter had already run such workings as far as mineral was found to exist.

MARY B.—This tunnel, on the point of West Aspen Mountain, is in some 300 feet, and it is expected that it will reach the Pride of Aspen mineral within the next 20 feet, where it will cut it over 400 feet deep.

REGENT, TIGER, AND PARK.—Messrs. Allison and Stillwell, of Leadville, have taken a lease and bond at \$100,000 on these lodes on Smuggler Mountain, and will begin work in June, erecting hoisting and other necessary machinery. The shaft is down 352 feet.

##### DAKOTA.

##### LAWRENCE COUNTY.

CALEDONIA.—Official advices from this mine for the week ended April 19th state that 1018 tons of ore were produced from the 425-foot level, and 508 tons from the cave, making a total of 1526 tons. The winze advanced 4 feet, making a total of 88½ feet. The south cross-cut advanced 9 feet. This cross-cut was started from the face of the south drift running east. The bullion shipped to New York for the first half of April was, net product, \$11,000.

EMPIRE CARBONATE.—This company has disposed of 45,000 shares of its treasury stock, the proceeds to be used in the purchase of hoisting-works, negotiations for which are pending.

IRON HILL.—Since this company has begun the payments of dividends, quite a boom has been created in the stock, which in January was quoted at \$1 and now at \$5 a share.



**RATTLER-GILROY.**—The differences heretofore existing having been amicably settled, work will be resumed.

**PENNINGTON COUNTY.**

Messrs. Robert A. Little, of Detroit, and James Campbell, of Chicago, have purchased the Excelsior, Champion, Peanut, Nutmeg, Hazlenut, Waterside, Susan S., and Julia claims for \$50,000. The claims lie about five miles east of Hill City, near Palmer Gulch. Two of them are placer claims, the rest quartz. The development consists of a shaft 35 feet deep. It is stated that some specimens tested showed nearly fifteen per cent of metallic tin. Work is to be pushed vigorously by the new owners.

**HARNEY PEAK.**—Things are working smoothly at the company's mill, though it has not been running continuously. It started up on the 25th of March, and ran one ton only. No rock was then run until April 3d, and then the mill was run continuously, seven days in all. The product is something over 18,000 pounds of cassiterite. Only forty or fifty tons of ore are crushed daily, while the capacity of the mill is 300 tons daily.

**IDAHO.**

**BANNOCK.**—This company has closed a contract with Fraser & Chalmers for a stamp silver mill to work the ores of its Horn-Silver mine at Era. It is to be a complete twenty-stamp silver mill, with power for forty stamps. The mill is to be completed by the first of October. The company, it is said, will probably levy an assessment of fifty cents a share in a short time, which will give \$50,000 to put in this mill.

**MAMMOTH GOLD AND SILVER MINING COMPANY.**—This company has been organized at Helena, Montana, to work mines near Huston; capital, \$1,125,000.

**MEXICO.**

The new mining law promulgated in the State of Hidalgo fixes the tax on gold and silver mined in the State and treated at the local reduction-works at 1.40 per cent of its value. Ores exported will pay two per cent on their assayed value.

**BADIGUATO GOLD MINING AND MILLING COMPANY.**—This company, which has been incorporated under the laws of the State of Illinois, by St. Louis capitalists, with a capital stock of \$5,000,000, owns property which comprises 20,000 acres of land in the State of Sinaloa, fifty miles northwest of Culiacan.

**SONORA SILVER MINING COMPANY, LIMITED.**—This company has been brought upon the English market, with a capital of £365,000, divided into 65,000 preference shares, of £1 each, and 300,000 ordinary shares, of £1 each. The company proposes to acquire the silver mine known as the San Miguel, situated in the Municipality of Soyopa, District of Ures, State of Sonora. The price paid to the vender is £299,993, which he has taken in fully paid-up ordinary shares, which are not to draw any dividend until the preference shares have received 10 per cent per annum. The mine was reported on by Rowland J. Atcherly, Ph.D., F.C.S., London, and by Prof. E. C. Garlick, mining engineer. These experts estimate "the ore in sight at 80,000 tons, worth considerably over £1,000,000."

**MICHIGAN.**

**COPPER MINES.**

**CALUMET & HECLA.**—The work of tearing out Ball heads and putting in the Leavitt, at the Calumet & Hecla mills, is nearly completed. This will then give the Hecla seven and the Calumet five Leavitt heads, and an addition to the latter mill is contemplated this year, so that another head may be added, thus making thirteen heads in all, capable of treating, if necessity requires, upward of 3000 tons of rock a day.

**TAMARACK.**—It is stated that they are now hoisting from the first level below where the Calumet & Hecla vein was struck in this mine, and the ground is looking very rich.

**IRON MINES.**

**HYDRAULIC POWER COMPANY.**—The Poetsch-Scoy-smith Freezing Company has made arrangements to apply its method of shaft-sinking at the Ludington & Chapin iron mines.

**IRON STAR.**—Steady preparations for the season's shipment are making. The retimbering of No. 1 shaft has been completed, and it will soon be ready for the cage.

**LONGYEAR.**—The property originally opened up by the Longyear Iron Mining Company, but afterward transferred to Messrs. Sellwood, Pickands & Smith, has been sold, it is stated, to Mr. John E. Burton, of Milwaukee, for \$100,000. It is expected that at least

40,000 tons of ore will be shipped from this mine the present season. Its location is on the northwest of southeast of sections 16-47-46, adjoining the Colby on the west and south, and it will hereafter be known as the Valley Mine.

**SHELDON & SHAFER.**—The hoisting machinery is all in place, and other arrangements are making for beginning mining work. The mine will be lit by electricity.

**STEPHENSON.**—The machinery has been put in running order, and the hoisting of ore has begun.

**MISSOURI.**

**ST. FRANÇOIS COUNTY.**

**DESLOGE LEAD-WORKS.**—These works at Bonne Terre, which were recently destroyed by fire, are to be rebuilt on a scale to secure double the capacity previously had. This increase is warranted by the developments in the mine. Plans for the new works are now preparing. The plant that was burned cost originally \$85,000, and consisted of a main building 214 by 50 feet, and connected houses and sheds, together with the machinery contained in the same. The four batteries of two boilers each were only damaged in the setting.

**MONTANA.**

**JEFFERSON COUNTY.**

**KEATING & BLACKER.**—This mine, near Radersburg, has been started up again after six years of idleness. The owners have put in pumps to drain it. The ore is sent to the Elkhorn, where it is used for the sulphur it contains. They are down about 400 feet. The ore yields about \$30 a ton.

**MIDDLE FORK.**—This company has been organized with a capital of \$300,000, to work the Little Sallie and May mines near Gregory. The main office will be at Helena.

**LEWIS & CLARKE COUNTY.**

**BOSTON & MONTANA.**—The statement for the first three months of the current year has been as follows:

Mine expense.....	\$12,548.44
Mine labor.....	48,809.00
Mill expense.....	18,515.88
Mill labor.....	8,670.97
General expenses.....	9,561.11
Bullion charges.....	5,419.55
Eastern offices.....	619.13

Total disbursements..... \$104,144.08

Cash on hand January 1st.....	\$70,163.54
Bullion product three months.....	215,256.42

Total.....\$285,418.96  
Disbursements as above and premiums paid insurance..... 108,044.08

Balance.....\$177,375.88

**ELKHORN.**—The product for March is officially reported at 21,748.41 ounces silver and 11.755 ounces gold.

**MEAGHER COUNTY.**

A company with abundant capital is now interested in the smelter at Toston. Alterations are to be made and another stack added to the plant, and when finished, the works will start up.

**SILVER BOW COUNTY.**

**ALICE.**—This company is reported to have purchased the Rising Star, Paymaster, and other adjoining mining ground for \$160,000. The controversy with the Magna Charta is also to be compromised. These transactions involve a considerable outlay of money, and suggest the reason why no dividends are in sight. No authenticated estimate of the actual value of the new purchase has been made public, nor is it stated how or from whom it has been made. Considering the reputations of some of the parties connected with the company, it might be interesting for the stockholders to have a little more light upon these transactions.

**NEVADA.**

**STOREY COUNTY—COMSTOCK LODGE.**

From the Virginia City *Chronicle*, we take the following:

**CONSOLIDATED CALIFORNIA & VIRGINIA.**—During the week ended the 17th ult., 1131 tons of ore were shipped to the Morgan mill, and 1678 tons to the Eureka mill. The average value of ore milled during the same period, according to assays from battery samples, was \$15.50 a ton for that crushed at the Morgan mill, and \$14 for that crushed at the Eureka mill, and bullion valued \$21,185.86 was shipped to San Francisco.

**CROWN POINT & BELCHER.**—The ore output for the week ended the 17th ult. foots up 2700 tons. The breasts in the stopes between the 1700 and 1400 levels show a face ample enough to produce twice the pres-

ent weekly average, if facilities for crushing by water-power were obtainable.

**GOULD & CURRY.**—The lateral drift on the 600 level is advancing toward the Savage line in a more southerly course. The face is in a solid body of mineralized quartz.

**HALE & NORCROSS.**—Connection has been made between the 3000 and 2900 levels through the uprise over the top of the deep ore winze, and the ore-deposit between the two levels will now be followed up to determine its extent.

**MEXICAN.**—The northwest drift on the 700 level has cut through the hanging-wall into the continuation of the vein on the 500 level. It was then swung around until the course is due north, and it is now skirting the eastern rim of the vein. Cross-cuts will be sent into the foot-wall to explore the vein when the lateral drift reaches the Union south line. The vein is a continuation of the broad belt of mineralized matter that the management has been prospecting on the 500 level during the past fifteen months.

**NEWFOUNDLAND.**

The discovery of valuable copper deposits at Holy-wood, twenty miles from St. John's, is reported.

**NEW MEXICO.**

**GRANT COUNTY.**

Bremen's mill at Silver City has been undergoing a most complete reorganization, and as soon as the changes now in progress are completed, the mill will start up again.

**FLAGLER REDUCTION-WORKS.**—The works are running about twenty-five tons of raw ore a day through their vats. The ore is hauled from the dumps of the New Mexico and New York mine on Chloride Flat.

**LANGSTON.**—This mine has been purchased by George A. Shufeldt, who will push work vigorously.

**NORTH CAROLINA.**

**CABARRUS COUNTY.**

**MIKE ISENHOUR.**—This mine has been sold. It is said to be favorably located. The ore is in part free-milling, but carries a fair percentage of highly auriferous pyrites.

**RANDOLPH COUNTY.**

**NEW HOOVER HILL.**—The mill crushed 679 tons of ore in March, yielding 248.28 ounces of gold.

**ROWAN COUNTY.**

**GOLD HILL.**—A contract has been let for sinking the main or Randolph shaft at these mines 60 feet deeper. The present depth of this shaft is 750 feet. This work is done under the auspices of the new English management. Other small contracts have been let.

**BULLION PRODUCTION FOR 1886—SPECIAL OFFICIAL REPORTS.**

MINES.	States.	of	
		Month	Year from
		March.	Jan. 1st,
		\$	1886.
Alice, g. s.	Mont.	166,714	
Boston & Montana, g.	Mont.	215,419	
Caledonia, g.	Dak.	61,971	
Christy, s.	Utah.	63,880	
Chrysolite, s.	Colo.	59,267	
Colorado Central, s.	Colo.	68,709	
Daly, s.	Utah.	126,728	
Deadwood-Terra, g.	Dak.	108,820	
Derbec Blue Grav., g. s.	Cal.	47,347	
Elkhorn, g. s.	Mont.	65,195	
Eureka, s. l.	Nev.	15,905	
Father de Smet, g.	Dak.	61,376	
Freeland, g. s. c.	Colo.	72,206	
German Consolidated, g.	Colo.	53,673	
Granite Mountain, s.	Mont.	361,300	
Head Center Cons., s.	Ariz.	4,633	
Hecla, g. s. l. c.	Mont.	251,303	
Holmes, s.	Nev.	115,791	
Homestake, g.	Dak.	300,461	
Hope, s.	Mont.	27,400	
Iron Hill, s.	Dak.	123,908	
Kentuck, s.	Nev.	458	
Lexington, g. s.	Mont.	218,637	
Montana Limited, g. s.	Mont.	356,705	
Moulton, g. s.	Mont.	138,500	
New Pittsburg, s.	Colo.	5,250	
Ontario, s.	Utah.	384,686	
Plymouth Consolidated, g.	Cal.	155,148	
Plutus, g. l. c.	Colo.	67,874	
Ropes, g. s.	Mich.	7,997	
Standard Consolidated, g.	Cal.	53,251	
Tombstone, g. s. l.	Ariz.	194,336	
Total.....		\$3,955,129	

G., gold; S., silver; L., lead; C., copper; M., mica. Silver valued by the different companies from \$1@\$.25 per ounce; gold, \$20.67. \*Not including value of lead and copper. †Royalty. ‡Net. §Ore sales. †Not official. —No shipments during month mentioned.

## UTAH.

## JUAB COUNTY.

**MAMMOTH.**—The company has levied an assessment of ten cents a share. The object of this assessment was chiefly for settling up the old affairs, or, rather, to effect a compromise on the old claims against Bowers and Butler Johnson during the time they were operating the property.

## WASHINGTON TERRITORY.

## STEVENS COUNTY.

**ELLA.**—This mine is producing and shipping ore of a high grade.

**KETTLE FALLS.**—The company's ten-stamp mill, located ten miles west of Colville, is about ready to start up.

## MARKETS.

## NEW YORK, Friday Evening, April 30.

The strikes, actual and threatened, throughout the country have greatly demoralized trade in every department, and in destroying confidence in the future, are undermining the very foundation on which prosperity and high wages rest.

If they continue a little longer, the probability is, that there will have to be a general reduction in wages from present figures, instead of an advance.

## Silver.

DATE.	London.		N. Y.		DATE.	London.		N. Y.	
	Pence.	Cents.	Pence.	Cents.		Pence.	Cents.	Pence.	Cents.
April 24.	40 $\frac{3}{4}$	101 $\frac{1}{4}$	Apr. 28	46 $\frac{3}{4}$	101				
26.	40 $\frac{3}{4}$	101 $\frac{1}{4}$	29	46 1-16	100 $\frac{3}{4}$				
27.	40 $\frac{3}{4}$	101 $\frac{1}{4}$	30	46	100 $\frac{3}{4}$				

The market has steadily declined the past week in London, on a light East India business, and is weak at the figures of the accompanying table.

**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 at 2 per cent. During the week, the bank lost £60,145 bullion; and the proportion of its reserve to its liabilities was raised from 41 $\frac{1}{2}$  to 41 $\frac{7}{8}$  per cent, against 50.13 per cent at the same date last year. On the 28th ult., the bank gained £20,000 on balance. The weekly statement of the Bank of France shows a gain of 7,548,000 francs gold and a gain of 2,388,000 francs silver.

**Copper.**—This market as to Lake copper is firm and unchanged at 11 $\frac{1}{2}$ c.; no producers are offering copper, and none has any accumulation that would make him anxious to sell. Nevertheless, some Lake in second hands has been offered at less than 11 $\frac{1}{2}$ c., but apparently only for effect. No order of any importance could be filled below our quotation.

With other brands, the case is somewhat different. Orford is held at 10 $\frac{1}{2}$ @10 $\frac{1}{2}$ c., according to quality; but Baltimore and Parrot are said to be demoralized and to be offering at figures in some cases even below the equivalent of 10 cents here. Some firms largely interested in Montana property and in exporting furnace material appear to be the most prominent bears, though the object is not apparent.

The very important rumor comes to us in a form which lifts it almost beyond the condition of a "rumor," that the Mountain View property at Butte, Montana, has been disposed of to English parties. The purchase price is said to have been \$1,200,000; and though there appears to be much uncertainty as to the identity of the purchasers, it seems probable that they are English copper refiners.

It is certainly desirable that the market, if sold, should go into hands that understand the market; for should it fall into the hands of a London stock company hungry for dividends and anxious to float stock by large receipts, both the property and the market would suffer severely. Every practical copper smelter well knows that, except with the rich ores near the surface, it is impossible to make any profit on copper mining in Butte at the present prices of copper, and every one knows now the depth to which the rich oxidized ores extend there, and the low grade of the unaltered ore that will then have to be worked.

The property is unquestionably a very valuable one to hold. If forced into large production, it would quickly lower the present low and unremunerative prices of copper.

On another page, we call attention to an interesting

new process for making copper tubes by electric deposition.

Chili Bars are quoted in London to-day at £41 7s. 6d., and Best Selected, £46.

Exports of copper from New York during the week have been:

803,100 pounds of matte.
897,800 " " ore.
289,220 " " ingot, etc.

**Tin.**—This market is stronger and higher. We quote 21 cents cash for spot in small lots, though slates at the Metal Exchange of five tons May and five tons June were posted at 20.80 cents. Cables from London to the Metal Exchange, to-day, quote spot £94 7s. 6d., and three months £95, an advance of about 26s. during the week. The imports during the week at this port amounted to 1,426,305 pounds tin, and 83,745 boxes tin-plate.

**Lead.**—There has been no change in this market. The agent of the Omaha Works still offers small lots of Domestic lead at 4.70c. and others quote 4.75@4.80c. Foreign can be laid down here at about 4.85c., the price in London having receded slightly during the week, though Soft Spanish is quoted in London to-day at £13 5s., the same as a week ago. English is quoted £13 15s. The imports from January 1st to April 1st were 5,328,151 pounds of lead; 225,372 pounds of lead were imported during the week.

In manufactures, we quote Sheet-Lead 6@6 $\frac{1}{2}$ c. net, and Lead Pipe, 5.40c. net. Shot, buck, and chilled, 6c., in 25-pound bags.

Messrs. Everett & Post, of Chicago, telegraph to us as follows to-day:

Market quiet and dull, nominally 4.60 and 4.65c.; little offering.

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

The market has ruled with scarcely any fresh business since our last report. Scarcely any trading on corroding, and sales of common will not aggregate over 300 tons, at prices ranging from 4.50@4.55c.

**Spelter.**—The market remains unchanged, though with an upward tendency, owing to the closing of some works in the West by strikes. We quote 4.60@4.7c. for Missouri, and 6 $\frac{1}{4}$ @6 $\frac{1}{2}$ c. for New Jersey. Foreign Spelter is quoted 5@5 $\frac{1}{2}$ c.

New Jersey Zinc Oxide has been advanced  $\frac{1}{2}$ c., and is now quoted 3 $\frac{1}{2}$ @4 $\frac{1}{2}$ c.

Silesian Spelter in London was quoted to-day £14 5s., as a week ago.

**Sheet-Zinc** is worth 4 $\frac{1}{2}$ @5.60c.

**Antimony.**—This market is quiet at 8 $\frac{3}{4}$ @9c. for Hallett's, 9 $\frac{1}{4}$ c. for Cookson's here, and in London £34 for Hallett's. One hundred and fifty casks of regulus of antimony were imported here during the week.

**Nickel.**—We quote 70c. nominal, though this price is freely shaded by the New Caledonia Nickel, which is forced on our market at "any price to beat Wharton." There were imported at New York 5500 pounds of nickel during the week.

**Bismuth.**—Is quoted at \$2@2.25 per pound, the latter price for small quantities. This metal comes in in small quantities, for use chiefly in the manufacture of sub-nitrate.

**Aluminium.**—Is quoted at 90c.@\$1 per pound to import.

## Sundry Quotations—New York Prices.

Acid, Sulphuric, 60° 1c.; 66° 1.1@1 $\frac{1}{4}$ c.
Muriatic, 18° 1 $\frac{1}{4}$ @1 $\frac{1}{2}$ c.; 20° 1 $\frac{1}{2}$ @1 $\frac{3}{4}$ c.
Nitric, 36° 5 $\frac{1}{2}$ c.; 42° 7@7 $\frac{1}{2}$ c.
Alkali, 36 p. c. 1.25c.; refined, 1.40c.
Alum., p. lb., lump, 1 $\frac{1}{2}$ c.; ground, 1 $\frac{3}{4}$ c.
P. ton, Liverpool, lump, £2 5s.
Sulphate of Alumina, £4 12s. 6d.
Arsenic, white, 2c.; red, 6 $\frac{1}{2}$ c.
P. ton, Plymouth, £8 10s.
Asbestos, c. i. f. Liverpool, p. ton, £20.
Asphaltum, Trinidad
Barytes, Sulph. No. 1, casks, Runcorn, p. ton, £3 7s.
No. 2, bags, £2.
N. Y., prime white, p. ton, \$18; foreign, \$20.
Off color, \$13.
Bleach, over 35 p. c. 1 $\frac{1}{4}$ @1.65c.
Borax, p. lb., 7@8c.
Refined, p. ton, Liverpool, £31.
Brimstone, crude, best 2d., \$22; 3ds., \$21.
Chalk, 4c.
China Clay, English, \$13.50@17; Southern, \$11.50.
Chrome Yellow, 6@18c.
Cobalt Oxide, 2.25c.
Copper sulphate, English Wks., p. ton, £15.
Precipitate, p. unit, £8 6s.
Copperas, common, 60c.; best, 1 $\frac{1}{2}$ c.
P. ton, in casks, Liverpool, £24 6s.
Emery, grain, 3 $\frac{1}{2}$ c.; flour, 2 $\frac{1}{2}$ c.
Keinit, p. ton, \$7.15@7.80.
Litharge, flake, 6 $\frac{1}{2}$ c.
C. i. f. Hull, £14 5s.

Manganese, lump, 70 p. c., c. i. f. Liverpool, £3 2s. 6d. 1s. 6d. per unit, up or down.

Ground, p. ton, £6.

Mineral Wool, 1@3c.

Ocher, Yellow, American, 1@1 $\frac{1}{4}$ c.; French, 1 $\frac{1}{2}$ @5c.

Washed, Dutch, 5c.

Phosphate Rock, p. ton, \$8; ground, \$10.50.

Plumbago, Ceylon, 4@5c.; American, 6@9c.

Potash, Chlorate, 16 $\frac{1}{2}$ @17c.

Carbonate, 4 $\frac{1}{2}$ @5 $\frac{1}{2}$ c.

Caustic, 7 $\frac{1}{2}$ @8c.

Muriate, 1 $\frac{1}{2}$ c.

Pumice-stone, Selected, 2 $\frac{1}{4}$ @2 $\frac{3}{4}$ c.

Original, cks., 1 $\frac{3}{4}$ @1 $\frac{1}{2}$ c.

Lumps, 3@5c.; powdered, 2@3c.

Pyrites, non-cupreous, N. Y., per unit, 10@12c.

Quicksilver, p. lb.

Rotten stone, England, powder, £3; lump, £4.

N. Y., p. lb., powdered, 3 $\frac{1}{2}$ c.; lump, 6c.

Salt Cake, 65@70c.

Saltpeter, crude, 4 $\frac{1}{2}$ c.; refined, 6@8c.

Sienna, American, raw, 1 $\frac{1}{2}$ c.; burnt, 1 $\frac{1}{2}$ c.

Italian, 5c.

Soda Ash, Carb., 48 p. c., 1.35c.

Caustic, 48 p. c., 1.35c.; 70 p. c., 2.45c.

Sal, English, .75c.; American, .90c.

Talc, c. i. f. Liverpool, p. ton, £4 5s.

French, N. Y., 1 $\frac{1}{4}$ c.; Domestic, 6c.

Umber, burnt, and powdered, Turkey, 4c.

Venetian Red, H. R. & Co., 1.75@1.50c.

Vermilion, American, 8@30c.; English, 55c.

Vitriol, blue, ordinary, 4 $\frac{1}{2}$ @4 $\frac{3}{4}$ c.; extra, 4 $\frac{3}{4}$ c.

White Lead, American, pure dry, 6 $\frac{1}{2}$ c.; in oil, 7c.

English, in oil, 8 $\frac{1}{2}$ c.

Zinc Oxide, American, dry, 3 $\frac{1}{2}$ @4c.; Liverpool, £17 10s.

Sulphate, p. ton, £8 6s.

## IRON MARKET REVIEW.

## NEW YORK, Friday Evening, April 30.

**American Pig.**—This market is without feature worthy of note. There is no change in prices and no indication of any change in the near future. We continue to quote \$18 @ \$18.50 for No. 1 X; \$17 @ \$17.50 for No. 2 X; and \$16 @ \$17 for Forge, standard Lehigh brands, tide-water delivery. For special irons, 50c. and \$1 more is asked.

**Scotch Pig.**—Arrivals amounted to 800 or 900 tons during the week. Prices remain almost as a week ago. We quote as follows: Coltness, \$20; Gartsherrie, \$19; Summerlee, \$19.50; Dalmellington, \$18 @ \$18.75; Langloan, \$19. Freight rates range about 4s., 5s. being asked. Cables to the Metal Exchange quote: Coltness, 47s.; Summerlee, 46s.; Langloan, 44s.; Gartsherrie, 42s. 9d.; Glegarnock, 42s. 9d.; Dalmellington, 41s.; Eglinton, 38s. 9d.; Warrants, 38s. 7d.; Middlesboro', No. 3, 29s. 9d.

**Bessemer Pig.**—The market is weak. We quote Domestic at \$18 at the furnace, and Foreign, ex ship, \$18.50 @ \$19, the latter figure being asked without takers.

**Spiegeleisen.**—We continue to quote, without change, English and German, \$26 @ \$26.50. Eighty per cent ferro-manganese is quoted at \$67.

**Structural Iron and Steel.**—Prices remain unchanged. We quote Angles, 1.90 @ 2.10c. delivered; Tees, 2.35c.; Iron Beams and Channels, 3c. for American from dock. Steel angles, 2.35 @ 2.40c.

The bids for the new Harlem bridge were as follows:

King Ridge Manufacturing Company	\$1,180,000.00
Phoenix Bridge Company	1,116,000.00
Union Bridge Company	687,500.00
Passaic Rolling-Mill Company	880,152.00
New Jersey Steel and Iron Company (Metal)	899,155.23
New Jersey Steel and Iron Company (Whole work)	2,596,750.19

Inquiries are now in the market for the supply.

**Plate Iron.**—Common Tank, 2@2.15c.; Refined, 2 $\frac{1}{2}$ c.; Flange Iron, 3 $\frac{1}{4}$ @3.5c.; Extra Flange, 4@4.25c.

**Bar Iron.**—Refined we quote at 1.75@1.90c.; Common, 1.55@1.70c. Store prices are 10@20c. higher.

**Steel Plates.**—We quote 2 $\frac{1}{2}$ c. for Tank; 3@3 $\frac{1}{2}$ c. for Boiler and Ship Plates; 3 $\frac{1}{4}$ @4c. for Flanges; 4 $\frac{1}{2}$ @5 $\frac{1}{4}$ c. for Extra Flange and Fire-Box Plate.

**Merchant Steel.**—American Tool Steel, 7@10c.; special qualities, 12@18c.; Crucible Machinery, 4 $\frac{1}{2}$ @5 $\frac{1}{2}$ c.; Bessemer and Open-Hearth Machinery, 2 $\frac{1}{2}$ @2 $\frac{3}{4}$ c.

**Old Rails.**—We may quote Tees and Double-Heads at \$19 @ \$20. Foreign Tees are offered, without finding buyers, at \$20.

**Steel Rails.**—The contracts booked having amounted to about 1,000,000 tons in the aggregate, and several of the mills having nearly filled their quota, a demand is being made to have the quota enlarged to 1,200,000 tons.



Some of the mills ask to have the restriction to production altogether removed. The old Vulcan Works of St. Louis are said to have taken contracts to the amount of 18,000 tons at \$38, which is lower than Eastern mills could deliver them at. This price is looked upon as unnecessarily low.

We hear of large orders of English rails by the Canadian Pacific at \$21.50, delivered at Montreal. The company has the right to import free of duty. We hear of \$20 a ton being named here in bond—a fact that demonstrates the necessity for the present rate of duty.

Scrap.—Quotations are unchanged at about \$20 for choice lots.

**Philadelphia.** April 29.

[From our Special Correspondent.]

The ore mines in this State and New Jersey are running pretty full at the advance in wages, and stocks are accumulating in furnaces and at the mines.

**Pig-Iron.**—Quotations for pig-iron, according to sales made this week, are \$18.50, \$17, and \$16.50 for Nos. 1 and 2 Foundry and Forge. Bessemer is \$19; Spiegeleisen, \$26 asked, with \$25.50 offered for 1000-ton lots. Some pig-iron buyers claim that they have had concessions offered to them for 1000 and 2000-ton lots of forge iron; but the parties implicated deny that any material concessions have been made for good brands of iron. It is admitted that inferior forge can be bought to-day at 25 cents less than a week ago, and some business was done to-day and yesterday at the reduction. There is no probability, however, of a general drop. Contracts have been heard of this week, amounting to about 6000 tons for early summer delivery. Very little has been done in foundry irons; nearly all buyers are pretty well supplied. Those who are not refuse to buy excepting what they must have, and several lots of rather inferior stuff have been taken at \$18 for No. 1. No. 2 is neglected. If the offers for Bessemer and spiegeleisen were accepted, some 10,000 or 12,000 tons could be unloaded in this market without trouble.

**Muck-Bars.**—Muck-Bars are quoted at \$29@30. One or two makers have had offers below asking prices, and will probably take them.

**Merchant Iron.**—The local demand is for the better grades of iron, which sell at \$1.80@1.90. A few country mills have been picking up small orders, and to-day it is stated that inquiries have been made for some large lots from country mills, but at prices one tenth off the figures asked. It is known that there are parties in the market that would like to be supplied with merchant iron, but who will insist upon a shading of about \$2 a ton, and probably find some one ready to meet their views.

**Sheet-Iron.**—Some complaint has been made this week about sheet-iron, the demand not being quite so active, although there is no reason for saying the consumption is falling off. On the contrary, builders and architects say that the demand for architectural iron and sheet-iron will be exceptionally heavy. This has been an off week with all, excepting perhaps one manufacturer, who reports business good.

**Nails.**—Nails have been selling at \$2.30@2.40, with outside prices nominally \$2.50. The demand is good, and the prospects for Western shipments are likely to keep stocks low here and in good condition.

**Plate Iron.**—The manufacturers of plate iron in some cases have put out a few heating-furnaces, on account of the delay in orders that were counted upon at this end of the month. Every manufacturer says that the present dullness will be offset by an increased activity as soon as the eight-hour question has been settled, and manufacturers generally know where they are. Tank iron is selling at 2-10c. in small lots; Skelp, 1-80@1-85c.; Plate iron, 2@2-10c.; Tee iron, 2-30c.; Shell iron, 2-30@2-40c.

**Structural Iron.**—Some large contracts for structural iron have been taken to fill the requirements of a New York bridge iron making establishment, and it is said to-day that there are signs of two or three large orders coming in during the next two or three weeks. The usual retail demand is coming in, and prices are firm for Angles at 1-90c., and Beams and Channels at the combination rates. Three works are increasing their structural iron making capacity in this State.

**Wrought-Iron Pipe.**—An active demand is in progress for wrought-iron pipe, and all the works throughout the State are reported busy, with prospects of an improved demand as the season progresses. Card

rates are firm, and prices are obtained without difficulty.

**Steel Rails.**—The rail-makers say there is no doubt but that they will be able to sell the half-million tons that they have the capacity for making in addition to the contracts already secured. Prices are \$34.50@ \$35.50, and orders only for small lots have been booked this week.

**Old Rails.**—There is nothing new. Prices range from \$20@21.50, according to quality and size of order.

**Scrap.**—Scrap has been sold at \$20.50 for No. 1; Machinery scrap, \$14; Steel scrap, \$12.

A great deal depends on the course of the anthracite and bituminous coal strikes. The bituminous strike is not likely to come to an early end, and the anthracite miners will strike, if they can secure harmony between both regions, which is unlikely.

**Pittsburg.** April 29.

[From our Special Correspondent.]

The week just closed has not been an active one. Dealers generally seem disposed to wait and see what turn the labor troubles will take. Besides, there are other matters of importance that will require adjustment in the near future. On June 1st, the new iron scale will be presented, with alterations and amendments. It is whispered that a material advance will be demanded.

**Pig-Iron.**—Not so firm, although no actual decline has been adopted. Buyers are offering lower prices. So far, however, holders are demanding last week's figures. Of course, there are at all times brands that can be purchased a shade below quotations. Most of the leading furnaces are running on former contracts, and have about as much as they can do to make deliveries without offering any thing to the outside trade. One of our leading furnace men informed us that he had refused orders for several thousand tons at current rates, preferring to fill the orders on hand before making further contracts.

**Southern Pig-Iron.**—Coke, native ore, No. 1 mill, \$16 cash, \$16.50 4 months; No. 2 mill, \$15.50 cash. Mottled, \$14.25 cash. Charcoal, Southern, No. 1 Foundry, \$20.75 cash; No. 3 Hot-Blast, \$19.50 cash.

**Pig-Iron.**—The following are the current rates:  
Coke or bituminous: Lake ore. Native ore.  
Foundry No. 1 ..... \$17.50@18.00 \$17.50@18.00  
Foundry No. 2 ..... 16.75@ 17.25 16.50@ 17.00  
Gray Forge, No. 3 ..... 15.75@ 16.25 15.50@ 16.00  
" " No. 4 ..... 15.00@ 15.25 @ @ .....  
White ..... 14.50@ 15.00 14.50@ 15.00  
Mottled ..... 15.00@ 15.50 15.00@ 15.50  
Silvery ..... 15.50@ 18.50 @ @ .....  
Bessemer ..... 19.00@ 19.50 @ @ @ .....  
Charcoal:  
Foundry No. 1 ..... 21.50@ 23.00  
Foundry No. 2 ..... 20.00@ 20.50  
Cold-Blast ..... 25.00@ 28.00  
Warm-Blast ..... 18.00@ 24.00

**Muck-Bars.**—Dealers are wide apart. The market is evidently weaker. We quote \$27.50@28 cash.  
**Spiegel.**—Steady, held firmly, \$28.50@29 cash.  
**Steel Blooms.**—Sales range \$31@36 cash.  
**Steel Rail Crop-Ends.**—Fair business doing; \$23 cash.  
**Steel Slabs.**—Held firmly at \$29@33 cash.

**Old Rails.**—Demand fell off; holders anxious to realize; prices off fully 50 cents a ton. Sales 500 tons, \$20.50 cash.

**Old Material.**—Wrought scrap held at previous prices; No. 1, \$19.50@20; No. 2, \$17@18.

**Steel Rails.**—Steady, \$36; light sections, \$35@42.

**Bar Iron.**—Dull, prices nominal; \$1.70@1.75 per cwt.

**Nails.**—Prices nominal; \$2.25@2.30 a keg.

**COAL TRADE REVIEW.**

New York, Friday Evening, April 30.

**Statistics.**

**Production of Coke on line of Pennsylvania RR.** for week ended April 24th, and year from January 1st: Tons of 2000 pounds.

	1886.		1885.	
	Week.	Year.	Week.	Year.
Alleghany Region.	4,119	62,415	3,690	59,297
West Penn. RR.	2,270	30,737	1,260	9,913
Southwest Penn. RR.	56,468	649,463	39,249	606,345
Penn. & W. Region.	4,889	101,171	3,177	75,094
Monongahela	3,186	34,719	1,365	26,335
Pittsburg Region.	.....	.....	.....	.....
Snow Shoe	.....	9,211	848	5,923
<b>Total</b> .....	<b>70,939</b>	<b>887,716</b>	<b>49,589</b>	<b>782,907</b>

**Production Anthracite Coal for week ended April 24th, and year from January 1st:**

Tons of 2240 lbs.	1886.		1885.	
	Week.	Year.	Week.	Year.
P & Ead. RR. Co.	176,916	3,062,140	253,483	2,963,271
L. V. RR. Co.	118,594	1,930,062	97,374	1,297,971
D. L. & W. RR. Co.	81,145	1,662,137	64,510	1,206,928
D. & H. Canal Co.	55,357	1,243,826	69,100	847,722
Penna. RR.	51,221	984,952	65,590	865,477
Penna. Coal Co.	26,325	372,660	25,340	336,513
<b>Total</b> .....	<b>509,558</b>	<b>9,256,177</b>	<b>575,397</b>	<b>7,517,982</b>
Increase.....	.....	1,738,195	.....	.....
Decrease.....	65,839	.....	.....	.....

\* Estimated.

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.

Production for corresponding period:

1881.....	7,853,940	1884.....	8,794,071
1882.....	7,656,160	1885.....	7,801,179

**Production Bituminous Coal for week ended April 24th, and year from January 1st:**

Tons of 2000 pounds, unless otherwise designated.

**EASTERN AND NORTHERN SHIPMENTS.**

	1886.		1885.	
	Week.	Year.	Week.	Year.
Phila. & Erie RR.	17	4,028	73	11,166
*Cumberland, Md.	1,797	373,107	76,083	734,171
*Barclay, Pa.	3,984	64,449	3,583	84,654
*Broad Top, Pa.	.....	.....	.....	.....
H. & Broad Top RR.	10,770	111,698	4,310	54,808
East Broad Top	.....	.....	.....	.....
Clearfield Region, Pa.	.....	.....	.....	.....
Snow Shoe	.....	34,770	1,491	63,991
Karhaus (Keating)	2,000	41,826	1,907	47,277
Tyrone & Clearfield	10,252	574,152	58,239	994,993
Alleghany Region, Pa.	.....	.....	.....	.....
Galitzin & Mountain	25,361	237,148	9,709	158,909
<b>Total</b> .....	<b>54,181</b>	<b>1,441,178</b>	<b>155,395</b>	<b>2,149,969</b>

\* Tons of 2240 lbs.

† Report not received.

**WESTERN SHIPMENTS.**

Pittsburg Region, Pa.	.....	.....	.....	.....
West Penn RR.	11,012	89,657	6,184	89,355
Southwest Penn. RR.	6,214	58,308	1,672	34,225
Pennsylvania RR.	4,224	63,674	15	51,728
Westmoreland Region, Pa.	.....	.....	.....	.....
Pennsylvania RR.	14,668	338,839	3,888	267,188
Monongahela Region, Pa.	.....	.....	.....	.....
Pennsylvania RR.	11,939	88,253	3,489	61,250
<b>Total</b> .....	<b>48,057</b>	<b>638,731</b>	<b>15,248</b>	<b>503,746</b>
<b>Grand total</b> .....	<b>102,238</b>	<b>2,079,909</b>	<b>170,643</b>	<b>2,653,715</b>

The Norfolk & Western Railroad Company reports the shipments of Pocahontas Flat-Top coal for the week ended April 24th, 1886, and year from January 1st as follows, tons of 2000 pounds: 1886—Week, 20,117; year, 248,113. 1885—Week, 15,583; year, 156,853. Increase, 1886—Week, 4,537; increase, year, 91,260.

**Anthracite.**

A very fair business has been done during the past week, with a strong tone to prices of most sizes. Pea and smaller sizes are practically out of the market. Broken coal is in very good request, while egg is increasing in activity, with a rising tendency. Stove and chestnut sizes are quiet, but held with a fair degree of firmness. The actual curtailment of this month will be much more perceptible upon this week's production than upon the previous ones; and as the indications are that there will not be much excess of production over the allotted 2,000,000 tons, the trade should be greatly improved. The impression in the trade last week was, that the 2,000,000 tons allotment for the month of May did not include the Pennsylvania Railroad's production. We were so informed, and stated it thus. We have since been informed by one of the committee that decided the question that the 2,000,000 tons covers every thing, which will make the curtailment very radical indeed, and should enable the companies, at the end of the month, to make a liberal advance in prices, should it be considered wise in all other respects to do so. As to an immediate or early advance, we expect one. It may not be so large as was some time ago contemplated. Furthermore, it is not likely that it will be heralded with a great blow of trumpets, but will probably be much more substantial than many advances that have been made with such accompaniment.

The all-absorbing question of the week has been the probabilities of a general strike to-morrow, or early in the month. We do not look for serious trouble, if any. The miners in the employment of the Delaware, Lackawanna & Western, Delaware & Hudson, the Pennsylvania Coal Company, and the Susquehanna Coal Company are showing a strong disinclination to strike, and it is hardly probable that a movement that is not unanimous will be seriously attempted.



DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns for Name and Location of Company, Capital Stock, Shares, Assessments, Dividends, and Name and Location of Company, Capital Stock, Shares, Assessments. Includes entries for Adams, Alice, Amie, Atlantic, Argenta, Barbee & Walker, Belle Isle, Belcher, Bellevue Idaho, Big Bend Hydraulic, Black Bear, Bodie, Bonanza Development, Bonanza K'g, Cousins, Boston & Mont, Brece, Bulwer, Caledonia, Calumet & Hecla, Carbonate Hill, Caribou, Castle Creek, Catalpa, Central, Christy, Chrysolite, Colorado, Cons. Cal. & Va., Con. Gold Mining, Contenton, Crescent, Crown Point, Deadwood-Terra, DeBee, Dunbar, Elkhorn, Eureka, Evening Star, Excelsior, Father of Smet, Franklin, Fremont, Fresno Enterprise, Gould & Curry, Grand Central, Grand Prize, Granite, Granite Mountain, Green Mountain, Hale & Norcross, Hall-Anderson, Hecla, Hel's Mt. Red, Holmes, Holyoke, Homestake, Honoraria, Hope, Horn-Silver, Idaho, Independence, Indian Queen, Inyo, Iron Hill, Iron-Silver, Jackson, Juculita, Kentuck, La Plata, Leadville Cons., Lexington, Little Chief, Little Pittsburg, Manhattan, Margarite, Martha White, Massachusetts, Mono, Montana, Morning Star, Mount Pleasant, Mt. Diabolo, Napa, Navajo, N. Hoover Hill, New York Hill, Northern Belle, North Belle Isle, Ontario, Ophir, Original, Osceola, Oxford, Paradise Valley, Pleasant Valley, Plymouth, Prussan, Quick-silver, Richmond, Ridge, Rising Sun, Robinson, Robert E. Lee, Roofs, San Francisco, Savage, Security, Shoshone, Sierra Buttes, Sierra Grande, Sierra Nevada, Silver Cord, Silver King, Silverton, Small Hopes, Smuggler, Socorro, South Yuba, Spring Valley, Standard, Stormont, St. Joseph, Syndicate, Tip Top, Tompstone, True Fisure, United Verie, Valencia, Vizina, Yellow Jacket.

G. Gold. S. Silver. L. Lead. C. Copper. \* Non-assessable. + This company, as the Western, up to December 10th, 1881, paid \$1,400,000. † Non-assessable for three years. ‡ The Deadwood was previously paid \$275,000 in eleven dividends, and the Terra \$75,000. | Previous to the consolidation of the California and Consolidated Virginia in August, 1884, the California had paid \$31,320,000 in dividends, and the Consolidated Virginia \$42,930,000. == Previous to the consolidation of the Copper Queen with the Atlanta, August, 1885, the Copper Queen had paid \$1,350,000 in dividends.



NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.	
	April 24.		April 26.		April 27.		April 28.		April 29.		April 30.			
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.		
Alice, Mon.														
Amie Con. Co.														500
Argenta														1,600
Bassick, Co.														1,600
Belle Isle, Ne.														1,235
Rodie Cons., Ca.	1.10	1.00	1.15						1.25	1.30				3,400
Reeco.														3,200
Hulwer, Ca.	.80		.80		.80	.80	.83	.80	.92	.88				900
Cal. B. H.														140
Chollar	.07													400
Chrysolite, Co.		.69	.55											3,400
Colorado Central														900
Cons. Cal. & Va., Ne.		1.80	1.85	1.80					1.50	1.35				3,400
Crown Point														900
Dunkin, Co.														140
Eureka Cons., Ne.							1.25	1.00		1.25				400
Father de Smet, Dk.														1,550
Freeland														3,200
Gold Stripe, Ca.														900
Gould & Curry, Ne.														140
Grand Prize, Ne.														400
Green Mountain, Ca.														3,400
Blair & Norcross, Ne.		2.50					2.45							900
Hall-Anderson, N. S.														140
Homesake, Dk.	19.00													400
Horn-Silver, Ut.									2.95	2.80	2.80			3,400
Independence, Ne.														900
Iron Silver, Co.										1.90				100
Leadville C. Co.							.25							1,200
Little Chief, Co.			.90											100
Little Pittsburg, Co.														100
Martin White, Ne.														800
Monilton								1.00		1.60				100
Nevado, Ne.							.60							100
North Belle Isle, Ne.														100
Ontario, Ut.														100
Ophir	.60													100
Osceola														100
Potosi	.45													100
Quicksilver Pref. Co.							21.00							100
Com. Ca.														100
Quincy														100
Robinson Cons., Co.								.65						300
Savage, Ne.									.95					935
Sierra Nevada, Ne.	.32								.30					425
Silver King, Ar.		7.75					7.75	7.63	7.50		7.50			100
Spring Valley, Ca.														100
Standard, Ca.									.90					100
Stormont, Ut.							.15							20
Tip Top, Ar.														20
Yellow Jacket							.80							20

Dividend shares sold, 18,352. Non-dividend shares sold, 47,890.

We quote ordinary free-burning coals f. o. b. as follows:

	April 30.	Week ended April 23.	April 16.
Lump	\$3.00 @	\$3.00 @	\$3.00 @
Steamboat	3.00 @	3.00 @	3.00 @
Broken	3.00 @	2.85 @ \$3.00	2.85 @
Egg	3.00 @	2.85 @ 3.00	2.85 @
Stove	3.25 @ \$3.35	3.25 @ 3.35	3.10 @ \$3.30
Chestnut	3.00 @	2.85 @ 3.00	3.00 @
Pea	2.25 @ 2.50	2.00 @ 2.40	2.00 @ 2.15
Buckwheat	1.75 @ 1.85	1.60 @ 1.75	1.65 @ 1.75
Dust	1.25 @ 1.30	1.25 @	1.20 @ 1.25

Bituminous.

In the bituminous trade, the sole matter of interest is the strike. This is confined principally to the Cumberland District and the mines of the Berwind-White Coal Mining Company in the Clearfield District.

This class of coal is in liberal supply, and some of the concerns now working indicate that they have no question that the final result of the strike will favor the companies contesting it, and that those now working will be able to knock off the advance they have already granted. That this is their belief is clear, because they are offering to take contracts at prices lower than were current before the strike began. They clearly see that business is being so much demoralized, and so much trade has already been lost, that when resumption does take place prices must rule lower than ever before. Those who are paying the advance in wages would be called, if laborers, "scabs;" for they know that it is not justified by the condition of trade, and that they have only granted it with the knowledge that the larger companies can not afford to pay it, and that in the mean time they can take advantage of the necessities of their competitors to secure new contracts or current business at advanced prices, owing to a short supply of this class of fuel.

The miners are becoming very much dissatisfied with the position they have been forced into by their leaders, and are showing a strong inclination to rebel against the distress that they are compelled to endure. During the week, President Hughes, of the National Federation, District No. 3, has been endeavoring to vindicate his actions with the Cumberland miners, with but doubtful success. He made an address at Lonaconing, of which a correspondent writes us as follows:

"His appeal was on the line that he had not only secured no advantages to himself in this move, but that now he has been published in all the papers in the country, and the failure of the present movement

would result in his name being 'blacklisted' at every point where employment would otherwise have been possible for him. Then, too, he appealed that many of his hearers were in the same boat, and it rested with them, as well as with himself, to continue until a successful end of the present struggle."

We are not surprised that the Executive Committee and President Hughes, who reside at the mines, should have been misled by the glowing reports of the condition of general business, and especially of the interest of speculators. But now that they see that they have made a gross mistake, we think that they, and especially President Hughes, who is said to have occupied the Baptist pulpit, should be willing to accept a dash of cold water, and have enough manhood to release their followers and thousands of innocent women and children from suffering. Such an act frankly performed would give them much more strength than though they waited for inevitable defeat. The miners are now able to secure the wages obtained before the strike began. If the strike continues much longer and additional trade is lost, the contest will become one of whether the men shall resume work at 35 cents or 50 cents.

In Wednesday's papers, there appeared a dispatch announcing the destitution of the miners in the Elk Garden and Cumberland districts, with the statement that, "for a year past, nothing has been done in the mines, and hundreds of families are without the commonest necessities. . . . Labor organizations and the charitable are urged to send aid to Samuel McGowen, Shaw, Mineral County, West Va., or to John A. Martin, Pekin, Allegany County, Md."

There is no question that there are many families in those districts that are in very destitute circumstances, but the Lord helps those who help themselves, and as the miners have within their grasp as good wages as are paid in any portion of the country for labor of equal skill, they become very questionable subjects for charity. The statement published and quoted above is a downright falsehood; the men have not been idle a year; in fact, it will be only eight weeks to-morrow since they foolishly gave up their employment.

In the Clearfield District, a very silly attack is made upon the Berwind-White Coal Mining Company. It is due to the energy of this company and of the

superior quality of the coals controlled by it that the business of this district has been built up to what it is. If it is compelled to keep its mines closed, it will be found that the trade will be very largely absorbed by other fields, and that a large portion of the miners on strike will have no employment. This company has secured permanent interests, and can not bend to temporary necessities that will prove continuously oppressive. To talk of cutting off the supplies of coal from this firm, or such other schemes as are proposed to compel it to grant the demands of the men, will be of no avail. The company is strong enough to close its mines for one year, or two, if necessary, to sustain an essential business principle. Of course, the company has large contracts; but those with whom they have contracted are showing the utmost sympathy and leniency, and would gladly cancel the contracts, as, beyond all question, new ones could be made with companies now working, at lower prices, and it is probable that this company could dispose of its contracts with profit to itself. After having patiently waited for the old miners to resume work, the company has at last been compelled to send new men to the district. Two parties have been sent up this week, and more will follow. In time, this will result in replacing the men who have struck, or create so great a burden upon the striking miners for the support of these men as to defeat the entire strike movement.

As we have previously stated, the demand for an advance in wages is inopportune, and the epidemic of strikes has so completely unsettled all business, that there is not a shadow of a chance of the success of the strikers. The bituminous miners should remember that the anthracite miners are only expected to do 33,500,000 tons of business this year, while they are able and would like to do 40,000,000 tons.

Buffalo.

April 20.

[From our Special Correspondent.]

The differences existing between the shippers and carriers of coal by lake have unsettled the business of chartering vessels to a considerable extent. The shipments reported elsewhere were nearly all by the gross ton. The shippers will not budge from their position, and the carriers have stood by their mutual agreement firmly. The former talk and insist on the gross ton; the latter, on the little or net ton. The shipping contracts that were made before navigation opened were for gross

tons; a few of the later ones to be at gross or net tons, as may be determined by the way the dispute is settled. A large number of coal-carrying vessels have left for the upper lake ports light.

A steamer and consort (their first appearance at this port) were chartered at 60 cents gross to Chicago yesterday; a propeller and consort to Duluth at 50 cents net on an old contract; five vessels were to load under some kind of agreement for the Northwestern Fuel Company; and all the other craft in port, many of them our best coal carriers, were under orders to go out light rather than carry gross tons.

Our local vessel owners have organized under the title of the Vessel-Owners' Association. The object is to protect the interests of the members in all matters appertaining to freight charters and kindred subjects.

At the last meeting of the Joint Western Anthracite Coal Committee in New York, three sub-committees were appointed: one for Buffalo, one for Rochester, and one for Toronto, Canada. The first and second of these have carried out instructions, and the third will do so the early part of next week. The result of the work done in Rochester is the establishing of a local dealers' exchange, organized on the same plan as the Buffalo one; and in our city, the sub-committee have arranged to co-operate in every way with the local exchange, which continues in good and satisfactory working order. It is expected that Toronto will fall in line again this year.

At a meeting of the Coal Exchange, last week, the following retail delivered prices for anthracite were adopted for Buffalo, to take effect May 1st: Grate and Egg, \$4.25; Stove and Chestnut, \$4.50; No. 4, \$4.75; and Pea, \$3.25 per net ton. When coal is sold at the yard, the price is to be 40c. a ton less than delivered price.

It is understood that schools, churches, charitable institutions, clergymen, and parties using a boiler to make steam for business purposes, will be allowed special rates for anthracite coal.

The survey of the proposed route of the Buffalo & Geneva Railroad (supposed to be, when constructed, in the Lehigh Valley interest) is nearly completed, and a very favorable line has been secured.

The New York, Lake Erie & Western Railroad has leased and will occupy a part of the Lehigh Valley Tift farm property for dock purposes.

The coal shipments from the opening of navigation to April 20th, inclusive, aggregate 59,270, nearly all gross tons; namely, 38,680 to Chicago, 4050 to Milwaukee, 9960 to Toledo, 3480 to Duluth, 100 to Bay City, 650 to Detroit, 300 to Pequaming, 1500 to Racine, and 550 to Sandusky. The engagements are nearly all on early contracts, per gross ton, at 60c. to Chicago, 55c. to Milwaukee, 40c. to Toledo, 56c. to Duluth, 30c. to Detroit, Sandusky, Bay City, and Pequaming, and 65c. to Racine. The agent of the Butler Colliery Company received imperative orders to unload its cars here into vessels, and freight room for about 10,000 tons was secured for Chicago at 50 cents a net ton.

**Boston.** April 28.

[From our Special Correspondent.]

The anthracite coal trade is fairly active at this port. Jobbers are very firm in their views. The strike in bituminous coal has had a very decidedly strengthening effect upon anthracite, as large quantities of steam sizes of anthracite continue to be purchased by would-be buyers of bituminous. Pea coal is closely sold on this account, and stocks of broken and egg at shipping ports have been much reduced. Should the mutterings in the anthracite regions be followed by a general strike, the market would be strengthened still further. There can be very little doubt that the extremely low prices of a few weeks ago are the lowest the market will see for some time, perhaps for the whole season.

The demand for bituminous in this market is out of all proportion to the available supply. Nova Scotia coal is sought, and one of our railroads has recently bought quite a quantity at \$4.25 delivered, for run of the mine. Nova Scotia coal is offered here delivered at from \$4.10 to \$4.25. For screened coal as high as \$4.50 is asked. There is a fair demand for provincial culm at \$2.60@2.75 delivered. Contractors are endeavoring to get coal here from all quarters. Quite a lot of gas-coal is coming here, nominally to gas companies, but really to parties that are "left" on their bituminous contracts. We note a recent shipment of 900 tons West Virginia gas-coal from

Baltimore, said to be on this account. The f. o. b. Philadelphia price for gas-coal samples ranges from \$2.80@3. The number of gas-coal mines operated is small, as the strike extends into that region. The general outlook is considered by the trade here as more favorable to the operators. Many miners are satisfied with the present rate of wages, and would return to work if they dared to do so.

A little coal is coming all-rail to one jobber, and is furnished to inland points at very reasonable rates, compared with price by water freights. It may not be out of place to remind parties that are buying liberally of anthracite steam sizes just now that it will not be well for them to have a lot of it on hand when the strike ends. It is generally conceded that soft coal is worth ten per cent more for steam purposes than anthracite.

Freight rates are away down to the minimum. We hear of occasional instances where concessions are made for quick dispatch.

We quote rates exclusive of discharging:

New York, 85@90c.; Philadelphia, \$1.05; Baltimore, \$1.10@1.15; Newport News, \$1.05@1.10; Richmond, \$1.25; Cape Breton, \$1.75@2; Bay of Fundy, \$1.60.

The Boston Tow-Boat Company is vigorously pushing preparations to put a line of coal-barges on between New York and Boston this summer.

Retail trade is as dull as usual for April.

**Pittsburg.** April 29.

[From our Special Correspondent.]

We have to report a dull and unsatisfactory market. There have been no shipments by river during the past week, but plenty of coal in the pools ready for shipment. One of our tow-boats is en route from Louisville to New Orleans with 740,000 bushels, or 27,400 tons. The coal rates are: River, wholesale on board, 4@5c. a bushel; railroad, 4¼@4½c.

Coke.—Present rates, \$1.50 a ton; Foundry, \$1.65; Crushed, \$2.

**FINANCIAL.**

**Mining Stocks.**

NEW YORK, Friday Evening, April 30.

Very little business has been transacted in mining shares during the last week, save those of Sutro Tunnel, which contributed over one half of the week's total transactions. Prices have fluctuated but little.

The foreclosure proceedings and the appointment of a receiver for the Sutro Tunnel Company, which we announced in our issue of April 24th, is no doubt the consequence of the downward movement in the stock, which has declined steadily from 16@10c., the lowest point reached in many months. The sales have been large, amounting to 38,800 shares; but it is stated that there has been less anxiety to-day to sell the stock, which was firm at 10c. bid. Consolidated California & Virginia was also lower, and declined from \$1.85@1.35. Hale & Norcross has been quiet at from \$2.50@2.45. The other Comstocks show the usual transactions, and were devoid of all interest.

Lacrosse was the feature of the Colorado stocks, and was actively dealt in at from 8@9c., with sales of 14,200 shares. Leadville showed a small business at 25c. Chrysolite sold at from 60 to 55c. Robinson, at 68c.

Quicksilver Preferred remains at \$21. Bodie showed an upward tendency, going from \$1@1.25; Bulwer, from 80@92c. Standard and Mono were almost entirely neglected; the former selling at 80c., and the latter at \$2.60.

Homestake has been higher at \$19. Caledonia remained at \$1. Very little is now done in Horn Silver; it sold at from \$2.95@2.80. Silver King declined from \$7.75@7.50. Moulton ruled at \$1.60. Rappahannock showed sales of 2500 shares at 12c.

A subscriber to the *Daily Indicator* asks where he can find a market for Yankee Girl and Silverton Mining companies' stock. Since our esteemed contemporary is unable to answer this question, we cheerfully come to its aid. Occasional sales of these stocks are made in Pittsburg, Pa., where the offices of both companies are.

The following securities were sold at auction in this city on the 28th ult.: 122 shares Lykens Valley Railroad Coal Company, 142; 200 shares Little Pittsburg Mining Company, 28c. a share; 200 shares Central Arizona Mining Company, \$15 lot; \$1,000,000

Philadelphia & Reading Railroad, 1st series 5 per cent consolidated mortgage bonds, 55@60; \$100,000 Philadelphia & Reading, 2d series, 5 per cent consolidated mortgage bonds, 25½; 100 shares Harney Peak Tin Mining, Milling, and Manufacturing Company, \$7 a share.

**Coal Stocks.**

The past week has furnished nothing but a market constantly depressed by strikes and rumors of strikes, and the united action of the leading bears, without the resistance of the acknowledged bulls. Should the next few days realize the gloomy expectations as to an abundance of strikes, the market may go somewhat lower. The coal stocks have been depressed by rumors of a general strike for eight hours' work and ten hours' pay. The dealings in Delaware, Lackawanna & Western have been 142,902 shares at \$123¼@123½, closing at \$123¼. Delaware & Hudson, with transactions of 17,442 shares, at \$101¼@96¾, closed at \$97. Jersey Central was dealt in to the extent of 27,750 shares at \$50¼@47½, closing at \$47½. Reading was for a time depressed by the announcement of a sale of some millions of its securities, hypothecated to pay the Jersey Central debt; but upon the sale actually taking place, and proving fairly satisfactory, the stock improved. The transactions in the stock amounted to 93,310 share at \$23¼@20¼, closing at \$20¼.

**Pipe Line Certificates.**

The following table gives the quotations and sales at the Consolidated Stock and Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
April 24	7¼	7½	7¼	7¾	8,848,000
26	71	72¾	70¾	72¾	5,781,000
27	73¼	73½	71¾	72¾	5,408,000
28	72¾	73¾	72¾	72¾	4,580,000
29	7¼	7¾	7¼	7¾	3,548,000
30	72¾	73¾	72¾	73¾	4,542,000

Total sales ..... 32,707,000

**Dividends.**

Derbec Blue Gravel Mining Company, of California, has declared dividend No. 13, of ten cents a share, or \$10,000, payable April 26th, at San Francisco.

Granite Mountain Mining Company, of Montana, has declared dividend No. 18, of 25 cents a share, or \$100,000, payable May 5th, at St. Louis.

Marshall Consolidated Coal Mining Company will pay the interest coupons due May 1st on and after that date, at the Farmers' Loan and Trust Company of this city.

Mary Murphy Mining Company, of Colorado, has declared dividend No. 1, of five per cent.

**DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF APRIL AND FROM JANUARY 1ST, 1886.**

NAME OF COMPANY.	Location of mines.	Paid during month of April.	Since January 1st, 1886.
Adams, s. l.	Colo.	\$15,000	60,000
Alice, g. s.	Mont.	25,000	25,000
Atlantic, c.	Mich.	40,000	40,000
Big Bend Hydraulic, g.	Dak.	6,000	18,000
Boston & Montana, g. s.	Mont.	30,000	120,000
Caledonia, g.	Dak.	20,000	20,000
Calumet & Hecla, c.	Mich.	500,000	40,000
Central, c.	Mich.	40,000	40,000
Colorado Central, s.	Col.	13,750	28,750
Cons. Cal. & Va. g. s.	Nev.	64.8-0	64.8-0
Derbec Blue Grav., g.	Cal.	10,000	30,000
Elkhorn, g. s.	Mont.	5,000	20,000
Freeland, g. s. c.	Colo.	20,000	40,000
Granite Mt., s.	Mont.	100,000	320,000
Hecla Con. g. s. l. c.	Mont.	15,000	60,000
Helena Mg. & R. g. s. l. c.	Mont.	19,850	19,850
Holmes	Nev.	25,000	75,000
Homestake, g.	Dak.	50,000	200,000
Iron Hill	Dak.	12,500	37,500
Iron Silver, s. l.	Colo.	100,000	100,000
Jackson, g. s.	Nev.	10,000	10,000
Manhattan, s.	Nev.	25,000	25,000
Mono, g.	Cal.	12,500	12,500
Montana, l. g.	Mont.	123,750	123,750
Moulton, g. s.	Mont.	30,000	30,000
Ontario, s.	Utah	75,000	300,000
Paradise Valley, g. s.	Nev.	10,000	10,000
Plumas-Eureka, g.	Cal.	35,158	35,158
Plutus, g. s. c.	Colo.	20,000	20,000
Plymouth Con. g.	Cal.	25,000	100,000
Quicksilver Pref., Q.	Cal.	64,500	64,500
Quincy, c.	Mich.	160,000	160,000
Robinson Con., s.	Colo.	70,000	70,000
Sierra Buttes, c.	Cal.	30,825	30,825
Silver King, s.	Ariz.	25,000	100,000
Silverton, s.	Colo.	4,000	16,000
Small Hopes Con., s. l.	Colo.	150,000	150,000
Valencia, m.	N. H.	3,750	3,750
		\$800,781	\$3,020,281

G., Gold; S., Silver; L., Lead; C., Copper; Q., Quicksilver; M., Mica.

\* Mr. Wharton Barker, of Philadelphia, was the chief purchaser of the Reading bonds.



COAL STOCKS.

Quotations of New York stocks are based on the equivalent of \$100. Philadelphia prices are quoted so much per share.

NAME OF COMPANY.	Par value of shares.	Quotations												Sales from April 24th to April 30th, inclusive.		
		April 24.		April 26.		April 27.		April 28.		April 29.		April 30.				
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.			
Barclay Coal.....	50	16 1/2	16	16	15 1/2	16	23 3/4	23	23 1/4	23	22 1/4	22	15 1/2	15 1/2	21 3/4	1,200
Cameron Coal.....	10															3,211
Col. C. & I.....	100	10 3/4	10	10 1/4	10	10	10	9 1/2	9 1/2	9	9	9	9	9	9	620
Ches. & O. RR.....	100															
Consol. Coal.....	100															
Cumb. C. & L.....	100															
Del. & H. C.....	100	10 1/4	10 1/4	100	99 1/2	100 1/4	99 3/4	99 1/2	99	99	97 1/2	99 1/2	96 3/4	96 3/4	17,442	
D. L. & W. RR.....	50	126 1/2	125 1/4	126 1/2	125 1/4	126 1/2	126	126	125 1/2	125 1/2	123 3/4	125 1/2	123 3/4	123 3/4	142,902	
Elk Lick Coal Co.....	50			50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	1,303	
Lehigh C. & N.....	50			50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	669	
Lehigh Valley RR.....	50			50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2	50 1/2		
L. & W. C. & I Co.....	100															
Maryland Coal.....	100															
Montauk Coal.....	100															
Morris & Essex.....	50															
New Central Coal.....	100															
N. J. C. RR.....	100	50 1/2	49 3/4	49 3/4	49 1/4	49 1/2	49 1/2	49 1/2	48 1/4	49	47 1/2	49	47 1/2	47 1/2	27,750	
N. Y. & S. Coal.....	50															
Penn. Coal.....	50															
Penn. RR.....	50			54 1/2	54	54 1/2	54 1/2	54	53 1/2	54	53 1/2	54	53 1/2	53 1/2	6,255	
Ph. & R. RR.....	50	23 1/2	21 1/2	22	21	21 1/2	20 1/2	21 1/4	20 1/4	21	20 1/2	21 1/2	20 1/2	20 1/2	118,587	
Spring Mountain.....	50															
Westmoreland Coal.....	50															

\* Of the sales of this stock, 25,277 were in Philadelphia, and 93,310 in New York.  
 + The quotations for these stocks are not percentage, but actual price. Total sales, 319,939.

Unlisted Stocks and Foreign Quotations. We give below the most reliable quotations obtainable for unlisted stocks and quotations on outside and foreign exchanges:

NAME OF COMPANY.	Location.	Price.	Where quoted.
Adams, s. L.....	Colo.	\$4@5	Unlisted
Bellevue, s. L.....	Idaho.	\$5	Unlisted
Big Bend H'dr'g, g.	Dak.	\$5	Unlisted
Bird's Eye Creek, g.	Cal.	\$5.02 1/2 @ \$6.25	London
Bonanza King, g.	Cal.	\$10	Unlisted
California, g.	Colo.	50@75c.	London
Colo. United, s. L.....	Colo.	\$12.50@15.75	London
Eb'rh'dt & Mon't'r, s.	Nev.	\$2.12@2.37	London
Elkhorn, g. s.....	Mont.	\$10	Unlisted
Golden River, g.....	Cal.	\$116*	Paris
Parts Civiles	Cal.	\$46*	Paris
Granite Mt., s.....	Mont.	\$24@24.50	St. Louis
Helene, g. s. L. c.....	Mont.	\$2	Helena
Honoring, s. L.....	Utah	75c.	Unlisted
Iron Hill, s.....	Dak.	\$5	Deadwood
Kohinoor & Donaldson, g. s.....	Colo.	50@62c.	London
La Plata, s. L.....	Colo.	\$1@1.25	London
La Trinidad, s.....	Mex.	\$25.00@27.50	London
Lexington, g. s.....	Mont.	\$12	Paris
Org'niz'r's shares	Mont.	40c.	Paris
Montana, Lt., g. s.....	Mont.	\$40.00@42.50	London
New Albion, g.....	N. S.	\$4.50@5.00	London
New Emma, s.....	Utah	\$1.25@1.50	London
New Hoover Hill, g. s.	N. C.	93 1/2 c. @ \$1.56 1/4	London
Plumas Eureka, g.....	Cal.	\$2.50@3.75	London
Richmond Con. s. L.	Nev.	\$23.1 1/2 @ \$24.37 1/2	London
Ruby & Dunderberg, g.....	Nev.	\$1.25@1.50	London
Russell Gold, g.....	N. C.	87c. @ \$1.12	London
Sierra Buttes, g.....	Cal.	\$6.87 1/2 @ \$8.12 1/2	London
Silver Queen United, s.....	Mex.	\$10.00@10.62 1/2	London
Small Hopes, s.....	Colo.	\$7.00	St. Louis
St. Joseph's, L.....	Mo.	\$7@7.50	Unlisted
United Mexican, s. L.	Mex.	\$15.00@16.25	London

Foreign quotations are per mail advices. \* The above quotations were given July 5th, 1885. Since then, there have been no quotations. † New issue.

ASSESSMENTS.

COMPANY.	No.	When levied.	Delinquent in office.	Day of sale.	Amount.
Buena Vista Petroleum, Cal.	33	Mar. 16	Apr. 20	May 10	1.60
Champion, Cal.	21	Apr. 13	May 20	June 8	.10
Columbia, Dak.	11	Mar. 15	Apr. 15	May 15	.01
Con. Amador, Cal.	11	Apr. 7	Apr. 10	May 26	1.00
Crocker, Ariz.	2	Mar. 10	Apr. 13	May 4	.20
Darbock, Dak.	1	Apr. 21	May 25	June 15	.01
Enterprise, Dak.	11	Apr. 4	May 10	May 28	.01
Eureka Con., Nev.	9	Apr. 20	May 31	June 22	1.00
Golden Prize, Nev.	6	Apr. 19	May 21	June 22	.30
Gould & Curry, Nev.	52	Mar. 27	Apr. 30	May 25	.40
Grand Prize, Nev.	18	Apr. 9	May 17	June 7	.40
Kearsarge, Mich.				May 1	5.00
La Plata, Dak.	2	Apr. 7	May 10	May 29	.02
Lucky Hill Con., Nev.	3	Apr. 5	June 7	July 7	.05
Mammoth, Utah		Apr. 21	June 10	July 10	.10
Martin White, Nev.	21	Mar. 12	Apr. 20	May 20	.25
McMillen, Ariz.	6	Apr. 9	May 14	June 8	.20
Mutual, Dak.	2	Apr. 17	May 20	June 12	.02
Navajo, Nev.	15	Mar. 30	May 4	May 27	.25
Pocahontas, Dak.	1	Apr. 15	May 16	June 15	.02
Peer, Ariz.	5	Apr. 13	May 20	June 16	.10
Potosi, Nev.	23	Apr. 16	May 20	June 9	.30
Prompter, Ariz.	7	Mar. 17	Apr. 5	May 6	.35
Rainbow, Dak.	2	Apr. 6	May 8	May 20	.24
Red Warrior, Utah		Apr. 6	May 17	June 5	.02
Ruby, Dak.	11	Mar. 13	Apr. 24	May 23	.1/2
Ruby Hill, Nev.	21	Apr. 12	May 12	June 15	.01
Sampson, Utah	23	Apr. 17	May 25	June 28	.25
Silver Hill, Nev.	23	Apr. 21	May 27	June 18	.10
Union Con., Nev.	33	Apr. 19	May 26	June 17	.25
West Galena, Dak.		Apr. 13	May 29	June 19	1/4

Meetings.

The annual and special meetings of the following companies will be held at the times mentioned:  
 Arizona Prince Copper Company, No. 13 William street, New York City, May 3d, at three o'clock P.M.  
 Grand Belt Copper Company, No. 47 Broadway, New York City, May 12th, at twelve o'clock M.  
 Horicon Iron Company, No. 24 Cliff street, New York City, May 8th, from twelve o'clock M. to one P.M.  
 Mount Hope Mining Company, Mount Hope, New Jersey, May 3d, at twelve o'clock M.  
 Rockland Land and Mining Company, Rockland, Mich., June 7th, at one o'clock P.M.  
 Saginaw Valley Land, Salt, and Mineral Company, No. 163 Broadway, Room 2, New York City, May 4th, from twelve o'clock M. to two P.M.  
 Santa Rita Copper and Iron Company, No. 66 Broad street, New York City, May 12th, at eleven o'clock A.M.  
 Victoria Gold Mining Company, Nos. 16 and 18 Broad street, New York City, May 1st.  
 Vulcan Mining Company, office of M. H. Hoffman, No. 629 Walnut street, Room 7, Philadelphia, Pa., May 13th, at twelve o'clock M.

Boston Copper and Silver Stocks.

(From our Special Correspondent.)

BOSTON, April 29.

The market for mining stocks has continued to rule dull and inactive the past week, although prices generally for the copper stocks are firmer and in some

San Francisco Mining Stock Quotations. Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	April 23.	April 24.	April 26.	April 27.	April 28.	April 29.
Albion.....						
Alpha.....						
Alta.....			.25	.25	.25	
Argenta.....						
Bechtel.....						
Beicher.....			1.12 1/2			
Belle Isle.....						
Best & Beicher.....	1.12 1/2	1.00	1.12 1/2	.90	.95	.95
Bodie.....	1.12 1/2	1.12 1/2	1.25	1.25	1.25	1.25
Bullion.....						
Bulwer.....	.80	.90	.75	.85	.85	.90
Chollar.....	.80		.80	.80	.75	.70
Con. Pacific.....		.40	.40	.40	.40	.35
Con. Cal. & Va.....	1.87 1/2	1.75	1.87 1/2	1.50	1.25	1.25
Crown Point.....	.95		.90	.90	.85	.90
Day.....						
Elko Cons.....						
Eureka Cons.....	1.12 1/2	1.00	1.25		1.12 1/2	
Exchequer.....						
Gould & Curry.....	.55	.55	.60	.80	.90	.85
Grand Prize.....						
Hale & Norcross.....	2.50	3.50	2.62 1/2	2.37 1/2	2.25	2.12 1/2
Independence.....						
Martin White.....						
Mexican.....	.50	.55	.45	.45	.35	.35
Mono.....	2.37 1/2	2.37 1/2	2.62 1/2	2.50	2.50	2.25
Mount Diablo.....						
Navajo.....	.10	.10	.15	.10	.10	
Northern Belle.....						
North Belle Isle.....						
Ophir.....	.65	.65	.60	.55	.55	.50
Overman.....						
Potosi.....	.55		.55	.50	.50	.50
Savage.....	1.12 1/2	1.00	1.12 1/2	1.00	.95	.90
Scorpion.....						
Sierra Nevada.....	.40	.35	.35	.35	.35	.30
Silver King.....						
Tip-Top.....						
Union Cons.....	.30		.25	.25	.25	.20
Utah.....		.50				
Wales Cons.....						
Yellow Jacket.....				.60		

instances higher; but there is so little doing that it is difficult to know just what the tendency is. Calumet & Hecla has been heavy and drooping the past week, and although there has been no great amount of stock thrown on the market, it shows a decline of \$5 a share, having sold down to \$224, with a slight rally to \$225, but it is still offered at that price. Quincy shows an improvement of \$1 a share, with sales at \$50 1/2 @ \$51. Franklin advanced from \$12 @ \$12 1/2, with latest sale at \$12 1/2. Osceola sold at \$14 1/2, which is an advance of 3/8 from last sales. Atlantic sold at \$10, which is a decline of 1/2. Ridge sold at 87 1/2 c. Tamarack advanced from \$107 (19th inst.) to \$110, at which price 165 shares were sold; later, it declined, on forced sale of 4 shares only, to \$108, the best bid to-day being \$105. Total sales of copper stocks for the week, 738 shares.

In silver stocks, there is no improvement to note, either in the volume of business or in better prices. The market is stagnant, with no disposition to operate in this class of stocks either way. Catalpa sold at 30c. Napa Quicksilver, 95c. Dunkin, 26c. Bowman, 12c. The rest of the list was without material change.

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