

which the British commissioners did not visit. As he well says, "Russia is the lee shore upon which the choicest educational pebbles may be gathered. In studying Russia, one sees all European technological education epitomized; and the whole plan of the new education in Russia may be seen in the two schools of technology at St. Petersburg and Moscow. In each school, is an ample, well-equipped manufacturing machine-shop, where the students see good work done by skilled mechanics, and are taught to do such work themselves. The course of study is otherwise substantially the same as in the German polytechnics. In each shop, a definite number of hours of work are required of every student, with this difference in the plan, that at Moscow the shop work is mixed with the duties of every week of the six-year course; at St. Petersburg, it is consolidated into a fifth year, after all the school work of the four-year course has been finished. At Moscow, no week passes without shop work; at St. Petersburg, no shop work is done till the beginning of the fifth year, which year is wholly devoted to drawing and shop work. The two schools differ also in this, that at St. Petersburg all the students are externs; at Moscow, about one third are boarders."

The difference in the total length of the course is made up by the higher requirements for admission at St. Petersburg. These two amply supported institutions constitute, therefore, a working experiment on a large scale, to settle, if possible, one of the important questions involved in technical education, namely, whether shop work should accompany or follow school work. So far as we can gather from Dr. THOMPSON'S papers, he considers the result of the experiment still undecided, though he seems to favor the Moscow plan, partly because of the difficulty of holding students to a final year of shop work only (unless, as in Russia, they must take it in order to obtain positions in the service of the government), and partly because he attaches some importance to the argument "that the shop work should be done prior to the age of twenty-one, that is, at a period when, on account of the sharpness of the acquisitive powers, students are best able to profit by it." This argument, by the way, Dr. THOMPSON himself presented with singular clearness and force in the famous debate on technical education, held jointly by the Society of Civil Engineers and the Institute of Mining Engineers at Philadelphia, in 1876.

The requirement of shop work as a prerequisite for admission to a polytechnic school of the first order does not exist in Europe. It is a feature of some intermediate technical schools, as, for instance, the Royal School for Foremen, at Chemnitz, Saxony, where mechanics, millers, dyers, tanners, etc., who have worked at least two years at their respective callings, receive theoretical instruction in three courses of half a year each. It is tolerably safe to say that, while such institutions are an inestimable help to artisans who find themselves in need of education after beginning their life-work, they will not supersede the more thorough and systematic scientific instruction afforded by the longer courses of the higher technical schools. That it is not impracticable, however, to combine both things in one institution, that is, to make provision for partial and special instruction, while maintaining also a regular comprehensive course, seems clear to us from such examples as the Cooper Union of this city, a school which, notwithstanding all that has been done at home and abroad, still remains in some particulars unique. That it is not more prominent as one of the higher technical schools is due, partly to the lack of means (for the public has agreed with striking unanimity to praise PETER COOPER, but not to help his great work) and partly to the fact that the pressure upon its room and revenue to supply the special needs of workmen is so great as to hinder the development of the symmetrical course of study which it bravely strives to maintain. Nevertheless, the plan is not lost sight of; and the great school, with its more than 2500 pupils, is not an unworthy embodiment of its happy title, the Cooper Union of Science and Art.

We return to Dr. THOMPSON'S review, merely for the purpose of saying in conclusion, that while, as an epitome of a part of the voluminous British report, it is a convenient and welcome document, his account of the Russian system, and his suggestive comments throughout, give it an original value. The cause of technical education in the United States lost a foremost leader, an acute critic, and a wise adviser when CHARLES O. THOMPSON died.

Riley's Soaking-Pit for Steel Ingots.—Mr. J. Riley, of Glasgow, Scotland, in treating ingots in the usual soaking-pit, covers the latter air-tight as soon as the ingot has been introduced. The ingot is then allowed to stand and soak until it assumes throughout a suitable temperature for rolling or otherwise pressing into a bloom. The difficulty experienced in this treatment is, that the pit is apt to cool too much for the proper treatment of the ingot in works where the ingots are cast at long intervals, or where the casting takes place at some distance from the rolling-mill. To remedy this difficulty, ignited gas is applied to the pit at the times when the temperature would otherwise become too low. Instead of burning the gas in or introducing the ignited gas into the pits themselves and in contact with the ingots, passages or flues are formed in the walls of the soaking-pits. Ignited gas is passed through these flues, so as to maintain the walls of the pits at such temperature that heat will not be injuriously radiated from the ingots.

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.]

Professional Ethics.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I notice, in this week's issue of your JOURNAL, a courteous disclaimer of any intention to charge me with plagiarism in your comments upon my address upon Professional Ethics, delivered at the recent meeting of the American Institute of Mining Engineers. Will you kindly permit me to supplement your editorial remarks by saying that, until my address was written, I was not aware that Mr. Rothwell had read a paper on the subject of Professional Morality at one of the earlier meetings of the Institute? It is mentioned by title in the Secretary's report of the Bethlehem meeting, August, 1871; but even the title was omitted—probably by accident—from the general index, in which Mr. Rothwell is credited with many valuable papers. If I had known of it in time, I should have selected another subject. My address was delivered February 16th. I did not have the satisfaction of reading Mr. Rothwell's paper until March 10th, and it gives me much pleasure to say that, so far as it relates to the subjects touched in mine, it anticipated my conclusions. In a foot-note to my address, as prepared for the Transactions of the Institute, I have said substantially this. My reasons for not quoting it in the text of my address, as delivered, was, that up to that time I was not indebted to it even for the pleasure which its subsequent perusal has given me.

I will not dispute your suggestion, that it is the duty of a President of the Institute to familiarize the contents of the forty volumes of the ENGINEERING AND MINING JOURNAL; but if this should be made a condition precedent to the acceptance of that office, I fear it would be difficult to fill it.

Respectfully,

J. C. BAYLES.

No. 66 DUANE STREET, NEW YORK, MARCH 13, 1886.

The Eureka-Beck Decision.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: As was expected, you, in your issue of the JOURNAL of the 23d ultimo, in commenting upon the recent decision of Judge Powers in the Eureka-Bullion suit at Tintic, Utah, reminded that gentleman of the fact that, in summing up his conclusions on the application of the statute, he "chose the wrong foundation." Allow me to say a few words on the subject. I am familiar with the facts, and was a witness in the case. For the better understanding of the case, I refer to the accompanying diagrams.

Fig. 1 shows a portion of the levels on the Eureka 300-foot level, which is the 200 of the Bullion; also, stopes, etc., on each of the two veins, as by references on the plat. Fig. 2, a geological sketch, shows approximately the bending of the lime-beds and the veins in their course northerly; and Fig. 3 a cross-section on line A A in Fig. 1, showing the wash debris over the limestone, and the position of the latter underneath the wash, also the position of each vein. These veins are simply fissure-veins like the Mammoth, the Carisa, the Northern Spy, and others in the limestone of the district. They run approximately parallel with each other, as will be seen by reference to the diagrams. The ore is found in chambers or pockets of irregular size and form, following distinct fissure-walls. In some instances, the ore is found to continue for considerable distances in a well-defined form; as, for example, in that part of the east vein traversing the wedge between the east side-line of Bullion 76, and the west line of Eureka, and that part of the west vein south of Eureka shaft where the ore goes down from the surface to the 500-foot level in an unbroken chimney, having an average thickness of perhaps five feet. The depth of this ore-chimney, when the rise of the hill is considered, is between 600 and 700 feet, and, I suppose, it continues down. These are remarkably regular ore-bodies in limestone, and are exceptional even in these veins.

Throughout the remainder of the ground, the ore is found in pockets. When a chamber or pocket is exhausted, the fissure is always followed until the miner is led to the next pocket. Thus the ore-chimneys and pouches alternate, as is common to all fissure-veins. The expansions or chimneys in these do not gradually widen out from a thin point until the maximum width is reached, and then taper down to a thin edge again, as we find in intercalated or lenticular bodies in some gneissic rocks, but, as is peculiar to limestone the world over, they abruptly widen out into irregular chambers or pockets, which are connected by the polished fissure-walls—the miner's A, B, C guide, his vein, which "leads him from poverty to profit."

The veins, in their course northerly, break from bed to bed in places nearly at right angles, in others more obliquely, as shown in the geological plan, and in my original sketch of Ashton Cut, made while sitting in the cut. It will be observed that chutes or openings are made along the bedding planes of the lime at the angles where the vein breaks to the west, shown in this sketch. Some of these open out into ore-bodies of considerable size. But they all "die out" in short distances. The veins are parallel, or nearly so, as seen in the map. Their dip is nearly vertical. The west vein varies about five degrees from it. The east vein, from the Hatfield fissure south, is bounded by thin beds of limestone and clay shale; the west, by heavy beds of limestone with no shale; thus showing them to be upon two different geological "horizons," as Professor Blake states. They are separated by a barrier of magnesian limestone, ranging from sixty-five feet at the south end to more than 300 feet at the north end line, as shown in Fig. 1. The west vein departs from the Eureka claim at Z, Fig. 1, and the east vein departs from the Montana and passes through the Eureka obliquely, as shown. The foregoing is a brief synopsis of the testimony of the Bullion experts upon the physical facts, as exhibited by the workings of both properties. All were agreed upon these points, as the testimony shows.

Some of the Eureka experts contended that the entire hill is one great lode or zone; that the shale-beds to the east of the east vein are the foot-wall, and from it westerly the entire country, to an unknown distance, was "impregnated" with mineral, and consequently was one lode. The

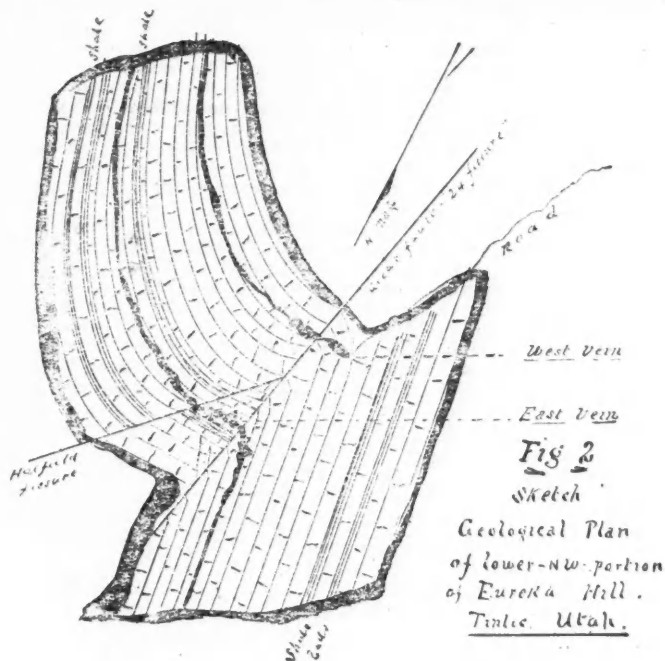


Fig. 2
Sketch
Geological Plan
of lower-N.W. portion
of Eureka Hill,
Tintic Utah.

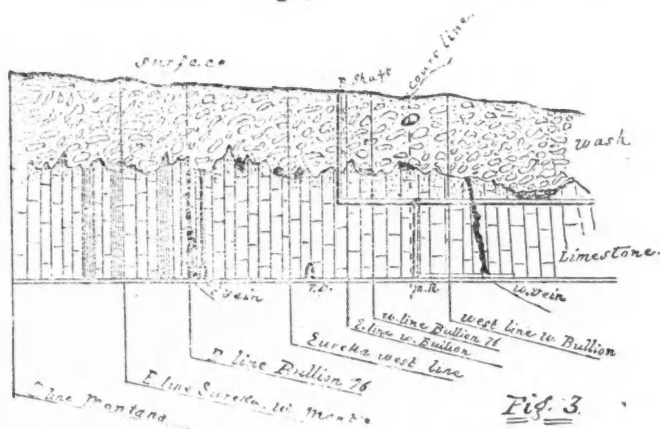


Fig. 3
Cross Section
Through A.A. Fig. 1.
Looking South.

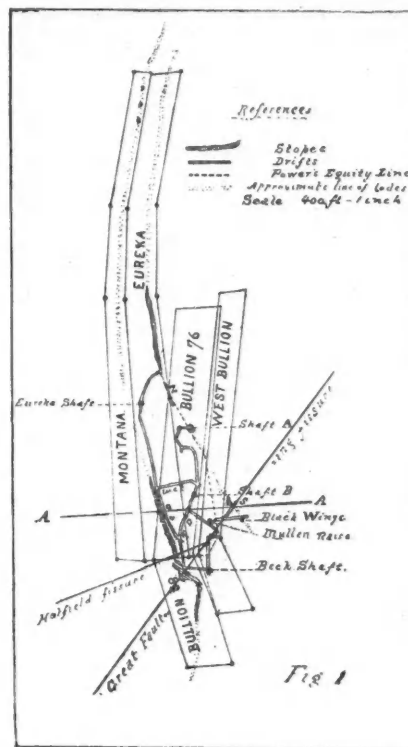
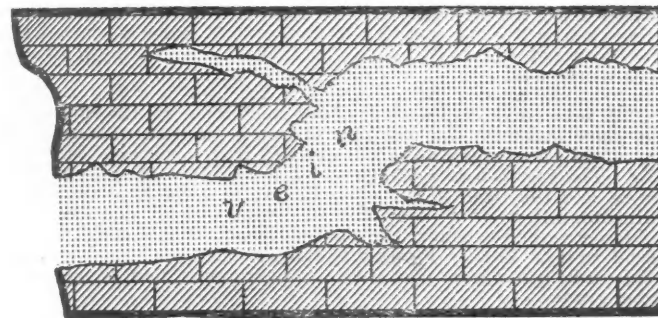


Fig. 1



Ashton Cut. west vein.

shale-bed west of the east vein was overlooked here. Besides, the fault of a thousand feet, which all admit, of the country north of the ravine, or faulting fissure, and the filling of the veins being subsequent to the faulting, which is also admitted, left the shale on the north side of the fault the hanging-wall (See geological plan.) Others contended that the veins joined together up the hill; south, at Brown & Sperry shaft. From that point north, they diverged for a certain distance, and came together again at the north end near the junction of the levels C D and T D, Fig. 1, and that the center limestone was a "horse."

T D is the "tracing drift," through which the western half of the split vein was supposed to have returned to the junction. (It may be remarked here that this drift is run most of the way on a fissure cutting across to the bedding planes of the limestone at right angles, or nearly so.) The cross complaint of the Eureka asserts that a part of the west vein "bulged" into the Bullion 76; but that in its course northerly it again returned to within the Eureka side-lines. Such I believe to be in brief the Eureka side of the question. While this new species of vein and "horse" were being explained to Judge Powers, the old miners and experts of the Bullion had followed the abused "barren fissure," the polished wall, on into large ore-chambers S. Fig. 1. The "Black winze," Fig. 1, still farther to the northwest, is the most recent opening, and shows a fine body of ore. It will be noticed that this point is across the great fault, showing again that the ore was deposited subsequently to the throw.

I desire to call attention to a few points in the judge's decision. He says, "To the east of the vein, there is an extensive area of intrusive rock, called by the miners porphyry. Next adjoining that, is a broad belt of magnesian limestone." But, he adds, "the mines are found in the limestone." After bringing the question into the small compass, "Is there one broad lode, or are there two veins?" the judge says that "much may be advanced in favor of either theory," and that "this is a case in which men may honestly differ." Now, it seems to me that two nearly parallel lines of development for distances of 2000 feet or more should be sufficient to eliminate all speculation or theory as to the facts disclosed in such openings.

Farther on, the judge says, "The court does not think that a barren crack in the earth is a vein or lode, within the meaning of the law, and hence it can not hold that where the fissure crosses the west line of the Eureka the vein crosses." The court's reference to this particular "barren crack" must have drawn a smile from Mr. McCrystal, the Superintendent of the Eureka. He has been following this barren crack for seven

years, from ore-body to ore-body, and has extracted from it, I presume, more than a million dollars. A vein is a fissure in the earth's crust partly filled with mineral or metallic matter differing from the rocks inclosing it. Did any one ever hear of a vein filled for its entire length with ore? Is it not the fact that the area of barren ground in all mines collectively is many times the area of productive ground? These "barren cracks," then, are, after all, the veins upon which legislation is based, and are the veins within the meaning of the law. To reject the sterile portions and accept the rich, is to be inconsistent. The court further says, "This simplifies matters, and narrows the inquiry to the question as to whether the line of ore-bodies upon which the Eureka discovery is located passes outside the side-lines of the Eureka. The testimony shows that it does not." If this wording means the particular ore-bodies seen at the surface immediately around the spot where the notice of location is posted, it will do. But if it is meant to embrace the continuity of the ore-bodies northerly to the end-line, the statement is incorrect.

The cross complaint says that it does pass the side-line, and the testimony fails to show where it returns. The court says that the fissure crosses, but it will not accept it as the vein. Again, the court says, "The Eureka lode has its apex underneath the wash, and does not depart from the claim. It is broader, and its course seems to be more westerly." If this be true, why was it necessary for the court to order the survey and establishment of the line beginning at the point where the "barren crack" departs from the Eureka west side-line Z in Fig. 1?

Judge Powers says, "The Eureka has its apex underneath the wash" (where the lime begins), "and does not depart from the claim;" and "the point where the lode becomes wider than the side-lines is upward of one hundred feet beneath the wash." According to this, then, the vein I have shown in the cross-section is not the vein that has its apex in the Eureka. The vein pictured by the court in a cross-section would look like a demijohn.

I do not know where the openings are that show the Eureka vein more than 100 feet beneath the wash. The level shown is the lowest to my knowledge. The vein in controversy is more than 200 feet west of the west side-line of the Eureka in the section shown. We have in this section about 100 feet of limestone in depth, and about the same of wash. The veins are about 300 feet apart, separated by limestone pure and simple. The east vein is perfectly defined and rather small. On the west vein, the miners of the Bullion are extracting ore from the exact point shown; and if this is not the vein in controversy, what vein is it? It can not be the vein that has its apex within the side-lines of the

Eureka. In the level run west from B shaft, its apex is found near the wash about 100 feet west of the shaft. It is from 5 to 10 feet thick, and stands nearly vertical. The Mullen rise *m*, in section, is entirely in limestone.

But why did the court order the new line shown that reaches so near this new vein, but not quite to it? If the vein apexes within the lines of the Eureka, all the latter company has to do is to sink on it. The reluctance to sink on the "large ore-bodies" seen by the court in the central drifts and other points is remarkable. The Bullion is extracting ore in quantity west of the court equity line. The stope shown in Fig. 1, west of shaft A, is immediately under the wash, and is therefore the apex of the vein at this point. The court line, as will be seen, passes between the shaft and the stope.

The upper edges of the limestone, as shown in cross-section next to the *débris*, are disintegrated by the action of water, and while the bedding planes are yet distinct, one can in many places remove the material with the fingers. It is a magnesian lime sand. At intervals, along through this material, boulders and isolated masses of ore are found—the black spots in the section. None of them, however, goes down.

To construe these erratic masses of ore into the apex of a vein against the extensive productive openings shown on the lines given in the maps is absurd.

The most important question raised by the equity line of Judge Powers's court is, that it simply allows the swinging of a claim—a point long ago decided by the higher courts to be inadmissible.

It is a great mistake to appoint judges from the East to Western districts. Cases such as the one in question are the most important we have, and only men of long experience before the bar, and of sterling character, and one who is familiar with mines, should be appointed to the bench here.

GOSHEN, UTAH, Feb. 14.

T. C.

THE MANUFACTURE OF SPIEGEL FROM FRANKLINITE RESIDUUM.

Written for the Engineering and Mining Journal by George C. Stone, Engineer of New Jersey Zinc Company.

The New Jersey Zinc Company was the first to make spiegel from franklinite residuum. Its first furnace was built in 1855, the original intention being to make wrought-iron. It was soon found, however, that there was too much waste in puddling to make this profitable, and it was decided to sell the pig-iron. At first, most of the iron was used for safe-linings, under the name of "Franklinite iron." Some was also used for car-wheels and roll shells. Later (in 1864-65) the Albany & Rensselaer Steel-Works were started, and took most of this iron.

In the early days of the manufacture, any iron that was not in large crystals was considered worthless, and recharged in the furnace. We now know that this close, fine-grained iron is the best. There is a tradition at the works that a lot of fine-grained iron was accidentally sent to Troy. The Troy people wrote back that it contained 16 per cent of manganese, and they wanted more like it. At this, the Zinc Company got indignant, and wrote to Troy that they were talking nonsense; that it had never sent any such iron, could not make it if it would, and did not intend to try. Finally, it began to analyze the iron, and found that it could make better iron than it had been shipping, and began to make higher grades.

The first furnace built by the New Jersey Zinc Company in 1855 was 19 feet by 7 feet, with open front and open top, a rectangular hearth and three three-inch tuyeres. The lines of this furnace are shown in Fig. 1, except that the upper half of the charging cylinder was not then used. When first built, the blast-pipes were under ground; they were afterward put above the mantel, after the furnace had broken out below the tuyeres and filled all the pipes with iron. Fig. 1 represents this furnace "A" as relined for the last blast in 1882. It was finally torn down in 1884, to make room for the new "A." Furnace "B" was built in 1863; it was the same as "A" at first, but was afterward raised 5 feet and rebuilt on about the same lines. It was relined, for the last blast, in 1882, as shown at Fig. 4. At the conclusion of this blast, it was torn down to make room for the new "B," Fig. 5. In 1871, the "C" furnace, a duplicate of "A," was built. It was raised and lined as shown in Fig. 3 in 1883. It had then a closed top and open front with a cinder notch set in the dam. As this arrangement did not work well, the furnace was blown out and relined as shown at Fig. 2. "C" was finally torn down in 1884, to make room for the new "A." The new "A," Fig. 6, is much the best furnace we have ever had.

About 1870, the New Jersey Zinc Company tried a bell and hopper, but could not make it work. It also tried a closed front, but was unsuccessful with that. The new "B" furnace was the first successful furnace built with closed top and closed front to make spiegel from franklinite residuum.

The blast was at first heated in a spiral pipe oven. Afterward, a Ford oven was used; this was badly constructed, and was unsatisfactory. It was finally torn down, and four Wasseraufingen ovens were built in place of it. These did fairly well, giving a heat of from 600 to 700 degrees Fahr., and were easy to clean and to repair, but required an enormous amount of repairs. With the new furnaces, we have two twenty-one pipe Cooper ovens, which are extremely satisfactory, giving a steady heat of 950 degrees. They are very easy to clean, and require a very small amount of repairs.

The plant at present consists of two furnaces—"A," 35 feet 7 inches by 8 feet; and "B," 34 feet 4 inches by 8 feet. The blast for each furnace is heated by a twenty-one pipe Cooper oven, arranged with an extra number of cleaning doors. At furnace "B," we have in addition two of the old Wasseraufingen ovens, which are not used, but are kept in reserve. The hoists are old-fashioned water-balances without safety arrangements. There are at present three blowing-engines, one an old model Morris vertical engine, with 20½ inch steam-cylinder, 60-inch blast-cylinder, both of 48-inch stroke, which can not be run faster than twenty-two revolutions; the other two engines are similar in general design, and were built at our own works. Both had 15½-inch steam-cylinders, 48-inch blast-cylinders, with 42-inch stroke. Last year, we put a new 20-inch steam-cylinder on one of them. They can be run up to about thirty-five revolutions. All three of the engines are too small and too light for our present fur-

naces. The Dickson Manufacturing Company is now building us an engine with 28-inch steam-cylinder, 60-inch blast-cylinder, 36-inch stroke, capable of running fifty revolutions. When we get this in position, we hope to do better work than at present. The water for tuyeres and hoists is taken from two wells, and raised to the tanks by an ample number of pumps. Steam is furnished by ten flue-boilers, thirty-seven feet long, forty inches in diameter, with two twelve-inch flues. They are set in batteries of two, one pair being kept in reserve. In addition to furnishing steam for the furnaces, these boilers give enough to run the engine that drives the fans for the spelter furnaces and for heating the drying-room of the pottery.

Ores.—The ores used are essentially a mixture of willemite, franklinite, zincite, and calcite from Sterling and Franklin, Sussex County, New Jersey. The ore from the Sterling Hill mine is principally of franklinite and calcite, with a very variable proportion of zincite, and but very little silicate. The ore from the front vein of the Taylor mine, at Franklin, also contains a good deal of calcite with franklinite, willemite, and rhodinite; it is low in zinc. The ore from the back vein, or "Buckwheat Field Opening," is our best ore. It contains a large proportion of willemite and zincite, with but little calcite. The following analyses show the composition of the ores:

ELEMENTS.	Selected Buckwheat.			Lean Buckwheat.		Sterling.			Front vein.
	No. 1.	No. 2.	No. 3.	No. 1.	No. 2.	No. 1.	No. 2.	No. 3.	
SiO ₂	10.21	9.91	11.03	10.28	10.33	4.86	4.43	5.15	9.78
Fe ₂ O ₃	31.41	31.63	27.54	30.46	30.36	30.33	30.13	27.62	27.20
MnO.....	15.84	16.46	17.63	15.66	15.95	12.30	12.21	13.09	17.81
ZnO.....	32.83	34.07	35.88	27.15	26.34	29.42	27.12	23.38	22.94
CaO.....	5.09	4.08	2.01	8.45	7.15	12.65	12.63	14.37	11.46
MgO.....	.....	0.21	0.77	0.91	1.09	.....	1.69	1.98	0.74
Al ₂ O ₃	0.31	0.80	0.24	0.09	1.16	0.67	.....	0.64	0.67
Fe.....	21.98	22.14	19.28	21.32	21.25	21.23	21.09	19.33	19.04
Mn.....	12.27	12.75	13.65	12.12	12.35	9.53	9.46	11.13	13.79
Zn.....	26.34	27.34	28.78	21.79	21.14	23.61	21.76	18.76	18.41

We are using all but the Front vein ore at present. The Lehigh Zinc and Iron Company uses an ore that is between the Buckwheat and the Front vein in composition, and the Passaic Company uses partly Buckwheat and partly ore like the Sterling from a mine of its own.

The ores are mixed in various proportions, limestone being added when necessary, and treated in the oxide furnaces where the greater part of the zinc is volatilized, to be collected and sold as oxide. The ore is mixed in the oxide furnaces with a large proportion of anthracite culm, and dust from coal-yards, very high in ash, as the following analysis shows:

Moisture.....	4.08
Volatile combustible matter.....	6.03
Fixed carbon.....	66.64
Ash.....	23.25

The ash from the culm is, of course, left in the residuum, making it leaner and adding a most objectionable amount of silica and alumina.

The clinker, as it comes from the oxide furnaces, is partly in flat cakes about two inches thick and from four to ten inches in diameter, and partly in small fragments, from dust to two inches in diameter. It is screened before going to the blast-furnaces, the very fine portion being rejected. The coarse clinker very frequently varies between certain limits, as shown by the following analyses:

	1.	2.	3.	4.	5.
SiO ₂	19.97	25.02	23.47	18.14	21.29
Fe ₂ O ₃	33.21	31.06	33.84	36.16	31.06
Al ₂ O ₃	2.25	6.36	8.24	6.94	5.98
MnO.....	17.83	16.22	15.66	18.80	21.03
CaO.....	11.96	10.73	11.04	11.81	7.60
MgO.....	2.30	2.67	1.84	1.98	4.01
ZnO.....	10.74	6.98	4.98	4.06	7.84
P.....	0.037	.....	.....	.....	.....
Fe.....	23.25	21.74	23.69	25.30	21.74
Mn.....	13.82	12.56	12.13	14.64	16.29

The last two (4 and 5) are exceptional. The clinker is lean and rather siliceous; it carries, however, nearly enough lime, magnesia, and alumina to flux the silica. The alumina is far from being a desirable ingredient, as I shall endeavor to show when speaking of the cinder made. The zinc oxide varies from three to eleven per cent, usually about six per cent, and is an unmitigated nuisance. It is all driven off when the furnaces work regularly. Part of it condenses on the throat in a hard, dense ring, which has to be frequently chiseled off at an expenditure of much time and hard labor; part of the remainder collects in the gas-flues, condensers, ovens, and boiler settings as a loose powder; and a large part is carried off by the escaping gases and lost.

If the furnace is not working well, especially if it has to be stopped for any length of time, the zinc is carried down near the tuyeres and condenses in the charge, making a pasty, infusible mass, which sometimes necessitates the shoveling out of the furnace. On one such occasion, I found coke at the level of the tuyeres that was completely saturated with zinc. This is not the only bad effect of the zinc; it penetrates the brick to the depth of six or eight inches, making it very tender. The brick from the upper part of furnace "B," after a fifteen months' blast, contained 1.14 per cent of oxide of zinc and 0.055 per cent of oxide of manganese, and was colored blue (probably from the reduction of TiO₂ contained in the brick) for about eight inches from the inner face.

Coal.—The coal used is Lehigh "broken;" it is usually rather higher in ash than it should be. The following analyses are of average samples:

Moisture.....	4.42	3.66	3.55
Volatile combustible matter.....	3.27	3.00	2.08
Fixed carbon.....	80.03	77.93	83.67
Ash.....	12.28	15.41	10.70

Analyses of ash:			
Silica.....	48.54	54.05	46.37
Sesquioxide of iron.....	.....	13.99	16.86
Alumina.....	.....	25.30	29.92
Lime.....	.....	2.08	2.75
Magnesia.....	.....	4.11	3.09
Protoxide of manganese.....	.....	0.91	Trace

Limestone.—Formerly we used a considerable quantity of oyster-shells and some Irish limestone; but have now given up both. Later, we used a dolomitic marble from Sing Sing, New York. At present, we are using

mainly a dolomite from the vicinity of High Bridge, New Jersey, and occasionally some Sing Sing stone. We use the Sing Sing stone entirely at the oxide furnaces.

	SiO ₂	Fe ₂ O ₃	Al ₂ O ₃	CaO	MgO
Sing Sing, No. 1.....	5.12	0.75	25.42	22.35	
Sing Sing, No. 2.....	4.76	0.62	28.88	20.88	
High Bridge, No. 1.....	2.70	1.54	29.48	20.72	
High Bridge, No. 2.....	2.76	1.60	29.18	20.46	

Furnace Working.—The first furnaces were small, and worked very irregularly. Unfortunately, the records are very incomplete, as the old Zinc Company has gone out of existence, and all of its drawings and many of the records have disappeared. The furnaces at first were run much more slowly, and were continually in trouble, either breaking out

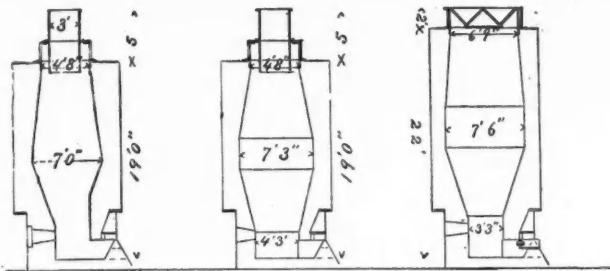


Fig 1

Fig 2

Fig 3

or chilling up. It was no uncommon thing to go two or three days without getting any iron. The blasts seldom lasted more than a few months. One celebrated blast lasted two years. To balance this, on one occasion, the furnace was relined three times in less than five months. The quantity made varied from three to six tons, usually about four tons a day. Bauerman (*Metallurgy*, page 252) says, "The weekly make was

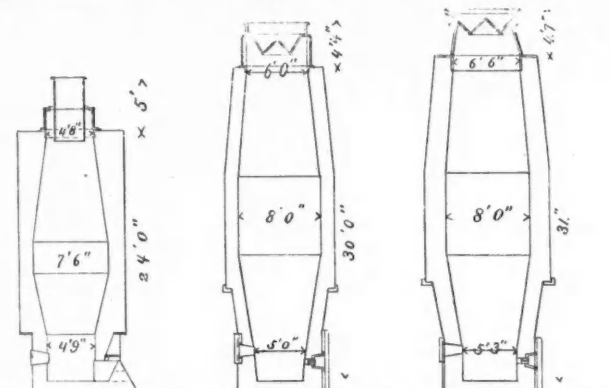


Fig 4

Fig 5

Fig 6

about twenty-five tons. The consumption of fuel was very high, being at the rate of three and a quarter tons per ton of iron. The hot blast was about 400 degrees Fahr., and a pressure of four pounds was used. Four blank charges of clean slags were made in every twenty-four, to prevent scaffolding."

Old Furnace "A."—This was the last of the square hearth furnaces. It was 19 feet high to the top of the brick-work, with a charging cylinder 5 feet high above that, 4 feet 8 inches diameter at the throat, 7 feet at the bosh, and 22 inches at the hearth. It had three tuyeres 3 inches in diameter. The usual blast-pressure was about three and a half pounds; temperature, from 600 to 750 degrees Fahr. The last blast lasted 259 days, during which time the furnace was stopped, for cleaning and repairs, eight days and nine and a half hours. The coal unit was 700 pounds; the average charge was 700 pounds coal, 740 pounds clinker, 180 pounds flux (one half dolomite, one half oyster-shells), and 100 pounds cinder. The filling was done in half-charges at this* as at all the open-topped furnaces. The average make of iron† was 7 tons 922 pounds a day, with a consumption of 0.19 ton boiler coal and 2.921 tons of broken coal per ton of iron. Of the iron made, 1.67 per cent was scrap, 1.99 per cent was from 10 to 12 per cent spiegel, 24.35 per cent was from 13 to 16 per cent spiegel, 42.36 per cent was from 17 to 19 per cent spiegel, and 29.63 per cent was 20 per cent spiegel. The average percentage of manganese was 17.45. The furnace worked well and gave no trouble. This was considered a very successful and satisfactory blast. It was at that time considered necessary to use oyster-shells and cinder in each charge, in order to keep the furnace from scaffolding. The lines of the furnace are shown in Fig. 1.

In 1892, the first round-hearth furnace was built. This was "B," Fig. 4; 24 feet to the top of the brick-work, 4 feet 8 inches diameter at

* One ton equals 2265 pounds.

† 3 1/2 per cent allowance for waste on boiler coal and 3 per cent on broken coal.

the throat, 7 feet 6 inches at the bosh, and 4 feet 9 inches at the tuyeres, with three tuyeres 3 inches in diameter. The blast lasted 269 days; the stops amounted to nine days nine and a half hours. The blast temperature and pressure were about the same as at "A." The average charge was 700 pounds coal, 770 pounds clinker, 180 pounds limestone. During the first part of the blast, the limestone was half Sing Sing and half oyster-shells, and 100 pounds of cinder were added to each charge. In the latter part of the blast, dolomite alone was used, without oyster-shells or cinder. The average make was 7 tons 165 pounds a day. The iron averaged 17.55 per cent of manganese, and was graded .09 per cent as scrap, 1.36 per cent as 10 to 12 per cent spiegel, 18.27 per cent as 13 to 16 per cent spiegel, 66.99 per cent as 17 to 19 per cent spiegel, and 13.29 per cent as 20 per cent spiegel. It required 0.033 ton of boiler coal and 2.921 tons of broken coal to make a ton of iron. This furnace worked more evenly, both in quantity and quality of iron made, and carried a heavier burden (maximum, 700 coal, 850 clinker, 200 limestone, 100 cinder) than any furnace had done before. That it did not make more iron was the fault of the management, as the engine was never run fast enough to give it as much blast as the smaller furnaces received. The following is a representative analysis of the cinder:

SiO ₂	34.66	MnO.....	15.44 = 11.98 Mn
Al ₂ O ₃	8.87	CaO.....	29.66
FeO.....	2.43	MgO.....	8.46

The formula is nearly 7SiO₂, R₂O₃, 11RO.

When this furnace went out of blast, it was decided to remodel it. I was directed to consult with Mr. E. S. Moffat, and prepare plans for a new furnace. At this time, "A" was still in blast, but the walls burnt out so rapidly that it had to be blown out before we had much more than commenced work on "B." It was decided to repair "C," and put it in blast at once, as this could be done in much less time than it would have taken to finish the new "B." "C" was raised and lined as shown in Fig. 3, according to plans made by a former pattern-maker. The design was modified by the head mason, who made the hearth smaller than was originally intended, because it was easier to build it so with the bricks then on hand. The furnace had a closed top and a cinder-notch set in a water-cooled casting let into the dam. This arrangement chilled up the tap-hole, and had to be abandoned. There were three 3-inch tuyeres, the blast pressure varied from three to seven pounds, the temperature was about 800 degrees Fahr. The blast was short and disastrous, only lasting forty-eight days, with the furnace hanging most of the time. The gas-flues were made much larger than before, the idea being that they would hold more oxide, and so permit of running longer without cleaning out. Unfortunately, the oxide settled so much faster from the slower current of gas that it was necessary to clean the flues every other day, instead of twice a week as before. The time lost in this way was twenty-eight and a half hours. The coal unit was 700 pounds, the same as before, but the entire charge was dumped at once. The heaviest charge was 700 coal, 825 clinker, and 200 limestone. This was only used for a short time; the average burden was much lighter. The average make was 6 tons 548 pounds, containing 17.11 per cent of manganese, requiring 0.389 ton of boiler coal and 3.317 tons of broken coal (anthracite) to the ton of iron.

Shortly after the conclusion of this blast, I was given charge of the furnaces, and relined "C" as shown in Fig. 2. This was after the new "B" furnace had been blown in. "C" was now 19 feet high to the top of the brick, 4 feet 8 inches at the throat, 7 feet 3 inches at the bosh, and 4 feet 3 inches at the tuyeres. It had five tuyeres, two and a quarter inches in diameter. It was in blast 266 days, and was then torn down, although still in good condition, to make room for the new "A," as "B" had by that time proved the superiority of the new style of furnace. The total time stopped (including four days sixteen hours, from accidents) was eight days nineteen hours. The average charge was 700 coal, 740 clinker, 190 limestone; the largest, 700 coal, 800 clinker, 200 limestone. The average make was 7 tons 338 pounds, containing 19.39 per cent of manganese. Of the total iron made, 42.72 per cent was graded as from 17 to 19 per cent spiegel and 52.10 per cent as 20 per cent spiegel; the remainder (5.18 per cent) was lower grades. In blowing out this furnace, I used Sing Sing marble to keep the throat cool. Much to my surprise, when we came to shovel out, I found that the dolomite, even that which had come down to the tuyeres, was not burnt, but was still a carbonate. Apparently less than one per cent of it was burned, so that it would slake when wet. It had merely broken up into grains, and a good deal of it had blown out of the top of the furnace.

This was the last of the open-topped furnaces. They were all small and badly proportioned; they required a maximum of labor and fuel to produce a very small amount of low-grade spiegel. At first, the fore-hearth was cleaned every morning; and in addition to the time lost in this way, the furnace was stopped at least twice a week, for one or two hours each time, to clean the oxide from the throat, gas-flues, and condensers. On the last blast at "C," the fore-hearth was only cleaned twice a week, when the furnace was stopped for the general clean-out. The average length of the last few blasts was nine months.

The New Furnaces.—The new closed-topped furnaces are larger than the old, and work rather more economically, using less coal and less labor to the ton of iron, though both are still very high when compared with large iron furnaces. With the new furnaces, it is only necessary to stop once a week, for from one to two hours, to clean out. The old furnaces were so small that they rapidly lost heat when stopped for even so short a time as two hours, and usually worked slowly for some hours after starting, and would make one or two casts of a lower grade of spiegel than usual. With the new furnaces, we have little or no trouble from this cause. We give a blank charge of 1350 pounds of coal and 1000 pounds of cinder long enough before a stop to have it down near the tuyeres when we stop, and a second one on starting, to take care of any zinc that may have dropped into the furnace. Undoubtedly, larger furnaces would be more economical if they could be used, but the danger from zinc is too great. With the furnaces 19 feet high, a ring of oxide about one foot deep would form on the throat; with the furnaces 30 feet high, the ring is 3 or 4 feet deep; with larger furnaces, it would undoubtedly be deeper and be too far down to allow of its removal, and would either close the throat so effectually that the blast could not get through, or would drop of its own weight and sink with the charge to cause trouble lower down. (TO BE CONTINUED.)

NOTES ON THE STEAM-STAMP.*

By Frederick G. Coggin, Calumet & Hecla Mills, Lake Linden, Mich.

The steam-stamp was evidently an offspring from the steam-hammer, the first idea of which seems to have come from the fertile brain of James Nasmyth in 1836. Twenty years elapsed, however, before the idea was first adapted to the purpose of stamping rock, by Mr. William Ball, of Chicopee, Mass., who was the first to introduce the steam-stamp.

It would be interesting to trace the history of the steam-stamp through all the changes of the next twenty-eight years from the first Ball stamp of 1856. This was a crude machine, wasteful of fuel, with a stamping capacity of scarcely fifty tons per twenty-four hours, while the Leavitt cut-off stamp of to-day has an average capacity of 230 tons of conglomerate rock per twenty-four hours. Unfortunately for this early history, Mr. William Ball has passed away, and it can not be expected that a great deal of the desirable material that remains in the hands of his son, Mr. E. P. Ball, will ever be contributed to the stock of knowledge in this field. We must therefore be content with what data we can get, through the memory of those still living who were familiar with the construction and operation of the first stamps, and who have had experience with the improvements from the beginning up to the present time, and were witnesses of them.

In May, 1856, Mr. William Ball took out his first patent on a steam-stamp, Fig. 89 being a reproduction of the Patent-Office drawing. His only claim was the long counter-bore *a*, into which the piston passed, when from any cause the stamp-shaft dropped too low, allowing the steam to pass by it so that the stamp would stop. The counter-bore *a*², at the top, was designed, as he specifies, "in order that the piston may not be subjected to unequal wear." These recesses will be referred to farther on.

The first stamps of Mr. Ball's design were made by the Ames Manufacturing Company, of Chicopee, Mass., for Commodore R. F. Stockton, for his mine in South Carolina, several of them being sent there in the latter part of 1856. The cylinders were 9 inches in diameter with a stroke of 24 inches. The stamp-shaft was 6 inches in diameter, having an offset foot locally dubbed a "sheep's-foot" (Fig. 90). Figs. 91 and 92 give the shape of the shoe and method of attachment. The former has been changed, but the latter is the same to-day as then. It is both simple and effective.

The valve gear was driven independently of the stamp, and seems to be peculiar to the Ball stamp, no material change having been made in it since the first.

Its arrangement is shown in Fig. 93, in which *C* is an ordinary eccentric cam, connected directly with the valve-stem. The cam-shaft is driven by the eccentric gears *BB'*, *a* being the driving-pulley, and the throw *e* of the cam is set at a right angle with *DD*, on the tangent diameter of the gears. This gives the valve its slowest motion when the cam is up, as shown, and the quickest motion when it is down—motions corresponding somewhat with that of the stamp. The throw and travel of the valve are such as to give a wide port at the top for the down-stroke, but only a partial opening at the bottom for the up-stroke—in present practice, about $\frac{1}{8}$ of an inch. Fig. 94 shows the shape of the first mortars, which were cast very thick, having no liners or die at the bottom. The rock was fed into a hopper, water being admitted into the urn at the top, and the stamped material was carried through the screen, which was upon one side only, extending about one quarter around the mortar. The screen was usually one eighth of an inch thick, punched with one quarter inch round holes. The stamps were usually set up in pairs, the valve-gears of both being driven by one shaft, so as to give alternate blows. Stamps set up this way are still running in Houghton, Michigan. With 75 as the usual number of blows per minute, and 80 pounds the usual steam pressure, the capacity of each stamp was about 50 tons of rock per twenty-four hours, dependent, however, upon the character of the rock. Originally, the stamp-shaft was rotated by means of a gear and pinion; but this was superseded by a chain running around a sprocket-wheel on the shaft, this method being the subject of a patent by Mr. Ball in 1867. This in turn was superseded by a belt, that being the present method.

The first shoes, as shown in Figs. 91 and 92, were about 12 inches wide, 15 inches long, and 6 inches thick, weighing about 300 pounds. They were cast of hard iron, but not chilled. The weight of the anvil under the mortar was about 8 tons, and that of the reciprocating part, including the shoe, about 2000 pounds. The stamp frame and sills were made of wood. Stamps of the above description were sent to the Copper Falls mine in 1857, to the Pewabic in 1859, and to the Franklin in 1860—all in Upper Michigan. Little or no improvement was made upon any of them until 1865, when, repairs being necessary at the Franklin, quite a number of improvements were made, some of which were suggested by those who had had experience with the old stamps, but which were covered by patents taken out by Mr. Ball in 1867. The steam-cylinder was increased from 9 to 12 inches in diameter. The "sheep's-foot" stamp-shaft was superseded by a straight shaft, 8 inches in diameter, the shape of the shoe being changed to give parallel sides and circular ends, as by Fig. 97, the weight being increased to about 500 pounds. From that time to the present, the shoes have been made in a chill, and the same form is still used, but increased in size and thickness. The mortar was also changed to the shape shown in Figs. 95 and 96, this shape being still used. Fig. 95 is a longitudinal vertical section, and Fig. 96 a back elevation. This mortar is lined throughout, the die, ring, and staves *e* being cast of hard iron and chilled. The screen surface was quadrupled. The depth of the mortar below the screen was increased, and the position of the hopper changed. The sills, which were made of wood, were changed to iron. Heretofore, but three spring timbers were used, but seven are now put in, the same number and size being still used. They are 14 inches wide, 18 inches high, the best white oak showing the greatest fatigue.

All these changes conspired to bring the capacity of the stamp up to about 100 tons of rock per twenty-four hours, and left the construction of the stamp as shown in Figs. 98, 99, and 100, from which no essential change was made until Mr. E. D. Leavitt, Jr., designed his stamp, having an iron pyramidal frame, when other parties appropriated the idea, applying it in the construction of the Ball stamps, several of which were

made this way in 1883-84. In 1864, several of the Ball stamps, as shown in Figs. 98, 99, and 100, were set up for the Calumet & Hecla Mining Company in Calumet, Mich., the diameter of the cylinders being still 12 inches. In 1875, three years after the removal of its mill to Lake Linden, the diameter was increased to 15 inches. The weight of the shoe was also slightly increased. The weight of the anvil was about 11 tons, and that of the reciprocating parts about 4500 pounds. The number of blows was also increased to about 90 per minute. These changes brought the capacity up to 150 tons per twenty-four hours. From this time up to 1879, little or no change, and no improvement whatever, was made, though various attempts were made to improve the cylinder and valve gear. That improvement was needed will be seen by reference to Fig. 93, showing the old cylinder, and to Fig. 101, which is a fac-simile of a set of steam indicator cards taken from a Ball stamp running at its best in the Calumet & Hecla mills. As the valve gear is driven independently of the stamp, the motion of the stamp-shaft is limited at the bottom by the rock in the mortar and at the top by the excessive lead shown in the card, or, in the absence of it, by a rubber bumper, in the bumper-head *V*, Fig. 99, against which the bonnet *B* strikes. As the rock in the mortar varies, or may through carelessness be allowed to get low, a large clearance at the bottom of the cylinder is necessary, four inches being usually allowed. At the top, *XX*, Fig. 93, represents the top of the stroke, a clearance of $2\frac{1}{2}$ inches being allowed for a possible compression of the bumper. To these large spaces, must be added the counter-bores before alluded to, together with the large and long ports. By actual and accurate measurement, the clearance spaces in a Ball cylinder 15 inches in diameter foot up to 2183 cubic inches, or over 50 per cent of the cylinder for a full stroke; but it must be remembered that not one stroke in ten is full, either at the top or bottom, so that the loss by clearance is much greater than the above, and its enormity fully justifies the charge made at the beginning that a Ball stamp is a fuel-wasting machine.

(TO BE CONTINUED.)

WROUGHT-IRON OR MITIS CASTINGS.

The notice we have already given (February 27th) of Mr. Ostberg's method of making wrought-iron castings by the use of an alloy of aluminium and iron makes the following further description of the furnace of interest:

The furnace is of iron, about five feet long, two high, and three wide, and is divided into three compartments, each large enough to contain two crucibles, each holding the iron. At one end of the furnace, there are three V-shaped troughs, about three inches deep. Into these troughs, crude petroleum is fed from a tank some distance removed. Being ignited, the flame is turned into the furnace by the draught of the chimney. It then passes down a narrow chamber, constructed of fire-brick, and enters the first crucible compartment through an opening near the bottom, uniting at the same time with a stream of air from an atmospheric conduit in the bottom of the furnace. The flame is most intense, and completely envelopes the crucibles. From this first compartment, it emerges at the top on the farther side, and enters the second compartment, surrounds the crucibles therein contained, and passes through an opening at the bottom of the third compartment. After surrounding the crucibles therein contained, it passes out near the top and into the chimney. It is obvious that the degree of heat to which the successive crucibles are subjected is of varying intensity; the severest heat being in the first compartment. This, which was at first thought objectionable, is found to be an advantage, though it necessitates more labor. Each crucible in its turn occupies each compartment, and a more perfect combustion is obtained thereby. When crucible No. 1, or those at the front are taken out to be poured, No. 2 takes their places, No. 3 taking the place of No. 2, and newly charged crucibles being placed in the compartment vacated by crucible No. 3. The intensity of the flame is regulated by a very primitive but effective method, it being the moving of a fire-brick over an opening in the first air-duct. The compartments are each covered by a slab of fire-clay, which contains a circular opening for viewing the progress of the combustion. The crucibles remain in the furnace two or three hours. We have already stated that, as soon as the iron in the crucible is melted, a small quantity of a 7 or 8 per cent alloy of aluminium and iron containing aluminium—it is said, to the amount of about .05 of 1 per cent of the iron in the crucible—is added to the crucible, and at once reduces the fusing-point of the iron several hundred degrees, thus making the metal very fluid and giving time for casting.

Then the two crucibles in the first compartment are taken from their fiery bath by a man clothed with a garment of asbestos and provided with spectacles of blue glass, and carried to the mold containing the pattern, into which the glowing mass is poured directly from the crucible. The molten iron is much more liquid and fluent than ordinary cast-iron. On this account, it is practicable to produce, by the new process, castings solid and fine beyond example.

Powder Manufacture in Sweden.—The Törsebro Powder-Works have manufactured 12,000 kilos. of 23 mm. powder, 14,000 kilos. of 6 to 10 mm. powder, and 20,000 kilos. of powder for small fire-arms. Aker's Works have manufactured 40,000 kilos. of powder for small fire-arms, and 30,000 kilos. of 5 mm. powder. The Marieberg Ammunition-Works have manufactured 5,400,000 loaded cartridges, 1,125,000 blank cartridges, and 65,000 drill cartridges, besides 159,000 loaded brass cartridges.

Rolling No. 9 Steel Wire.—In reference to rolling steel wire of No. 9 gauge in Westphalia, it may be stated that this is done under the patent of Herr Boecker, which has been purchased by the Hoesch Steel-Works, Dortmund. The chief feature of the invention consists in using two sets of rolling trains, which are arranged one behind the other. The wire goes from the first train in a straight line to the second, the rolls of the latter having a greater velocity, thus avoiding the formation of loops in the wire while it is passing from one pair of rolls to the other. It is said that there is no difficulty in rolling steel wire down to No. 9 gauge, or 3.76 mm., by this method. We hope to give further details of the invention.

* From the Transactions of the Society of Mechanical Engineers.

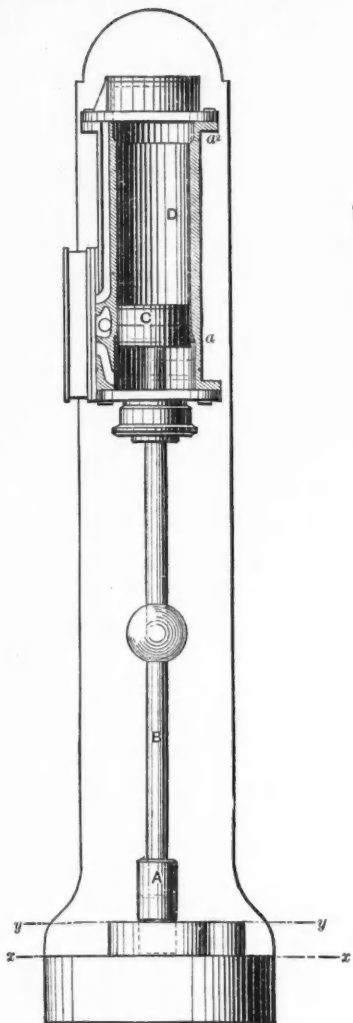


Fig. 89

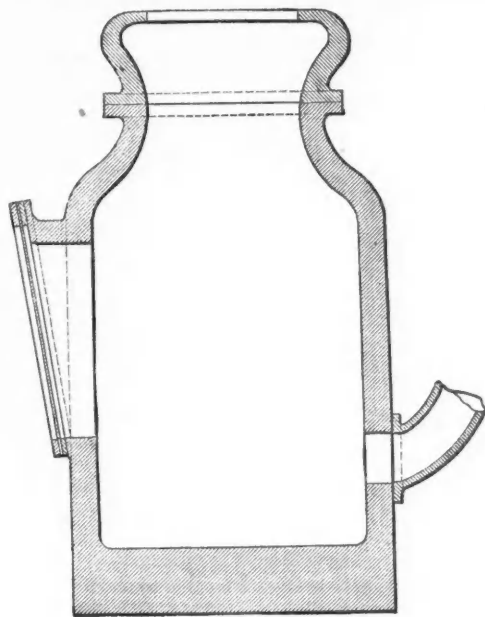


Fig. 94

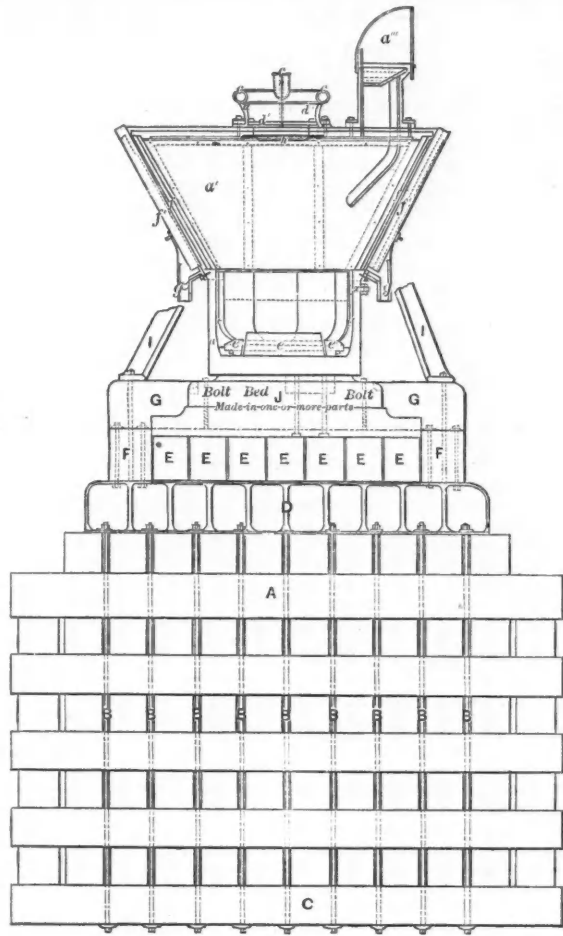


Fig. 95

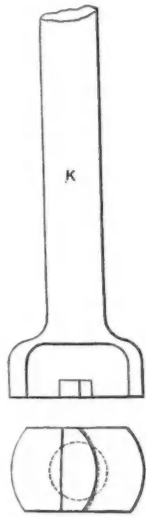


Fig. 97

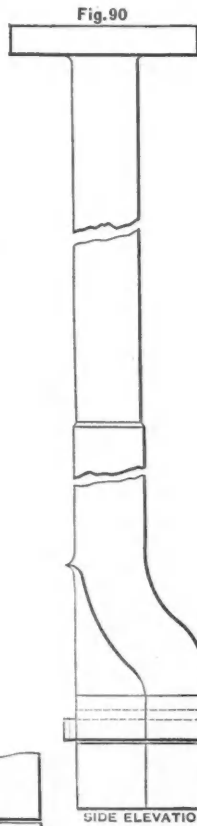


Fig. 90

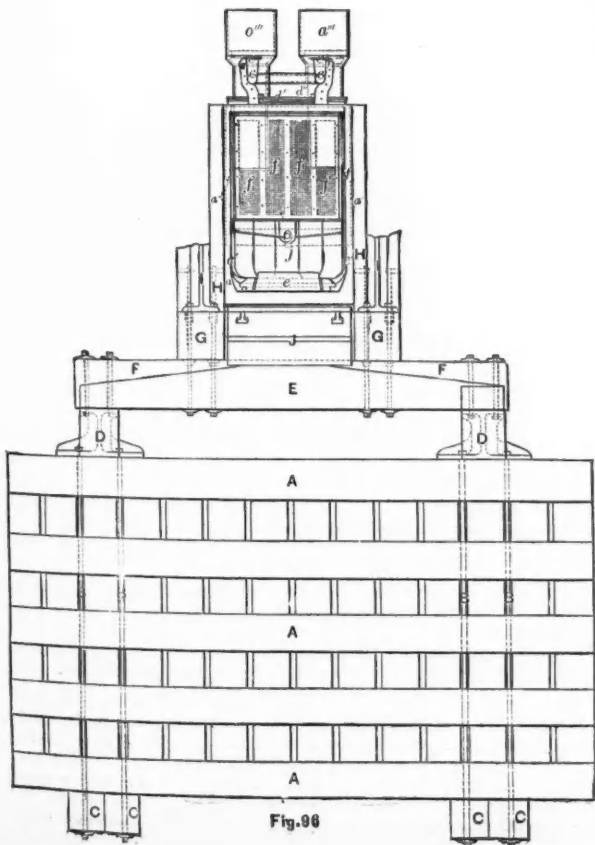
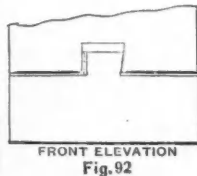
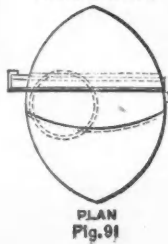


Fig. 96



FRONT ELEVATION
Fig. 92



PLAN
Fig. 91

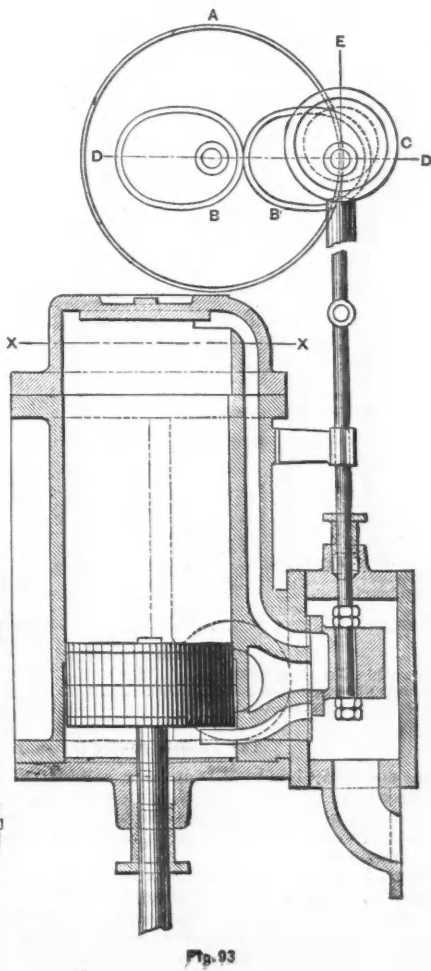


Fig. 93

OFFICIAL STATEMENTS AND REPORTS.

Alice Gold and Silver Mining Company, Montana.

Reports have been made by this company for the past three years, and each year we have called attention to some important omissions in them. Some of these omissions have been filled in the subsequent report; but we still note the absence of any statement of the assay value of the ore as milled or the proportion of gold to silver in it, or of the loss in treatment. With not a little trouble, we have compiled the following tabular statements. From the first of these, it appears that the ore is declining in value, or at least that the receipts per ton milled are declining. How much of this is due to the decline in the value of silver, or how much may be due to the losses in treatment, is not stated.

The report might, without much additional work, be made to give the data that would enable the stockholders to judge whether their property is well or badly managed. As it is, they are in the dark on some important points.

The company is still in debt to the amount of \$116,666.67, and still pays dividends. The company had on hand January 1st a cash balance of only \$43,403.

The cost of salt and some other supplies has been reduced. The rates of wages paid are not stated.

Prof. W. P. Blake, in his report made in November, 1881, states that bars 1 to 122 (from 1877 to July 23d, 1878) averaged \$74.22 per ton milled; and bars 123 to 424 (from July, 1878, to January 1st, 1880) had an average value of \$56.95 per ton.

In Professor Maynard's report upon this property, made in 1881, he states the average yield of ore treated from October, 1877, to November, 1881, was 46.06 ounces silver and 299 ounce gold per ton. "The average proceeds of the sale of bars has been \$58.70" per ton milled.

The following table, compiled from the annual reports, shows how this decline has continued. Professor Blake stated in 1881 that 86 per cent of the gold and silver was obtained from the roasted ore.

	Dry tons milled.	Ounces doré bullion produced.	Amount received for bullion.	Amount received per ounce.	Ounce per ton rock milled.	Actual receipts per ton.
1880	84,586	3,726,518.5	\$3,306,696.19	\$0.888	41.1	\$39.16
1883	33,201	1,690,454.8	1,045,242.25	0.622	50.6	31.47
1884	34,906	1,894,417.2	949,443.04	0.501	54.1	27.05

RECEIPTS.

Cash in hand of treasurer and superintendent, January 1st, 1885	\$35,266.24
From bullion	949,443.04
Old iron sold	712.32
Supplies sold	10,164.53
Interest on credit balances in bank	45.29
Railroad reclamations	1,268.16
Other items	4,045.76
Total receipts	\$1,000,943.34

DISBURSEMENTS.

	1885.	1884.	1883.
Expressage on bullion	\$14,387.90		
Supplies for storehouse	18,216.23		
Lode claims	7,825.63		
Bullion reclamations	2,688.61		
Mine, permanent improvements	30,383.23		
Mill, permanent improvements	16,758.64		
Machinery	72,068.07	\$171,328.31	\$4.89
Pro-pecting and dead-work:			
Labor	77,579.21		
Supplies	2,451.89		
Powder and fuse	5,925.74		
Fuel	11,486.38	97,443.21	2.78
Ore extraction:			
Labor	194,158.62		
Supplies	5,272.59		
Powder and fuse	11,052.43		
Fuel	22,972.75		
Assay materials	617.62	234,073.44	6.68
Ore-reduction:			
Labor	101,215.90		
Supplies	7,226.98		
Salt	14,887.98		
Freight on salt	94,361.71		
Quicksilver	10,762.90		
Fuel	68,918.26		
Assay materials	1,235.25	298,608.28	8.53
Expense account:			
Salaries	9,700.00		
General expense	1,509.35		
Legal expense	3,719.83		
Office expense	422.91		
Traveling expense	256.50		
Stable and ore-hauling	2,034.11		
Insurance	6,584.40		
Interest on company's notes	7,263.50		
Stationery and printing	1,213.72		
Postage and telegrams	374.03		
Discounts	571.05		
Advertising	80.84		
Registrar's fees	750.00		
Taxes	4,495.42	39,994.67	1.14
Dividends	125,000.00		1.23
Cord wood on hand	7,421.00		1.83
Bills payable	50,000.00		
Cash on hand	2,736.36	\$185,157.36	
Total	\$1,036,605.27	\$24.02	\$23.79

SUPPLEMENTAL STATEMENT.

Bills payable, January, 1886	\$116,666.67
Mine and mill supplies on hand	60,778.79
Cash on hand	329.58

The Atlantic Mining Company, Mich.

This company has long been our model of economical and efficient management, and we have cited it, year after year, as it has lowered its own record, as the most remarkable example of economical mine and mill work, even in that district, where so many mines have attained marvelous results.

The rock of the Atlantic mines is hard amygdaloid, and wages average about \$1.50 a day. The speed with which drifting, sinking, and other mine work is done at our lake mines is so much greater than almost anywhere else in the world in the same character of rock, owing to the greater skill of the experienced men and the efficiency of the rock-drills

used, that the extraordinary work accomplished may be incorrectly attributed to the nature of the rock.

The following summary is, we believe, the most remarkable exhibit of economical mine work in hard rock that has yet been put on record.

It is not surprising that the directors say, "under existing conditions, it is not likely that these figures will be materially reduced in the future."

Sinking 81 feet, average	\$22.00
Drifting 3401.1 feet, average	7.38
Stoping 12,898 130-216 fathoms, average	7.97
Ground broken in openings and stopes	13,403 cubic fathoms
Rock stamped	241,010 tons
Product of mineral	4,913,167 pounds
Product of refined copper	3,582,256
Yield of refined copper per cubic fathom of ground broken	267 "
Yield of rock treated, 1480 pounds copper per ton, or	743 per cent.
Gross value of product, per ton of rock treated	\$1'6565
Cost per ton of mining, selecting, and breaking, and all surface expenses, including taxes	7862
Cost per ton of transportation to mill	0480
Cost per ton of stamping and separating	3036
Cost per ton of running expenses at mine	1'1378
Cost per ton of freight, smelting and marketing product, including New York office expenses	2545
Cost per ton of working expenses	1'3923
Total expenditures per ton of rock treated	1'4360
Net profit per ton of rock treated (exclusive of interest earned)	2205

The cost of mining, selecting, and breaking, and all surface expenses, including taxes, only 79 cents a ton for hard rock from a deep mine, is quite unexampled, as is also the cost of stamping and concentrating at a cost of 30 cents a ton.

That a deep copper mine in hard ground, with wages averaging \$1.50 a day, should be able to earn dividends from an ore yielding $\frac{7}{10}$ of 1 per cent of copper, with an average market price of copper of 11 $\frac{1}{10}$ cents a pound (say £51 8s. per ton of 2240 pounds) is probably unexampled in this or any other country working under similar conditions of rock and wages.

From the directors' report of operations during the year 1885, we learn that "the production of mineral was 4,913,167 pounds, which yielded $\frac{31}{100}$ per cent, or 3,582,256 pounds of refined copper. The shipments to market during the year amounted to 3,568,066 pounds, which realized an average price of 11 $\frac{1}{10}$ cents a pound.

The following is a summary of the year's business:

PRODUCTION.		Pounds.	
Copper sold and delivered	2,729,588	\$302,316.72	
Copper on hand, sold	836,478	95,464.49	
	3,568,066	\$397,781.21	
Copper at smelting-works December 31st, 1884, 348,791 pounds, valued at 9 cents, net		\$31,391.19	
Copper at smelting-works December 31st, 1885, 364,981 pounds, valued at 9 cents, net	32,848.29	1,457.10	
Net value of product of 1885		\$399,238.31	
Add balance of interest account		3,065.92	
		\$402,304.23	
Working expenses at mine as per clerk's tables	\$274,233.30		
Freight	\$11,673.40		
Smelting	40,227.54		
Expenses	6,147.58		
Brokerage	1,976.23		
Insurance	1,194.60		
Storage	111.50	61,330.85	335,564.15
Showing a mining profit in 1885 of		\$66,740.08	
There has also been expended for addition to plant, as per detailed statement hereafter		10,514.64	
Leaving a net gain for the year of		\$56,225.44	
The surplus from 1884, after disposal of copper on hand and payment of dividend, was		246,471.36	
Making the net surplus December 31st, 1885		\$302,696.80	
as shown in detail in the annexed statement of assets and liabilities, and out of which a dividend of one dollar per share (\$40,000) was paid January 28th, 1886.			
ASSETS.			
Cash		\$126,230.49	
Copper on hand, 836,478 pounds, sold for		85,464.49	
Copper at smelting-works, 364,981 pounds, valued at 9 cents, net		32,848.29	
		\$254,543.27	
At Mine.			
Cash		\$2,863.24	
Coal		13,480.00	
Wood		1,887.50	
Supplies		25,375.82	
Merchandise in store		41,536.76	85,143.32
Total assets			\$339,686.59
LIABILITIES.			
Indebtedness at mine		\$20,148.44	
Agent's drafts outstanding		6,261.30	
Accounts payable		10,580.05	36,989.79
Balance of assets			\$302,696.80
(Less dividend payable January 28th, 1886, \$40,000.)			

The German Dynamite Syndicate.—By the adhesion of the Dresden Dynamite Company, the syndicate has now a practical monopoly of the manufacture of dynamite in the German Empire, the few concerns not parties to the agreement being too unimportant to seriously influence prices. The capital of the united firms amounts to 9,000,000 marks.

Sale of Russian Metal-Works.—According to the German papers, the Russian government has decided to dispose of a number of metal and mining works in Poland. Among others, are mentioned the zinc-smelting furnaces at Bendzin, Dombrowo, and Slawkowo; the calamine mines "Barbara," "Anna," "Georg," and "Joseph;" the coal-mines in Dombrowo and Peary; the blast-furnaces in Pankau, and works in connection at Praczkau; and the ironstone mines of Kostrzyn and Zajoncza.

THE BRENNAN ROCK-BREAKER.

This new candidate for the favor of the mining community presents several novel features, for which important advantages are claimed by the manufacturer, Mr. G. G. Young, No. 42 Cortlandt street, New York. A reference to the accompanying illustrations and the following description fully explain the peculiarities of this machine. The sizes of these machines are: No. 1, 12 inches by 37 inches; about 32,000 pounds weight, with an estimated capacity of from 20 to 30 tons an hour, broken to say

having long bearings in the sides of the frame, is further strengthened and firmly held in place by the U-bolts *e*, holding it securely in intermediate bearings cast fast to the top of the frame at the center of each jaw, shown in Fig. 1.

F, f. The cam *F* has a renewable wearing surface, is fitted to revolve easily on its shaft *G*, but is held in place by the dog *f*, the tail of which engages a rubber ring fitted in a recess in the cam. This slightly flexible fastening allows the shaft and cams to be revolved, even while the machine is working by means of the hand-wheel and worm gear shown

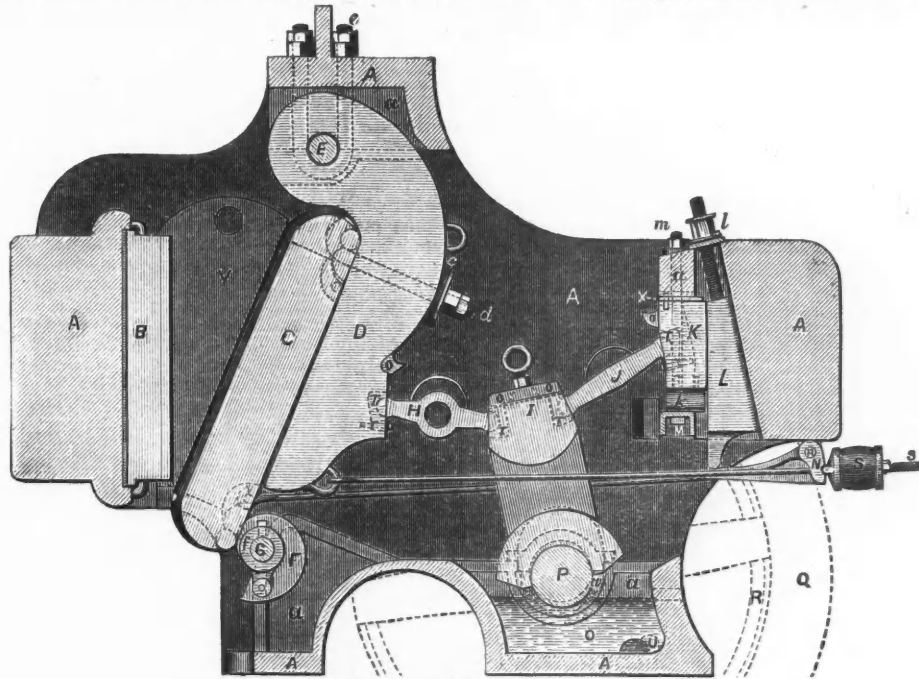
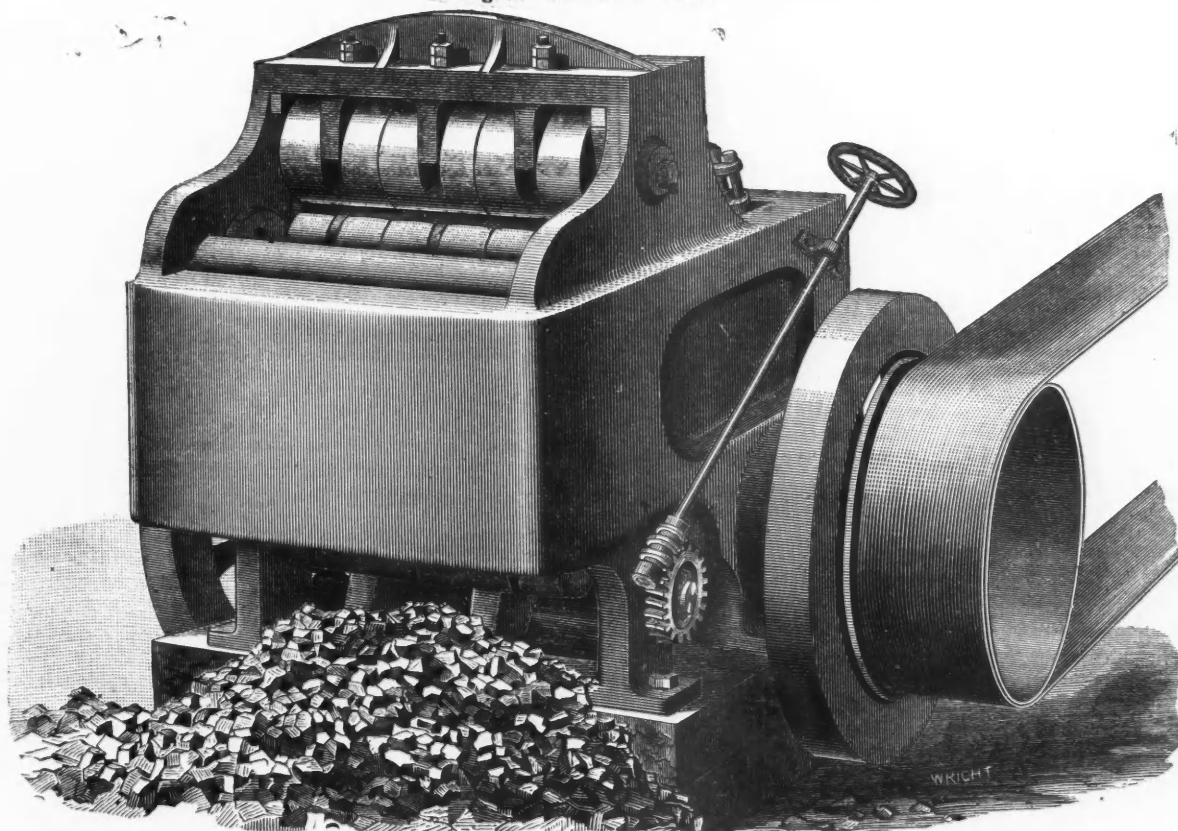


Fig. 2.—Sectional View.



THE BRENNAN ROCK-BREAKER.—Fig. 1.

2 inches; speed, 300 revolutions. No. 4 is 5 inches by 20 inches; 6000 pounds; 400 revolutions; capacity, from 8 to 10 tons an hour.

DESCRIPTION OF PARTS.

A, A, A. The frame of the machine is cast in one piece, having ample strength and weight to resist vibration.

a, a, a. Intermediate bearings, cast fast to the frame.

B, C. Fixed and hinged crushing-plates, reversible, readily taken out and put in place and securely fastened.

c, d. Hook-bolt, provided with a rubber washer or cushion *c*, which allows the fixed and hinged crushing-plates to be worked close together at their lower ends with safety, as the hinged plate can rock slightly on the point of the jaw *D*, if it should strike the fixed plate.

E, e. Jaw-shaft and U-bolts. The jaw-shaft is of steel, and besides

in Fig. 1. The cams can be set separately so as to compensate for any difference in thickness or wear of the crushing-plates. The machine being in operation, the stroke of the lower ends of the crushing-plates can be cut off to any desired proportion of the stroke of the swinging jaw *D*, by adjusting the position of the cams, which are held in place by the worm gear until a new adjustment is desired. The lower ends of the crushing-plates rest against the cams during the time their stroke is cut off, thus greatly facilitating the discharge of the crushed material.

G. Steel cam-shaft.

H. Safety-toggles, made with a transverse hole through the center, as shown, have a tested strength fully capable of crushing any rock, but far below the strength of the other parts of the machine. As they have to bear the direct and immediate pressure of the work, the other parts

are insured against injury in case pieces of iron or steel such as sledges, bars, drill-points, etc., get into the crusher through carelessness or accident.

I. The strain on the pitman being in compression, allows of its being made of a moderate weight, and its construction is such that it can be quickly removed and replaced when desired.

J. Toggles of different lengths are provided, so that all wear can readily be taken up.

K, k. The toggle-blocks are firmly held up to their bearings *a*, by the stiff flat springs *k*, which, while preventing lost motion, permit the toggle-blocks to move readily on raising or lowering the adjusting wedge *L*.

x. The angle of the toggle *J* is alterable by means of the liners *x*, and the amount of the stroke of jaw *D* is thereby controlled, and prevented from becoming excessive through wear of bearings, etc. This adjustment, in connection with the cams and the wedge *L*, gives complete control of the crushing action, which thereby can be varied to suit any kind of material and the size and quality of the product required.

L, l. The wedge is extended downward so as to maintain (in connection with the lever *N*) the jaw springs at the proper tension, no matter how much the wedge is raised or lowered. The nut *l* is flanged and provided with a locking pin. As the position of the wedge *L* controls the position of the motion of the jaw *D*, as well as the forward reach of the crushing-plate *C*, it will be seen that, when the cams are once adjusted so that the discharge opening is of the desired width, the amount of stroke of the lower end of the crushing-plate can be regulated with the utmost nicety by raising or lowering the wedge *L*, while the size of the product allowed to be discharged can be controlled by the hand-wheel and cams. When the adjustment for size of product and amount of stroke are once made (which can be easily done in five minutes from the coarsest to the finest sizes, without stopping the machine), no new adjustment of the cams is necessary, except for wear of the crushing-plates, and no new adjustment of the wedges, except for wear of the bearings, and these, being self-oiling and of unusual size and efficiency, the machine requires very little subsequent attention.

M, m. The ends of the supporting-bar *M* are held in slides formed on the frame. The bolts *M*, passing up between the toggle-blocks, can be slacked and tightened up even while the machine is running, and the liners *x* changed.

N. By means of this spring lever, the proper tension of the jaw-springs is not disturbed by raising or lowering the wedge.

O. Oil-chamber (cast in frame), for the automatic continuous lubrication of the crank-shaft and pitman bearings. The oil in this chamber is kept at such height, by means of supply and overflow pipes, that these most important bearings are continually supplied with an abundance of oil, and at the same time no waste of oil can take place, as the overflow can be led to a tank or vessel and used over again.

w. Interchangeable boxes for crank-shaft bearings, of specially prepared metal, which can be renewed in a few minutes by simply raising the shaft and fly-wheels in place, the shaft-eye being large enough to permit of this operation. This is a most important point in making it easy to keep the machine always in the highest state of efficiency.

P. The crank-shaft is of ample diameter, has very long bearings in the sides of the frame and intermediate bearings between the eccentrics. The eccentrics are arranged radially on the shaft so that the jaws are actuated alternately. The moving parts thus balance each other, saving power and preventing vibration, and the machine has the advantage of continuous operation on the material.

T. Bronze toggle-bearings, interchangeable. Those in the jaw and toggle-block are held in place by a wedge and screw, and those in the pitman by the double oil-cup *o*, *o*, held down by the eye-bolt and nut.

o, o. Oil-cups for toggle-bearings. Those on the jaw and toggle-block are cast thereon, and the double cup on the pitman is a substantial casting. They are all of the full length of the bearings. When filled with grease, which can be put in while the machine is running, they effectively lubricate the toggles for a long time without refilling.

The following special advantages are claimed for this rock-breaker :

1st. Ability to change the character of the stroke of the machine, in proportion to the size of the product desired.

2d. The simple yet complete method of changing all adjustments while in motion.

3d. Positive safety from breakage.

4th. Perfect lubrication.

5th. A minimum of power required for a given product.

DICK'S NEW FORM OF REGENERATIVE FURNACE.

Mr. F. W. Dick, of the Steel Company of Scotland, recently read a paper before the South Staffordshire Institute of Iron and Steel Works Managers on this subject. The furnace does not in any way differ in principle from the ordinary Siemens furnace, but only in construction and arrangement of the various parts. There are the melting-chamber or furnace proper, and four regenerative chambers, two for gas and two for air. But instead of the furnace and regenerators forming parts of one structure of brick-work, they are separate from each other, and are contained in circular castings of wrought-iron or steel plates riveted together, and not only are the regenerators separate from the furnace, but they are separate one from the other. The arrangement consists of a circular furnace body placed on a platform supported by girders, while the regenerative chambers are placed in pairs at each end of the furnace. The furnace is thus left entirely clear underneath, a condition of things that insures the bottom being kept cool, and lessens the likelihood of the charge breaking through. The regenerators, not being underneath the furnace, are out of harm's way in the event of a break-out; and as the regenerators have nothing but their own weight to carry, they can never get out of shape. The furnace is not supported in any way by the regenerators, and this is a feature in the design that must commend itself; for a worse support than a mass of white-hot brick-work on which to carry the weight of a furnace and its load of metal can scarcely be conceived. With the exception of having dampers to separately control the passage of the products of combustion through the gas and air-chambers, no change was at first made in the flue and valve arrangements;

but in later designs, a system of disk valves has been adopted, which gives very good results.

Mr. Dick described the work of several furnaces. In one at the Blochairn Works, erected early in 1884, steel of soft quality was made for the first four months, 3½-ton charges being brought out under eight hours by the Siemens pig and ore process. In this and similar furnaces, heavy rolls were melted. At first, they were broken by blasting with dynamite at a cost of 12s. 6d. a ton; but the resulting pieces, from their size and irregular shape, were worth only 30s. a ton. The melting cost 6s. 8d. a ton, and the stuff was run into a marketable pig of superior quality. In a small furnace of this order, a 4-ton piece of roll took about two hours to melt, and the furnace cleared its cost in a few months. It needed very few repairs, and scarcely any attention save the cleaning of the regenerators. At the works of the Patent Shaft Company, at Wednesbury, where furnaces of the class described are working, careful measurements have been taken, which show that for months at a time soft steel is produced with an average weekly expenditure of 9 cwt. of coal a ton, while several separate weeks show an expenditure of only 7 cwt. of coal a ton of steel produced. In conclusion, Mr. Dick called attention to the peculiar adaptability of the furnace for the basic process. It is not even necessary to use basic bricks, since the circular body can be rammed with the same ease as a Bessemer converter. The easy and complete severance that can be made between the basic and acid lining renders the production of basic steel in the open-hearth furnace both possible and feasible. During the discussion that followed, Mr. Allen spoke favorably of the furnace, and remarked that the loss of heat by radiation was very small. Mr. Macallum thought the furnace occupied more room than the ordinary form of furnace of the same capacity. The flame also was very short indeed. No doubt the furnace had great advantages for working the basic process; but in England, he thought the basic process had done work most successfully at the open-hearth furnace. Mr. Farnworth, who spoke favorably of the invention, said that he had seen it at work, and it gave very good results.

Number of Thomas-Gilchrist Converters in Different Countries.—

Germany.....	41 with 367 tons capacity.	France.....	13 with 124 tons capacity.
Austria.....	7 " 17 " "	United States.....	2 " 20 " "
Russia.....	2 " 20 " "	Great Britain.....	19 " 188 " "
Belgium.....	4 " 32 " "		

The Hours of Labor per Week in Machine Factories.—

United Kingdom.....	52	Russia.....	72
United States.....	40	Switzerland.....	65
Germany (Mr. Crowe gives 60 and 60).....	60	Belgium.....	62
France (Mr. Crowe gives 72).....	60	Italy.....	72
Austria.....	66	Holland.....	64

Dividends of German Companies in 1885.—

	Per cent.
Lüneburger Eisenwerke (Hollow-ware manufacturers).....	8½
Duisburger Maschinenbau Aktien-Gesellschaft (Machinery manufacturers).....	8
Berliner Aktien-Gesellschaft für Eisengiesserei und Maschinen-Fabrik. (Foundry and machine-works).....	8½
Aktien-Gesellschaft Maschinen-Fabrik Deutschland, Dortmund. (Machine-works).....	9
Maschinenfabrik Aktien-Gesellschaft Nürnberg. (Machine-works).....	9
Vienna Neustadt Locomotive Company.....	10

BOOKS RECEIVED.

(In sending books for notice, will publishers, for their own sake and for that of book-buyers, give the retail price!)

UNITED STATES COMMISSION OF FISH AND FISHERIES. SPENCER F. BAIRD, COMMISSIONER. *The Fisheries and Fishery Industries of the United States*. Prepared through the co-operation of the Commissioner of Fisheries and the Superintendent of the Tenth Census, by George Brown Goode, Assistant Director of the U. S. National Museum, and a Staff of Associates. Section I. Natural History of Useful Aquatic Animals. With an Atlas of two hundred and seventy-seven Plates. Text, Washington: Government Printing-Office, 1884. Quarto, pages xxxiv+(4)+895 (including Index). The Atlas of Plates. Quarto, pages xx and 277 Plates.

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 MARCH 9TH.

- 337,372. Method of Utilizing Aqua-Ammonia as a Motive Power in Engines. Joseph H. Campbell, New York City, Assignor of three eighths to Charles H. Campbell and James McLain, both of same place.
- 337,374. Method of Utilizing Aqua-Ammonia as a Motive Power in Engines. Joseph H. Campbell, New York City, Assignor of three eighths to Charles H. Campbell and James McLain, both of same place.
- 337,387. Process of Manufacturing Ammonia. Alfred Feldmann, Bremen, Germany.
- 337,408. Device for Preventing the Freezing of Gas in Pipes. John E. Kearns, Peoria, Ill.
- 337,411. Process of Utilizing the Waste Heat from Bone-Black-Revivifying Kilns. S. Morris Lillie, Philadelphia, Pa.
- 337,471. Ore-Concentrator. John M. Adams and William F. Carter, San Francisco, Cal.
- 337,495. Process of Treating Peat. Salomon Heimann, New York City.
- 337,513. Method or Process of Making Wire Cables. Arthur J. Moxham, Johnstown, Pa.
- 337,516. Apparatus for Burning Gaseous Fuel. Ferdinand Phillips, Philadelphia, Pa.
- 337,526. Support for Rock-Drills. Henry C. Sergeant, New York City.
- 337,535. Amalgamating Apparatus. Julius E. Thielsen, Eugene L. Giroux and Henry W. Dilz, Portland Oregon.
- 337,570. Mill for Pulverizing Quartz. Gideon Frisbee, New York City.
- 337,580. Expanding Joint for Tubes. James Hemphill, Pittsburg, Pa.
- 337,661. Stone-Sawing Machine. William H. H. Campbell, Wichita, Kan.
- 337,667. Method of Conveying Gas in an Inexplosive Condition. John H. Dalzell and Thomas J. McTighe, Pittsburg, Pa.
- 337,668. Method of Distributing Gas. John H. Dalzell and Thomas J. McTighe, Pittsburg, Pa.
- 337,683. Ore-Concentrator. William Hooper, Ticonderoga, New York, Assignor to himself and John R. de Lamar, Denver, Colo.
- 337,684. Ore-Concentrator. William Hooper, Ticonderoga, New York, Assignor to himself and John R. de Lamar, Denver, Colo.
- 337,726. Ore-Crusher. Jacob C. Wiswell, Medford, Mass., Assignor to the Wiswell Electric Mining Machinery Company, Portland, Me.

REISSUE.

- 10,699. Apparatus for Burning Hydrocarbon Oils. Henry W. Whiting, Philadelphia, Pa., Assignor of two thirds to Albert E. Peterson and John H. C. Whiting, same place.

FURNACE, MILL, AND FACTORY.

The Pacific Iron-Works, at San Francisco, report business improving. They have lately sold the Duncan concentrator to the Arizona Northern Mining Company, at Cerbat, Arizona, and to the Kettle Falls Mill and Mining Company, at Spokane Falls, Washington Territory, and shipped several of them to South America.

The Buckeye Engine Company, of Salem, Ohio, sold one hundred and twenty-five of its automatic cut-off engines last year, fifty-three of which were for electric light plants. The company manufactures all sizes, from 15 to 700 horse-power, is running full-time and full force, and every second or third week is compelled to run fourteen hours.

The Webster, Camp & Lane Machine Company, of Akron, Ohio, is enjoying quite a boom, and has orders enough to keep it busy for two months.

The Bucyrus Foundry and Manufacturing Company, of Bucyrus, Ohio, is rushed with orders. The company is making arrangements that will nearly double its present capacity. It has a number of orders for steam-shovels and dredges, and within a short time has shipped a steam-shovel to San Francisco, and will have another to go to the same place. It has also a good trade in its mine cars, mine car-wheels and axles, and other mine supplies.

The Seibel-Suessdorf Copper and Sheet Iron Company, St. Louis, Mo., has begun the construction of new works near its present place of business.

The Pontiac Rolling-Mills, Pontiac, Ill., were entirely burned on the 15th inst.

The Tod furnace, at Brier Hill, Ohio, operated by the Brier Hill Iron and Coal Company, blew in on the 14th inst. It is stated that all the furnaces in the Mahoning Valley are running.

The Cuyahoga Rolling-Mill Company, of Cleveland, Ohio, has made an assignment. The concern was started in August last, and claimed a capital of \$20,000.

A. & P. Roberts & Co., of the Pencoyd Iron-Works, Philadelphia, Pa., in a notice to their striking employes, say that upon careful consideration they believe it impossible to bid upon work in the present unsettled condition of affairs, and therefore, having no orders of any magnitude at present, they regret to announce the closing of the entire works until further notice.

PROPOSALS.

The Philadelphia County Prison, Philadelphia, Pa., will receive proposals until March 23d, for supplying the prison with the following articles: Tin, sheet-iron, iron pipes, etc., and bricks.

The Harlem River Bridge Commissioners, office Room 73, Cotton Exchange Building, Hanover Square, New York City, will receive proposals until April 23d, for the construction of the proposed bridge over the Harlem River, at 181st street.

Until March 24th, the Boston Water Board, H. T. Rockwell, Chairman, City Hall, Boston, Mass., will receive proposals for furnishing as follows: 400,000 pounds iron castings to be furnished; 125,000 pounds old iron to be taken by the contractor; 300,000 pounds iron service-boxes to be furnished; 75,000 pounds old iron to be taken by the contractor; 9000 pounds composition castings to be furnished; 9000 pounds brass castings to be furnished; 5500 pounds of old brass and composition castings to be taken by the contractor; 6700 pounds brass and composition turnings to be taken by the contractor.

LABOR AND WAGES.

The Warwick Iron Company, Pottstown, Pa., will increase the wages of its employes on April 1st from 10 to 15 per cent.

The Atlantic Iron-Works, at Sharon, Pa., have advanced the wages of their laborers 15 cents a day.

The Pottstown Iron Company, of Pottstown, Pa., has posted notices announcing an increase of 25 cents a ton for puddling, from \$3 to \$3.25, while the wages of the heaters, rollers, nailers, feeders, machinists, and blacksmiths will be increased 5 per cent, and the wages of the laborers 10 cents a day, from 90 cents to \$1.

The employes of the National Tube-Works, at McKeesport, Pa., on the 18th inst. demanded an advance of 15 per cent in their wages. The demand was refused, and the works have been closed.

The coal miners employed at the White Oak mine, near Marisea, Mo., have struck on account of a reduction of wages from 30 cents to 25 cents a box of seventeen bushels.

At a convention of railroad coal miners of the Pittsburgh District, held at Pittsburg, Pa., on the 18th inst., a resolution was unanimously adopted requesting the operators to conform to the provisions of the Columbus Convention scale by paying 71 cents a ton on and after the 1st day of April. This is 2 3/4 cents a bushel, or one quarter of a cent more than is paid at the present time.

A general strike of the miners in the competing bituminous coal regions was formally declared on the 16th inst., and has been swiftly carried into effect. A great mass-meeting of the strikers of the Clearfield, Cumberland, and Broadtop districts, in conjunction with the members of the Executive Board of the Federation of Miners and Mine Laborers, held at Houtzdale on the 16th inst., to determine upon the question of accepting the conditional proposition of the operators, agreeing that, if the men would resume work, they would be granted the advance of 18 cents asked as soon as an advance in the price of coal could be effected, or to decide upon a continued strike, after a brief discussion concluded in a unanimous declaration for a general strike.

The employes of the Reading Iron-Works, Reading, Pa., have asked for an increase in wages. In some cases, the increase asked for amounts to 20 per cent.

All the French miners employed in and about Decazeville, France, have agreed to subscribe one franc each per month to support the miners on strike in that district.

It is announced that the iron mining companies in the Menominee iron range, Wis., have all voluntarily advanced the pay of their men from ten to fifty cents a day. This advance is said to be due to the fear of trouble that might come in the busy season.

The men at Chapman's quarry, Easton, Pa., struck on the 16th against ten hours' work. All work has been suspended.

TRANSPORTATION NOTES.

The Duluth Dock Company has been formed at Duluth, Minn., and will build a large merchandise dock in the heart of the city, to be used as an independent dock at which all vessels may land. Work will begin at once. This is quite important to all vessel men and shippers.

The Montana & Idaho Railroad Company has been organized with a capital of \$1,000,000. The committee appointed at the first meeting reported in favor of building the road from Missoula to Salmon City, Idaho, via Bitter Root and Nez Percé Fork, with branches through the Big Hole country to a junction with the Utah & Northern in Beaver Head County, and up the Lou Lou to a junction with the Oregon Short Line at Moscow, Idaho.

A railroad project is on foot, which, if brought to a successful issue, will advance railroad interests in the South and West. The scheme is the construction of a road costing about \$15,000,000, called the Louisiana, Arkansas & Fort Scott, to run from Fort Smith, Kan., to New Orleans. This will shorten the distance from 869 miles, its present length, to 600 miles, and when built and connected with the Kansas, Nebraska & Dakota road, form one grand trunk line north and south, the whole system crossing between the north line of Nebraska and Alexandria, La., no less than twenty-seven different roads running east and west. The Kansas portion of the road will tap coal regions and pass through one of the finest farming regions in the West, and the whole of the road, with the exception of some parts of Arkansas, will run through a splendid country, rich in timber and agricultural resources.

The Milwaukee, Lake Shore & Western Railroad Company announces an advance of ten cents per ton in ore freights. This makes the freight charge on the product of the Gogebic mines eighty cents a ton between Ashland, Wis., and the mines, against seventy-five cents last year.

Dispatches from Helena, Mont., state that considerable feeling has been created in business circles by threats of the Northern Pacific Railroad to build parallel lines to Red Mountain and San Coulee, where the Montana Central has extensive mining and coal interests. In the event of the Northern Pacific doing

this, it is believed the Montana Central will push work and make a connection with the Canadian Pacific Railroad this year.

COAL TRADE NOTES.

ALABAMA.

The Coal Creek Coal Company has been organized with a capital stock of \$200,000, to develop coal lands in Walker County.

ILLINOIS.

The Consolidated Coal Company, of St. Louis, has been organized at Birkner, St. Clair County, to carry on a general coal mining business; capital stock, \$2,500,000; incorporators, Charles Ridgely, Thomas D. Price, Eli J. Crandall, Henry Schureman, August F. Donk, Henry S. Dorsey, and Edwin Doyoy. This consolidation, it is stated, makes one of the largest monopolies in the West.

The Eureka Coal Mining Company, at Eureka, has been incorporated for the purpose of doing a general coal mining business; capital stock, \$25,000; incorporators, W. W. Conrad, H. Damerill, J. H. Chamberlain, Joel Gudeman, John Darsh, and M. Murray.

MONTANA.

St. Louis capitalists are negotiating for the purchase of the Trail Creek coal mines, owned by Byam, Hedges, Mounts & Co.

PENNSYLVANIA.

ANTHRACITE.

The annual report of Mine Inspector Roderick for 1885 for the Fourth District shows that during the year there were mined and shipped 5,535,543 tons of coal, an increase of 261,416 tons over the preceding year. The average number of days worked was 208, and the whole number of persons employed 14,234. There were 200 serious accidents, of which 42 resulted fatally.

The Bernice Coal Company, which has a capital stock of \$250,000, has been granted a charter.

A charter has been granted to the Keystone Coal Company of Wilkes-Barre; capital, \$80,000.

The Bellmore colliery, Shamokin, has shut down indefinitely on account of a scarcity of paying orders.

COKE.

The coke trade is reported good, and the region has about settled down to active work. The Hazlett & Painter Works of McClure & Co. are still idle, but work will probably be resumed before long. The demand for coke is active, but shippers are experiencing some trouble in getting cars. The railroad strike in the West is detaining cars and aggravating this difficulty. It is also retarding shipments.

GAS AND OIL NOTES.

Exports of refined, crude, and naphtha from the following ports, from January 1st to March 15th:

	1886.	1885.
	Gallons.	Gallons.
From Boston	597,700	1,301,076
Philadelphia.....	20,716,948	13,331,743
Baltimore	2,282,223	1,854,356
Perth Amboy.....	718,086	.....
New York.....	73,316,073	68,316,283
Total exports.....	97,631,030	84,803,458

DAKOTA.

The Black Hills Oil Company has ordered from the Empire Well and Auger Company, of Ithaca, New York, a complete boring apparatus, together with casing and a twenty horse-power engine.

EGYPT.

The Egyptian government expects to derive a large revenue from the results of the discovery of petroleum in the Khedive's dominions.

ILLINOIS.

Last week, at Vanuleck's well No. 9, near Litchfield, a flow of gas was struck at a depth of 640 feet, a somewhat weaker flow having been met at a depth of 610 feet. The company has five miles of pipe laid through the city. The gas has already been in use here for six months, both for heating and lighting, and has given entire satisfaction.

NEW YORK.

The Improved Coal Gas Company has been incorporated, with a capital of \$500,000. Its object is to manufacture and deal in gas or any other gaseous or elastic or other fluid or matter of any description for lighting, heating, cooking, locomotion, propulsion, or any other purposes to which such can be applied.

OHIO.

A large gas vein was struck in Piqua, on the 17th inst., at the depth of 400 feet.

PENNSYLVANIA.

A charter has been granted to the Pennsylvania Natural Gas Company, the business of which will be carried on in Washington and Alleghany counties; capital, \$500,000.

The Carnegie Natural Gas Company, capital stock \$300,000, has been chartered to produce gas in Franklin, Pa., and North Huntingdon, Westmoreland County, and Patton and North Versailles, Alleghany, and to furnish it to citizens and manufacturing establishments along the main line and branches.

The Baden Gas Company has completed its negotiations with the Ohio Valley Gas Company, and each company will lay mains necessary to supply its customers. The Baden Company, by the agreement, becomes possessed of all the territory formerly controlled by the Ohio Valley Company.

The Torrens Gas Company will soon apply for a charter. Its capitalization is \$250,000, and the company contemplates supplying a number of small towns in Western Pennsylvania, and Pittsburg, and Alleghany. The company has secured between 2000 and 2500 acres of gas territory in Penn, Plum, Patton, and Franklin townships, with several fair leases in Westmoreland. The company is drilling wells at Penn station, in Penn township, and in Franklin township, in both of which it expects to strike gas.

GENERAL MINING NEWS.

ARIZONA.

MARICOPA COUNTY.

CENTRAL ARIZONA.—A correspondent writes us from Phoenix that it is generally understood there that the Vulture gold mine, which has been worked for some years past by the Central Arizona Company, has been purchased by Mr. Elmore and Senator J. P. Jones, and that under their management the mine is paying a handsome profit. The want of success in the past is attributed to bad management, particularly to the indiscriminate working of wall-rocks and waste, even the old refuse of the mine having been run through the mill; and to the neglect of proper dead-work upon the vein. It is well known that, before the property was acquired and reopened by the Central Arizona Company, the greater portion of the available reserves of ore had been stoped out, leaving remnants only of the vein here and there. The new mill seems to have been occupied chiefly upon the leavings and waste of the old mine, to the neglect of new and virgin ground, and consequently, the yield has failed to sustain the old record of this great gold property. The quartz now worked is said to average over \$6 a ton, and the costs less than \$3 a ton, giving a clean profit of over one hundred per cent.

MOHAVE COUNTY.

CERBAT.—This mill is getting into order, preparatory to starting up. Work is done on the Conner mine, near Chloride, and the ore is hauled in to the mill at Cerbat.

GOLDEN GATE.—The shaft is down 100 feet, and the tunnel is in 125 feet. Sixty tons of good ore were taken out of the shaft in sinking the first fifty feet. The ledge is from 12 to 15 feet.

CALIFORNIA.

AMADOR COUNTY.

A correspondent who has just visited Amador City writes as follows:

Three years ago, but three mines were in operation; now, there are seven, and other mines now abandoned will soon be reopened, and the immense masses of low-grade ores will yield a handsome profit to the investor. Wages are \$2.50 a day for miners, and \$2 for laborers. At the Plymouth Consolidated, 120 stamps are working. At the Empire and the Pacific, 119 men are employed. The ore-breasts at the 1200-foot level are between 40 and 50 feet, where one Burleigh drill averages between 50 and 60 tons in twenty-four hours. The company is now sinking the Pacific shaft to the 1300 level. From Jackson, the county-seat of Amador, to Plymouth, a distance of about fifteen miles, on the mother lode, nearly three hundred stamps are steadily at work, and it will not be many years before double that number will be in operation.

MONO COUNTY—BODIE DISTRICT.

MONO.—From the southeast drift, 700 level, very rich ore, both gold and silver, is produced. There

were shipped to Bodie mill, during the week ended the 6th inst., 193 tons of ore.

CANADA.

PROVINCE OF NOVA SCOTIA.

It is stated that the government is considering the proposal to test deep mining in Nova Scotia by the sinking of a shaft to the depth of from 1000 to 1200 feet.

COLORADO.

ARAPAHOE COUNTY.

According to reports, a new smelter is to be erected in Denver, and by the middle of the summer it is expected that the new works will be in active operation. The gentleman at the head of the new enterprise is Mr. E. R. Holden, owner of the Holden Sampling-Works at Leadville. He will have associated with him Mr. A. Chanute and Mr. Richard Clive, of Leadville, and Mr. Iles, who for years has been the chief metallurgist for the Grant Smelter. The site of the new smelter is on the opposite bank of the Platte River from the Grant Smelting-Works. It will be a four-stack smelter, with a capacity to treat 150 tons of ore daily. The machinery will be of the latest improved pattern.

CLEAR CREEK COUNTY.

At Georgetown and vicinity, miners' wages are coming down to \$2.50 a day.

ASTOR.—During February, this mine shipped about 30 tons of ore, the first class of which averaged 758 ounces silver and 15 per cent lead. The engine-shaft will be sunk another lift of 100 feet, and when completed, the perpendicular depth will be 400 feet. The bottom of the shaft shows a fine vein of rich ore. A new vein of ore has been opened up in No. 2 stope about six inches in thickness.

GARFIELD MINING AND TUNNEL COMPANY.—This company, which owns the Excelsior, Monarch, Aurora, and Grand View lodes, in the Horseshoe, near the Queen of the West property, is running a cross-cut tunnel to intersect with the lodes named, cutting the first one 200 feet perpendicularly from the surface, the second 300, the third 700, and the fourth 1000.

PAY ROCK.—The winze on this lode is still pushing down. Drifting both ways from this winze is under way on a vein of solid ore about 12 inches in thickness.

PULASKI.—Work is to be resumed.

SILVER EAGLE.—This lode, on Republican Mountain, has been sold at Georgetown under a trust deed for \$405.

VIRGIN.—The shaft on the Virgin lode, on Sherman Mountain, is sinking by the lessees, with fair results. The bottom shows a vein of mineralized quartz about four inches in thickness that mills \$128 a ton.

DOLORES COUNTY.

BLACK HAWK.—A sixth interest in this mine near Rico has been sold by the administrator of the estate, Judge Robinson, at public sale, to John Glasgow, for \$2375. Mr. Glasgow owns five sixths of the mine, which it is expected will be vigorously operated and become a large shipper.

EAGLE COUNTY.

The Battle Mountain mining camp, which has recently been attracting considerable attention, says the Leadville *Herald-Democrat*, is in a flourishing condition, and presents a strange contrast compared with three years ago. The district has about twenty producing properties, many of which are working under the leasing system, and employ from 250 to 300 men in mining. The most productive mine is the Iron Mask, while a great many lesser properties are operated in the quartzite zone, and in other sections than Battle Mountain. The value of the quartzite belt, which has created such a *furor* during the past few months, has since been rapidly and satisfactorily developed. The prominent mines situated on its outcrop are as follows, beginning at the east: Ground Hog, Pine, Martin, First Chance, Percy Chester, Golden Wonder, Pargourd, Tip Top, Star of the West, Ben Butler, Gold Wedge, Rocky Point, Polar, Accidental, Eureka, and Eclipse. The ore is principally an impalpable clay or kaolin, together with iron-stained sand and lumps of decomposed quartz. The silver apparently exists as a sulphide and the gold in its native form.

GILPIN COUNTY.

LEAVENWORTH.—The recent developments made in sinking the Ayres shaft have been encouraging. The crevice matter has materially changed for the better.

NEWFOUNDLAND TUNNEL COMPANY.—This company, which has located a tunnel site 3000 feet in

length, and has over 400 feet completed, will soon put steam-drills at work in the tunnel.

POST HOLE.—Twenty-five stamps of the Hidden Treasure mill will run on ore from this mine. As soon as the 400-foot levels are extended a sufficient distance from the shaft, sinking will again be resumed. A plant of machinery and improved hoister is soon to be erected.

GUNNISON COUNTY.

DETROIT.—The sale of this mine for \$10,000 is reported. New machinery is to be erected and operations to be resumed at once.

LAKE COUNTY.

The Leadville *Herald-Democrat* reports the following:

Mr. James V. Dexter, who is interested in the American, Little Sliver, and Hibernia properties, has taken under advisement the matter of running a tunnel from the Arkansas Valley under Fryer and Carbonate hills, and there is a possibility of his securing the money necessary to drive the tunnel. His plan is to start a tunnel between the town of Malta and the lower smelters, and advance it under the city of Leadville, and up Stray Horse Gulch. Such a tunnel would pass 300 feet below Harrison avenue, and intersect the deep shafts on East Fryer and Carbonate Hill at a depth of from 800 to 1000 feet, being considerably below the present depths of these shafts. The tunnel would greatly reduce the expense of draining the mines. It will have a total length of nearly three miles. Three surveys are at once, to be made to determine the most practical level to be established, and other preliminary features.

ADAMS.—It is stated that the earnings of this company in February were over \$28,000. The Clontarf shaft is going down in search of the second contact, which has been opened in the Big Chief shaft; and the Adams shaft, on Yankee Hill, adjoining the Small Hopes group, is rapidly nearing the ore horizon of the Keene mine, situated to its westward.

COLONEL SELLERS VS. MINNIE MINE.—The owners of the Colonel Sellers mine have brought a suit against the owners of the Minnie mine, immediately adjoining. The suit is instituted under the law that provides for the assessment of mines that may be drained and benefited by the work of their neighbors on the same ledge. The suit is undoubtedly the outgrowth of a trespass on the territory of the Minnie mine by the Colonel Sellers people, and the extraction of a small body of mineral. The owners of the Minnie claimed damages to the extent of \$30,000, which Mr. Patrick considered exorbitant, and refused to recognize. As an offset, he has filed this suit to recover a portion of the expense encountered in draining this section of Iron Hill, and reduce his liability to the Minnie owners.

DENVER CITY.—The ore-chute in this mine, now leased to the Lee Basin Company; that was reported yielding rich ore about a month ago, is still in mineral. The streak is about eighteen inches in thickness, and the ore returns about fifty dollars a ton.

FRYER HILL SMELTER.—Messrs. Thompson and Head have secured the slag-dump of this smelter, and will work it over this year. Parties are sampling and washing the slag, with the view of working it under the tribute system.

LEE BASIN.—The pumps were to be started on the 15th inst.

SILVER CORD.—The mine is stated to be looking better than for many months past. Besides the large amount of ore that will be extracted by the tribute-workers, the company will mine on its own account this month about 150 tons of sand ore.

PITKIN COUNTY.

ASPEN MINING AND SMELTING COMPANY.—The smelter at Aspen went into blast again on the 11th inst., after a long period of idleness. The company will go ahead and develop its property, where ore can be found to pay expenses, or where too great an outlay will not be required. The company will also buy all ores that are offered in the camp that can be treated without loss.

SAN JUAN COUNTY.

TREASURE TROVE.—The company has acquired the Red Mountain tunnel site, for the purpose of opening up the Treasure Trove at great depth. The tunnel is in 374 feet, and it is supposed that it will cut the ore-body at a depth of 500 feet.

SUMMIT COUNTY.

GOLD DUST.—The difficulties at this mine, to which we referred in our last issue, have not yet been settled.

The Thomas party still hold possession, and it is said that suit has begun by the parties dispossessed—Derochie and Ware—to recover for labor done on the mine. The ore already at the mill is attached for the purpose of such payment.

KEY WEST.—Another small but rich pocket of free gold ore has been struck. The mine is also producing a large quantity of free-milling ore, which will be treated at the Huntington mill.

DAKOTA.

LAWRENCE COUNTY.

CALEDONIA.—Official reports, dated March 8th, state that the winze advanced $4\frac{1}{2}$ feet, making a total of $61\frac{1}{2}$ feet. The south drift advanced 8 feet; total, 69 feet. The ore produced from the 425-foot level was 870 tons; cave, 432 tons; total, 1302 tons.

FATHER DE SMET.—The superintendent's report of March 8th shows ore extracted from the first, second, and third levels, 2025 tons. East cross-cut, third level, advanced 3 feet, on company account. Total length, 80 feet.

SEABURY-CALKINS.—The shaft is down seventy feet, at which depth they are cross-cutting, and they have penetrated the ore-body seven feet. Work has been stopped until the hoisting-works, engine, pump, etc., are erected and in running order, when active operations will begin.

UNCLE SAM.—The shaft at this mine is down 240 feet, at which depth cross-cutting was begun, and now, after running the cross-cut forty or fifty feet, it is reported that the ore-body has been struck.

PENNINGTON COUNTY.

HARNEY PEAK MINING AND REDUCTION COMPANY.—The machinery for the reduction-works is now all in place at the Etta tin mine, and the reduction of ore will soon begin. The company intends to have some ore hauled from the Coats mine in Hill City District, to be tested in the mill.

GEORGIA.

GLYNN COUNTY.

GEORGIA PHOSPHATE COMPANY.—This company is now thoroughly organized, with a paid-up capital of \$100,000, and owns 1200 acres of rich phosphate deposits situated at the head-waters of the Little Satilla River. Operations will begin as soon as machinery can be put in at St. Simon's mills, where steam-power is available. The company will also erect permanent works in Brunswick.

IDAHO.

BIG COPPER.—Negotiations are pending for the building of a mill on the gold ledge of this mine, Lost River. The property has also a copper ledge, carrying considerable silver.

MCLEAN GOLD MINING COMPANY.—The company's project is to bring a ditch to cover the auriferous bars of Snake River, on its north side. Work has begun, and will be pushed with vigor until completed, which must be by the 1st of May. The company has let the earth and gravel contract out, but will control the rock work. This project, although quite extensive for Eagle Rock, at the present time, is only a beginning. The canal will be fourteen miles in length, and will carry 16,000 inches of water. It is built solely for mining purposes. The company has secured a large tract of land along the banks of Snake River that prospects well in gold. It is working on the canal some 300 men.

ILLINOIS.

AUSTIN.—A license has been issued to this company, of Chicago, to carry on a general mining business; capital stock, \$300,000.

MEXICO.

PIÑOS ALTOS BULLION COMPANY, LIMITED.—This company has been organized at London with a capital of £300,000 in £1 shares, of which 100,000 shares will be issued, fully paid up, to the vendors in part payment of the purchase money. The company has been formed for the purpose of acquiring and working a gold and silver mining and milling property at Pifios Altos, State of Chihuahua. The property is 250 miles west from Chihuahua City on the western slope of the Sierra Madre Mountains. The mines are in direct telegraph communication with London.

MICHIGAN.

COPPER MINES.

BELT.—According to the *Ontonagon Miner*, work has been resumed on these mines on a small scale.

TAMARACK.—It is stated that the company struck rock in sinking its second shaft at 20 feet from the

surface, against 47 feet in the first shaft. No. 2 shaft is 600 feet at right angles from No. 1.

GOLD AND SILVER MINES.

ROPES.—At the annual meeting, recently held at Ishpeming, an assessment of ten cents a share was levied for the purpose of adding a boiler, an air-compressor, a hoist, and power-drills to the mine equipment, to facilitate mining work. It is proposed to sink the shaft another hundred feet at once, and to extend the drifts with all possible speed.

IRON MINES.

LAKE SUPERIOR.—At A shaft, the ore vein found some years ago by the diamond drill has been reached, and shows at the present time a width of 20 feet. The ore is of the hard variety, high in iron. The vein dips to the south, opposite to that at the mouth of the shaft, some 400 feet distant, although the two bodies seem to be distinct deposits.

MONTANA.

DEER LODGE COUNTY.

WEST GRANITE MOUNTAIN.—Reports are, that ore has been struck in the tunnel on the Rattlesnake lode, the property of the company.

SILVER BOW COUNTY.

ALICE.—The recent strike on the 800-foot level is developing well, and the ledges from the 100 to the 800-foot levels are producing the usual quantity of ore.

CLEAR GRIT.—The ore extracted is rich. Operations are principally conducted on the 300-foot level.

MOULTON.—The pump is running at the 700-foot station, and working perfectly. Cross-cuts will begin at this point. Work is done on the 500-foot level and on all the others above it. For the last three months, most of the work done has been dead-work and exploring. Heretofore, thirty stamps of the mill have been running on custom ore, but hereafter only twenty will be reserved for that purpose.

NEVADA.

ESMERALDA COUNTY.

HOLMES.—Everything at the mill and the mine is in good order and doing good work. There were shipped on the 6th inst. nine bars of bullion valued at \$11,049.32.

MOUNT DIABLO.—The company has leased a portion of the New Princess mill to work its accumulation of ore.

STOREY COUNTY—COMSTOCK LODGE.

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

ALTA.—In driving the north drift on the 700 level, numerous stringers of quartz are encountered, carrying bunches of high-grade ore.

CONSOLIDATED CALIFORNIA & VIRGINIA.—During the week ended the 6th inst., 1103 tons were shipped to the Morgan mill and 1079 tons to the Eureka mill. The average value of ore milled during the same period, according to assays from battery samples, was \$15.51 a ton for that crushed at the Morgan mill and \$13.36 for that crushed at the Eureka mill. The northwest drift on the 1650 level has reached the old workings in the north end. There is a large deposit of low-grade ore at this point, left in the stopes before the fire caused a suspension of operations in that part of the mine.

HALE & NORCROSS.—At the annual meeting, the following Board of Directors was elected to serve the ensuing year: Archie Borland, George W. Grayson, Maurice Hoefflich, E. B. Holmes, H. M. Levy, L. Greenbaum, and L. P. Drexler. The latter two are new members, and were elected to fill the places made vacant by the retirement of Messrs. Russell and King of the old board. It is stated that a project for placing the mine on a self-sustaining basis is under consideration.

KENTUCK.—The ore product for the week ended the 6th inst. was 450 tons. This output will be doubled in a short time, and the Douglass mill in Lower Gold Hill started up in conjunction with the Rock Point on ore from the mine.

OVERMAN VS. SUTRO TUNNEL.—The Overman Silver Mining Company has sued the Sutro Tunnel Company, and prays that the contract between the companies be declared void, and that it be decided that the defendant has no right or claim against the plaintiff for \$8824.50, and has no lien against the mine; that the defendant be enjoined from asserting any right or claim to any lien of royalty against the mine; and that the defendant be restrained from prosecuting a suit to recover the aforesaid sum of \$8824.50,

alleged to be due as royalty on ore extracted from the mine.

SIERRA NEVADA.—A bar of gold bullion weighing a fraction over 17 ounces, and valued at \$264, was shipped on the 5th inst. This bullion resulted from the crushing of fourteen tons of ore taken out of a tunnel near the summit of Cedar Hill. This is the first bullion shipment made from the Sierra Nevada for nearly ten years.

NEW MEXICO.

GRANT COUNTY.

ORO Y PLATA.—A new strike has been made in this mine, consisting of a streak of solid galena that had been struck next to the hanging-wall in the bottom of a 60-foot shaft. There are also about 10 inches of galena on the foot-wall, and in between the two streaks is a considerable quantity of lead carbonate. It is the intention of the owners to run a first set of levels at the bottom of the present shaft and continue sinking at the same time.

SILVER CITY CONCENTRATING AND SMELTING COMPANY.—In the case of this company against Shufeldt, the injunction that had been granted restraining the operation of the mill and the sale of the property, so far as it restrained the operation and running of the mill by Mr. Shufeldt, was dissolved, but was continued so as to restrain the sale of the property until the final hearing of the cause. The court refused to appoint a receiver, but directed that the defendants give bonds to the amount of \$750 to account for the rents and profits of the property as they may be finally ascertained and awarded. This decision leaves the property in Mr. Shufeldt's possession. He will shortly resume business and will put the mill in order for working and concentrating ores. He intends to work mainly his own ores, but will sample for shippers and purchase when ores are suitable for concentrating.

VALLEY AND BLUE LEAD.—The former has been bonded for \$10,000, and the latter for \$2500, to the Friend Brothers.

SOCORRO COUNTY.

PEACOCK.—A new streak of ore has been met in this mine. The vein is a six-inch vein of peacock ore, and runs high in silver and 50 per cent copper. Another strike was made in the north drift of ore running from 20 to 70 ounces. The mill will soon be enlarged to about double its present capacity. Returns from the last three cars of ore shipped from this mine to the Denver Sampling-Works ran \$160 to the ton. A car-load of concentrates is now on the road.

NORTH CAROLINA.

ROWAN COUNTY.

GOLD HILL.—It is reported that a new strike has been made in the west vein, in entirely new ground, and above the Williams drift, or 400-foot level, and west of the 600-foot center shaft. The ore is a heavy sulphide, showing free gold. This vein, going down in entirely new ground and west of any other work, is likely to run into another chute of ore similar to those found in Randolph and Big Sulphur chutes, which were so productive in former days.

TREXLER.—Recent prospecting-work shows a fair grade of ore discovered in a vein of sufficient size to warrant success with good management. The ore is a free-milling brown quartz, which will go into sulphurets at or below the water-level, and is worth from \$4 to \$15 to the ton. It is the intention of those interested to equip and work the property, and arrangements are making to that end.

STANLY COUNTY.

BARRINGER.—It is stated that negotiations are pending with parties that contemplate taking hold of the property. The deepest shaft on the place is less than a hundred feet down. The Meech process has been chosen as the most desirable for this ore, and will be used should the sale be consummated.

TENNESSEE.

CONCORD MARBLE COMPANY.—This company has been organized at Knoxville, Tenn., with a capital of \$10,000. A quarry has been purchased, and will be extensively developed.

UTAH.

BEAVER COUNTY.

HORN SILVER.—An 800-ton clean-up of matte has been made at the company's reduction-works and sold to the Germania smelter, of Salt Lake City. It is stated that ore is hoisted and shipped.

SUMMIT COUNTY.

ANCHOR.—The shaft is down to a depth of between

300 and 400 feet. Two pumps keep the shaft clear of water at this depth.

DALY.—There were sent to Salt Lake City, during the week ended the 10th inst., 13,707.90 ounces of fine bullion.

WASHINGTON COUNTY.

The new leaching-works at Silver Reef are running through between 75 and 80 tons of mill tailings every twenty-four hours with good results.

CHRISTY.—During February, there were produced 21,000 ounces of silver.

STORMONT.—There were produced during February 1600 ounces of silver. The main incline in the Buckeye and Savage has been sunk 150 feet below the 600-foot level, and a cross-cut started at a point 125 feet below the sixth. Work on the cross-cut in the Thompson is progressing, and the ledge is improving as the foot-wall is approached. A streak of very good ore has been encountered. The mine is producing an average of 100 tons of ore a month.

BULLION PRODUCTION FOR 1886—SPECIAL OFFICIAL REPORTS.

MINES.	States.	Month of February.	Year from Jan. 1st, 1886.
Alice, G. S.	Mont.	92,655	166,714
Boston & Montana, G.	Mont.	67,336	148,919
Caledonia, G.	Dak.	16,812	42,236
Christy, S.	Utah	23,555	23,555
Chrysolite, S.	Colo.	17,090	17,090
Colorado Central, S.	Colo.	23,332	48,176
Daly, S.	Utah	28,445	31,294
Deadwood-Terra, G.	Dak.	15,759	15,759
Derbec Blue Grav., G. S.	Cal.	23,456	23,456
Elkhorn, G. S.	Mont.	15,905	15,905
Eureka, S. L.	Nev.	17,901	35,353
Father de Smet, G.	Dak.	19,187	19,187
Freeland, G. S. C.	Colo.	138,800	252,400
Granite Mountain, S.	Mont.	94,098	94,098
Homestake, G.	Dak.	6,200	6,200
Hope, S.	Mont.	36,120	87,000
Iron Hill, S.	Dak.	64,738	127,588
Lexington, G. S.	Mont.	110,100	210,931
Montana Limited, G. S.	Mont.	63,050	63,050
Moulton, G. S.	Colo.	920	2,980
New Pittsburgh, S.	Utah	212,321	212,321
Ontario, S.	Cal.	45,611	101,294
Plymouth Consolidated, G.	Colo.	24,627	24,627
Plutus, G. L. C.	Mich.	3,151	3,151
Ropes, G. S.	Cal.	19,309	19,309
Standard Consolidated, G.	Cal.	*69,440	135,622
Tombstone, G. S. L.	Ariz.		
Total			\$1,955,660

G., gold; S., silver; L., lead; C., copper; M., mica. Silver valued by the different companies from \$1 to \$1.29 per ounce; gold, \$20.67. *Not including value of lead and copper. †Royalty. ‡Net. §Ore sales. No shipments during month mentioned. ** Not official.

MARKETS.

Silver.

NEW YORK, Friday Evening, March 19.

DATE.	London.	N. Y.	DATE.	London.	N. Y.
	Pence.	Cents.		Pence.	Cents.
Mch. 13	40 3/4	102 1/4	Mch. 17	46 13 16	102 3/4
15	40 3/4 @ 7/8	102 3/8	18	46 13-16	102 3/4
16	46 13-16	102 3/8	19	46 13-16	102 3/4

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 \$116,005 bullion; and the proportion of its reserve to its liabilities was reduced from 46 1/2 to 41 1/2, against 49 per cent at this date last year. On the 18th inst., the bank lost \$50,000 on balance. The weekly statement of the Bank of France shows a gain of 22,394,000 francs gold, and a gain of 4,659,000 francs silver. The statement of the Imperial Bank of Germany shows a gain for the week of 4,444,000 marks.

Copper.—The copper market is very firm, though quiet, and the tendency is all toward higher prices. Quotations remain nominally 11 1/2 c. for Lake, 10 1/4 to 10 3/4 c. for Orford and Baltimore, according to quality. P. S. C. is quoted 10 3/4 c. The next sales of Lake copper to manufacturers will probably be at nearly 12 cents. The English prices, as cabled to the Metal Exchange to-day, show a considerable advance, Chili Bars being quoted £43 5s. @ £43 7s. 6d., and Best Selected £47—an advance of £1 10s. during the week. Shipments to Europe continue on a very small scale, and during the next two months will probably be less than in

January and February; in fact, the increase in consumption here that we hear of from manufacturers promises to fully absorb any increase in the output of the lake companies, and we look for no increase elsewhere. There is a probability of new rolling-mills being established that will be able, or rather willing, to roll at say 1 cent a pound instead of 5 or 6 cents, as now charged, and with such a reduction in cost, the increase in consumption would leave but little copper to export.

The use of copper in telegraph wire is increasing enormously, and it is probable that, with the increase in strength that a slight addition of aluminium will give to copper, our telegraph wires will, in the near future, be exclusively of copper-aluminium bronze.

Vivian, Younger & Bond, under date of March 4th, 1886, make the following remarks on the metal trade:

The month of February has not been any exception to those to which for a long time past we have been accustomed. Prices in some cases advanced a little, but at the close, the old hopeless feeling predominates. When investigated closely, there appears to be ground for the belief that a check has been put upon the large overproduction in many articles, and the consumption has a tendency to increase, but it is very slight. Until a considerable time has elapsed, and these circumstances have developed themselves more strongly, a cheerful view will scarcely be taken by most people, much less any sanguine anticipations formed; so that the most that can be expected at present must be a gradual hardening of prices.

Copper.—It appears to be clear now that, for the present at all events, the import of copper from America is not likely to assume the magnitude that was the case when it practically forced the price down £10 a ton last year. Perhaps what is more important, the copper is not coming thence in the shape, nor are contracts for its sale made on the conditions, of last year; for it was probably these two circumstances combined that affected the price more even than the large supplies.

It is likely that America will produce somewhat less copper this year. She will undoubtedly consume a great deal more, and business generally on that side being more profitable, and the price of copper being higher there than here, there may not be the same anxiety to force such quantities of material on our importers and smelters.

As it can not be said there is any thing in the figure to represent the enormous fall in the value, we may easily see a moderate change in the quotations without any especial improvement in the trade demand.

We give this prominence to the American question because it would appear that, while the large increase in production elsewhere may be considered responsible for the reduction to £50 a ton for Chili Bars, the American element probably reduced the price to £40 and below.

Tin.—This market has been without material change in price, which may be quoted 20.70 @ 20.80c. for spot and March, with sales of 25 tons March at the Metal Exchange to-day at 20.70c. English cables to-day quote £93 5s. for spot, and £93 15s. for three months Straits.

Lead.—Nearly 1000 tons of foreign lead have been ordered during the week at 4.85c., and the business has been confined closely to this. Domestic is worth more in the West than here, selling in Chicago at 4.80c., equal to 5.05c. here. Probably 3500 tons of foreign lead have been ordered since the beginning of the year; 1600 tons of Richmond lead unsold are on the way here, but 1200 tons of it come by sailing vessel, and are not due here until July. Besides this, the Richmond Company is said to have only about 1000 tons on hand. Cables to the Metal Exchange quote Soft Spanish Lead at £13, and English at £13 12s. 6d., which is a decline of 5s. during the week. We quote Lead Pipe here at 5.40 @ 5.50c. net, and Sheet-Lead 6.20 @ 6.25c. net. Drop Shot, 5 1/2 c. Buck and Chilled, 6 1/2 c. a pound, in 25-pound bags. Shot in 5-pound bags about 1/4 cent a pound more.

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

Market quiet and dull; prices unchanged. Refiners asking 4.82 1/2 c., 4.85c. Eastern brokers offered and sold to consumers here, on account of Eastern parties, 280 tons at 4.80c., 4.77 1/2 c., and 4.75c. It had no effect on market. At close, 4.80c. bid; nothing offering, however. Demand is only moderate, and but very little doing.

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

Market quiet and featureless. Three hundred tons for April Corroding sold at 4.75c.

Spelter.—This metal changes not, and maintains the stereotyped quotation of 4.50 @ 4.65c., according to quality. New Jersey spelter is worth 6 1/4 c. New Jersey White Oxide, 3 1/2 @ 4c., according to grade.

Sheet-Zinc is quoted 5 @ 5 1/4 c.

Silesian Spelter is quoted by cable to-day £14 12s. 6d.

Spelter Production in Europe in 1885 and 1884, in Cwt. of 50 Kg.

	1885.	1884.
Rhenish Prussia and Belgium	2,594,000	2,584,800
Silesia	1,616,600	1,522,320
England	482,000	585,180
France and Spain	296,000	306,820
Poland	100,000	83,280
Austria-Hungary	48,000	47,300

Total..... 5,136,000 5,129,700

Antimony.—This market remains quiet and steady at 8 1/2 @ 8 3/4 c. for Hallett's, and 9 @ 9 1/4 c. for Cookson's. London cables quote Hallett's £34 10s.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 19.

American Pig.—This market continues extremely quiet, and business only moderate. Prices remain unchanged at \$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. Special irons, such as Glendon, Chickies, and a few others, ask from \$1 @ \$2 more than these figures for No. 1, but Glendon makes but little of this. We hear of Lynchburg, Va., iron still offering without takers.

Scotch Pig.—This market is very dull, and may be quoted as follows: Coltness, \$20.50 @ \$21; Summerlee, \$20; Dalmellington, \$19; Eglinton, \$18. Cables to the Metal Exchange to-day quote Coltness 47s.; Summerlee, 46s. 6d.; Langloan, 44s. 6d.; Gartsherrie, 43s.; Glengarnock, 44s. 6d.; Dalmellington, 42s. 6d.; Eglinton, 40s. Freighters are still high.

Bessemer Pig is quiet and but little is doing. We quote Domestic at \$18 @ \$18.50 at furnace, and Foreign merely nominal.

Spiegeleisen.—The market is dull. We quote English 20 per cent at \$27 @ \$27.25; German, \$26 @ \$26.50; 80 per cent ferro-manganese is quoted at \$67 for foreign; Domestic is quoted \$65 @ \$65.50 in Philadelphia.

Structural Iron and Steel.—There is nothing worthy of note in the market. A fair business in all kinds of manufactured iron is done, and prices remain unchanged. We quote Angles, 2 @ 2.10c. delivered; Tees, 2.35c.; Iron Beams and Channels, 3c. for American from dock.

Plate Iron.—Common Tank, 1.95 @ 2c.; Refined, 2 1/2 c.; Flange iron, 3.4 @ 3.5c.; Extra Flange, 4 @ 4.25c.

Bar Iron.—Refined we quote at 1.85 @ 1.95c.; Common, 1.60 @ 1.70c. Store prices are 10 @ 20 higher.

The Steel Association has issued, under date of March 4th, its new classification of manufactured steels, with the slight advance already noted in this report. The new list appears to be fairly well maintained.

Steel Plates.—We quote 2 1/2 c. for Tank; 3 @ 3 1/4 c. for Boiler and Ship Plates; 3 1/4 @ 4c. for Flanges; 4 1/2 @ 5 1/4 c. for Extra Flange and Fire-Box Plate.

Merchant Steel.—American Tool Steel, 8 @ 10c.; special qualities, 12 @ 18c.; Crucible Machinery, 4 1/2 @ 5 1/2 c.; Bessemer and Open-Hearth Machinery, 2 1/2 @ 2 3/4 c.

Steel Rails.—The mills are so full of orders that each cares little what its neighbor does. No large orders have been placed during the week, and prices are very firm, and have even been advanced by some of the Eastern mills \$1 to \$36. The Bethlehem Company now declines business at less than this price. The other Eastern mills quote \$34 to \$35, but none of them is anxious to take orders. We quote \$34 @ \$36 Eastern mills, with the probability of \$35 being the bottom figure at an early date.

The tariff legislation creates but little anxiety ex-

cept as to raw materials. There is rather more probability than there has been that ore and a few other "raw materials" may have the duty reduced or be made free, though there has been very little demand for this. On manufactured products, there will probably be no change.

The Patent-Office has decided against the claims of Jacob Reese to the basic patents, and has confirmed the claims of Thomas to priority of invention.

Old Rails.—There have been some small sales of Double-Heads at \$21.50, and Tees would probably not bring over \$20. The market is very weak. We quote \$20@21.

Scrap.—About 200 tons of extra good scrap sold here doing the week for 1 cent a pound, but \$20 per ton is a fair quotation.

Crop Ends.—A sale of several hundred tons has been reported at \$22.

Philadelphia. March 18.

[From our Special Correspondent.]

The furnace interests of Eastern Pennsylvania are stimulated to increase their productive capacity to the utmost limits. Some of those who accepted large contracts for deferred delivery some time ago have regretted their course, while those who sold iron as they produced it are realizing moderate and satisfactory margins. There is a gradual increase in capacity, and at this time a great deal of repairing work is in progress at furnaces. Nevertheless, the company agents all speak hopefully of improving prices. Already some companies that have no iron to sell under sixty days are asking from 25 to 50 cents a ton higher, and expect to sell at outside prices as soon as they are able to take contracts. No large contracts will be taken at present. The furnace interests feel that their wiser policy is in delay, and some think that the development of the iron trade of the next three months will put them in a position where \$20, \$18.50, and \$17.50 will be the average prices for the standard irons of the three brands. This is a view too sanguine for many to take. Its realization largely depends on the course of the finished iron market, concerning which there is a good deal of difference of opinion. During the past week, some little Forge has been selling, most of it of the lower grades, at good prices. No. 2 iron is selling at \$16.50@ \$17.50 for material inquired for. No. 1 Foundry runs from \$18@ \$19.50, with very little selling. The consumption is as large as at any time, and, in fact, larger, and therefore the prediction is made by the iron-makers that the market is moving in the right direction. The Chestnut Hill Iron Ore Company will sustain a heavy loss by the caving-in of the brick lining of the cupola of furnace No. 2. It will be necessary to blow out the furnace.

Bessemer Iron.—Bessemer iron is dull and quoted at \$19@ \$19.50.

Spiegel-eisen.—There are some inquiries for spiegel-eisen, and large orders likely to be placed before the close of this month. Quotations are \$26@ \$27. Ferro-manganese is quoted at \$65.

Merchant Iron.—Several lots of merchant iron have been sold at \$1.55@ \$1.60 for Common. Several lots of Refined have been sold both from mills and store at \$1.80@ \$1.95. The demand is irregular, and the buyers need more iron than they are taking.

Nails.—Nails are a little firmer, though quoted nominally at \$2.40@ \$2.50. A good many buyers are holding off, not willing to put orders in for summer delivery. It is probable that we shall have to put up with a hand-to-mouth trade for some time to come.

Plate Iron.—Plate iron is fairly active at 2 cents for Plates, 2@ 2.10c. for Tank. Shell iron is moving a little better. Several lots of flange iron have been taken, and orders for fire-box have also been secured.

Sheet-Iron.—All the sheet-iron markets report a good demand at but little off card rates.

Steel Rails.—There are inquiries in the market, though possibly not new ones, for a good many steel rails for new roads. The makers report a little increased interest in the rail market, but as yet no very heavy transactions. It is impossible to give more than a guess as to the week's business. It has been made up mostly of small lots, for which \$35@ \$35.50 has been paid. Rails are likely to advance.

Old Material.—There is very little new in old material. Arrivals are sufficient to supply the market demand and prices are easier. There are a good many crop ends offering, and scrap of all kinds is coming in more freely.

Pittsburg. March 18.

[From our Special Correspondent.]

Pig-Iron.—We report a steady market, with a good business. The sales during the week have been the largest for some time past. The total of various kinds amounts to 21,000 tons, including 10,000 tons Bessemer for future delivery at \$19, 4 months. This is a decline. Other descriptions show but slight changes, prices varying as to quality and fancy of purchasers. The current rates are as follows:

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	15.25@ 15.50	" @ "
White	14.50@ 14.75	13.75@ 14.00
Mottled	14.25@ 15.00	14.00@ 14.50
Bessemer	" @ 20.00	" @ "

Charcoal:	Lake ore.	Native ore.
Foundry No. 1	21.50@ 23.00	
Foundry No. 2	21.00@	
Cold-Blast	25.00@ 28.00	
Warm-Blast	18.00@ 24.00	

Muck-Bar is attracting more attention. Sales during the week aggregate 1700 tons at \$28.

Anthracite.—Sales 500 tons Gray Forge at \$15.50; the first sales for some time.

Spiegel.—Steady, \$28.50@ \$29 a ton.

Steel Blooms.—Firm at \$31@ \$36.

Steel Slabs.—Firm and unchanged at \$29@ \$33.

Steel Rails, Crop Ends.—Steady at \$24.

Steel Bloom Ends.—\$23.

Old Iron Rails.—These have further declined. We note sales of 800 tons at \$22.50@ \$23.

Old Steel Rails.—Steady and unchanged at \$22@ \$22.50.

Wrought Scrap.—Sales 200 tons No. 1 at \$20; 200 tons No. 2 at \$17@ \$18.

Steel Rails.—Firm and 50 cents higher, \$35@ \$36; light sections, \$35@ \$42.

Bar Iron.—Without movement; prices unchanged, 1.70@ 1.75c. a pound.

Nails.—The nail mills in this vicinity remain idle. Both sides appear firm; the strike commenced June 1st, 1885. The quotations for nails are \$2.25@ \$2.30 per 100-pound keg.

SALES.

500 tons Bessemer Lake ore	\$20.00 4 mos.
500 "	19.00 cash
500 " Gray Forge Lake ore	15.25 4 mos.
1000 "	16.25 "
1000 " Foundry, No. 2 "	16.50 "
1000 " Gray Forge, Native ore	16.50 "
500 "	16.25 cash.
300 "	16.50 4 mos.
50 " Cold Blast (charcoal)	25.00 cash
50 "	29.00 "
1000 " Muck Bars	28.00 "

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 19.

Statistics.

Production Anthracite Coal for week ended March 13th, and year from January 1st:

Tons of 2240 lbs.	1886		1885	
	Week.	Year.	Week.	Year.
P. & Read. RR. Co.	238,575	1,827,198	246,717	1,663,408
L. V. R.R. Co.	116,803	1,174,766	125,076	884,331
D. L. & W. R.R. Co.	100,492	1,088,882	76,253	696,465
& H. Canal Co.	99,388	902,344	64,259	544,477
Penna. R.R.:				
N. & West Br. R.R.	44,728	288,608	22,936	212,878
S. H. & W. B. R.R.	3,531	32,875	3,160	24,301
P. & N. Y. R.R.	12,173	223,109	8,341	67, 111
Penna. Coal Co.	24,806	213,716	17,904	208,299
Shamokin Div., N. C. R.R.	15,000	175,180	19,946	165,537
Lykens Valley	9,500	90,217	9,933	91,301
Total	635,000	6,016,895	594,525	4,558,308
Increase	40,475	1,458,587		
Decrease				

* 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 5,199,091 | 1883 4,915,233
1882 4,492,037 | 1884 4,541,721

Production of Coke on line of Pennsylvania R.R. for week ended March 13th, and year from January 1st: Tons of 2000 pounds.

	1886		1885	
	Week.	Year.	Week.	Year.
Alleghany Region	3,507	37,109	3,390	37,839
West Penn. R.R.	1,257	17,784	857	2,975
Southwest Penn. R.R.	41,556	325,107	42,454	366,040
Penn. & W. Region	7,420	67,982	4,619	55,264
Monongahela	3,258	13,048	1,829	14,090
Pittsburg Region				
Snow Shoe	764	8,118	192	3,602
Total	57,762	459,148	53,341	479,810

Production Bituminous Coal for week ended March 13th, 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	383		
*Cumberland, Md.	8,653	268,300	45,971	352,833
*Barclay, Pa.	3,759	42,172	5,003	56,274
*Broad Top, Pa.				
H. & Broad Top RR.	5,788	59,787	3,823	30,494
East Broad Top				
Clearfield Region, Pa.				
Snow Shoe	3,949	30,926	4,630	43,973
Karhaus (Keating)	4,711	25,137	1,634	35,637
Tyrone & Clearfield	40,876	535,835	65,481	628,765
Alleghany Region, Pa.				
Gallitzin & Mountaintain	10,311	127,082	10,443	102,965
Total	78,064	1,089,622	136,985	1,250,941
* Tons of 2240 lbs.				

WESTERN SHIPMENTS.

Pittsburg Region, Pa.				
West Penn. R.R.	5,561	47,376	4,712	50,811
Southwest Penn. R.R.	3,121	22,363	1,708	20,963
Pennsylvania R.R.	3,007	42,513	4,363	46,249
Westmoreland Region, Pa.				
Pennsylvania R.R.	11,335	272,670	22,515	231,151
Monongahela Region, Pa.				
Pennsylvania R.R.	4,541	34,328	1,639	42,255
Total	27,565	419,250	34,937	391,429

Grand total 105,629 | 1,508,872 | 171,922 | 1,642,370
† Considerable gas-coal shipped East, of which no division is made in report.

The Norfolk & Western Railroad Company reports the shipments of Pocahontas Flat-Top coal for the week ended March 13th, 1886, and year from January 1st as follows, tons of 2000 pounds: 1886—Week, 13,512; year, 140,760. 1885—Week, 9920; year, 96,013. Increase, 1886—Week, 3592; increase, year, 44,747.

Anthracite.

During the past week, the demand for coal has been small, and prices have continued on the downward course. The event of the week has been a new circular by the Pennsylvania Coal Company, quoting prices f. o. b. Newburg, from which point shipments are now being made. The contractors' prices f. o. b. are as follows:

Lump	\$2.80	Stove	\$2.90
Steamboat	2.80	Chestnut	2.85
Grate	2.45	Pea	1.50
Egg	2.50		

For the alongside price in this city, add 25 cents per ton.

The other companies claim that they are not meeting this cut; but we know that at least one of them is practically doing so, and it is folly to think that the others are not or will not. In fact, it is a dangerous market for a responsible dealer to bid any reasonable price for a round lot of coal. There has been a better demand for pea and buckwheat coal, due to the scarcity of bituminous coal, owing to the strike of bituminous miners. These sizes are in consequence a little firmer. Broken and egg sizes have not as yet been influenced by this cause; but if the strike continues many days longer, they certainly will be firmer.

Business has become so completely demoralized that it is evident that some radical changes must be made before a fresh period of stability can come to the coal trade. The uncertainties of Reading affairs are the immediate cause of the demoralization, and until the Morgan-Welsh syndicate (Pennsylvania Railroad) or Mr. Gowen shows who is to control the future of that company, there is not likely to be a coal combination. To establish this will take some time.

The Reading Reorganization Committee, which is backed by the Morgan-Welsh syndicate, has permitted its plan to come out in an unofficial form this week, and it has met with a very unfavorable reception. Mr. Gowen announces that when the plan is officially and in a responsible manner put before the public, he will have something to say. There does not seem to be any question of this, or that he will propose a plan that will, to a very great extent, capture the stock and junior security holders.

We do not believe that, when the syndicate's members see this, they will step to one side and permit Mr. Gowen to reorganize the company. If they do not, however, there will be a dead-lock; for they may possibly become as great obstructionists to Mr. Gowen's plan as he can be to theirs. Even should this semi-Pennsylvania Railroad syndicate give up and leave the field to Mr. Gowen, no doubt the Pennsylvania Railroad would be found under some other disguise as a disturbing influence. That company will not permit Mr. Gowen to put Reading on its feet, if it can prevent it. However, it must be admitted that the Pennsylvania has not the dash and backbone it once had.

Mr. John H. Jones, official accountant, furnishes the following statement of the anthracite coal tonnage for

the month of February, 1886, compared with the same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines :

COMPANIES.	Feb., 1886.	Feb., 1885.	Difference.
Phila. & Reading RR...	755,726	655,452	I. 100,274
Lehigh Valley RR....	480,736	279,743	I. 200,993
Del., Lack. & West. RR.	418,299	309,901	I. 108,398
Del. & Hud. Canal Co..	319,053	167,948	I. 151,104
Pennsylvania RR.....	267,076	220,265	I. 46,811
Pennsylvania Coal Co.	77,348	91,372	D. 14,024
N. Y., L. E. & W. RR...	66,790	43,025	I. 23,765
Total	2,385,028	1,767,707	I. 617,321

COMPANIES.	For Year 1886.	For Year 1885.	Difference.
Phila. & Reading RR..	1,455,899	1,257,422	I. 198,477
Lehigh Valley RR....	927,233	620,488	I. 306,745
Del., Lack. & West. RR.	915,059	548,321	I. 366,739
Del. & Hud. Canal Co..	632,139	332,946	I. 299,194
Pennsylvania RR.....	499,598	428,864	I. 70,735
Pennsylvania Coal Co.	160,934	155,377	I. 5,557
N. Y., L. E. & W. RR..	132,437	66,092	I. 66,345
Total	4,723,299	3,409,510	I. 1,313,789

The stock of coal on hand at tide-water shipping points, February 27th, 1886, was 996,946 tons ; on January 31st, 1886, 779,004 tons ; increase, 217,942 tons.

It is not surprising that stocks should be large under such an enormous production. In January, the Delaware & Hudson and the Delaware, Lackawanna & Western companies were accused of forcing a large production for the purpose of getting a larger percentage in the proposed coal combination. Although those companies show a large increase for last month as compared with the corresponding month in 1885, the Delaware & Hudson Company nearly doubling its output, yet the Lehigh Valley makes the most remarkable increase. For the two months, Erie has a little more than doubled its output.

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

	Week ended		
	March 19.	March 12.	March 5.
Lump.....	\$2.70@2.80	\$2.70@3.00	\$2.80@3.00
Steamboat.	2.70@2.80	2.70@3.00	2.80@3.00
Broken.....	2.55@2.70	2.60@2.80	2.60@2.80
Egg.....	2.55@2.70	2.60@2.80	2.60@2.80
Stove.....	2.85@3.10	3.00@3.10	3.00@3.15
Chestnut...	2.75@3.10	2.80@3.00	2.75@3.10
Pea.....	1.50@1.75	1.50@1.75	1.40@1.75
Buckwheat.	1.20@1.50	1.20@1.50	1.25@1.50
Dust.....	1.00@1.10	1.00@1.10	1.00@1.10

Bituminous.

There is but very little coal coming to market and little business doing, and that at fancy prices. The strike, although not general, covers the most important fields, and has a much more serious look than it had a week ago. Both miners and operators appear to be firmer in their positions. There is, however, a suspicion among some of the miners that they are not fairly dealt with. It is generally reported that the Pocahontas mines are at work, and have been right along. The leading spirit in the strike comes from that district.

On Wednesday, the engineers were driven away from the pumps of the Berwind-White Coal Mining Company's mines, and one of the company's houses was burned. Of course, the latter, at least, does not tend to help the cause of the workmen. This company is showing a strong inclination to stand out until the men resume at the old wages. It is making arrangements with the steamship companies to have the steamers bring over as nearly as possible the coal necessary for the round trips. It is rumored that it has arranged by cable, through its London agents, to have 50,000 tons of English coal sent to this port, should the strike last long enough. Some of this coal is expected here very soon.

Buffalo. March 18.

[From our Special Correspondent.]

The dealers in coal and agents of the anthracite coal companies have no news to tell relative to the future of this industry. "Hope deferred maketh the heart sick," is an old saying, and the probabilities and possibilities of a combination are so vague and the uncertainty so realistic, that spring sickness prevails among the coal fraternity to an alarming extent. Rate-cutting is reported as usual.

A miner and dealer in bituminous coal, in reply to

my queries, said : " My dear fellow, I can not say one word ; I dare not utter a syllable ; the trade is dreadfully unsettled ; business is on a very uneven keel ; I can not tell what a day may bring forth ; our mines are worked all right to-day, but they may be idle to-morrow, or next day, or the next, or a week hence, though I hope all is well and will continue so." This really is the key-note of the situation, and it is unnecessary to enlarge upon the topic of the strikes, etc.

There is no change in the prices of anthracite ; bituminous coal is nominally 25@35c. higher. Coke is steady at nominally unchanged figures. Stocks of anthracite coal are fair, bituminous plentiful, and coke light.

The Common Council on Monday last granted the Natural (Standard Oil) Gas Company, the right to place its mains and conduits in our streets. If not vetoed by the mayor, and if the company agrees to the restrictions imposed, six months from now this fuel will be in use here. It is provided that the company shall, before commencing business under this grant, make and file with the city clerk a schedule that shall contain the prices that the company shall charge for supplying natural gas to consumers. The company may at any time file a new schedule of prices ; provided, however, that at no time it will be permitted to fix, collect, or charge a greater rate to any consumer or consumers than those fixed by the first schedule filed under this grant, without the consent of the Common Council. The city is to receive the gas at ten per cent less than the price charged individual consumers. The sewers and the water and gas-pipes are not to be disturbed, and the company gives heavy bonds to restore the streets to their proper condition as soon as the pipes are laid.

The latest news from the Straits of Mackinaw relative to the probable opening of navigation came from St. Ignace, Mich. It was to the effect that the ice was breaking up at the ends of Lakes Michigan and Huron, but the Straits between these points were still solid. An early opening, however, may reasonably be expected.

At a meeting of the shippers at this port, a few days since, it was the almost unanimous opinion that coal should be shipped by lake by the gross instead of the net ton. Vessel men will probably object, unless a corresponding allowance be made in freight rates.

The following items from Duluth, Minn., may be interesting : " The Ohio Coal Company has no hard coal left except some little odds and ends, and has on its docks only from 15,000 to 20,000 of bituminous coal, almost all sold to different railroads." Mr. Rose, a well-known vessel agent, has returned from lower lake ports, and reports an improved feeling in freighting. " The most conservative estimates figure an increase of at least 1,000,000 tons in the movement of iron ore, and coarse freights, such as lumber and salt, correspondingly larger," says he, " and, with the heavy stocks of grain at Chicago, Duluth, and other points, the indications are, that very low coal rates will be offered ; but vessel men will not be disposed to accept such low figures as prevailed last year, as they will prefer to run their vessels up light, and thus make one extra trip during the season ; they will not touch coal at 50 cents."

Boston. March 17.

[From our Special Correspondent.]

There is a moderate demand for anthracite coal at this port, considering the time of year. Stocks are light with retailers here, and have been all the winter. Dealers would buy quite heavily now if they dared to, but they do not. It is true that stove coal is selling at about 75 cents a ton less than it did last year at this time ; but it is also true that it has sold within recent years at 50 cents less than to-day's prices. It seems hardly probable that the extreme low prices referred to will be reached this year ; for it would mean a complete disruption of the market. The present feeling is a very weak one, however, and the situation is entirely in buyers' favor. In lack of any news favorable to the formation of a combination, the market seems to be traveling a downward path, and it would not be strange if \$3 would very shortly buy the best stove coal that New York can offer our dealers. The temporary scarcity in bituminous has caused a rather larger inquiry for the small sizes of anthracite.

The strike, which is so general in the soft coal

district, has prevented any thing in the way of new business of late in Boston coal jobbing circles. There is a great scarcity of bituminous coal on spot, and jobbers are tiding over the stringency as best they can by borrowing and buying small lots of retailers. The long trips of vessels have much to do with this trouble. We hear of some sales for immediate shipment at \$2.50 f. o. b. at Baltimore, or \$4.10@4.15 delivered. The inquiry for new business on the part of dealers is small. They are willing to sell on a basis of \$2.15@ \$2.25 f. o. b. for delivery after the strike is over, in most cases ; but some do not care to entertain any bids at present. It is naturally feared that increased wages, if granted, will cause an increase in the price of coal. It is hard to see how it would be otherwise. The miners demand from 12½ to 15 cents advance, if we consider the outside help. The price of coal allows no room for such an advance ; yet it seems to be conceded that the miners will get fully half of what they claim. Clearfield and Pocahontas shippers are sold way ahead, and must fill their contracts. That the railroads will stand behind the shippers who have sold ahead seems to be the belief among very many, and there is no excitement. If it were not for some such backing, it would be extremely difficult to figure out any thing but a heavy loss on some of the low-priced contracts, in case the miners carried their point completely, and there would be less serenity than is observable to-day. It may be that the George's Creek people who have sold very little coal this year will come out at the large end of the horn, after all.

S. D. Warren & Co., who burn 20,000 tons, are reported to have bought 5000 tons. The Boston & Lowell contract continues to be a secret. Probably the shipper has no reason to be proud of the price at which it was taken.

Freights are not as firm. We quote rates, exclusive of discharging :

New York, \$1 ; Philadelphia, \$1.25 ; Baltimore, \$1.35 ; Newport News, \$1.15@1.20 ; Richmond, \$1.25 ; Cape Breton, \$1.60@1.75 ; Bay of Fundy, \$1.40@1.50.

Retail trade is quiet and without special points of interest. Large lots can be had at rather lower prices than we quote, as the feeling is easy. We quote :

Franklin Egg and Stove.....	\$7.00
Lorberry "	6.50
Shamokin Egg	\$5.50@6.00
Stove	5.75@6.00
Lehigh Furnace, Egg and Stove	5.25@5.50
Nut.....	5.50@5.75
White Ash Furnace and Egg	4.75@5.00
Stove and Nut	5.50@5.75
Cannel, American.....	10.00@12.00
English	14.00@15.00

Wharf prices : Broken, \$4.25@4.50 ; Egg, \$4.25@4.50 ; Stove, \$5.

Pittsburg. March 18.

[From our Special Correspondent.]

The first March shipment of coal by river leaves to-day for the South, and there is a large amount ready. Should the water in the Ohio reach eight or nine feet, the shipment will exceed ten million bushels. There are forty-five tow-boats in port that can be pressed into service. The market is exceedingly dull here, and at all Western and Southern points.

Prices in this market : River, wholesale, in boats, 4@5c. a bushel ; railroad, 4¼@4¾c. At Cincinnati : wholesale, 4½c. ; 5c., 5½c., being the outside figures, with reports that sales have been made at less prices. Louisville is not much of a coal market. We quote nominally 5@6½c. a bushel wholesale there.

Connellsville coke is in fair demand. The advance noted in our last was maintained. The coke producers held a meeting on Wednesday, at which the agreement for the coming year was duly acknowledged. The present arrangement differs very materially from that of last year. The minimum price of coke was fixed at \$1.35 a ton. Report says there will be a further advance in the near future. Ninety-five per cent of the ovens are in operation ; prospects are considered good.

The blast-furnaces experience no trouble in getting all the coke they want. Minor troubles crop out every few days among the workers, so that a portion of the ovens are still idle. A few days will see the difficulties adjusted. Quotations : Blast-Furnace Coke, \$1.35, f. o. b. cars at ovens ; Foundry Coke, \$1.50 ; Crushed Coke, \$1.80@2 a net ton.

COAL STOCKS.

Table of Coal Stocks with columns for Name of Company, Par value of shares, Quotations of New York stocks (March 13-19), Philadelphia prices, and Sales from March 13th to March 19th inclusive.

* Of the sales of this stock, 89 998 were in Philadelphia, and 356 523 in New York.
+ The quotations for these stocks are not percentage, but actual price. Total sales, 1,235,478.

ence is, that the actual oil is in strong hands outside the Exchange, and we look for better prices soon. We have issued a circular giving late figures and information on oil, which may be had on application at our office.

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

Table with columns: Opening, Highest, Lowest, Closing, Sales. Rows for dates March 13-19 and Total sales.

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

Table of San Francisco Mining Stock Quotations with columns: Name of Company, Closing Quotations (Mar. 12-18).

The following are the financial balances of the various mining companies on March 1st:

Table of financial balances for mining companies, categorized into Cash on hand and Indebtedness.

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, March 18.

There has been a strong undertone to the market for coppers the past week, and prices show a good advance, especially in the productive mines, and there is a good buying demand for investment, which stimulates prices and causes holders not to be in a hurry to part with their stocks, at present prices.

In silver stocks, there has been but little activity. Crescent sold at 17 1/2 c. Breece, at 25 @ 27 1/2 c. Catalpa, 32 1/2 c. Napa Quicksilver, at \$1 1/2 @ \$1.

At the Mining Exchange, about the same routine of business has been transacted, and prices generally show but little change. We note a new mine listed, which promises to be active—the Blue Ridge Gold Mining Company, of Georgia; capital, \$200,000; shares, \$1. The stock was placed on the market at 30c., at which a few sales were made; but later, it advanced to 35c., and there is now none offered under 40c. Much higher prices are predicted. Milford holds steady at 60 @ 62 1/2 c. Dunkin sold at 36c. Bowman, steady at 13 @ 14c.

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A METALLURGIST-CHEMIST, HAVING experience in Colorado in chemistry, and in Swansea in the extraction of silver and gold from copper mattes, desires to become connected with a copper-silver or silver-lead works. Refers to W. B. Devereux, Manager Aspen Smelting Co.; Regis Chauvenet, President School of Mines, Golden, Colo.; William Terrill, Esq., care of Messrs. Williams, Foster & Co.; Morpha Copper Works, Swansea, England; Manager Royal Bank of Scotland, Dundee, Scotland, etc., etc. Address G. S. M., care ENGINEERING AND MINING JOURNAL, New York.

DIVIDENDS.

PLYMOUTH CONSOLIDATED GOLD MINING COMPANY, 23 NASSAU STREET, NEW YORK, Feb. 26, 1886.

DIVIDEND NO. 34. The Board of Trustees have declared a dividend of TWENTY-FIVE THOUSAND DOLLARS, the same being twenty-five cents per share of the capital stock of the company, payable on the fifth day of March, at the Company's offices in New York and San Francisco.

OFFICE OF THE HOMESTEAK MINING COMPANY, MILLS BUILDING, 15 BROAD STREET, NEW YORK, March 15, 1886.

DIVIDEND NO. 92. The Regular Monthly Dividend of FORTY CENTS per share has been declared for February, payable at the office of the company, San Francisco, or at the Transfer-Agency in New York, on the 25th inst. Transfer-books close on the 20th inst.

OFFICE ONTARIO SILVER MINING COMPANY, MILLS BUILDING, 15 BROAD STREET, NEW YORK, March 19, 1886.

DIVIDEND NO. 118. The Regular Monthly Dividend of FIFTY CENTS per share has been declared for February, payable at office of the company, San Francisco, or at the Transfer-Agency in New York, on the 31st. Transfer-books close on the 25th.

COLORADO CENTRAL CONSOLIDATED MINING COMPANY, 48 EXCHANGE PLACE, ROOM 23, NEW YORK, March 11, 1886.

Dividend No. 7, of FIVE CENTS per share, has been declared to the stockholders of this company, payable on April 10th, at the Farmers' Loan and Trust Company. Transfer-books close on April 1st, reopening on April 12th.

OFFICE OF THE MOULTON MINING COMPANY, BUTTE CITY, MONT., March 16, 1886.

DIVIDEND NO. 9. Dividend No. 9, of Thirty Thousand (\$30,000) dollars, being 7 1/2 cents per share, will be payable at the office of John M. Moore & Co., Transfer-Agents, No. 78 Broadway, New York, on and after March 29th, 1886. Transfer-books close March 22d.

OFFICE OF IRON SILVER MINING COMPANY, MILLS BUILDING, 23 BROAD STREET, NEW YORK, March 15, 1886.

The trustees of this company have this day declared Dividend No. 16, of TWENTY CENTS per share (\$100.00), to be paid on and after April 2d to stockholders of record on that date. Transfer-books close March 26th and reopen April 7th, 1886.

USEFUL BOOKS.

- A TEXT-BOOK OF THE MATERIALS OF CONSTRUCTION. By Robert H. Thurston, M.A. New York, 1885. 8vo, pages 697 and 177 Figures. \$5.
ELECTRO-DEPOSITION. A Practical Treatise on the Electrolysis of Gold, Silver, Copper, and other Metals, and Alloys. With Descriptions of Voltaic Batteries, Magneto and Dynamo-Electric Machines, Thermopiles, and of the Materials used in Every Department of the Art. By Alexander Watt, Author of "Electro-Metallurgy." Numerous illustrations. London, 1886. 8vo, pages 508. \$5.
GOLD: ITS OCCURRENCE AND EXTRACTION. Embracing the Geographical and Geological Distribution and the Mineralogical Characters of Gold-Bearing Rocks; the Peculiar Features and Modes of Working Shallow Placers, Rivers, and Deep Leads; Hydraulic Mining; the Reduction and Separation of Auriferous Quartz; the Treatment of Complex Auriferous Ores containing other Metals; a Bibliography of the Subject; and a Glossary of English and Foreign Technical Terms. By Alfred G. Lock, F.R.G.S. With six double-page maps and 185 Engravings in the Text. 1882. Large 8vo, cloth. 1229 pages. (Full Index.) \$20.
NOTES ON THE CHEMISTRY OF IRON. By Magnus Trolius, E.M. New York, 1886. 8vo, pages 98, and 9 Illustrations. \$2.
POCKET-BOOK OF MECHANICS AND ENGINEERING. Containing a Memorandum of Facts and Connection of Practice and Theory. By John W. Nystrom, C.E. Eighteenth Edition. Revised and greatly Enlarged, with Original Matter. Philadelphia, 1885. Oblong 8vo, pages 671. \$3.50.
PRINCIPLES OF METAL MINING. By J. H. Collins, F.G.S. With 76 Illustrations. London, 1875. 8vo, pages 149. 50 cents.
PRINCIPLES OF COAL MINING. By J. H. Collins, F.G.S. With 139 Illustrations. London, 1877. 8vo, pages 151. 50 cents.
REFERENCE BOOK OF PRACTICAL AND SCIENTIFIC INFORMATION, for the Use of Colliery Managers. Written with a View to Assist Candidates in Passing their Examinations for Certificates of Competency as Colliery Managers. By W. Wardle, M.E., C.C. London, 1880. 8vo, pages 191, 101 Illustrations (many of them full-page). \$4 25.
STATISTICS AND DYNAMICS FOR ENGINEERING STUDENTS. By Irving P. Church, C.E., Assistant Professor of Civil Engineering, Cornell University. New York, 1886. 8vo, 194 Figures. \$2.
THE GEOLOGIST'S TRAVELING HANDBOOK. An American Geological Railway Guide, giving the Geological Formation at Every Railway Station, with Notes on Interesting Places on the Route, and a Description of Each of the Formations. By James Macfa-lanec, Ph.D., with the Co-operation of the State Geologists. New York, 1879. 8vo, pages 219. \$1.50.
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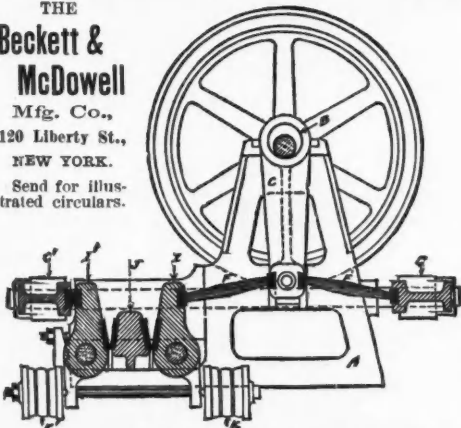
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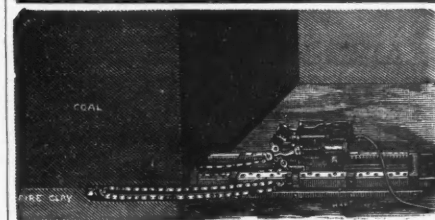
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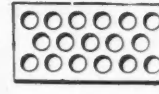
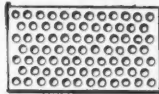
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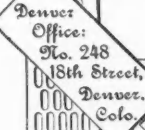
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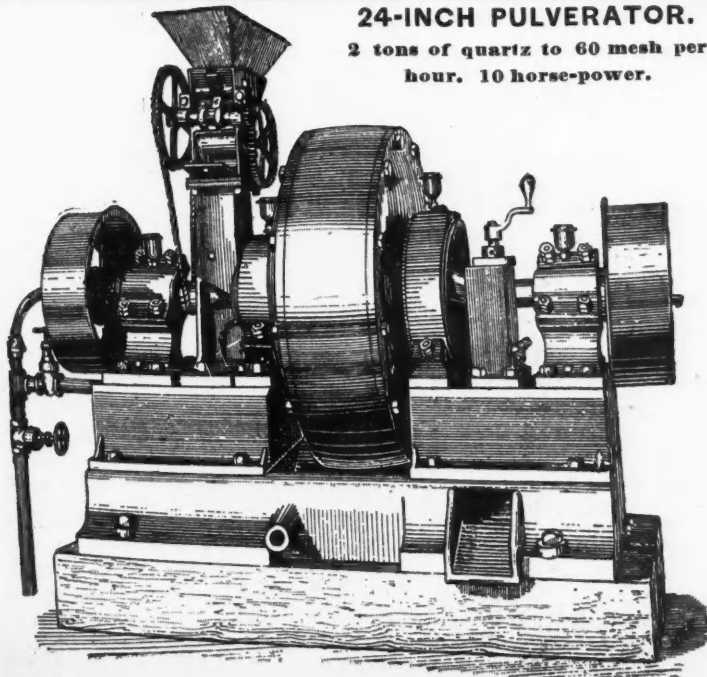


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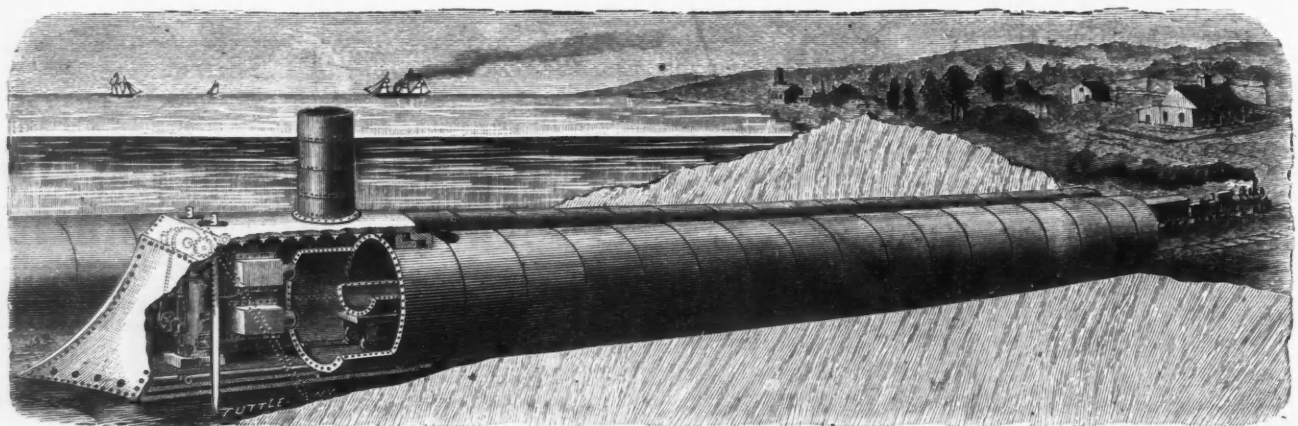
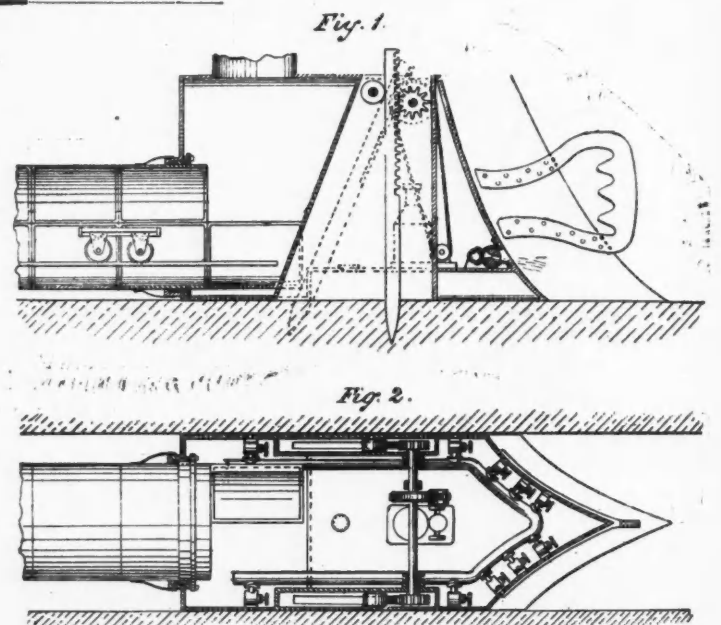
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