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The English committee appointed to inquire into the influence of earth tremors on the issue of gas in mines has made a preliminary report, in which it is stated that the inquiry thus far has shown that the question is important, though it has not afforded sufficient data to justify any definite statements.

The committee intends to continue its investigations in a systematic manner with better instruments, and it is to be hoped that the results will prove of considerable value to coal miners.

The average annual production of Bessemer steel in this country per converter was in 1886 34,907 tons, and in England 20,134 tons. In 1887, the average yield per converter increased in England to 24,635 tons, while in the United States it was 36,940 tons, or fifty per cent. greater than in England. And yet this enormous superiority in output per given plant is accomplished with even fewer men than are employed in England, so that in reality our output per man is greater than that in England by more than fifty per cent. It is not surprising, therefore, that there should be a demand from abroad for American engineers, machinery and metallurgical appliances.

THE ALASKAN BUBBLES.

It appears from a correspondent's letter on another page that Mr. NOWELL has found, as the ENGINEERING AND MINING JOURNAL stated, that the ore of his Alaska Union gold mine does not contain "pay;" so at least it must be concluded from the fact that he has decided not to mill the ore of which he boasted so much, and on the asserted value of which he extracted so many good dollars from Eastern pockets.

The stockholders will find that the ENGINEERING AND MINING JOURNAL was, as it usually is, well informed when it pricked this bubble. We are not as yet specially informed as to the prospects of the new claim mentioned, but the stockholders will do well to make a very liberal discount on Mr. NOWELL's statements, and had better obtain independent, disinterested expert advice, and call on Mr. NOWELL to show that his statements were based upon something more than a desire to get hold of the stockholders' money.

Alaska has valuable mining property, but the confidence of the public in it and the interests of the territory will be greatly injured by the successful floating of such worthless enterprises as those Mr. NOWELL has placed in the East.

THE COLLAPSE OF THE SECURITY BUBBLE AND ITS POSSIBLE CONSEQUENCES.

The Security mine (Colorado) has come to the ignominious end predicted for it in the ENGINEERING AND MINING JOURNAL, February 19th, 1887, when we said "the Security, known to ancient history as the Silver Cliff mine, of Rosita, Colo., has through a monotonously disastrous existence left an extremely ill-savored reputation." The New York Indicator, which in June last was industriously inflating this "bubble," and declined to publish our exposures of its character, has now at last found that "there has been some big lying somewhere," and intimates that "the promoters have wilfully misrepresented things." Perhaps the Indicator took pay in stock for its puffing and now finds the stock worth a little less than nothing.

The ENGINEERING AND MINING JOURNAL pricked the bubble when it was first brought out, and warned the public against the scheme.

It would be interesting to know how far the estimable gentlemen who "endorsed" the statements and claims of the promoters of the Security scheme can be made legally responsible for the stock bought on their representations. We published these endorsements at the time, and called upon each of the gentlemen to repudiate the remarks credited to him if not correct. This is in part what we stated in the ENGINEERING AND MINING JOURNAL of June 18th, 1887, concerning the junketing party that was employed to boom the stock to \$9 a share:

"Perhaps the most curious and lamentable thing about the matter is the unanimity with which some twenty-six ostensibly reputable men positively assert things which they could not have personal knowledge of and prostitute themselves to be mere "booters" for a disreputable scheme when they might easily have ascertained the facts of record which are in direct contradiction of their statements.

"These are the gentlemen: Mr. John A. McPherson, Chairman of the Consolidated Stock Exchange, New York; Hon. J. Willard Rice, of Rice, Kendall & Co., Boston; F. G. Storey, Superintendent of Security Safe Deposit Vaults, Boston — it is to be hoped that his depositors there will fare better than those who invest in Security mine on his positive assertion that "the ore is certainly much richer in the center of the hill" where they "will soon reach it" A. L. Ames, of Peabody; Dr. Henry A. Choat, druggist, of Bowdoin square, Boston; Levi B. Gay, of the Banker and Tradesman; Benj. Dickerman, Chatham Row, Boston; A. L. Sewell, of 10 Wall street, New York; H. A. Wright, of Doran, Wright & Co., New York; Gouverneur Morris, New York; Thomas Reed, Jr., New York Stock Exchange; Hon. J. L. Kamrur, of Webster City, Ia., of Hamilton County National Bank; Capt. Lewis Cray, of Webster City, Ia., also of the Hamilton County National Bank. — If these gentlemen, in the management of their banking business, indorse as confidently and as freely, and with as little knowledge as they have in this case, an early collapse of their bank can be reasonably predicted. — J. W. Wilson, of Syracuse, N. Y.; Edward E. Ewers, of Syracuse, N. Y.; R. J. Wilson, of Russellville, Ark.; Thos. J. Wyse, of Greenville, Ark.; N. F. Wilkins, of Senter & Co., St. Louis, Mo.; John A. Lindsay, Minturn, Ark.; T. A. Kelly, Cleveland, Ohio; Geo. W. Wright, Cleveland, Ohio; M. B. Jones, Batesville, Miss.; J. P. Coffin, Powhatan, Ark.; C. A. Hayden, Rochester, N. Y."

Perhaps these gentlemen may find blowing mining bubbles a far less profitable occupation than they thought. The stock is now quoted at 4 cents a share.

PLAYING IT LOW DOWN ON THE BOOM-REPORTER.

The experiences of the members of the Institute of Mining Engineers at the hands of local reporters, during the late Southern meeting, were even funnier than usual. There is a gifted corps of journalists down there, who can play more intricate and surprising variations on proper names and technical terms than any similar body of performers in the world. It was fortunate that they disguised in this picturesque fashion every body as well as every thing; for the member who would have writhed with mortification over the astounding statements attributed to him in the newspaper report of yesterday's session was enabled to smile tranquilly, as he found that his name, as well as his sentiments, had been tattooed beyond recognition.

There is a strong temptation, under such circumstances, to victimize the good-natured, eager credulity of the gentlemen of the press. Wherever

one goes, they are at his heels, pressing him for an "opinion"—no matter what, if it only helps the "boom;" and since they take so little pains, or achieve so little success, in printing correctly what is said to them, why should one care what one does say?

This temptation, however, was withstood by the mining engineers at the Birmingham meeting. They went on mildly and seriously giving their "views" to the reporters, and contemplating the cross-eyed results in print; and when the meeting was adjourned, every man of them could honestly put his hand on his heart and declare that however the manufactured articles might look, the raw material had been honestly furnished, and any defects in the product must have been due to the process.

Such a prolonged strain upon heroic virtue seems, however, to have been too much for our witty friend, E. C. PECHIN; and, after getting away from the restraint which the Birmingham atmosphere had put upon his passions, he took occasion at Sheffield, Ala., while returning home in his private capacity, to revenge himself, once for all, on a "boom-reporter." It was cruel, thus to abuse the childlike trust of a constant attendant; but allowance must be made for the wrongs previously received from others of the same species. It is on this principle that we pardon a man for murdering a mosquito who has not yet stung him.

According to the victim's version, which appears in the *Sheffield Enterprise* of May 28, Mr. PECHIN was much interested in the work of the Sheffield blast-furnace. But we must quote *verbatim*:

"In the course of a conversation with Mr. Chambers in regard thereto, that gentleman produced a copy of a chemical analysis which had just been made by that eminent expert and analytical chemist, Mr. Alfred F. Brainerd, of Birmingham, and asked Mr. Pechin his opinion regarding it. Mr. Pechin examined it for a moment, and then thoughtfully said: 'Isn't there some mistake about this? Are you sure that this is a true copy of Mr. Brainerd's analysis?'"

"There is no mistake," said Mr. Chambers; "I copied it myself, and I know that it is correct."

"Well, then," said Mr. Pechin, "it is simply ruinous, ruinous!"

"I am very sorry to hear you say that," said Mr. Chambers; "I had hoped for something better," and he placed the paper in his pocket, and resumed conversation on another subject.

"A half hour afterward, Mr. Pechin said, 'See here, let me look at that analysis again, will you?'"

"The analysis was handed him, and he went over it again carefully, remarking, 'And that is an analysis of your iron, is it?'"

"Oh! bless you, no!" was the quick response; "Not an analysis of iron but of slag."

"With an exclamation of surprise, Mr. Pechin said, 'Well that's another thing entirely.' Then, turning to Major Doud, he asked some questions regarding the usual proportions of the chemical constituents of slag, and nodding approval said, 'Yes, that is so; and this analysis shows that the Sheffield furnace is making the best iron that is being turned out by any Southern furnace that I have ever seen; and more than that, it confirms the opinion that I formed while at the furnace, that you are making a pound of iron with a pound of coke, and that, I know, is better than any Southern furnace is doing.'

"That is strong language, but it is the truth, and can be verified by gentlemen who heard; and, more than that, the analysis will abundantly confirm the judgment of Mr. Pechin. It is matter for congratulation that at this early stage in the history of the Sheffield furnace, the results achieved are the subject of such complimentary notice."

There is abundant internal evidence that Mr. PECHIN said all that is here attributed to him. Nobody else could with a serious face pretend to mistake a slag-analysis for one of pig-iron; pretend to discover his mistake; inform his delighted listener, "with an exclamation of surprise," that a slag-analysis was another thing entirely; and then deduce from the analysis the quality of the pig and the consumption of fuel.

It was wrong, of course; but it is delicious; and being human, we can not help being grateful to our colleague for squaring with one payment the whole account of the Institute with the press. We feel like the pious old lady at the railway-station, who said "Thank you, sir!" when another party, not so pious, who had been left by the same train, did the cussing for her.

THE MINERAL RESOURCES OF CANADA.

THE GREAT MACKENZIE BASIN.

The mineral resources of British North America have up to the present time been almost neglected, and are but little known or appreciated, notwithstanding the fact that Canada has expended annually for many years very large sums upon the Geological Survey, and published as long ago as 1868 Sir WM. LOGAN'S admirable geological report. Though the fact is not creditable to the "powers that be," it must be admitted that nearly all the knowledge we have of Canada's useful minerals is that furnished in the work of that eminently practical and progressive engineer and geologist. During the past two years the Geological Survey has again commenced publishing information that has practical value, and which will tend to direct attention to its mineral resources which are vast and rich beyond any conception that has yet found place in the public mind.

Even the best known mineral districts, the magnificent coal, iron and gold fields of Nova Scotia and Cape Breton, the copper deposits of New-

foundland, the gold washings of the Chaudière, Quebec, the phosphates, asbestos, iron, copper, gold and silver of Ontario, though known and worked for many years, are still but infant industries, and it is difficult to convince capitalists in this country that the deposits can amount to much because they hear so little of them, and their output is so comparatively insignificant after so many years' development.

The Canadians themselves are ignorant of most of the vast mineral riches their country contains, and comparatively indifferent to what they do know, so that the revelations of a recent Parliamentary committee report on the Great Mackenzie Basin are as unexpected there as here. According to this report, as summarized in the *New York Times*, the area of the Great Mackenzie Basin is given as 1,260,000 square miles, and in this are not included any of the islands of the Arctic Archipelago. The coast line on the Arctic Ocean and Hudson's Bay, exclusive of inlets, measures 5000 miles. Over one-half of this coast line is accessible to whaling and sealing craft. The total area of the lakes probably exceeds that of the Eastern Canadian-American chain, and the navigable coast line of the larger lakes of the region is about 4000 miles. There is river navigation in the region to the extent of 2750 miles, half of which is suitable for stern-wheel steamers, which, with barges, may carry 300 tons. The other half is deep enough for light-draught seagoing steamers. A total of 6500 miles of continuous lake and river navigation is broken in two places. One of these occurs on the Great Slave River, and to overcome it a 20-mile wagon road is now under construction from Fort Smith southward. The other break consists of 70 miles of the Athabasca River, above Fort McMurray. In these 70 miles, rapids are unpleasantly numerous. The committee states that flat-boats can descend, but can not ascend them.

The immense lacustrine area of the northern and eastern portions of the territory implies, the committee thinks, the future supply of a great part of the North American Continent with food fish.

In the Great Mackenzie Basin there is, in the committee's opinion, a possible area fitted for the growth of potatoes of 656,000 square miles; suitable for barley, 407,000 square miles; and suitable for wheat, 316,000 square miles. The pasturable area is placed at 860,000, of which 26,000 miles is open prairie. Including the latter, 274,000 square miles, the committee states, may be considered arable. Of the total area, 400,000 square miles is useless for the pasturage of domestic animals or for cultivation.

The forest area contains the liard, a balsam poplar, which attains a growth of 120 feet in height and a stump diameter of six feet; the white spruce, 150 feet high, with a stump diameter of 5 feet; the larch, of about the same size, and the banksian pine, which has a straight stem 100 feet high, with a stump diameter of only 2 feet.

MINERAL INTERESTS.

Of the minerals of this vast region little is known. Nothing is known of the minerals which may exist east of the Mackenzie River and north of the Great Slave Lake. Enough is known of the western affluents of the Mackenzie, the committee thinks, to show that at the headwaters of the Peace, Liard and Peel rivers there are from 150,000 to 200,000 square miles which may be considered auriferous, while west of the Rocky Mountains there is a metalliferous area, principally of gold-yielding rocks, 1300 miles long and from 400 to 500 miles broad. Gold has been found on the west shore of Hudson's Bay, silver on the Upper Liard and Peace Rivers, and copper on the Copper Mine River. Iron, graphite, ocher, brick and pottery clays, mica, gypsum, lime, sandstone and asphaltum are also known to exist in the region. Salt is found in crystals and in saline springs.

VAST PETROLEUM FIELDS.

The evidence submitted to the committee points, in the language of the report, to the existence in the Athabasca and Mackenzie valleys of the most extensive petroleum field in America, if not in the world. The committee suggests that 40,000 square miles of this territory be for the present reserved from sale, as it is probable that in the near future petroleum will rank among the chief assets of the Dominion. The committee bounds the reserved lands as follows: Easterly by a line drawn due north from the foot of the Cascade Rapids on Clearwater River to the south shore of Athabasca Lake; northerly by the said lake shore and the Quatre Fourche and Peace rivers; westerly by Peace River and a straight line from Peace River Landing to the western extremity of Lesser Slave Lake, and southerly by said lake and the river discharging it to Athabasca River and Clearwater River as far up as the source.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

All letters should be addressed to the MANAGING EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Cost of Pig-Iron in Alabama.

EDITOR ENGINEERING AND MINING JOURNAL:

DEAR SIR: I see in your last issue a letter from the Tennessee Coal, Iron and Railroad Company stating that I am not connected in any way with that company, as author of a paper read at the Birmingham meet-

ing of the A. I. M. E. on the cost of producing pig-iron in the Birmingham district.

There appears to be a mistake all round. I specially stated that I had no connection with that company, and that my figures should not be used against them, and the cost was figured out for South Pittsburg, Tennessee, and in the Sequachee Valley, and not for Birmingham.

I take this chance of answering a question that was asked me on one of the excursions as to how much of the cost of a ton of pig-iron represented labor. In my opinion fully 95 per cent. of the cost of a ton of pig in this district is labor—a comforting reflection for free traders.

SOUTH PITTSBURG, Tenn., May 30, 1888.

WM. M. BOWRON.

The Nowell Alaska Bubbles.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The recent articles in your paper on Alaska and the mining operations of Mr. T. S. Nowell seem to have created a good deal of interest, and perhaps under the circumstances you would like to know what Mr. Nowell's latest opinion is on the milling prospects of the Alaska Union Mining Company.

His present early trip to Alaska was made with the express purpose of starting the mill immediately (it was promised to start last November) and disproving to the world the so-called libelous statements in your JOURNAL. In a letter from Mr. Nowell from Alaska, received in Boston within a few days, he makes a statement to the effect that the mill will not start at present, because the tunnel (over 900 feet) has not yet struck the vein, only a few stringers having been encountered.

The delay in starting the mill on account of not finding ore in the tunnel is surprising, when one of the leading arguments, which he so successfully used to sell stock by, and as a guarantee of immediately running the mill upon its completion, was that that the mine had unlimited quantities of ore.

Mr. Nowell then claimed that the creek cut a vein as large as the Treadwell, and exposed to view thousands of tons of paying ore assaying from \$6 to \$20 a ton (assays taken by other parties range from about \$4 to a trace—generally not a trace); that the creek was floored over to blast down upon, and that a branch tramway extended to it which would take the ore to the mill, so that an ample supply of ore would be in readiness upon its completion. Also that, as the tunnel was not depended upon to supply rock, there could be no possible delay in starting the mill. But Mr. Nowell now writes that the ore on the "Juneau," a claim between the A. U. M. Co. and Treadwell's, and nearer the shore, is very good, and that he has ordered that the tramway be extended to this new promising prospect, so that the ore can be trammed from it to the mill, which will only delay the starting a short time. Meanwhile the vein in the 900-foot tunnel is daily expected to be struck. Why does Mr. Nowell not blast rock from the creek (where most of his assays have come from), start the mill, and relieve the anxiety of his stockholders?

NEW YORK.

BELETED LETTERS.

I.—THE BIRMINGHAM, ALA., IRON INDUSTRY.

The cause of the delay in the appearance of this communication is not the outrageous mismanagement of the post-office, or the culpable neglect of the managing editor, or the "crowded condition of our columns," or any thing of that sort. I brought the letter with me; and I was a long time getting home; and owing to the crowded condition of my baggage and pockets, I brought it in my head (which, as will be at once inferred by the truly witty) was less crowded; and so here it is.

I am not going to tell what a good time we had in the South—at least, not now. That goes without saying, though a great deal might be said about it. Lovely weather; hospitable hosts; interesting sights; picturesque scenery—and ourselves. What more could be needed for the perfecting of a good old-fashioned Institute time?

Of course, the prevailing and intense feeling at Birmingham concerns the rapid and wonderful development of the iron industry in that district. Local hopes and opinions on the subject are colored more or less by the incidental effect of this development on real estate. Up to this time, there has been much more money made in town-lots than in the manufacture of iron.

The real-estate "boom" is at this time under a depression, the consequence of wild speculation ending in collapse. But values will adjust themselves in due time to the actual basis which the industry of the region will furnish. The important question is therefore, What are the special conditions of the pig-iron manufacture in the Birmingham district?

The best answer to this question is undoubtedly to be found in the books of the manufacturing companies. Their figures of actual expenses and receipts would, however, probably give, in most cases, an impression not quite fair to the district; since the past has been a period of experiments and of much loss through injudicious technical management. It is reasonable to expect that the new plants managed in the light of past experience and aided by the perfected facilities of transportation, will do better. On the other hand, it is still to be proved that the very large furnaces now in progress, and the high speed, pressure and temperatures at which they they are to be driven for maximum product, will prove technically economical.

I can only undertake, therefore, to record impressions and guesses, without attaching to them the dignity of professional estimates, still less of actual records of practice. According to my impressions, gained by observation and inquiry, the advantages of the Birmingham district are:

1. The extraordinary thickness and richness of the Clinton fossil-ore beds as there developed. Ore can be mined in several of the mines and delivered on cars at 75 cents (in some new openings, not deep, at 65 cents), to which a royalty of 25 cents should be added, making the cost of ore \$1 at the mine. Of the ore-charge as put in the furnaces, probably 2½ tons make one ton of iron.

2. The neighborhood of ore, limestone and coal, their connection with the furnaces by railroad, and the cheap rates charged by the Mineral railroad—which are, in most cases, I understand, 25 cents per ton for all

moderate distances. At these rates, a furnace without special facilities, buying its ore, coke and limestone in market, would have to pay about \$1.25 total freights on the raw materials for one ton of iron. Some of the companies having mines, coke-ovens or railroads of their own, claim to pay much smaller total freights. One establishment keeps a transportation account, to which all freight expenses on raw materials are charged; and it is claimed that the total last year was 35 cents per ton of pig-iron. The manager of another concern says their total freights on raw materials per ton of pig-iron will be less than 50 cents. This is an immense advantage over the usual conditions of Northern blast-furnaces.

3. The very low rates charged by the Southern railroads. I am told that Birmingham iron can be put in Philadelphia for \$3.75 freight per ton.

On the other hand the disadvantages of the district are:

1. The quality of the iron made, which has hitherto been, in the main, siliceous and weak. The furnaces do not succeed in making foundry-iron mainly; and the large amount of mill-iron and lower grades which they make is not so easily salable. The furnaces of the Birmingham district at the time of our visit were oversold on foundry-iron and generally overstocked with mill-iron. The amount of phosphorus in the iron is not very large—averaging 0.7 to 0.8 in the district.

2. The scarcity and cost of water. The various land companies appear to own the streams, and charge heavily for the use of the water. At least this is the case at Birmingham, where one establishment pays to the Elyton Land Company \$6000 per annum for the water used at two furnaces. Other concerns may be more favorably situated in this respect; but all the furnace-owners say that the water question is a serious one.

3. The scarcity of suitable coke. The supply of coal is now some 5000 tons daily less than the consumption of the railroads, etc., plus the aggregate capacity of the furnaces running and nearly ready to run. The quality of the coke is not first-class; but it is better than that of Tennessee. The amount of ash seems to run from 8 to 15 per cent.

4. The nature of the labor. This is doubtless considerably dearer per ton of pig than in the Lehigh Valley, although day-labor is nominally lower. The laborers are chiefly negroes, who have unconquerable vagabond tendencies. The manager of one of the large works told me that, to keep 500 men at work, he had 1000 names on his monthly pay-roll, and that there would be 5000 names during the year. Under these circumstances it is almost impossible to keep a trained corps of furnace-laborers.

5. Most of the companies are very heavily in debt. This will cripple them in the sharp competition which is sure to come as the production of the district increases. There are 22 furnaces finished or nearly finished, the total estimated capacity of which will be over 2500 tons of pig-iron daily; and the larger part of this product is going to be not foundry-iron. It requires no gift of prophecy to foresee that such concerns as are forced for pecuniary reasons to run at every sacrifice and to sell their product, even at a loss, in order to realize cash, will both aggravate the general situation and suffer the particular consequences.

I suppose it is necessary to do what everybody else does—give an estimate of the average cost of pig-iron at Birmingham. Such estimates are not worth much; but the following, based on the general conditions, is intended to be fair. It excludes commercial risks, selling commissions and interest on capital and debts, and it is supposed to be the cost at a furnace buying ore, limestone and coke in open market.

2½ tons of ore at \$1.25	\$3 12½
2 tons of coke at \$2	4 00
Limestone at 75c, say	.50
Labor	2 00
Sundries, including water, molding-sand and 25c. renewal fund	1.37½
Total	\$11.00

Some favored concerns are doing better than this; and some, I am sure, are doing worse.

The political situation at Birmingham is amusing. Every day the local papers publish leading articles in favor of Mr. Cleveland's re-election, and also long articles denouncing the President's tariff proclamation and the Mills bill. Their warcry is "Cleveland and Protection!"

ÖZOKERITE IN GALICIA.*

Boryslaw is a town of 20,000 inhabitants, in 49 degrees 17 minutes 3 seconds latitude, twelve miles from Drohobycz, in Galicia, and on the north slope of the Carpathians. The valley is surrounded by small hills, not exceeding 300 feet above it, and is traversed by a small river.

The surface is covered with a few yards of diluvium. Beginning at the top, there are found yellow clays, rolled pebbles and gravel, and plastic clay. Below this are beds about 600 feet thick of sandstone and schist, very much dislocated, of Miocene age, in which the ozokerite is found. These Miocene rocks rest upon menelitic schist, containing petroleum, and consisting of beds of coarse sandstone, green marl traversed by veins of calcite, of highly colored schists alternating with dull black schists passing gradually into thick beds of sandstone and schist which contain no petroleum. These beds of shale and sandstone rest upon the older Carpathian sandstones, strongly impregnated with petroleum, which is found in greater quantities at greater depths.

The ozokerite is found in the form of thin leads or veins in the Miocene sandstones and schists, varying from a few hundredths of an inch to some feet in thickness. It is accompanied with variable quantities of petroleum and hydrocarbon gases. The veins, filling the innumerable fissures of the rocks, form a complete network, but frequently follow the bedding of the rocks.

In the central portion of the field (which is of pear-like form) the veins become more productive with depth; but in the margins the veins are much thinner, and run out at depths varying from 30 to 100 feet. The central and richer portion has an area of about 52 acres, and the outer area is about 95 acres. At a depth of 650 feet the width of the richer area has

* "Note sur l'Ozokerite, ses gisements, son exploitation à Boryslaw, et son Traitement Industriel." By A. Rateau. *Annales des Mines*, 1887, Vol. XL, pp. 147-170. Plate VI. Published in abstract in *Trans. North of England Inst. of Mining Engineers*.

diminished from 1150 feet to about 325 feet, which shows that the ozokerite has passed upwards through some fracture of the lower strata.

The ozokerite rocks are also impregnated with petroleum and surrounded by petroliferous rocks, except on the northeast side. The petroleum wells on the other sides are all sterile below a depth of about 300 feet.

The external area contains about 2 per cent of ozokerite, whilst the internal area contains an average of 5 per cent; consequently the entire field contains about 2,000,000 tons above a depth of 650 feet.

Up to the end of 1886 about 330,000 tons have been extracted, worth at least £8,000,000. The price per ton is very variable:

	£	s.	d.	£	s.	d.
1874-5	17	12	0			
1876-7	25	12	0			
1878	22	8	0	to	24	8
1885	24	0	0	"	26	0

The annual production is about 20,000 tons, worth £480,000.

The difficulties of working are considerable. The issue of fire-damp compels the use of safety-lamps and even causes explosions. The rocks exert great pressure upon the timber owing to the action of the ozokerite and petroleum. Timbers a foot square are often broken to match-wood. Another result of these pressures is the frequent and violent eruptions of gas, petroleum, and ozokerite into the pits and galleries; and the workmen are sometimes drowned in the fluid mass. The proportion of deaths from accidents varies from 7 to 15 per 1000 per annum, against less than 2 per 1000 in ordinary mines.

The ordinary method of working is to sink pits about 5 feet diameter at regular intervals. One man works in the bottom; he drives short horizontal galleries at right angles until he finds a good vein of ozokerite. But these drifts, owing to the pressure, are very short; about 15 feet is the maximum, which can not be exceeded without considerable danger. The pits, from 65 to 650 feet in depth, may yield about 20 tons of ozokerite per annum and last from five to ten years. The produce is drawn by buckets, iron or wire ropes being used of about one quarter inch diameter, worked by a jack-roll. About 1000 pits have been sunk, of which 700 to 800 are still in operation. The whole area is pierced like a sponge.

The paper concludes with some notes on the preparation of the ozokerite for the market.

CONCENTRATING MAGNETITE WITH THE CONKLING JIG AT LYON MOUNTAIN, N. Y.*

By Ferd. S. Buttman.

There is now in use at the mines of the Chateaugay Ore and Iron Co., at Lyon Mountain, New York, an ore-concentrating machine or jig, which, in view of the increasing attention given to the subject of concentrating lean ores of iron, seems worthy of notice.

This Conkling jig, as it is called, is not entirely unknown, having been used at several places with more or less success; but as yet, I believe, no drawings of it or records of its work have found a place in print. Although the jig will be found to be merely an adaptation of old forms, there are several points which deserve attention, particularly the method of central discharge, of freeing the bearings from grit, and the rotation of the sieve or screen.

The ore-body at Lyon Mountain consists of a bed of rather compact, granular magnetite, occurring in a gneiss formation. The side walls of the ore-body are not sharply defined, the ore on either side becoming gradually poorer as the distance from the central point of the body increases. It is this lean ore, which, before the introduction of the jigs, was thrown away as waste, that is now concentrated. The material treated consequently consists of magnetite, intermixed with the component parts of gneiss, viz., quartz, felspar, hornblende, and mica. Grains of trap also form part of this material. These come from dikes of trap, which cross the ore-body at intervals.

The ore which is to be concentrated usually contains from 30 to 40 per cent of metallic iron. It is first crushed to the size of two inches or less, by two large Blake crushers. The material from these crushers passes by a chute lined with screens, having holes $\frac{1}{4}$ inch in diameter, to a second set of four crushers, set so as to close to one inch. The product from this set of crushers, together with that which passes through the screens in the chute, is then taken by an elevator to the top of the mill, and passed through a revolving screen, perforated with $\frac{1}{2}$ inch holes. The ore which passes through the screen goes to the jig-hoppers; that which passes over goes to a third set of six crushers, set to $\frac{1}{2}$ -inch. These are of the Blake multiple-jaw pattern, having three jaws.

The product from these three crushers is again screened through a double revolving screen, having holes $\frac{1}{4}$ inch in diameter. That which passes through goes to hoppers; what passes over goes to a fourth set of crushers. These are of the Blake multiple-jaw pattern, having six jaws, which are set so as to close to $\frac{1}{4}$ inch. The product from these last crushers is again screened, and the grains which are still too large pass again through the final crushers. All the material which passes through the $\frac{1}{4}$ -inch holes goes to the jigs without further sizing. The ore is crushed dry, and goes to the jigs in that state.

The machine, as shown in the accompanying drawings, may be divided into four essential parts: 1, the frame; 2, the tub; 3, the jig; 4, the elevators. For the better understanding of the drawings, the following index of the names of the parts is appended, the numbers referring to corresponding numbers in figs. 1 and 2.

INDEX.			
1. Bevel-wheel.	14. Hoop.	26. Cam-wheel.	37. Cone-pulleys.
2. Pinion.	15. Screen-plates.	27. 36-inch pulley.	38. Spring-pole.
3. Upright shaft.	16. Spider.	28. Pinion-shaft.	39. Strap.
4. Shoe.	17. Key.	29. Cone-pulleys.	40. Bumper.
5. Link.	18. Cone.	30. Lever-beam.	41. 3-inch water-pipe.
6. Upper collar.	19. Water-sleeve.	31. Yokes.	42. Regulating-valve.
7. Trunnion-piece.	20. Water-box.	32. Lever-shaft.	43. Outlet-pipe to tail-race.
8. Lower collar.	21. Lower elevator-box.	33. Driving-shaft.	44. Tub.
9. Outside nut.	22. Lower elevator-shaft.	34. Top elevator-shaft.	45. Splash-rim.
10. Flange.	23. Lower elevator-shaft.	35. 24-inch pulley.	
11. Inside nut.	24. Band-arms.	36. Flange-pulleys.	
12. Standard.			

* A paper read before the American Inst. of Mining Engineers, Feb., 1888.

The Frame.—The frame, which is shown in vertical section and elevation in Fig. 1, in plan in Fig. 2, and in horizontal section in Fig. 3, is made of squared spruce or hemlock timber, $6\frac{1}{2} \times 6\frac{1}{2}$ inches, and braced by cross-bracing, 3×4 inches, at the sides and ends. The upper string-pieces project 4 feet 5 inches beyond the first pair of uprights. The sills are 13 feet $8\frac{1}{2}$ inches long and project $6\frac{1}{2}$ inches beyond the front and rear uprights. The second pair of uprights is placed 3 feet 9 inches behind the first pair. The frame is 4 feet 1 inch wide inside. There are an upper and a lower cross-piece at each pair of uprights except the rear, where the cross-piece is placed 3 feet 8 inches from the rear end of the string-piece. To the lower side of this cross-piece is attached the bumper for the lever-beam. The main driving shaft is placed directly over the rear uprights; and 9 inches from the forward end of the string-pieces is placed the shaft for the elevator-pulleys. Between the first and second cross-pieces is a cross-beam which carries the journal for the upright or jig-shaft. The front edge of this timber is set even with the center-line of the jig. From this timber to the forward cross-piece extend two timbers, 4×6 inches, as shown in Fig. 2, which carry the boxes for the pinion shaft. To the second and rear cross-pieces are bolted pieces 3×9 inches, and 2 feet high, which carry the spring-pole. On the front of the second pair of uprights, 1 foot $6\frac{1}{2}$ inches (to center) below the string-piece, are the journals which carry the lever-shaft. The whole is framed with mortise and tenon-joints, and tied together with 1-inch bolts.

The Tub.—The tub is made of yellow pine, 4 feet 11 inches inside diameter. The staves are 4 feet 8 inches high, 5 inches wide and 2 inches thick, rabbeted 1 inch deep, 3 inches from the lower edge to receive the bottom. The staves are not doweled. A door in the side having bevelled edges gives access to the interior. Four iron bands provided with tighteners binds the whole together. A hole near the bottom fitted with a plug serves to empty the tub for the purpose of examination or repairs. The tub is set between the first and second pair of uprights, as shown in the drawings. Two troughs to allow for the passage of the elevator belt and buckets into the tub are let into the front side.

The Jig.—The jig consists essentially of a circular sieve, suspended from one end of a lever, being moved up and down by a cam striking the opposite end of the lever. The concentrates pass through the sieve to the bottom of the tub; the tails pass out by means of an annular opening around the jig-shaft. The general arrangement is shown in Fig. 1.

The spider is made in one piece of cast-iron, with a taper bore to receive the jig-shaft which is keyed into it. It is also supported by the standards from the flange, which may be moved by the upper and lower nuts. A sheet-iron hoop, 12 inches high, is bent around the spider, and fastened by the holding-down bands which are riveted to the rim, pass through the holes in the end of the arms, and are fastened below with nuts. The screen-plates rest on the arms of the spider and are held in place by U-bolts passing under the arms and through the holes in the screens. The screen-plates are $\frac{1}{2}$ inch thick, made of cast-iron, in segments of $\frac{1}{6}$ of a circle; the holes are $\frac{1}{8}$ inch in diameter on top and $\frac{7}{16}$ inch below.

Beneath and bolted to the spider is the cone (20, Fig. 1), under that is the water-sleeve (21, Fig. 1), which slides up and down in the water-box (22, Fig. 1). This water-box and also the lower elevator-box (Fig. 9 and 23, Fig. 1) are the inventions of Mr. William Hodson, superintendent of the mill at Lyon Mountain. All the water which is to be used in jigging passes through these two boxes, and flowing out through the annular openings, keeps the bearings free from grit. Previous to the introduction of these improvements, the water-sleeve would wear out in a very short time. The water, under pressure of 8 feet head, enters through the 3-inch pipe (41, Fig. 1) provided with a valve (42) to regulate the quantity.

The jig is suspended in the tub from the end of the lever-beam (30, Fig. 1). The trunnion-piece (7, Fig. 1) is kept in place by the upper and lower collars, which are provided with set screws. The links (5, Fig. 1) connect the jig with the lever beam. The jig-shaft passes up through the horizontal bevel-gear wheel (1, Fig. 1) by which it is rotated; the shaft moves freely up and down, but it is provided with splines in which fit keys attached to the gear-wheel. The pinion is driven by belt from the rear driving-shaft (33, Fig. 1). The pulleys to transmit the rotary motion are conical, reversed in order to change the speed. The cam wheel (26, Figs. 1 and 2) is provided with six cams, and is keyed to the shaft which is driven by a belt 8 inches wide, passing over the 36-inch driving pulley (27, Fig. 1). The cam-wheel makes 43 revolutions per minute, giving about 260 jars per minute to the jig. The lever-beam is set to move the jig up and down about $\frac{3}{4}$ inch, giving a slowup and a quick down motion. The jig makes seven revolutions per minute.

The Elevators.—The lower elevator-box, shown in detail in Fig. 9, is provided inside with wooden bearings. The box is bolted firmly to the bottom of the tub. The elevator pulleys overhang somewhat, to give free exit to the water which passes through the box. The elevator belt is rubber, 4 inches wide, and the buckets are riveted to it. The elevators travel at a speed of 10 feet per minute.

The Jigging.—The crushed ore is brought from the hoppers to the jigs by chutes provided with gates at the lower end, just above the screen plates. The screens are first covered closely with pieces of heavy ore about the size of hickory nuts; the crushed ore is then spread over this until it is level with the collar of the spider, about $2\frac{1}{2}$ to 3 inches deep. The spring-pole is connected with the lever-beam by the strap, the water turned on, and the jig started. The water flows upward through the screen-plates and over the collar of the spider, carrying the gangue to the tail race; the ore settles through the screen, is collected at the bottom of the tub, and thence raised by the elevators to bins. The rotation of the jig produces an equal distribution of the crushed ore on the screen plates, and also forces the particles to traverse a path longer than the radius of the sieve. The crushed ore is allowed to fall on the screen as near the outer periphery as possible.

The jig has a capacity of treating 5 tons of ore per hour, requiring 135 gallons of water per minute, or 1620 gallons per ton treated. One man or boy is sufficient to attend to two jigs, his duty being to see that the jig is properly supplied with material to secure a uniform depth on the screen; that the water is flowing in the proper quantity (a depth of $\frac{1}{2}$ to $\frac{3}{4}$ of an inch over the collar being sufficient), and that the concentrates

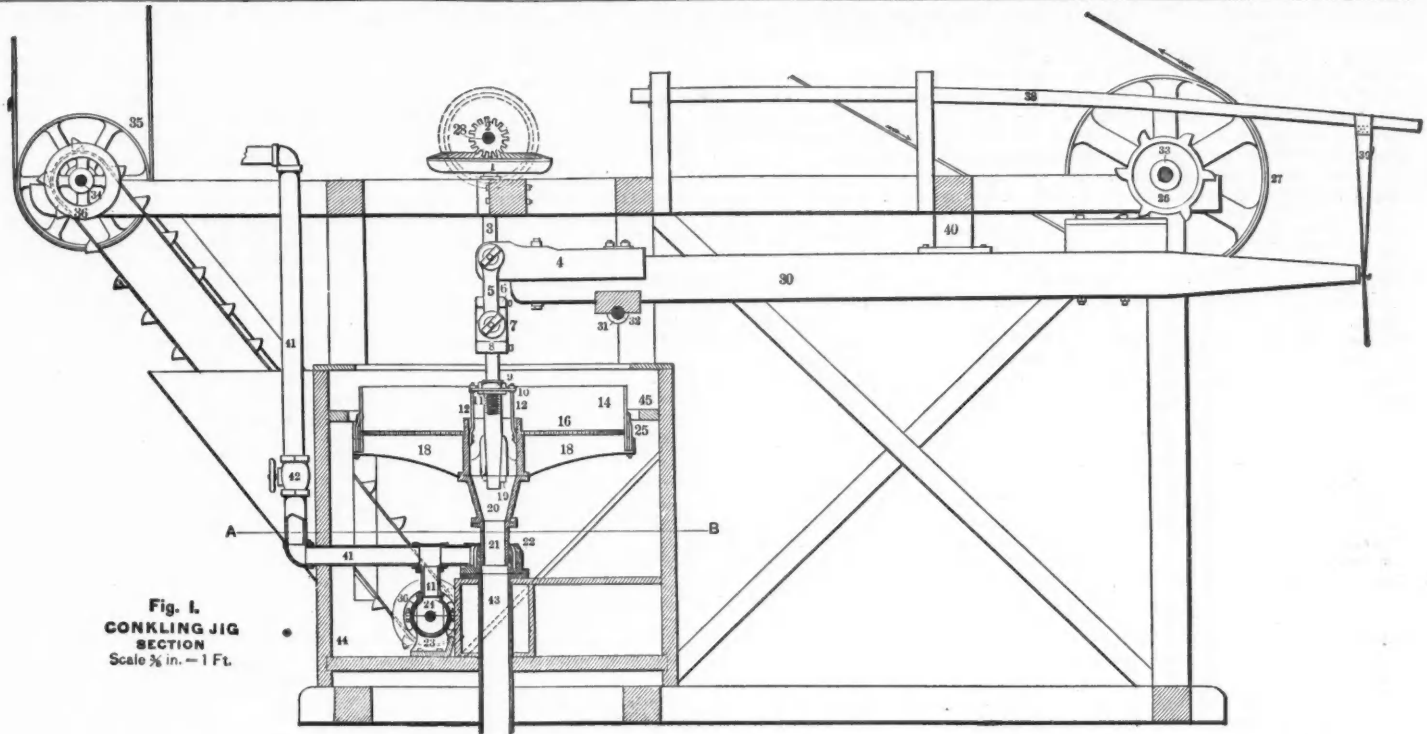


Fig. 1.
CONKLING JIG
SECTION
Scale 3/8 in. = 1 Ft.

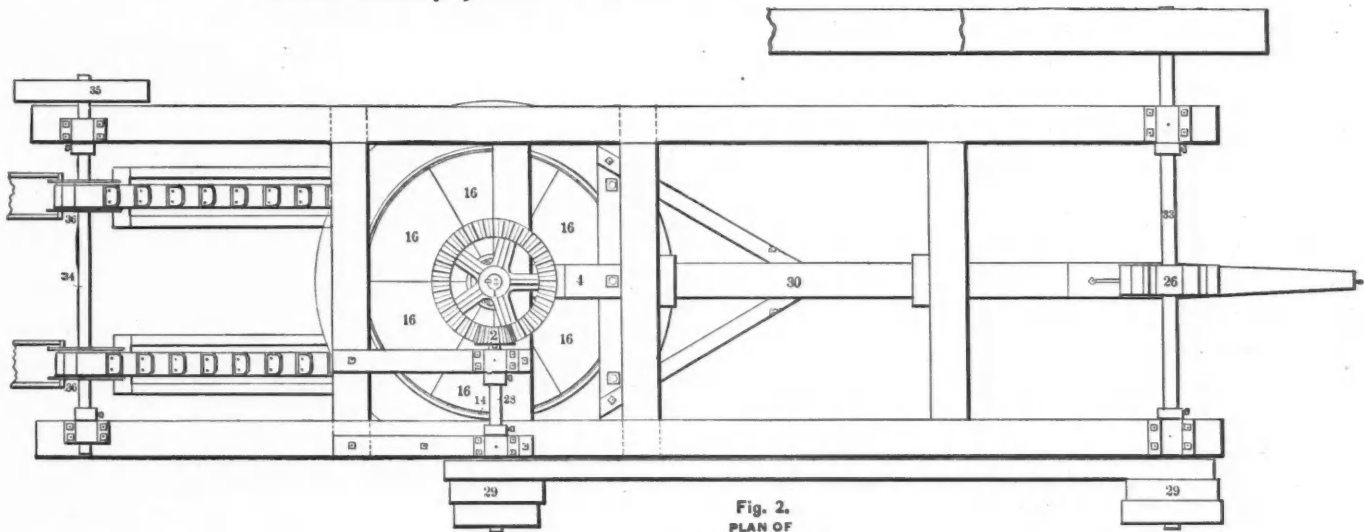


Fig. 2.
PLAN OF
CONKLING JIG.
Scale 3/8 in. = 1 Ft

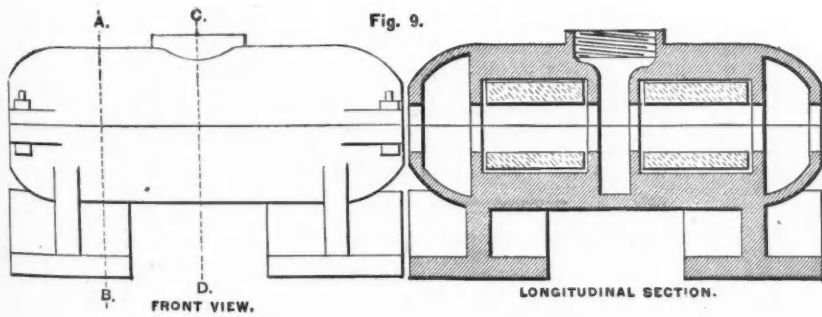
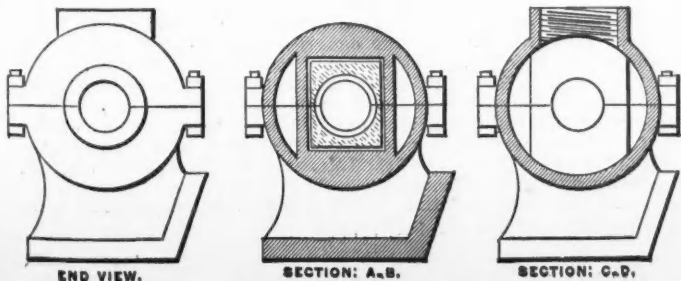


Fig. 9.

FRONT VIEW.

LONGITUDINAL SECTION.



END VIEW.

SECTION: A-B.

SECTION: C-D.

WATER BOX FOR ELEVATOR PULLEYS.

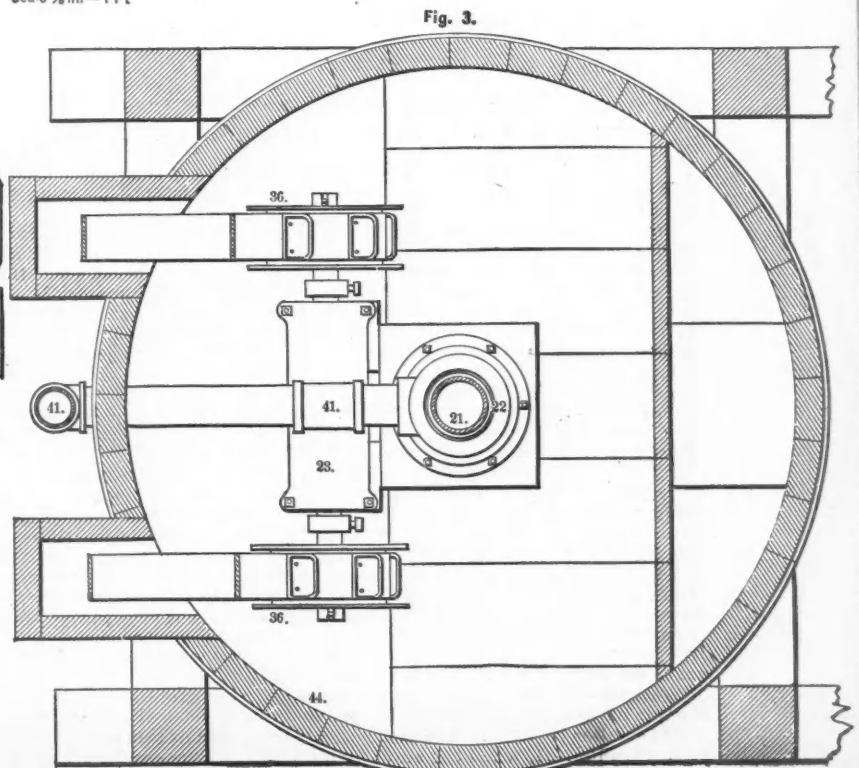


Fig. 3.

SECTION, (HORIZONTAL) ON LINE A-B FIG. 1
Scale 3/8 in. = 1 ft.

Eng. by Am. Bank Note Co. N. Y.

are free from gangue. If there is too much gangue in the product the attendant lets out a hole in the strap from the spring-pole to the lever-beam, to make the shock less violent.

An examination of the bed on the screens during the process of jigging showed the ore lying just above the screen, the greatest depth and largest pieces being near the edge of the screen, gradually thinning out and becoming finer toward the center of the jig, the gangue increasing in depth toward the central point of discharge.

An analysis of samples, taken on October 10th, 1887, gave the following results, the samples being analyzed for iron only:

	Metallic iron. Per cent.
"Stock," or material treated.....	43.56
Concentrates.....	65.90
Tailings.....	22.91

which shows a saving of only 47.4 per cent of the iron contained in the stock.

The chief impurity contained in the concentrates appears to be silica in fine grains. An examination of the tailings shows the lost ore principally in two forms: very fine ore or "slimes," and small particles of ore imbedded in the larger pieces of gangue. The causes of this loss may be summed up as follows:

1. The material is delivered to the jigs dry; hence the fine ore, almost in the condition of dust, is carried over into the tail-race on the surface of the water.

2. There is no classification according to size; and the ore being friable, is crushed finer than the gangue. Hence, without sizing, there is not sufficient difference in the falling-time between the fine ore and the coarse gangue to produce a good separation, and fine ore goes over with the gangue into the tailings. A larger saving would probably be effected by a sizing into at least two classes; still, this would not save the ore which is lost through being imbedded in the grains of gangue.

3. The loss last noted is due to the fact that the material is not crushed fine enough to free the ore from the gangue. The remedy is, of course, a finer crushing; but this would produce a larger percentage of fine ore or slimes, which is not desirable.

A better arrangement for treating this class of ores with this jig would probably be as follows:

1. A wet crushing with stamps, say to the size of $\frac{1}{2}$ inch. The Ball steam stamp would probably work well in this connection, and produce a smaller percentage of fine ore than dry crushing.

2. A first jigging on a set of jigs arranged for this size, practically like those at Lyon Mountain.

3. A screening of the tailings from first jigging by a screen with $\frac{1}{2}$ or $\frac{3}{8}$ -inch holes. The material above that size to be recrushed, either by being sent back to first stamps or by a second stamp.

4. A second jigging of the tailings from the first jigging, which pass through the $\frac{1}{2}$ or $\frac{3}{8}$ -inch screen.

If it may be supposed that the second jigging will be as perfect as the first this arrangement will probably result in the saving of an additional 20 or 25 per cent of the iron contained in the stock.

The economical practicability of this arrangement may be questioned on the ground of expense, taking into consideration the comparatively low price of the product obtained. As I have no means of knowing either the cost of treating per ton of material, or the price obtained for the product, I must leave this point in doubt.

There seems to be considerable room for improvement in the arrangement of the jig. As it now is it is a somewhat clumsy arrangement, and occupies a space 10 x 24 feet (allowing 2 feet of working space around the frame). This could easily be reduced to 10 x 10 feet by doing away with the lever, spring-pole, etc., and giving the motion to the jig-shaft by means of a cam working on a horizontal shaft just back of the jig-shaft. The spring-pole could be replaced by a coil-spring on the vertical shaft, with an adjustable nut to regulate the jar. A suitable bumper could be arranged either above or below the bevel-gear wheel. The action of such an arrangement would be similar to that now produced, with the advantage of economy of space and material.

MICA MINING IN NORTH CAROLINA.—VI.

Written for the Engineering and Mining Journal by Wm. B. Phillips.

(Concluded from Page 398.)

It is proposed in this article to describe the process of dressing the rough mica, or, as it is termed, "block" mica.

The rough mica is hoisted from the mine in blocks of considerable size, weighing from 50 to 250 pounds, tabular in shape, and more or less contaminated with fragments of feldspar, quartz, waste mica, etc. It is the purpose of the dressing to free the blocks from all materials not made use of in preparing cut mica. This is all done by hand, and consists in cleaving a block with thin steel wedges along the planes of lamination, separating it into a number of tabular pieces about $\frac{1}{2}$ inch thick, and as large as the stock will allow. These pieces are then further cleaved until the proper thickness for cut mica is attained, this being according to the use it is to be put to, from $\frac{1}{4}$ to $\frac{1}{16}$ inch, or even thinner. The workman doing this also frees the sheets from adhering quartz, fragments of mica, etc., and passes them to the "scraper."

Scribing is an operation demanding a considerable degree of skill and experience. Upon it depends the yield of cut from block mica. It is performed by laying upon the sheet the pattern by which it is to be cut, and marking or scribing around it with a knife or similar instrument. The patterns are pieces of tin, sheet iron, etc., with the shape and size determined by the order from the mica brokers or dealers in the large cities, or by the stove maker himself. In Mitchell County alone there are about 100 different patterns, and their shape and size is constantly varying according to the fashion for stove windows. The size of cut mica was formerly of much greater consequence than at present. Several years ago there was a regular and systematic increase in value with the increase in size, the quality of course remaining the same. This is true to some extent now, though there appears to be a decided tendency towards smaller patterns. The first noticeable change in this respect was perhaps in 1883-84, when the stove manufacturers were compelled by the

scarcity of large mica to use smaller sheets. They found the change so advantageous to their pockets that they persevered in it, and thus influenced the mica trade no little.

I would not be understood as saying that small mica is as valuable as large mica, but that large sheets are not as valuable as they were ten years ago. There is a limit below which it is not safe to go, and I should be inclined to put it at 3 x 6 inches. The patterns range in size from 1 x 1 inch up to 8 x 10, or as large as the stock will permit, increasing one fourth inch each time. As the value of the mica increases at the same time it becomes necessary to cut from a given rough sheet the largest number of patterns of the highest market value. The price of mica depends not only upon the size, but also upon its freedom from specks, stains, cloudiness and striations, these conditioning its quality. Of late, too, a certain amber or rum colored mica has become fashionable, and fancy prices are sometimes paid for a good lot of extra "rum" mica. The regular colorless or "white" mica, however, commands the bulk of the trade. Certain mines, as for instance, the Clarissa, are famous for "rum" mica.

As, after the scribing, the sheets are cut with heavy shears along the lines marked down it will at once appear that much skill and experience are required of a good scriber. He must be constantly on the alert to furnish from every piece the largest number of valuable cut sheets. With the diversity in patterns and prices, and the variation in the mica itself, this becomes no easy task. A good scriber always commands good wages, for upon his skill depends the yield of cut from block mica. No matter how much block mica is brought to bank, nor how good the quality of it, if the sheets be not properly scribed the yield of cut mica diminishes, and with it the profit. A really skillful scriber will get from a given block twice as much cut mica as a beginner. He sees at a glance just what patterns a certain sheet should yield, he instantly detects flaws, stains, etc., and with a few rapid movements of his marking implement he "scribes" the sheet and passes it to the "cutter," who merely cuts the sheet through along the lines marked. The different sizes are then cleaned of the fine filaments of mica with a stiff brush, wrapped in strong paper, generally in one pound packages, boxed and shipped. As most of the mines lie from 20 to 30 miles from rail, the haulage across country is costly. A railroad now being surveyed down the Toe River, between Mitchell and Yancey counties, will give an outlet north via the East Tennessee, Virginia & Georgia Railroad, and south via the Richmond & Danville (Western North Carolina Division), or the Charleston, Cincinnati & Chicago Railroad, now building. I am proach the subject of the yield of cut mica from block mica with some hesitation. Cut mica is the only product of a mica mine that is sold on a commercial scale. It determines the value of the mine. So much depends on the quality of the blocks and of the rough sheets, whether they are stained, or cloudy, or flawed, or striated, so much depends on the skill of the scriber, and other local conditions that what is here said is to be taken as applicable to average conditions.

On the average, therefore, 100 pounds of block mica should yield from 10 pounds to 12 pounds of cut mica. Instances are not unknown where the yield has fallen to 5 per cent; it has risen at some mines to 33 per cent, and once to 75 per cent. This last yield is very far above the average, and has been obtained only once, so far as I know. With the general average of block mica a 12 per cent yield in cut mica is considered a fair return. These 12 pounds will vary in value according to the quality and size of the patterns, the highest price being \$4 per pound, the average price being not far from \$1.75.

A 12 per cent yield with these figures will give an average value of \$31 per 100 pounds of block mica, or \$420 per ton of 2000 pounds. That the business has been profitable may be realized by remembering as stated in No. 1 of these articles, that in 1880 there was invested in North Carolina mica mines \$6900, and the value of her product was \$61,675. As was remarked then, I cannot say whether these figures are correct or not. One may be allowed one's own opinion, and some would say it is too good to be true. It has been stated* that in the Carolinas the mica is more apt to have a twisted structure, and to be stained or cloudy than the New Hampshire mica. This could be known only by comparing the percentage yield of cut from block mica, as twisted or A mica and strained mica is not included in cut mica.

Prof. Shaler speaks also of the relatively small amount of gangue in the richer parts of the vein compensating for the increased expense of mining Carolina mica. This has less to do with the yield of cut mica than the quality of the blocks. The greater or less preponderance of gangue may, and doubtless does, influence the mining account, and so, indirectly, the balance sheet; but the value of 100 pounds of block mica depends less upon the percentage of gangue than upon the quality of the cut mica obtained from it. The assertion that Carolina rough mica yields less cut mica than that from New Hampshire remains to be proved.

To Libraries, Institutions, and Geologists.—At every session of the International Geological Congress there are numerous geological memoirs, maps and other valuable documents distributed to the members. The editions of these documents, etc., are generally regulated by the number of cotisation fees which have been received by the general secretary, indicating officially the number of persons who expect to take part in the congress. Many of these subscribers do not actually attend the congress, but the papers are sent to them just as if they had done so; and in addition the volume of the proceedings of the session, which is itself a rich mine of the latest researches and generalizations of the best minds. It is announced that for every subscription of ten shillings the sender, whether an institution or an individual, will receive all the documents distributed to members of the congress, and, in addition the volume reporting the discussions, papers and maps of the fourth session. Some of these things can be procured in no other way, and the volume itself, like those which have preceded it, will soon be out of print and only procurable at a much greater cost. Subscriptions should be made at once to William Topley, Esq., General Secretary Committee on Organization of the fourth session of the International Geological Congress, Museum 28 Jermyn street, London.

* N. S. Shaler, 10th U. S. Census, Vol. XV., p. 874.

The Thomson-Houston Company have put up nine 1200 candle-power arc lamps in M. Désiré Giron's factory, at Rouen, France, the power being furnished by a waterfall nearly a mile distant.

Lead Ore Imports from Canada Also.—In addition to the free import of certain lead ores from Mexico, complaint has reached the Treasury Department from Northern Idaho with regard to the large importations being made there of lead ore from the British dominion. Extensive mines of galena have been found on the line of the Canadian Pacific road, and it is being brought across the border into Idaho to be reduced. The complaint says that the ore is of extraordinary fineness, running as high as 60 per cent of lead, and some silver.

Decision on Employers' Liability.—The Supreme Court at Harrisburg, Pa., on May 28th decided that "a party can not recover damages for an injury, which, by the exercise of reasonable care, he might have avoided." This opinion was rendered in a case from Columbia County, in which the lower court decided that a man named Cadow was entitled for damages on account of having received injuries on the track of the Delaware, Lackawanna & Western Railroad Company. The Supreme Court reversed this decision for the reasons stated.

Accumulator Tests.—According to *The Electrician*, Prof. von Waldenhofen has recently carried out at the Electro-Technical Institute a comprehensive series of experiments with storage cells of the Fahrbaky and Schenek, Reckenzaun, and Julien type. The chief object of the experiments was to ascertain the efficiency of each type, especially for tramway purposes; and to eliminate errors in estimating the degree to which the cells had been charged or discharged the experimenter based his investigation on three measurements, viz., the electromotive force on open circuits, the density of the electrolyte, and the potential difference when at work. The efficiency of the Reckenzaun accumulator was found to be 89.3 per cent for the quantity, and 80.85 per cent for the energy. For the Julien accumulator, the figures were respectively 89.7 per cent and 83.4 per cent, whilst the Schenek-Fahrbaky accumulator gave 91 per cent efficiency for quantity and 78.5 per cent for energy.

A Department of Labor.—The Senate, on the 22d inst., after a short debate, passed the bill establishing a Department of Labor, which was passed by the House in substantially the same form some weeks ago. The bill as passed provides that there shall be a Department of Labor, the general design and duties of which shall be to acquire and diffuse among the people of the United States information on subjects connected with labor in the most general and comprehensive use of the word, and especially upon its relation to capital, the hours of labor, the earnings of laboring men and women, and the means of promoting their material, social, intellectual and moral prosperity.

The department is to be under the charge of a commissioner of labor at a salary of \$5000 a year, who is to ascertain among other things the cost of producing articles at the time dutiable in the United States in leading countries where such articles are produced, including the wages paid in such industries by the day, week, month or year, or by the piece, the hours employed per day, the profits of the manufacturers and producers of such articles, and the comparative cost of living and the kind of living.

The commissioner is also to report on the effect of the tariff on agriculture, on the currency, on articles controlled by trusts, etc. He is to investigate disputes between employers and employes, and in general to duplicate almost all this information in regard to the United States, with reports from foreign countries.

Some of the senators are inclined to think it may be vetoed by the President.

Quicksilver and the Tariff.—The following is a list of the articles manufactured from quicksilver in the East, but not in California, and on which the duty is 25 per cent. ad valorem:

Bisulphate of mercury, yellow; cyanide of mercury, iodide of mercury, green; iodide of mercury, red; nitrate solution of mercury; oxide of mercury, black; oxide of mercury, yellow; photo-bromide of mercury; sulphate of mercury, yellow; sulphuret of mercury, black; sulphuret of mercury, with chalk; mercurial ointment, mercurial preparations, vermilion, cinnabar, artificial.

It appears that the Eastern manufacturers, who are protected by a duty of 25 per cent. *ad valorem*, are trying to get a 10 per cent duty taken off the substance which forms the base of their products. They must buy this base in order to make the product. They would sacrifice the quicksilver mining industry of California to benefit themselves, regardless of the fact that our mines are owned by individual citizens, while the foreign mines are owned by governments. The Austrian and Spanish quicksilver miners are paid very low wages, and the mines are so immense that they can largely increase production and flood our markets if they desire.

Spain and Italy levy an import duty on quicksilver, respectively, of 1.60 pesetas on 100 kilos, and 10 francs on 220.464 lbs.

Cadmium.—From Mr. Rudge, of the Denver Zinc-Works, says the Georgetown, Colo., *Miner*, we learn that an appreciable amount of cadmium occurs in the zinc blende from the Mendota mine of this place. There is but one known ore of cadmium, called Greenockite. It is analogous to zinc blende, but a very rare mineral, and has never been found in large quantities. It has an adamantine luster and a honey-yellow to orange-yellow color. Whether the metal occurs in the Mendota in a compound with zinc or as an ore is not known. Cadmium is a white, soft, malleable, ductile metal. It leaves a mark upon paper the same as lead, and when bent gives out a creaking sound similar to that known as the "tin cry." It can be distilled the same as zinc, and when it is set on fire and burns, it gives a brown oxide. It sometimes happens that zinc white is contaminated by this brown powder and rendered worthless as a paint. When alloyed with other metals, cadmium causes them to fuse at a lower temperature; a very little of it renders copper perfectly brittle. It is as a yellow paint that cadmium compounds are most highly prized. By mixing a solution of gum arabic, chloride of cadmium, and hyposulphite of soda together, we obtain a fine yellow paint, which is one of the most durable known to artists. The very property that led to the condemnation of zinc white, and which ultimately brought about the discovery of cadmium, is the yellow color, now most frequently turned to valuable account. The sul-

phate is of similar properties to those of zinc, but much more powerful. It is used in medicine in the treatment of rheumatism and gout; in diseases of the eye as an astringent and stimulant, and for the removal of specks and opacities of the cornea. Manufacturers are becoming accustomed to save the furnace and flue dust of zinc-works, and separate the cadmium from them, and in this way the supply of the metal is increasing.

Relative Efficiency of Locomotives Burning Coarse and Fine Coal.—For many years the Wootten culm or fine coal burning locomotives have been in use on the Philadelphia & Reading Railroad. They were thoroughly tested and introduced under the management of President F. B. Gowen. It appears from the following note, which is announced as "an important test," that the new men are going over the same ground already traveled, and are again learning the lessons and acquiring the experience the company had already paid for. This is one of the drawbacks of new management; the new men have to be educated, and they are generally far above learning from those who go out. Educating employes is always rather a costly matter, and there is probably no other knowledge so expensive as that gained by putting new men as managers instead of promoting those who have become familiar with the duties in subordinate positions.

The "important test" was to establish the relative economy of Wootten and other anthracite burning locomotives. The engines selected for the test were Nos. 933 and 932. The former has what is known as a wagon-top boiler and narrow fire-box, and the latter a Wootten boiler and fire-box. Each engine hauled 145 loaded coal cars from Palo Alto to Port Richmond, and 165 empty cars on the return trip. Engine No. 933 consumed 26,600 pounds of steamboat coal, costing \$2.45 per ton, in making the round trip; and engine No. 932 consumed 32,700 pounds of buckwheat coal, costing 60 cents a ton. The actual cash difference in favor of the latter was \$20.49. For the present no more locomotives of the wagon-top pattern will be built for the coal carrying trade. Engine 915, also of the Wootten pattern, hauled a train from Cressona to Philadelphia containing 2380 tons of coal. This was the greatest single haul ever made on the Reading Railroad.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book buyers, give the retail price! These notices do not supersede review in another part of the Journal.]

Index to Volumes I. to XV., Transactions American Institute of Mining Engineers. Published by the Institute, New York, 1888. Pages 378.

Bulletin of the Philosophical Society of Washington. Vol. X. Containing an Index to the first ten volumes. Published by the co-operation of the Smithsonian Institution, Washington, D. C., 1888.

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.

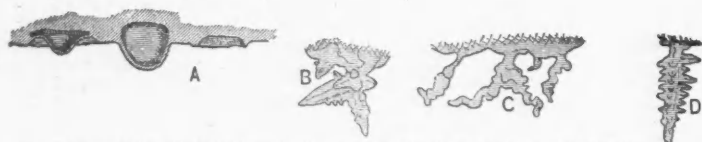
- PATENTS GRANTED JUNE 5TH, 1888.
- 383,857. Governor for Electro-Magnetic Motors. Chas. F. Brush, Cleveland, Ohio.
 - 383,863. Magnetic separator. Gordon Cokking, Glens Falls, N. Y.
 - 383,865. Pipe-Coupling. Alphonse Cote Galway, N. Y.
 - 383,877. Pressure-regulator. Horatio Gale and Christian D. Wiseloge, Albion, Mich.
 - 384,878. Wire-Nail Machine. Almon B. Glover, Birmingham, Conn.
 - 383,901. Electric Power-Controller. Gustave S. Neu, New York, N. Y.
 - 383,911. Nail-Feeding and Distributing Machine. Freeborn F. Raymond, 2d, Newton, Mass.
 - 383,918. Magnetic Separator. Michael H. Smith, Halifax, Eng.
 - 383,919. Insulated Wire. Henry Splittdorf, New York, N. Y.; Assignor to the Splittdorf Wire Company, same place.
 - 383,932. Composition for Making Cement. Justus Wolf, Union, N. J.; Assignor of three-fourths to Sarah B. Folkers, Brooklyn, N. Y.
 - 381,935. Valve for Steam Engines. Walter J. Allen, Springfield, O.; Assignor or two-thirds to Philr. J. Cole and Lawrence J. Hickey, both of same place.
 - 383,936. Brick Kiln. William Allop and Samuel H. Alst, Mokena, Ill.
 - 383,957. Manufacture of Carbonic Acid and Heavy Magnesia. Henry Leffmann, Philadelphia, Pa.
 - 383,963. Valve Gear. Robert Mackay, Warren, Pa.
 - 383,971. Blow-Pipe Furnace. Francis J. McLaren, New York, N. Y.
 - 383,976. Rotary Valve. James O'Donnell, San Francisco, Cal.
 - 383,986. Breaker and Crusher. Frederick L. Preston, Darien, Wis.
 - 383,990. Rolling Mill. John T. Richardson, Harrisburg, Pa.; and Aaron Rapp, Holland, N. J.; Assignors of one-third to A. H. Ege, Mechanicburg, Pa.
 - 383,996. Rotary Pump. Oswald Seifert, San Francisco, Cal.
 - 384,009. Triple Valve for Air-Brakes. George B. Williams, La Crosse, Wis.
 - 384,012. Shaft-Coupling. Simon H. Barnes, Lanesborough, Pa.
 - 384,023. Anti-Friction Bearing. Frank Co-batt, New York, N. Y.
 - 384,031. Corrugating Machine. Samson Fox, Leeds, Eng.
 - 384,035. Electro-Magnetic Separator. Joseph B. Hamilton, Springfield, Mass.
 - 384,041. Machine for Excavating. Charles S. Jones, Yates Centre, Kas.
 - 384,050. Hydraulic Pump. John H. Martin, Oroville, Assignor of one half to Joshua Hedy, San Francisco, Cal.
 - 384,051. Lubricator. Rodney Mason and Jesse M. Smith, Detroit, Mich.
 - 384,056. Valve. Patrick W. Meehan, Providence, R. I.
 - 384,058. Separating Machine. Andrew J. Miller, Arion, Ohio.
 - 384,063. Rolling Mill. Charles A. Nighman, Canton, Ohio.
 - 384,065. Piston Meter. John R. Norfolk, Boston, Mass.
 - 384,073. Pipe Coupling. Benjamin W. Poh, Buffalo, N. Y.; Assignor to himself and Philip Steingotter, same place.
 - 384,075. Hand Charger for Combining Metals with Chemicals, Minerals, etc. Paul S. Reeves, Philadelphia, Pa.
 - 384,080. Pipe Expander and Cutter. Samuel A. Ross, Erie, Pa.; Assignor of one half to H. R. Barnhurst, same place.
 - 384,081 and 384,082. Cylinder Welding Apparatus. Thomas F. Rowland, New York, and Warren E. Hill and Angus McLachlan, Brooklyn, N. Y.; said Hill and McLachlan Assignors to said Rowland.
 - 384,087. Operating Lever for Valves, etc. William Scott, Malden, Mass.
 - 384,091 and 384,092. Die for Making Rolled Forgings. G. F. Simonds, Fitchburg, Mass.
 - 384,117. Governor for Electric Motors. William Baxter, Jr., Baltimore County, Assignor to the Baxter Electric Manufacturing and Motor Company, Baltimore, Md.
 - 384,118. Interlocking the Edges of Metal Plates. Franz C. Bellinger, Fulda, Prussia, Germany.
 - 384,119. Boiler-Feeder. Ambrose Blatchley, San Francisco, Cal.
 - 384,125. Feeder for Stone-Sawing Machines. Philip Christa, Detroit, Mich.
 - 384,132. Gas-Governor. B. Frank Day, Sellersville Pa.
 - 384,137. Apparatus for opening Furnace Doors. Frank Doyle, Chicago, Assignor of one half to John Birstow, Lake View, Ill.
 - 384,165. Mining Drill. John R. Howells, Plymouth, Assignor of one half to Richard M. Howells, Wilkes-Barre, Pa.
 - 384,172. Crushing-Mill Roller. George E. Noves, Washington, D. C.
 - 384,186. Direct-Acting Engine. Gustav A. Barth, St. Louis, Mo.; Assignor to Pierre Chouart, same place.
 - 384,196 and 384,197. Metallic Bridge. Martin Leonard Edmond Duval, Paris, France, Assignor to the Compagnie de Fives-Lille, same place.
 - 384,213. Cut Off for Steam-Engines. Bruno V. Nordberg, Milwaukee, Wis.; Assignor to the Bruno Nordberg Company, same place.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(Continued from page 366.)

2d. Intrusions apparently caused by the entrance of gas from the surrounding metal after the walls of the blowhole have become pasty. They consist chiefly (A) of little knobs, which the gas has forced into the blowhole but has not burst: (B) of pits, the remains of knobs which have burst (Fig. 19 A).



Figs. 19 A to 19 D.—MICROSCOPIC INTRUSIONS IN BLOWHOLES. MARTENS.

3rd. Intrusions of metal apparently due, not to the escape of gas but to change of volume in the surrounding metal, whether due (A) directly to the necessarily irregular changes in the temperature, which, though generally falling, yet perhaps occasionally rises as in the "after-glow": or (B), as Martens believes to the solidification of the different components of the mass at different

in a zone parallel with the outer surface, and with the axes of the blowholes normal to that surface, as in E, Figure 20, characterizes rather hard steel: with soft steel the blowholes are less regularly disposed, and a larger proportion is found nearer the center.

The shape and position of these blowholes are closely like those of the bubbles in ice. We note in Figures 21 to 23[†] that the ice bubbles are in general tubular, occasionally lenticular, or even spherical as in Figure 22. The length of the tubules is always normal to the cooling surface, and appears to be nearly independent of gravity.^b Thus Figure 23 shows the cross section of ice formed at and just below the shoulder of a common sherry bottle, which stood in the position here shown while the ice was forming. Here the bubbles are everywhere normal to the cooling surface, even when, as in the upper portion of the figure, this compelled them to grow downwards. Figure 22 gives a cross section of the same ice ingot taken lower down. Here we have, exactly as in a steel ingot, first a row of external tubules, then a quite compact region, then a second row of cavities, this time nearly spherical bubbles, then another comparatively compact zone, and finally a core decidedly porous or even friable.

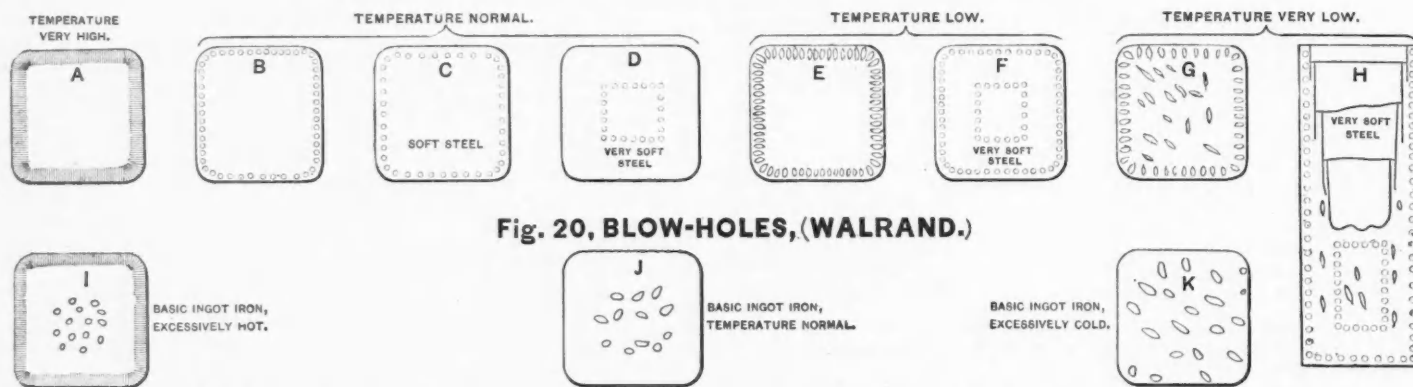


Fig. 20, BLOW-HOLES, (WALRAND.)

A to H, Walrand, Van Nostrand's Engineering Magazine, XXXIII., p. 353.

I to K, J. Hartshorne, private communication.

periods, each changing volume as it solidifies: or (C), as we may conjecture, to the successive births of different definite minerals from the mother magma, with decrease or increase of volume as the new-born mineral is denser or less dense than the mass from which it springs. While these intrusions sometimes consist of simple crystals, Figure 19 B, they are more often irregular, Figure 19 C, or of fir-tree shape, Figure 19 D.

Chernoff, too, finds twisted dendritic crystals, like those of Figure 26, on the upper sides of the blowholes.

Figure 20 and the last column of Table 71, § 202 C, indicate the usual positions of blowholes. If the temperature be excessively high, fine, closely-packed, elongated, external blowholes form, as A, Figure 20, together with sporadic central ones if the metal be very free from carbon as in I. It is said that if the temperature be normal or low, the blowholes are wider, and tubular or lenticular. With a normal casting temperature they lie, in case of hard steel, chiefly in a zone very near the exterior as at B: in softer steel they lie nearer the center as in C, D and J. If the temperature be rather low, the blowholes lie as in E and F: and if it be excessively low the ingot becomes spongy as at G; while if the metal at the same time be very soft it rises violently, nearly half emptying the mould, as at H and K.^a

In general, the regular arrangement of the blowholes

Downward growing tubules are also shown in Figure 21, a vertical section of an ice ingot which stood while freezing in the position here shown.

The tubular form of the blowholes in ice and iron is readily accounted for. While part of the first-evolved gas may swim to the upper surface, another part attaches itself to the already solidified walls in minute spheres.^c Into a bubble already formed gas evaporates from a saturated liquid much more readily than if no bubbles are present,^d as is illustrated by the bumping of many boiling liquids. Hence whatever gas is evolved in the neighborhood of the bubble, by preference passes into it and augments its size. But meanwhile the freezing is progressing, and, as a bubble is a poor conductor of cold (more accurately, of heat) freezing occurs by preference between the bubbles. And so freezing and tubule-growth take place together, the walls expelling gas as they grow, and on this gas the tubules feed. If the evolution of gas in-

[†] Figures 21, 22, 23 and 24 will appear in our next issue.

^b Figures 21 to 23 are from photographs of ice ingots prepared by the author.

^c In a freezing water-bottle a persistent rising of minute bubbles occurs simultaneously with the formation of the tubules.

^d For an admirable elementary explanation of the principles of surface tension see Maxwell, Theory of Heat, pp. 279 et seq.

In a freezing ice bottle in which tubules are forming the spherical ends of the gas bubbles in the tubules appear to project beyond the already frozen walls into the still liquid centre: but this cannot be seen very distinctly. Conversely, when a tubule-holding lump of ice melts in water, the ice may melt quite a distance back from the end of the tubule, leaving a spherical bubble of air, which very clearly projects into the water, but eventually, after the ice has melted back far enough, the bubble detaches itself and rises to the surface.

* Copyright by the Scientific Publishing Company, 1887.

^a Van Nostrand's Eng. Mag., XXXIII., p. 362, 1885.

creases more rapidly than the freezing, the tubule will increase in diameter as it elongates, and it may reach such a size that gravity overcomes capillarity, and that a bubble detaches itself and swims to the surface.

I have noticed many horizontal tubules in growing ice of the form of Figure 24.

Chernoff believes that iron solidifies, not in approximately regular parallel layers, but by the growth of pine-tree crystals, whose trunks and branches mechanically imprison the evolved gas and prevent its swimming to the surface. He attributes the twisting of the dendritic crystals (Figure 26) at the top of the blowholes to the partial rise of gas bubbles, which part and even detach the branches of the pine-tree crystals.^a

Now, as we shall see in Chapter XIII., the solidification of iron is doubtless a species of crystallization: witness the ingot's columnar structure, most marked near the

beyond the solid growth to detain bubbles mechanically. For Müller found, on pouring out the interior of partly frozen ingots at various stages of solidification, and thereby revealing successive stages of the growth of blowholes, that the inner walls of the hollow ingot were remarkably smooth and even, though perforated with many blowholes in case of rising steel. (Figure 32).

To obtain a little side light on this question I applied the same device to freezing ice-ingots and found their walls very smooth, though perforated with many tubules. With a lens I detected a slight convexity over the mouths of certain blowholes: but apart from this I could detect no excrescences. The mouths of other blowholes were open, showing that the gas bubble probably projected into the still unfrozen water. Yet in the central vugs of one ice-ingot which had cracked and bled, I found large crystals of extraordinary beauty. I often noticed that the first



Fig. 25.



Fig. 26.—Dendrite from a blowhole. Chernoff.

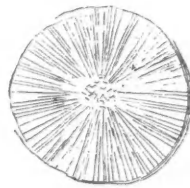


Fig. 27.—Columnar structure of ingots. Chernoff.

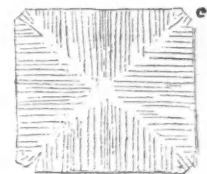


Fig. 28.—Pipe. Magnified four times. Chernoff.

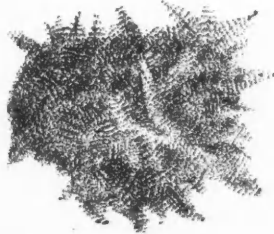


Fig. 30.—Crystals from a pipe in steel. Magnified four times. Chernoff.



Fig. 31. Pine-tree crystal from iron. Knop.

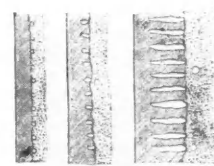


Fig. 32.—Growth of blowholes. Müller.

shell, and in small ingots extending to the center, producing strong radial markings in circular and a maltese cross in square ingots, (Figures 27-28). Indeed, iron occasionally develops beautiful pine-tree crystals, actual in-

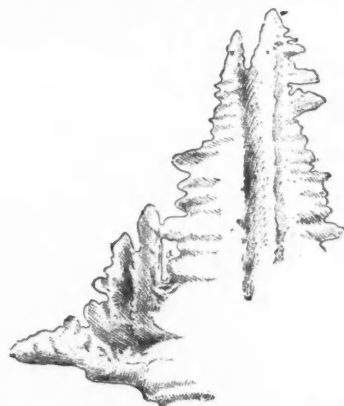


Fig. 29.—Crystal from a pipe in steel. Magnified 70 times. Chernoff.

stances of which are shown in Figures 25,^b 29, and 31. One crystal in the former is 2.25 inches wide. Still, it is improbable that the tree-tops usually protrude far enough

^a Revue Universelle, 2d Ser., VII., p. 153, 1880.

^b Figure 25, from a photograph, represents a bunch of crystals kindly sent me by Mr. John Fulton. It is from the sinking-head cavity of a large steel ingot. Iron, Jan. 5, 1883, p. 18; Sept. 14, 1883, p. 244.

skimming of ice on the upper surface of the water would form through beautiful long needles, which shot across from side to side, as happens in ponds on still nights: yet if the resulting ice-ingots were emptied when partly frozen, the sides of the cavity were invariably smooth and free from excrescences, with perhaps one exception. In one case I found beautiful fig-leaf crystals at the top of an ice-ingot whose interior had been poured out when perhaps one-sixth of the whole was frozen. From the position of these crystals I fancy that they may have grown in a vug. But, though great pains were taken to pour the water from this ingot so gently that it could not wash off any delicate crystals, the sides of the cavity were extremely smooth, showing at most suggestions of crystalline markings, but perforated with many growing blowholes. In the same way I have often noticed that, on pouring out the interior of a partly solidified block of slag, the sides of the cavity were smooth and free from crystalline markings, although the solidified portion had a strong columnar structure, and although, if allowed to solidify completely, the vugs, even those very near the upper surface which were probably formed early, were usually lined with beautiful and in some cases marvelously beautiful crystals.

(TO BE CONTINUED.)

PERSONAL.

Ezra H. Baker, President American Loan and Trust Company and a director of the Union Pacific Railway Company, died in this city on the 7th inst.

Mr. Fred. F. Chisolm, mining engineer, of Denver, Colorado, has been examining the property of the Alabama Gold Mining Company, in Talladega County, Ala.

Mr. C. W. Kempton, of Messrs. Kempton & Thacher, mining engineers, New York, has gone to Silverton, Colo., to assume charge of the San Juan Chief Mill, at Mineral Point.

Mr. Benj. Baker, the English engineer, is about to take charge of the Tehuantepec Ship Canal and push it forward to completion. The estimated cost of the canal is \$40,000,000.

Mr. John Gibson, who has been superintendent of the mines of the Colorado Coal and Iron Company at Crested Butte, Colo., has been superseded by the appointment of Thomas Lawther.

Mr. David Spence, for several years the superintendent of the foundry of G. W. Brown & Co., Galesburg, Ill., has resigned his position to accept that of superintendent of the Sagamore Manufacturing Company, at Valatia, N. Y.

Mr. Edward E. Higgins, formerly of the Standard Electric Company, Vermont, has accepted a position with the Sprague Electric Railway and Motor Company, as managing agent for Eastern New York, with headquarters at Buffalo.

Mr. F. Harrison Garrett, a brother of Robert Garrett, and manager of the banking firm of Robert Garrett & Sons, of Baltimore, was drowned on the 7th inst. by the collision of his yacht, on which he and a party of friends were cruising, with the steamer "Joppa" in Patuxco River, Md. Mr. Garrett was a director of the Baltimore & Ohio Railroad.

Mr. E. Windsor Richards, who for the past 12 years or more has been the general manager of Bolckow, Vaughan & Co., resigned his position, the duties being too arduous, and accepted the position of managing director of the Low Moor Iron-Works, near Bradford, England, at the same time being elected a director of Bolckow, Vaughan & Co. Mr. Richards is well known to American iron makers, having visited this country some years since. The directors of Bolckow, Vaughan & Co. have decided that Mr. Franklin Hilton, who for the last eight years has been the chief engineer and assistant general manager at their works, shall be appointed his successor.

One of the most distinguished of our American mining engineers, Prof. John A. Church, who is now in China in a very important position, writes as follows: "I read the JOURNAL with great interest, now as ever, and think you are making a remarkably good paper, but unless you are willing to change your vernacular, I doubt if you can much advance your circulation here. In fact I believe you have a clean sweep of the colonists here. You might advertise that every English speaking person in Mongolia takes the JOURNAL! It would prove your great popularity." This very agreeable and complimentary testimony has, however, a far wider significance than merely showing the popularity of this paper. It shows the widespread appreciation of American mining and metallurgical practice and American machinery and appliances abroad, and to this appreciation the ENGINEERING AND MINING JOURNAL has contributed in no small degree, and to this also no doubt it owes the fact that it possesses the largest foreign circulation of any American trade or technical periodical.

FURNACE, MILL, AND FACTORY.

The Whitaker Iron Company, Wheeling, W. Va., started up three of its sheet mills on the 4th inst., three shifts on each mill.

The Standard Foundry Manufacturing Company, of Cleveland, Ohio, has contracted for the rebuilding of its works, which were destroyed by fire some time ago.

At the Riverside Iron-Works, Wheeling, W. Va., the tube department is on in full. The plate mill, steel works, furnace and nail factory are running as usual.

The No. 2 furnace of the Nashville Iron, Steel and Charcoal Company, of West Nashville, Tenn., recently blown in on charcoal, on the 31st of May made 57½ tons of iron.

The trustees of the Bridgewater Iron Company, of Bridgewater, Mass., have declared another dividend of 10 per cent, making 40 per cent which has been paid toward the indebtedness of the company.

The stack of the Tecumseh (Ala.) Iron Company was blown in on the 2d inst. The furnace has been put in repair by the addition of a new hearth, in-wall, counter-wall and bottom, and the bush has been increased to 30 feet.

The Cooke Locomotive and Machine Company, of Paterson, N. J., is about to put on the market a new high-speed automatic engine under patents of Mr. James T. Halsey. The engine, it is stated, will be built in all sizes suited to electric systems.

The Franconia Iron Company, of New Hampshire, chartered in 1805, and which for more than three quarters of a century operates its mine in Franconia, paying from 10 to 30 per cent dividends annually, has been

idle for some time, but is now in process of reorganization.

The Sprague Electric Railway and Motor Company report business as excellent, and constantly on the increase, with large sales of standard motors, and in addition the company has closed contracts for the equipment of a railway at Steubenville, Ohio, also the Naumkeag road at Salem, Mass.

The proposition of General Manager John H. Flagler, making the reduction 7½ per cent on wages of \$2 per day and under, and 10 per cent for wages over \$2 per day, the employees of the National Tube Works Company, McKeesport, Pa., have decided to accept the same, and the works will continue as usual.

Work has been commenced on the buildings of the Universal Horse Shoe Works, Anniston, Ala. A meeting of the stockholders of this company will be held in Birmingham on June 25th, for the purpose of considering whether or not the company shall increase its capital stock from \$175,000 to \$300,000.

The Link Belt Machinery Company, of Chicago, has purchased 5½ acres on Thirty-ninth street, at the Fort Wayne Railroad crossing. On this tract a foundry is to be erected for the production of machine castings, pulleys and gearing, the Jefferson street property being required for machinery purposes.

The Standard Mineral Company, of New York, the mill of which was recently destroyed by fire, as reported in our issue of May 26th, is making arrangements to rebuild the works. We are officially informed that the loss by the fire is now found to be \$32,000, with \$13,300 insurance. This company is an extensive shipper of feldspar and silica, used chiefly in the manufacture of pottery ware, and its suspension will cause considerable delay to many manufacturers.

The wages of the employees of the Reading Iron-Works, Reading, Pa., are to be reduced 10 per cent. June 18th. The reason given is dull trade and want of orders. Similar notices will be issued at the rolling-mill of Messrs. McIlvaine and the Keystone Iron-Works. Reports state that similar reductions will go into effect in all the larger iron mills in Eastern Pennsylvania. Grave fears are entertained that the Knights of Labor iron workers will refuse to accept the reduction and that some of the mills will be closed.

CONTRACTING NOTES.

Machinery and supplies wanted. See page xiv. Contracts open will be found on page xix. New contracts this week: No. 914, Sewer Construction; No. 915, Street Lighting; No. 916, Water-Works; No. 917, Excavating, Filling and Pipe Laying; No. 918, Sewers; No. 919, Iron Shore Protection; No. 920, Cast Iron Water-Pipe; No. 921, Water Works; No. 922, Bridge.

A contract has been given to the Westinghouse Air Brake Company, Pittsburg, Pa., to put its brakes on 1000 freight cars and 200 locomotives.

The Navy Department, Washington, D. C., has received the following bids for steel for use in the construction of the United States armored cruiser Maine, to be built at New York. The three bids for steel plates were as follows: Linden Steel Company, of Pittsburg, at \$120,422; Carnegie, Phipps & Co., of Pittsburg, \$89,779; Chester Rolling Mills, of Chester, Pa., at \$114,240. Carnegie, Phipps & Co. made the only bid for steel shapes, their price being \$35,986. They also bid for steel rivets at \$9737. Oliver Bros., of Pittsburg, bid \$1584 for this class. The Standard Steel Company, of Thurlow, Pa., bid for steel castings at 18½ cents per pound. The other bids for castings were: Midvale Steel Company, of Nicetown, Pa., at \$56,448, and the Pittsburg Steel Casting Company, at \$50,176.

GENERAL MINING NEWS.

Shipments of iron ore from the mines of the districts mentioned below for the season up to and including May 30th, as reported by the Marquette Mining Journal, were as follows:

	Tons.	Tons.
Marquette, Marquette District.....	1887.	1887.
St. Ignace, " "	33,629	103,797
Escanaba, " "	20,739	14,447
Menominee District.....	86,004	142,247
Gogebic District.....	124,181	179,112
Ashland, " "	31,728	103,792
Two Harbors, Minnesota Iron Company, Vermillion District.....	64,244	28,188
	14,433	
	374,948	571,613

SHIPMENTS OF IRON ORE, GOGEBIC DISTRICT.—Shipments of iron ore from Ashland and Escanaba, the mines of the Gogebic District, for the season, up to and including May 30th, are as follows:

	Tons.	Tons.	
Anvil.....	2,032	Iron King.....	1,444
Ashland.....	11,996	Montreal.....	2,808
Aurora.....	17,294	Norrie.....	35,347
Brotherton.....	3,139	Odanah.....	1,813
Colby North.....	1,025	Patst.....	2,900
Colby South.....	11,644		
Colby, 15 South.....	1,141	Total tons.....	96,972
Germania.....	3,429		

TENNESSEE COAL, IRON AND RAILROAD COMPANY.—Official advices to us show that the Tracy City Division of this company during May produced 13,527 tons of coal and 1,466 tons of coke, making a total from January 1st of 77,960 tons of coal and 65,190 tons of coke.

Messrs. F. D. Presco & Co., of New York, who supply mining and other companies with laborers, tell us that they are in every way satisfied with the results of their advertisement. They are now negotiating for the supplying of Italian laborers to the following companies: Londonderry Iron Company, of Nova Scotia; Clarendon & Pittsford Railroad Company, of Vermont; New York, Ontario & Western Railroad Company, and the New York Central & Hudson River Railroad Company.

ALABAMA.

CALHOUN COUNTY.

It is reported that ocher beds have been discovered at Jacksonville, and J. A. Gaboury and others will soon erect a paint mill to utilize it.

ARIZONA.

YAVAPAI COUNTY.

The building occupied as the office, assay office, and residence of Frank Cockburn, manager of the Arizona Sampling Works, at Prescott, was totally destroyed by fire May 30th, with nearly all the contents, the only things saved being the assay scales and a portion of the contents of the assay office.

CALIFORNIA.

AMADOR COUNTY.

AMADOR GOLD MINE.—The Amador Ledger reports that Mr. A. P. Minear, manager of this mine, has arrived from New York. He states that the company is going to put in air compressors and power drills, and put up larger hoisting works on shaft No. 3. That he is now arranging to have a 60-stamp mill erected, which is under contract at the Pacific Iron Works in San Francisco, and is in hopes to have it ready to run this fall before the rainy season sets in. The mill will be set 250 feet from shaft No. 3, and 50 feet lower than the collar of the shaft, so the ore will be dumped in at the top of the mill. The east drift is in 80 feet from shaft No. 1, west drift 295 feet, and the south drift is in 149 feet, and the south or shaft No. 3 is down 116 feet.

NEVADA COUNTY.

BOSTON RAVINE.—Mr. John Hays Hammond has commenced a suit in the Superior Court for a partition of the Boston Ravine mine, formerly constituting a portion of the Massachusetts Hill claim at Grass Valley. The co-owners and defendants are B. McGrath, David Watt, Dan Collins, John Taaffe and Thomas J. Taaffe.

BRUNSWICK GOLD MINING COMPANY.—We are officially advised that reports from the mine, dated the 30th ult., state: "Since mine of 23d inst., the ledge in the west drift toward the Idaho has again improved, showing now a vein fully 9 inches thick, with a fine foot-wall and gouge, showing indications of the approach of a permanent shoot. I expect developments on this now every day, and will write you immediately upon any improvement. "In the east drift, regardless of the extra force put on there last week, we have still 50 feet to go before we unwater the old shaft ledge, still showing well in bottom. The plan I promised is not completed yet, the surveyor having been away for some days."

GOLD POINT.—According to the Grass Valley Tidings, work is to be resumed on this mine at Union Hill, and a stamp-mill erected. For ten years the mine has been worked spasmodically, and in that time a tunnel 1500 feet in length has been carried in the hill on the vein. Operations will be resumed at the face of this drift and an endeavor be made to demonstrate that even \$7 ore can be worked to advantage. A contract has been made with the Grass Valley Water Company (Bourn & Co.) to supply power for the mill and water for other purposes in which it will be required.

PLACER COUNTY.

Judge Sawyer in the United States Circuit Court granted an injunction May 28th, to Maria D. Valentine against Samson D. Valentine and others, restraining them from taking any gold-bearing or other ore from the Little Pine Tree, Big Oak Tree, Werry, or Golden Eagle mines, near Colfax. Complainant is to furnish \$10,000 bonds, and the injunction holds until a further order of the court is made. The complainant is plaintiff in a suit of ejectment at present pending in the U. S. Circuit Court.

CANADA.

PROVINCE OF NOVA SCOTIA.

Reports from Halifax state that John R. Bothwell of New York has interested several New York capitalists in the purchase of a number of Cape Breton coal companies, which are to be consolidated into one management. Among the companies selling to the syndicate are the Sydney & Louisburg Coal and Railway Company, the International and the Caledonia Company. It is also likely that a number of collieries now owned in Halifax will be taken into the consolidated company.

Our own advices from Nova Scotia state that the effort was to get all the Nova Scotia collieries into the syndicate, but that this scheme failed.

PROVINCE OF ONTARIO.

COLLINGWOOD ROCK WELL COMPANY.—By the explosion of two torpedoes in the 500 foot gas well shaft at Collingwood on the 1st inst., the flow of gas was increased. There are indications of the presence of gas in West ward also, and the company is going to sink a shaft there.

PROVINCE OF QUEBEC.

NICHOLS' ALBERT MINES AND CAPELTON CHEMICAL WORKS.—For the last year and a half the famous old Albert copper mines, situated at Capelton, Province of Quebec, Canada, have been a scene of greatly increased life and activity. Messrs. Geo. H. Nichols & Co., of 41 Cedar street, New York, who are the owners both of the Albert mines and Capelton

Chemical Works, as also of the Laurel Hill Chemical and Copper Works on Long Island, showed their good judgment and their faith in these mines when, during the depression in the copper market, instead of abandoning the properties, they determined to meet the difficulties by introducing every labor-saving appliance they could, and so improving their whole plant that they would be able to continue the mining, concentration and shipping of their ores to this city at a profit, even during the most unfavorable state of the markets. This work of the entire reconstruction of their whole plant is now finished, and all the departments are running most successfully, and a short description of the new works will not be uninteresting.

The vein is being worked now from three shafts instead of one as heretofore. The shafts, which are numbered 1, 2 and 3, are respectively 800, 500 and 150 feet deep; they are all inclined at an angle of about 60° and cut diagonally through the ore chutes of the great deposit. The ore mineral is a mixture of copper and iron sulphides in a gangue of quartz and talc. Each of the three shafts has been most thoroughly equipped with first-class machinery. Numbers 1 and 2 are worked by large automatic dumping skips, operated by a 150 horse-power double drum engine, and number 3 shaft is run by an independent 50 horse-power engine.

The new crushing and concentrating mill is situated exactly over No. 1 shaft, and is so connected by surface incline planes with shafts 2 and 3 that the ore from all these shafts is delivered automatically to the dressing floors, and crushed, sized and concentrated without any but mechanical handling, except at the picking tables, where boys do the actual sorting. The whole design of these works reflects the greatest credit on Messrs. Copeland & Bacon, contractors for the plant, and Mr. Earle C. Bacon, who is the consulting engineer for the company, and from whose designs and under whose direction, aided by the superintendent, Mr. Richard Penhale, the work has been so successfully carried out. The crushing and concentrating mill is run by a 100 horse power cut-off engine, supplied with steam from a battery of 400 horse-power boilers. In addition to the mill engine, the boilers supply steam for two large air compressors, an Ingersoll and a "Norwalk Compound," which supply and run 18 drills underground.

The ore coming from the three shafts is first dumped from the automatic skips on to a "grizzly," with the grates set three inches apart; below this "grizzly" is a second one with the grates set one inch apart. All the material which will not fall through the upper "grizzly" is fed direct to the large 30 by 15 Farrel foundry Blake crusher, from which the ore is discharged on to the second "grizzly" with the fines from the first "grizzly." What passes through the one-inch bars goes on down to the concentrators, but all the material between 1 inch and 3 inches is fed to an endless picking table. Boys are stationed on each side of this table and pick out the lean and barren rock. The lean ore goes to a 20 by 6 crusher and thence to two sets of 30 inch Cornish rolls and from these to the concentrators, while the clean and rich ore is discharged over the end of the traveling table and fed to two 20 by 6 crushers, from whence it drops into bins and is ready for shipment. The fines from the screens and the lean ores from the tables are conveyed to the double compartment plunger jigs, of which there are six, and the concentrates are conveyed into bins for shipment. The ore from these bins is then fed automatically again into the buckets of a wire rope tramway, which carries it down the mountain side and delivers it direct into the railroad cars, 4500 feet from the mine. This tramway, which has also proved a very great success and a source of great economy, was built by the Trenton Iron-Works of Cooper, Hewitt & Co., of New York. The capacity of mill and tramway is 300 tons per day. The fines from the mines are conveyed by tramway to the chemical works at foot of the hill and made into sulphuric acid. This is probably the most complete sulphuric acid plant on this continent. It will thus be seen that practically, from the time the ore is first loaded into skips at the bottom of the shafts, its progress through all the different operations of sizing, crushing, separating, concentrating and transporting to railroad is entirely automatic.

Both the designing and carrying out of the whole plan is worthy of great commendation, and is an example of mechanical skill well worth examining and following by mining engineers in general.

COLORADO.

FREMONT COUNTY.

Well 9 at the Florence, says the Florence Oil Refiner, has been abandoned after drilling beyond 3200 feet where rock was encountered, making it impossible to go any farther. They will probably shoot the hole. The drill has been started on well 10.

It is stated that the first car of naphtha ever made in the State was recently shipped from Florence to Denver.

SAN JUAN COUNTY.

OLD LOUT MINING COMPANY, LIMITED.—The transfer of the property to the company to the organization of which we referred in our issue of March 31, has been effected. Under the contract for purchase of mine, this company is entitled to all ores won as from the 1st day of December last, and pays expenses as from 1st of March. The advices from the mine are satisfactory.

SUMMIT COUNTY.

CASSANDRA MINING COMPANY.—The company is still prosecuting work in the old Warrior's Mark shaft. The shaft is being sunk beside the ore-body, and no effort has yet been made to explore its extent. It is stated that the mine is improving constantly.

DAKOTA.

Professor F. R. Carpenter, of the Dakota School of Mines, states that he has received at the School of Mines three different applications for designs of tin mills, and has made arrangements with several parties for the treatment of tin ore at the school.

LAWRENCE COUNTY.

DEADWOOD REDUCTION COMPANY.—At a recent meeting the following officers were elected: Harris Franklin, President; J. H. Adams, Vice-President; Geo. Hickok, Secretary and Treasurer; C. W. Carpenter, Ben Baer, Seth Bullock, Executive Committee; R. D. Clark, Superintendent. It was decided to begin forthwith with the rection of the new works at Deadwood. Mr. Clark will visit New York and other points to purchase machinery.

IRON HILL MINING COMPANY.—A force of 18 men is at present employed upon the various levels of this mine. The diamond drill is also in constant and continuous operation, and recently, it is said, penetrated a six-foot body of low grade ore on the 200 level.

PLUMA CONSOLIDATED GOLD MINING COMPANY.—The last installment due on account of the purchase of the Snow Storm 20-stamp mill has been paid by this company owning the Minnie tunnel property, situated on the hill adjoining that on which are located the Homestake group of mines. Operations will begin at once.

PENNINGTON COUNTY.

CLEVELAND TIN MINING COMPANY.—The Deadwood Pioneer is authority for the statement that this company, of the Nigger Hill district will build tin reduction works with a capacity of 200 tons per day on Sand Creek and connect it with the mine by means of a narrow gauge railroad.

IDAHO.

ALTURA COUNTY.

CARRIE LEONARD MINING COMPANY.—At a meeting of the stockholders, held at Salt Lake City, recently, the following resolution was adopted: "Resolved, That the articles of agreement or incorporation of this company be, and the same are, changed and amended in the following particulars, to wit: The amount of the capital stock of said company shall be increased from \$3,000,000 to \$4,000,000; the number of shares of stock is increased from 150,000 shares to 200,000 shares; the par value of said shares shall remain at \$20 each, thus making the capital stock \$4,000,000, divided into 200,000 shares; that the shares now issued be returned and canceled, and for each share returned and canceled, the holder shall be entitled to receive one share, and that the officers of said company issue said shares accordingly."

MICHIGAN.

Our correspondent writes us from Ishpeming, June 5th, as follows: An astounding discovery of native gold in the Sugar quartz veins on the Michigan Gold Company's tract of land near Ishpeming is reported. Specimens are on exhibition at the National Bank in this city. It was found near the surface, about 1200 feet east of the shaft put down last summer on this same ground. The vein is the same as the celebrated Bonanza found in the Superior shaft. It had been stripped last summer and brushed clean for three-quarters of a mile, and numerous specimens of free gold found at intervals all the way. Besides many branch veins running northwest and southeast, the main veins running almost due east and west were uncovered and looked rich. The Michigan folks feel elated over the discovery.

The Superior shaft is being pumped out and sinking will at once commence. The bottom of the Michigan shaft, seventy feet deep, looks well; work is also going on there. Many pieces of gold in size from a bean to mustard seed were plainly visible in the specimens brought in. There now appears to be no doubt about the immediate development of this gold field.

The forty stamps at the Ropes are pounding away on good pay rock. The second, seventh and eighth levels look especially well at this mine. The Ropes is a distinct vein one mile north and two east from the others. It is in soft magnesian rock, while the Michigan Superior is in diorite; both are true fissures and all that could be asked geologically.

Locally the excitement rather beats politics, and as gold does not ask for a tariff in order to live, both parties are satisfied.

Iron ore is going forth in some volume, but sales are not made, for the reason that mine owners are a trifle above the market in their demands, while furnacemen are holding off or only buying for their present use in hopes of lower prices still. From July on things will rush.

ROPES GOLD AND SILVER MINING COMPANY.—The new twenty-stamp mill of this company has been put into operation, and is working satisfactorily.

COPPER MINES.

The output of mineral (about 80 per cent copper) of the seven leading copper mines of Lake Superior in May is given by the Boston Transcript as follows:

Mines.	May.			Jan. 1 to May 31.		
	1888.	1887.	1886.	1888.	1887.	1886.
Calumet & Hecla	2,593	2,781	2,694	10,983	13,542	12,978
Tamarack	625	301	200	3,120	1,487	985
Atlantic	256	203	181	1,175	1,024	945
Osceola	219	164	172	1,043	763	841
Franklin	285	200	202	898	1,003	1,014
Quincy	183	280	261	1,585	1,161	1,097
Auron	130	15	100	610	380	577
Total 7 mines.	4,162	3,844	3,810	19,414	15,517	18,474

The Central mine has produced this year to May 31st 472 tons of mineral; the May output being light on account of the unusual thickness of the masses encountered, which are very slowly cut up.

QUINCY MINING COMPANY.—The annual meeting was held in New York City on the 6th inst. The following board of directors were elected: Thomas F. Mason, John Brown, Morris H. Smith, Edwin Rice, Samuel B. Harris, of Michigan. No other especially important business came before the meeting.

TAMARACK MINING COMPANY.—The No. 2 shaft was sunk 65 feet in May, and now is down 1321 feet. The product of this mine probably will show no marked change from month to month until No. 2 shaft is down to and communication established with the present workings, which is expected to take place within a year. The ninth level developments show great improvement over the eighth. The new head of stamps at the mill has been started up and is working successfully. Tests made showed results at the rate of 296 tons per day per head. The new head has a rigid iron foundation instead of the usual spring timbers, an innovation which, in connection with other improvements, has proved of material advantage. This improvement has been advocated in the ENGINEERING AND MINING JOURNAL, and this Tamarack stamp was illustrated in the JOURNAL January 28th.

MONTANA.

LEWIS & CLARKE COUNTY.

HELENA & LIVINGSTON SMELTING AND REFINING COMPANY.—In our last issue we referred to the incorporation of the Helena Smelting Company, later reports show that the name of the company was not correct and is as above, also that the capital is \$5,000,000, instead of \$1,000,000 as reported last week.

NEVADA.

LINCOLN COUNTY.

Mr. Chas. L. Roe is erecting a copper smelter at Bristol. It will be of about ten tons per day capacity. Some good copper ore is lying on the dump at the Ohio mine at Bristol District, which was mined years ago. The present price of copper justifies him in erecting the furnace and developing the mine, in which a good seam of copper ore is exposed, but which has remained untouched for years past on account of the low price of the metal and the expense of transporting the ore to market.

INDEPENDENT.—The demurrer of the defendants in the suit of R. H. Elam and James McFarlane against the banking-house of Lazard, Freres & Co. was sustained and the action dismissed. The plaintiffs sought to recover \$31,000 damages sustained by the alleged malicious restraint of operations in this mine.

STOREY COUNTY—COMSTOCK LODGE.

We condense the following from the Virginia City Chronicle:

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—During the week ended May 26th there were shipped 1185 tons of ore to the Morgau mill, and 1836 tons to the Eureka mill. The average assay value of all the ore worked at the above mills, according to battery samples, was \$36.37. There was shipped during the week to the Carson mint bullion valued by assay at \$80,589.75.

PENNSYLVANIA.

COAL.

The Schuylkill Coal Exchange has issued the following report: The collieries drawn to furnish prices of coal sold during the month of May, 1888, to determine rate of wages to be paid, make the following returns: Elmwood Colliery (P. & R. C. and I. Co.), \$2.382; Indian Ridge Colliery (P. & R. C. and I. Co.), \$2.428; Kohinor Colliery (P. & R. C. and I. Co.), \$2.44; Locust Spring Colliery (P. & R. C. and I. Co.), \$2.305; Reliance Colliery (P. & R. C. and I. Co.), \$2.331. The average of these prices is \$2.373, and the rate of wages to be paid is four (4) per cent below \$2.50 basis.

Exports of refined, crude, and naphtha from the following ports, from January 1st to June 2d.

	1888.		1887.
	Gallons.	Tons.	Tons.
From Boston	95,426		1,962,080
Philadelphia	46,319,771		61,746,401
Baltimore	1,321,053		3,006,106
Perth Amboy	9,080,048		7,093,938
New York	141,254,972		151,131,055
Total exports	199,465,870		224,940,230

UTAH.

BEAVER COUNTY.

HORN SILVER MINING COMPANY.—A representative of the ENGINEERING AND MINING JOURNAL interviewed the officers of the company, as well as the representatives of the dissatisfied stockholders. The troubles of last fall seemed to have disappeared, and the mine is being worked. A shaft is down 1300 feet, and will soon be sunk 100 feet more. Work is being done on the 3d, 4th, 6th and 7th levels. The smelter is not running, owing to lack of ore, yet all current expenses are paid, with an average of \$1000 to \$1500 per month to spare. The stockholders and officers are entirely satisfied that the superintendent, Mr. Hill, has been as successful as possible under the circumstances. Weekly reports are forwarded to the New York office, so that stockholders can easily learn the exact condition of the mine and the work being done.

It is said that Mr. Hill feels rather discouraged at his failure to find new and extensive deposits by this time, and when the 1400-foot level is reached, a new plan of working may be decided upon.

SAUPETE COUNTY.

KIMBALL COAL AND COKE COMPANY.—This company has been organized with a capital stock of \$30,000, shares \$50 each, to develop coal lands, mine and sell coal, manufacture coke, and to conduct a general merchandising business. The company owns extensive coal fields near Fairview. The officers are: S. P. Teasdel, President; W. H. Kimball, Vice-President; H. W. Teasdel, Treasurer, and Frank B. Kim-

week. The number of inquiries being received, however, would point to an improved buying movement in the near future. We learn that some large contracts for rolling stock are now under advisement, and as soon as decided will place some of the car works in the market for pig and bar iron, which will bring business to the furnaces from the rolling-mill as well as the car builder. Should the miners' strike in Alabama be of long duration or spread to any great extent, the output in that section will be very largely restricted.

The quotations are for cash, f.o.b. at Louisville, will be found in our weekly register of prices.

Pittsburg. June 7. [From our Special Correspondent.]

The iron market during the week has undergone but little change compared with the preceding week. As noted last week, it looks very much as if the bottom had been reached, at least for certain descriptions. City furnaces and Bessemer was more fancied, with sales of the latter at quotations above the current a week ago. For other descriptions of pig there is nothing in the outlook to warrant the expectations of much, if any, improvement in the near future, in common grades, with the chances in the opposite directions, are unfortunately somewhat indefinite. Many of the furnaces in this vicinity are still out of blast and will so remain until there is a satisfactory arrangement with their employes. The stock of No. 1 Pig in the market at this time is not large, still consumers can obtain all they desire, provided prices are made satisfactory to the sellers, who are not disposed to accept lower prices, as in many cases present rates don't cover first cost, while others are of the opinion that the end of lower prices can't be far off, and are disposed to take the chances for more money for their iron.

The most important question at present is the new iron scale that is undergoing a rigid investigation by the iron men. The scale when signed holds good for one year. As all the meetings are held with closed doors, there is nothing to go by except rumors, circulated in many cases by interested parties. Since our last the workmen have accepted a reduction in wages in several mills in preference to a strike. This speaks well for the future. The iron trade at present is certainly in a very demoralized condition. The railroads have afforded some relief by reducing freights on ore and iron to various points extending South and West. The cut ranges from 7 to 22 cents.

The Western cut nail manufacturers, at their meeting held at Pittsburg on the 6th inst., adopted a new card, making the base from 12 to 40-penny. The change advances 10-penny nails 10 cents, and 50 to 60-penny 25 cents. The trade is very dull.

Coal and Coke Smelted Lake Ore.

Table listing coal and coke prices: 1500 Tons Bessemer at Valley Furnace 15.50 cash, 1000 Tons Bessemer spot 16.75 cash, etc.

Coke, Native Ore.

Table listing coke prices: 300 Tons Gray Forge 14.50 cash, 100 Tons Gray Forge 14.50 cash, etc.

Charcoal.

Table listing charcoal prices: 100 Tons Cold Blast 26.00 cash, 60 Tons Cold Blast 25.00 cash.

Muck Bar.

Table listing muck bar prices: 550 Tons Neutral 26.25 cash, 500 Tons Neutral 26.50 cash, etc.

Steel Slabs and Billets.

Table listing steel slab and billet prices: 700 Tons Slabs 28.25 cash, 500 Tons Billets 28.50 cash, etc.

Steel Crop Ends.

Table listing steel crop end prices: 1000 Tons Crop and Blom Ends 18.00 cash, 500 Crop Ends 17.50 cash.

Steel Wire Rods.

Table listing steel wire rod prices: 400 Tons American Fives 42.00 cash, 1000 Tons American T's 21.75 cash.

Old Iron Rails.

Table listing old iron rail prices: 1000 Tons American T's 21.75 cash.

Philadelphia. June 8.

[From our Special Correspondent.]

Reductions of wages will be made at Eastern and Middle Pennsylvania mills between now and June 30th. Reductions have been announced in city mills to take effect July 3d and at Reading to take effect June 18th. Other mill owners feel obliged to do the same. The attitude of labor organizations on the question has not been defined, but it will be largely influenced by the advice or perhaps by the action of the Amalgamated Association in the West.

The chief interest developed since Monday has been the improving demand for bar, plate and sheet iron. Western bars have been coming in in car-load lots and selling at \$1.65.

Coal has been shaded from 10 to 30 cents per ton, and this has helped. Coke has also dropped a little. Furnace wages have been reduced at some points. Southern iron has helped to crowd down prices. The sum total of these influences is that bar iron has been reduced, and consumers are now pushing in, and some few mills captured a number of large orders. Prices are lower than they have been for years. The nail makers held their convention and fixed up a classification that harmonizes interests that have been in conflict for years. Prices are unchanged. Production is a little too heavy. Building requirements are not very urgent.

The pig-iron market has not been unsettled by Southern sales or by concessions at home. In fact, a better

feeling exists all around. The activity in the mills, if it proves to be solid, will help pig-iron, because very few mills have more than a week or two's supply in yard. Some few have contracts. Iron for pipe purposes is offered here between \$14 and \$15. Mill irons are quoted as they have been all along.

The outlook for the trade is somewhat better and there is no panicky feeling. Importers of iron are occasionally asked to make prices. The muck iron demand is irregular and rolls are off work at several mills for a few days. The bloomaries manage to keep going. Plate mill orders have picked up, and prices are kept at points that are tempting to parties having large orders to place.

Business in structural iron mills has not fallen off, and brokers report to-day that unless something unforeseen happens there will be a good summer business. Orders from five hundred tons of angles down to twenty-five tons have been coming in. The merchant steel mills and the sheet mills have had more business, and there are specifications now in hand for

steel that will help to tide over the summer. The ship yards have many orders out. Locomotive builders are in the market. A few car iron orders have been extended. Agricultural iron makers are asking for figures.

Steel rail makers report capacity nearly all taken up, and no change in quotations. Sales in all mills for the past week, if the estimate given is correct, is 18,000 tons. The arrivals of ore at this port are large. A few lots of old rails were taken at buyer's prices, but new orders can not be placed except at maker's figures. The yard men have had two or three good days in No. 1 and choice scrap.

FINANCIAL.

NEW YORK, Friday Evening, June 8.

There is almost nothing doing in the mining share market. The transactions were small, and prices on the whole showed a declining tendency. We are promised bonanzas galore, but the good time is "coming."

IMPORTATIONS AT NEW YORK FROM MAY 25 TO JUNE 6, AND FROM JAN. 1 TO SAME DATE.

Large table with multiple columns: Spelter, Steel & Iron Rods, Old Rails, Zinc Sheets, Nickel, Antimony, Pig Lead, Tin, Tin Plates, Forgings, etc., Bar Iron. Columns include Week, Year, and Tons/Pounds.

WEEKLY REGISTER OF CURRENT QUOTATIONS.

Table of chemical and mineral prices including Sulphur, Vermillion, Vitriol, Zinc Oxide, Tannin, and various acids and salts.

Table of building materials including Bricks, Jersveys, Haverstraw, Front bricks, Building Stone, Granite, Slate, and roofing materials.

Table of rarer metals including Aluminum, Arsenic, Barium, Bismuth, Cadmium, Calcium, Cesium, Cerium, Chromium, Cobalt, Didymium, Erbium, Gallium, Glucium, Indium, Iridium, Lanthanum, Lithium, Magnesium, Manganese, Molybdenum, Niobium, Osmium, Palladium, Platinum, Potassium, Rhodium, Ruthenium, Rubidium, Selenium, Sodium, Strontium, Tantalum, Tellurium, Thallium, Thorium, Tungsten, Vanadium, Yttrium, and Zirconium.

Table of various metals including Aluminum, Copper, Lead, Tin, Zinc, Antimony, and Quicksilver, listing different grades and forms.

Table of iron and steel products including American Pig-Iron, Scotch Pig-Iron, Bessemer Pig-Iron, and Spiegeleisen.

Table of steel products including Steel Blooms, Steel Billets, Steel Nail Slabs, Steel Wire Rods, Steel Rails, Structural Iron and Steel, and Iron Plates.

Table of cast-iron and wrought iron pipes, boiler tubes, and rail fastenings.

Table of Louisville prices for hot blast irons, mahoning valley, Missouri charcoal, and forge irons.

Table of Pittsburg prices for coke or bituminous pig, foundry pig, charcoal pig, and steel products.

Table of Philadelphia prices for foundry pig, Bessemer pig, steel rail blooms, and various iron and steel products.

STOCK MARKET QUOTATIONS.

Table of Baltimore, Md. stock market quotations for various companies and commodities.

Birmingham, Ala.

Table of Birmingham, Ala. stock market quotations for various companies and commodities.

Pittsburg, Pa.

Table of Pittsburg, Pa. stock market quotations for various companies and commodities.

Foreign Quotations.

Table of foreign quotations for various commodities and metals, including London and Paris prices.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS, DIVIDENDS, and NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS. Lists 150+ mining companies with their financial details.

G. Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. † This company, as the Western, up to Dec. 10th, 1881, paid \$1,400,000. Non-assessable for three years. ‡ The Deadwood previously paid \$275,000 in eleven dividends, and the Terra \$75,000. Previous to the consolidation in Aug., 1881, the California had paid \$31,320,000 in dividends, and the Con. Virginia, \$42,390,000. Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1876, the Copper Queen had paid \$1,350,000 in dividends.

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns for Name and Location of Company, dates from June 2 to June 8, and Sales. It lists various mining companies like Adams, Alca, Argenta, etc., and their stock prices.

*Assessment unpaid. †Dealt in at the New York Stock Ex. Unlisted Securities Dividend shares sold, 7,775. Non-dividend shares sold, 57,700. Total New York, 65,475.

BOSTON MINING STOCK QUOTATIONS.

Table with columns for Name of Company, dates from June 1 to June 7, and Sales. It lists various mining companies like Atlantic, Bodie, Bonanza, etc., and their stock prices.

*Ex-dividend. Boston: Dividend shares sold, 6,944. Non-dividend shares sold, 19,777. Total Boston, 26,721.

COAL STOCKS.

Table with columns for Name of Company, Par val of sh'rs, and dates from June 2 to June 8. It lists coal companies like Barclay, Buck Mt., Ches. & O. RR., etc., and their stock prices.

*Bid. †Asked. **Of the sales of this stock, 65,881 were in Philadelphia, and 152,725 in New York. Total sales, 253,229.

San Francisco Mining Stock Quotations.

Table with columns for Company, dates from June 1 to June 7, and Sales. It lists various mining companies like Alpha, Alta, Belcher, etc., and their stock prices.

and the exact date of its arrival has not yet been stated.

Barcelona has been the most active stock on the list, some 10,600 shares changing hands, at prices ranging from 88c. @ \$1.

Very little is doing in the Comstock shares. Consolidated California & Virginia was neglected, notwithstanding the appearance of its regular monthly dividend of \$108,000.

The news that a deficit has been discovered in the accounts of H. R. P. Hutton, secretary of the Eureka Consolidated Mining Company, created no little excitement in mining circles in New York and San Francisco.

Mr. William Cunningham, formerly with Wells, Fargo & Co., has been appointed secretary. The company has been rather unfortunate in the choice of secretaries in several instances, for just five years ago next month it passed through a similarly unpleasant experience with Percy Jacobs, the secretary at that time, who defaulted to the amount of \$30,000.

It is said that the dividend just declared by the Silver Mining Company of Lake Valley, New Mexico, the successors of the famous "Sierras," is part of the amount realized from the voluntary assessment called about a year ago when the company was reorganized.

In consequence of the proposition to issue one million dollars of preferred stock and to retire common stock the stock of the Tennessee Coal, Iron and Railroad Company has advanced slightly in price on the New York Stock Exchange.

One sale of Phoenix of Arkansas is reported at 35c. We are officially informed that the Plymouth Consolidated Gold Mining Company's mine is still closed, but will be opened shortly.

The stock of the Astoria Gold Mine, of Amador County, California, has been placed upon the "Permanent List" of the Consolidated Stock & Petroleum Exchange. The company is organized under the laws of the State of California, where the principal office will be, with a capital stock of \$200,000, divided into 100,000 shares, \$2 each, assessable.

The business in Bodie stocks was small. Twenty-five shares of Bulwer were sold at 25c. per share, and a few shares of Consolidated Pacific at 10c., and of Standard at from \$2 to \$2.10.

Security was neglected, and appeared on the list only on Wednesday and to-day, when it sold at 8 and 10c. In our editorial columns we refer extensively to this company.

Horn Silver was only dealt in on Saturday, when it sold at 82c. Iron Hill, after a long absence, came out once at 25c. and Caledonia at \$2.05.

Homestake, Deadwood Terra and Father de Smet show no transactions.

Proustite and Shoshone received considerable attention. Both stocks were largely dealt in considering the dullness of the market, the former at from \$1.10 @ \$1.15 and the latter at from 11c. to 13c.

San Sebastian declined from 92 to 86c., closing today at 87c. Silver King continues on the downward grade, and this week has gone to \$4.

El Cristo was firm. It opened at \$1.50, and on Tuesday advanced to \$1.65. Since then it has been selling again at \$1.50.

Rappahannock showed considerable activity at from 13 to 14c.

The following nominations for officers of the Consolidated Stock and Petroleum Exchange have just been made. The election will take place on June 11th. The polls will be open from 10 A. M. to 3 P. M.

For President, Chas. G. Wilson; 1st Vice President, Frank Tack; 2d Vice President, T. L. Watson; Treasurer, John Stanton; Chairman, A. W. Peters. For directors to serve two years: R. A. Chesebrough, W. C. Hendrie, E. S. Meedels, C. F. Thumm, A. Dutenhofer, C. E. Thornburn, G. W. Fuller, Jr., M. Lauterback, A. W. Peters, J. E. Vail, H. A. Tewksbury, V. W. Voorhes, C. A. Parsons, J. Gutman, G. W. Lincoln, G. L. Ring, S. B. Hard, D. S. Anness and H. De Wolf.

Meetings.

The annual and special meetings of the following companies will be held on the dates given:

Bar Pumping Engine Company, Germantown Junction, Philadelphia, Pa., June 19th, at 10 o'clock A.M.

Central Coal Co., of Pennsylvania, office of Geo. B. Newton & Co., No. 308 Walnut street, Philadelphia, Pa., July 10th, at twelve o'clock noon.

United States Depository Mining Co., Ouray, Colo., July 2d, from one to five o'clock P. M.

Dividends.

Bridgewater Gas Company of Pennsylvania has declared regular monthly dividend, No. 27, of one per cent., payable May 31st.

Consolidated California & Virginia Mining Co. of Nevada has declared dividend No. 18, of fifty cents per share, or \$108,000, payable June 11th.

Eureka Consolidated Mining Co. of Nevada announces that owing to available assets on hand not having been converted in time, payment of dividend No. 85 is postponed until July 9th.

Franklin Mining Company of Michigan has declared a dividend of two dollars per share, or \$80,000, payable July 2d, in Boston.

Mammoth Mining Co., of Utah, has declared dividend No. 4, of \$10,000, payable June 20th, at Rooms 2-3, No. 251 South Main street, Salt Lake City, Utah.

Silver Mining Company of Lake Valley, New Mexico, has declared a dividend of five per cent., payable June 20th, at No. 119 South Fourth St., room 62, Philadelphia, Pa.

Spanish-American Light and Power Co., consoldated, has declared a quarterly dividend of one and one-quarter per cent., payable June 15th, at No. 40-42 Wall St., New York City.

Tamarack Mining Company, of Michigan, has declared a dividend, No. 2, of three dollars per share, or \$120,000, payable July 2d, in Boston.

Assessments.

Table with columns: COMPANY, No., When levied, D'l'nq't in office, Day of sale, Am't per share. Lists various mining companies and their assessment details.

* One half cent a share is delinquent if unpaid June 12th, and the other if unpaid July 12th. † Delinquent day and day of sale postponed to these dates.

Pipe Line Certificates

Messrs. Watson & Gibson, brokers, 49 Broadway report for the week as follows:

The oil market has been drooping again, and the bulls are discouraged. It has been urged by traders on the floor that if the shut-down movement proves ineffective in advancing prices of oil that some disorderly spirits might resort to a destructive policy in the region of oil tanks.

oil upon which certificates are issued, some operators deduce a bullish argument, but since a fire assessment is levied on holders of oil certificates the loss would fall on the holders, and if all the oil on top of ground were obliterated the shorts would not be cornered.

If one considers the value of oil solely with reference to Pennsylvania's output, bull statistics would be a much safer guide for speculators, but Ohio, Colorado and Russia are not to be banished from the field of competition by resolutions or compacts of local producers.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE. Table with columns: Opening, Highest, Lowest, Closing, Sales. Lists various stock prices.

Total sales in barrels 6,741,000

NEW YORK STOCK EXCHANGE. Table with columns: Opening, Highest, Lowest, Closing, Sales. Lists various stock prices.

Total sales in barrels 2,886,000

Boston Mining Stocks. June 7.

The feature of the market for copper stocks this week is the activity and advance in Boston & Montana Copper Company. The rise is based upon the report in our last letter regarding the purchase of additional property and the interest of the French syndicate in the company.

Franklin advanced to \$15% @ \$15 1/2 on the announcement of a \$2 dividend, but later declined to \$15. The product of the mine continues to show a decline, and were it not for the high price of ingot copper the stock would sell much lower.

Tamarack sold at \$165 @ \$163. Huron at \$4 1/2. Bonanza steady, but dull at \$1 1/2.

In silver stocks dullness and inactivity prevail. Dunkin seems to have touched bottom at 75 @ 80c.

Security is still actively dealt in at 6 @ 8c. After June 9, all stock on which the assessment of 25 cents per share is not paid will, we are told, be forfeited to the company.

St. Louis Mining Stocks.

Table with columns: Name of company, Opening, H., L., Closing. Lists various mining stocks and their prices.

Bid and asked prices during the week ending June 5th.