

THE ENGINEERING AND MINING JOURNAL



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

VOL. LV. FEBRUARY 4. No. 5.

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THE SCIENTIFIC PUBLISHING CO., Publishers.

SUBSCRIPTION PRICE: For the United States, Mexico and Canada, \$5 per annum; \$2.50 for six months; all other countries in the Postal Union, \$7.

REMITTANCES should always be made by Bank Drafts, Post-Office Orders or Express Money Orders on New York, payable to THE SCIENTIFIC PUBLISHING CO. All payments must be made in advance.

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THE SCIENTIFIC PUBLISHING COMPANY.

OFFICERS: R. P. ROTHWELL, Pres. & Gen'l Mang. | P. O. BOX 1833.
SOPHIA BRAEUNLICH, Sec'y & Treas. | 27 Park Place, New York.
Cable Address: "Rothwell, New York." Use A BC Code, Fourth Edition.

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THE publication of the index to Volume 54 of the ENGINEERING AND MINING JOURNAL for the six months ended December 31st has been retarded by the necessity of putting the whole force of the office on the statistical volume, now nearly completed. The index will be issued, however, at an early date.

THE Harney Peak Tin Mining, Milling and Manufacturing Company's mines and mills were closed down on the 2d inst., after a short and unsuccessful run. Superintendent J. S. Childs, who had been in this city in consultation with the American owners of the property, stated, it is said, that this had been done in accordance with a decision arrived at by the owners, and that the suspension will be permanent. This was to be expected by those who have followed the reports upon those mines, published in the ENGINEERING AND MINING JOURNAL from time to time. There will probably be many explanations of the stoppage, but the real cause is the lack of tin in the ore. There is now not a tin mine in operation in the country.

IT is proposed to erect a large copper smelting and refining establishment at Salt Lake City, Utah, to treat ores from Utah, Nevada and adjoining States, and to refine Montana matte. The supply of copper ore in Utah is small, but the promoters of this enterprise argue that so far no encouragement has been given to the mining of copper ores there or to prospecting for them. Obtaining a reduction of freights it is estimated that some money can be made out of Montana matte. Dry silver ores could also be treated.

SALT Lake is well situated in several respects for the location of such a plant, but we fail to see how it could ever compete, so far as treating Montana ores and matte are concerned, with smelters at Great Falls, Mont., where power and fuel are both cheap. If such a smelter is built in Salt Lake it will certainly have to rely almost entirely upon Utah ores.

THE adoption, after Capt. JOSIAH THOMAS' favorable report, of the California Stamp Mill at the Dolcoath tin mine, Cornwall, may lead to its general introduction in the tin mining interests at least. The indifference or even distrust of Europeans toward our milling machinery is somewhat hard to understand. It is certainly remarkable that nearly 40 years after our stamp mill was perfected it should be introduced in Cornwall and be running side by side with its crude prototype, the Cornish iron shod square beam wooden stamp.

IT is true that in Germany, where American stamps were introduced at an early date, the products in several instances were found to be unsuited to concentration, but we can hardly believe the statement there made that the iron stemmed stamp is more expensive in operation than the old-fashioned wooden one. The Hayle machine shops in Cornwall have long made "California stamp mills" "for the colonies," but the Cornishman at home is the most "conservative" or, as we would put it, the least progressive of intelligent managers, and they cling to their antediluvian methods of ore concentration long after the rest of the world has abandoned or even forgotten them. Cornwall is an excellent place to study the ancient history of mining, but a difficult field in which to introduce progressive methods.

THE California State Mining Bureau has been seriously criticised of late, and its strongest opponents, whose interests are agrarian, have not hesitated to say that it should be done away with. The annual reports, in Governor MARKHAM'S opinion, are masses of padding of little actual value, and their cost, he says, is entirely disproportionate to the information they contain. The Governor, who will soon appoint the successor to WM. IRELAN, JR., the present incumbent of the office of State Mineralogist, does not agree with the radical opponents of the bureau. He believes that it should exist, and that in proper hands it may be, what it has not been, an institution which, through the collection of known facts and the discovery and announcement of new principles, may be of the utmost service to the miner.

IN theory the California State Mining Bureau is an excellent machine, but it works badly in practice. Politics, which impaired the usefulness of the United States Geological Survey, has here been destructive. Appropriations secured through political influence were spent in conciliating those whose votes could secure other sums. Counties whose interests were agricultural and whose mineral resources were unimportant were thoroughly explored and favorably reported upon, in order to obtain the influence of their legislators. Some districts which had been the back bone of California mining were barely touched upon, the votes of their representatives—mining men—being considered secure. Where mines were examined and the data recorded it was done in such a manner as to make it evident that the object was to conciliate and even benefit the individual owner rather than the whole industry, and the information published in the annual report was in consequence far from trustworthy.

THE Mining Bureau by this foolish policy has lost the friendship of its former adherents and has failed to secure the respect of those to whom

t has been subservient. It is to be hoped, however, that it will not be suspended, or even its appropriation curtailed. It has a most useful field before it, and it can be, if politics is kept from its doors, of paramount service to the miner.

THE PRODUCTION OF LEAD.

The amount of lead imported in ore in 1892 amounted to 26,734 tons of 2,000 lbs. The lead refined in bond and exported amounted to 12,874 tons, or a total of 39,608 short tons, which, deducted from our total production, 218,500 tons, leaves 187,892 short tons as the make from domestic ores, as against 178,133 tons from domestic ores in 1891 (when 2,700 tons of bullion were refined in bond, the total production being 180,833 tons in 1891) and 143,859 tons in 1890, when none was refined in bond.

The amount of "soft lead" produced in 1892, which we gave as 31,000 tons, does not represent the whole output from Missouri, Kansas, Wisconsin and Illinois ores, for a very important amount of these was mixed with argentiferous ores from the West, and the lead from them was marketed as desilverized. The distribution by States is given fully in the "Mineral Industry," now in press.

GOLD AMALGAMATION.

The London *Mining Journal* of December 24th contains a full report of a meeting of the Institution of Mining and Metallurgy, which was devoted to the reading and discussion of a paper on "Gold Amalgamation," by Mr. C. C. WARNFORD LOCK, whose portrait, with a biographical sketch, appears in the same journal. Mr. LOCK's father is the author of a large book on "Gold: Its Occurrence and Extraction," which possesses considerable value as an industrious and comprehensive composition, though not as a technical authority. I am sorry to say that the son, if one may judge from his paper on the subject, is without practical knowledge of gold amalgamation. Worse than this, the paper is essentially a thinly disguised puff of a new machine, in which "by means of electro-chemical action, produced in a very simple manner, the mercury in an unbroken body is permeated by constant streams of hydrogen and sodium." Concerning this apparatus Mr. LOCK utters a good deal of what must be recognized theoretical nonsense, and gives a number of reports concerning its performances in "Africa, America and Australia," which it is quite permissible to doubt, because they are not presented in a form which commands confidence. He delicately avoids naming the machine, as if that would be to misuse the opportunity afforded by a technical paper, but he seems to think that the mere omission of the name from what is practically an advertising puff is all that is required to make it acceptable as a technical paper. On the contrary, Mr. LOCK should have named the machine frankly, told who makes it and sells it and at what price, and avowed his own connection with it, if he is at all interested. But he should not have been content with the vague summaries of its surprising performances, which constitute the proof of his astounding theories.

With the exception of this electro-chemical paragon, I notice but one other machine specially mentioned with approval by Mr. LOCK. This is "an amalgamator composed of a series of revolving dishes superposed on a vertical spindle," so as to provide "an enormous area of amalgamating surface within a very small space," concerning which apparatus he says that three years ago, after a number of successful trials, he expressed himself in its favor, and adds: "Recent reports from Montana, where the machine has been in operation for some time on tailings from the mills of the Montana and other companies, more than confirm my opinion. The saving of 80 cents a ton, which it effected on the Drumlummon tailings, means an addition of £14,000 a year to the income of that mill."

The machine here referred to is the "Jordan Centrifugal Amalgamator," and I happen to know something of its trial at Marysville, at the Drumlummon mill of the Montana Company, Limited. It ran 26 days, and the total clean-up was \$1854. If Mr. LOCK's other statistics of economy are similar in character to this specimen they are quite worthy of his chemical and metallurgical theories. He has simply been deceived, as well meaning people have been before him, by delusive analogies, plausible laboratory experiments and misleading reports from others. As he is a gentleman of intelligence in other departments, personally most agreeable and popular, and an officer and active promoter of the new Institution of Mining and Metallurgy, it is to be regretted that he should have identified himself with crude statements which can only discredit him among practical metallurgists.

A number of gentlemen took part in the discussion of Mr. LOCK's paper; and although their evident personal liking for him prevented them from severity of criticism, those who were best entitled to confidence as expert authorities did not fail to make it pretty plain that they disagreed with him in every important particular; and especially in his condemnation of amalgamated copper plates, and his assertion that "mercury troughs are capable of doing much better service." Whoever does not know how much more readily gold unites with an amalgam already formed than

with liquid mercury can add little to the valuable literature of the subject, because he has left A out of his alphabet.

Mr. LOCK and many other would-be reformers of practice are on the wrong tack altogether. They are trying to find an apparatus, which, with one crushing and one amalgamation, will save the maximum amount of gold. According to all sound analogy and experience, they will never do it in the world. Successive operations, beginning with relatively coarse crushing, and ending with the treatment of slimes, are necessary to maximum economy and efficiency of extraction. This was found out long ago; and the contrary proposition, which begins to be agitated again, is simply the revival of an exploded error.

R. W. R.

THE POSITION OF ALUMINUM.

The great advance that has been made in the metallurgy of aluminum within the past ten years is one of the most hopeful signs of the application of scientific principles to commercial problems. When one recalls the status of this matter in 1880 when aluminum was but little more than a plaything, and an expensive one at that, and then refers to the present condition of the industry, he is impressed with two considerations. First, that so much has been done to cheapen the processes for the extraction of this metal from its ores, and, second, that in all probability the methods now in use will be discarded before 1900. A great deal of laborious and costly work has been done, and the result is that aluminum can be bought for 50 cents per pound as against \$12 in 1886. This is indeed a great achievement and one of which any man may well be proud. It is often quite as useful to point out the way in which a desired result is *not* to be reached as to show how it may be attained. It is in this direction that a great deal, if not most, of the work that has been done on the commercial extraction of aluminum is valuable. In spite of the wonderful cheapening of the product, in spite of the outlay of hundreds of thousands of dollars, in spite of the beautiful pictures that are held up to view of the future of this magical metal, what have we to show for it all? So far as concerns the future of aluminum it may be said that unless it can be made in large quantities, just as lead or copper or zinc, it can not hope to enter as an important factor in the great industries.

It must be smelted in large quantities direct from its ores, or obtained as a bye-product in the preparation of some widely consumed substance, ere it will take in trade the position its qualities command.

A great deal of nonsense has been written about aluminum and a great deal of vital force expended in prophesying its brilliant influence upon civilization. The truth is that the industry is but little beyond the experimental stage and may be compared to the manufacture of iron in the days of Tubal-Cain. It is not likely that at the present time the greatest producer of aluminum is making regularly one ton per day, and the total daily output of the world is short of five tons per day. And this result has been reached after a quarter of a century of constant investigation and at a cost of vast sums of money.

It is, nevertheless, a result to be proud of, for it has brought into use, if not on a large commercial scale at least on an important one, a valuable metal. But we do not think that the further prosecution of electrical methods, by which alone aluminum is now made, will bring the cost of it to the point at which it will become a prominent metal, *unless*, and we desire to lay especial stress on this, they proceed along the line of direct reduction. Even here it is by no means certain that they can make it cheap enough. Aluminum is cheap now, compared to the prices of ten, or even five, years ago, but the plea we make is that it is not cheap enough. One reason why the prominent metals are cheaper now than they have ever been is because of the immense output, and this in turn is conditioned by modern methods, the use of improved machinery and better management.

Looking at the matter from a standpoint of practical results and the cost of them it would seem that there is too much reliance placed on electrical methods, whether electrolytic or electro-chemical. It may be urged that inasmuch as by means of electrical methods aluminum has been reduced in price from \$12 to 50 cents per pound, and inasmuch as large investments have been made in such plants, it were better to attempt the solution of the problem in this way; that, in fact, more is to be expected from methods that have already done so much than from others that have accomplished nothing. And this is sound reasoning so far as it goes, but it does not go far enough. It proceeds on the assumption that electricity is capable of indefinite cheapening.

There is a very inviting field for research here, and one that to the earnest metallurgist is as attractive as the refining of cast iron was to KELLY and BESSEMER in the early fifties.

While we would not be understood as condemning the electrical reduction methods, we would encourage those who seek by other means to make cheaper aluminum. Those who have brought the present methods up to their known efficiency are probably best qualified to investigate possibilities that lie in other directions, for they know the commercial limitations affecting the employment of the current for large and regular

products, and have the skill and energy and professional training that will be needed. Let us have cheaper aluminum, and after that, perhaps, still cheaper aluminum. Tubal-Cain's furnace did very well for his day and time, but would be now somewhat out of date, not because it could not make good metal, but because it could not make enough of it or make it cheaply enough.

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 page of the Journal.

Small Talk About Business. By A. E. Rice. Published by The Fremont Publishing Company, Fremont, O., 1892. Pages 60. Price 75 cents.

Theory of Structures and Strength of Materials. By Henry T. Bovey, M. A., D. C. L., F. R. S. C. Published by Messrs. John Wiley & Sons, New York, 1893. Pages 817. Price \$7.50. Illustrated.

A Report on the Iron Ores of Missouri. From field work prosecuted during the years 1891 and 1892. By Frank L. Nason, Assistant Geologist. Being Vol. II. of the Geological Survey of Missouri. Published by the Geological Survey. Jefferson City, Mo., 1892. Pages 365. Illustrated. Also map.

Catalogue of American Localities of Minerals. By Edward Salisbury Dana. Being a reprint from the sixth edition of Dana's "System of Mineralogy." Published by John Wiley & Sons, New York, 1893. Pages, 51. Price, \$1.00.

A Report on the Mineral Waters of Missouri. By Paul Schweitzer, Assistant Geologist. Being Vol. III. of the Geological Survey of Missouri. Published by the Geological Survey. Jefferson City, Mo., 1892. Pages 257. Illustrated. Also Map.

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 Russell Process at the Marsac Mill.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Allow me to call your attention to several errors in my article published in the ENGINEERING AND MINING JOURNAL of December 17th, 1892.

The statement that no payment has been made for the gold in Marsac bullion since refining of the sulphides commenced is wrong. It has been paid for at the rate of \$20.67 an ounce. This misconception was due to the omission to fill out a blank space in a table accompanying my article. On the sixth line from the bottom of the sixth column of page 580, the extraction of silver by lixiviation at the Marsac mill should read 91.9%, instead of 91.0%.

In the tabular matter in the second column of page 580, the difference in favor of the Marsac mill is stated to be \$62.54; this is obviously a transposition of the correct figure, \$2.654. W. G. LAMB.

PARK CITY, January, 1893.

The Non-Homogeneity of Gold Bars.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: As an appendix to the correspondence anen the homogeneity of gold bars which appeared recently in the JOURNAL, the following note may prove interesting: M. de Réaumur, writing in the reports of the *Académie Royale des Sciences*, p. 88, (April 27, 1718), says of the large gold nuggets on record: "In the same piece of gold the fineness varies considerably. The nugget examined by the academy in 1716, and belonging to Don Juan de Mur, corregidor of Arica, was found to vary in fineness; in one place it was 23½ carats fine; in another 23, and in a third 22 only; this nugget weighed 56 marcs. Another nugget, weighing 66 marcs,* mentioned by the Père Feuillée and belonging to the collection of Don Antonio Porto Carrero, was shown to be, on top, 22 carats 2 grains fine; a little lower it gave only 21 carats and ¼ grain, while 2 in. above the bottom the fineness had sunk to 17½ carats."

These observations, recorded 175 years ago, show that the non-homogeneity of a natural gold ingot at least is not a discovery of to-day.

JOHN HEARD, JR.

PARIS, January, 1893.

Pyritic Smelting.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The article entitled "Pyritic Smelting" in your number of January 14th, 1893, will strike Colorado men as rather peculiar. The statement that slag carrying 5½ oz. silver has been run through a furnace using the pyritic or matte concentration process is incorrect.

At Leadville Mr. Holden has two 120-in. water jacket lead furnaces in operation and two more under construction. They are using the old Grant dump, which has been hand sorted once by other people, and the old La Plata dump, adding enough lead ore to make a proper amount of bullion. Carbonate ores being somewhat scarce, galena is used, and, of course, some matte is formed. Coke is used for fuel.

Across the California gulch, on the site of the old La Plata Smelter, the Bi-Metallic Smelting Company is operating one stack and building two more of peculiar design, and are using the "Austin" process. The furnace was designed and built by the Colorado Iron Works, Denver. Raw sulphide ores direct from the mine are fed into the furnace, with the necessary proportions of quartzose ore and limestone to form slag. No fuel is used in the slack, except, perhaps, an occasional charge of coke when some irregularity occurs.

A. Y.

EDDY, N. Mex.

[If our correspondent will read the article on the desilverization of lead slags on another page he will observe that Leadville slags running even so low as 5½ oz. have been treated by a matte concentration process.—ED. E. & M. J.]

* marc = 8 oz.

The Percentage of Iron in Magnetite.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I notice with interest in your issue of the ENGINEERING AND MINING JOURNAL for January 28th an editorial by Dr. R. W. Raymond on "The Percentage of Iron in Magnetite," in which he explains the excess of metallic iron over that necessary to form the normal magnetite oxide (Fe₃O₄), in the analysis of Gunflint Lake ore, as being most probably due to an excess of ferrous oxide (FeO) in the magnetite itself, corresponding to an abnormal formula x. FeO. Fe₂O₃. I should like to offer a further suggestion, namely, that such an excess may be due, not to an excess of FeO in the magnetite itself, but to its presence in a gangue of silicate of iron, etc., as hornblende, pyroxene, etc. This is, for instance, the case in the ore from the Cranberry mine, Mitchell County, N. C., where the gangue is chiefly hornblende or pyroxene, epidote, calcite, quartz, etc. An analysis of this ore (run of mine used in furnace August 4th, 1889) by Mr. Porter W. Shimer, of Easton, Pa., shows:

Fe₂O₃ = 49.94%; FeO = 10.32%; SiO₂ = 25.96%; Al₂O₃ = 0.99%; MnO = 0.55%; CaO = 10.62%; MgO = 1.67%; P₂O₅ = 0.018%; S = 0.041%. Total, 100.109%.

If we calculate the metallic iron (44.19%) to Fe₃O₄ we have 61.02%, giving a total addition of 100.869 for the analysis, an excess of nearly 0.9% above its possible content, which would be considered "off."

I know nothing of the character of the gangue of the Gunflint Lake ore, and the above suggestion may be totally inapplicable to that particular case; undoubtedly it is, for the excess there is much greater than would be due to FeO in hornblende alone. I simply offer my suggestion as bearing on the same general point, though showing a different cause, yet one which may be taken into consideration in special cases.

CHAPEL HILL, N. C., Jan. 30, 1892.

H. B. C. NITZE.

PRODUCTION OF BESSEMER STEEL INGOTS AND RAILS IN THE UNITED STATES IN 1892.

Through the courtesy of the Bessemer steel manufacturers, the "Bulletin" of the American Iron and Steel Association has been able to present complete statistics of the production of Bessemer steel ingots and of Bessemer steel rails of all weights and sections in the United States in 1892, except the comparatively small quantity of rails made by other manufacturers from purchased blooms. In these statistics of ingots the production of the few Clapp-Griffiths and Robert-Bessemer plants, and also the production of steel castings, are included. The total production of ingots in 1892 was the largest in our history, exceeding the large production of 1890, and the production of rails was much larger than has generally been supposed.

The following table gives the production of Bessemer steel ingots in each half of 1892, and the total production in that year compared with the total production in 1891. A statement of the ingots produced by the Clapp-Griffiths works alone is added to the table:

States—Ingots.	First half 1892.	Second half 1892.	Total 1892.	Total 1891.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pennsylvania	1,218,504	1,169,508	2,388,012	2,048,330
Illinois	437,967	443,167	880,234	605,921
Ohio	206,946	211,036	417,982	333,666
Other States	202,411	278,333	480,744	239,500
Total	2,058,928	2,102,044	4,160,972	3,247,417
Clapp-Griffiths only	36,974	39,552	67,526	65,389

The total production of Bessemer steel ingots in 1890, the year of largest production prior to 1892, was 3,688,871 gross tons, which was 472,101 tons less than in 1892.

The total production of Bessemer steel rails in 1892, with the exception above noted, was 1,458,743 gross tons, an increase of 219,350 gross tons over the production in 1891. The following table shows the production in each half of 1892 and the total production of the year compared with that of 1891, with the exception above noted for both years:

States—Rails.	First half 1892.	Second half 1892.	Total 1892.	Total 1891.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pennsylvania	474,018	411,654	885,672	849,556
Illinois	240,925	209,628	450,553	364,725
Other States	57,493	65,945	123,438	25,112
Total	772,436	686,307	1,458,743	1,239,393

The production of Bessemer steel rails by the Bessemer steel manufacturers in 1890 was 1,797,489 gross tons. The production of 1892, while much larger than that of 1891, was 338,746 tons less than that of 1890.

Effect of Turpentine Gathering on the Timber of Longleaf Pine.—In Circular 8 of the Forestry Division, published about a year ago, it was stated that tests made on timbers of Longleaf Pine, bled or unbled, lent countenance to the belief that bled or tapped timber did not suffer in strength by virtue of the tapping. Further tests and examinations permit now the announcement without reserve that the timber of Longleaf Pine is in no way affected by the tapping for turpentine. This refers to its mechanical as well as chemical properties, and hence even the reservation that it might suffer in durability is now eliminated and any prejudice against the use of bled timber in construction, wherever the unbled timber has been considered desirable, must fall as having no foundation in fact, being based only on vague belief, proved to be erroneous. The basis for the statement regarding the mechanical properties is furnished by a series of tests comprising not less than 300 tests on 32 trees of this Pine, bled and unbled, from various localities. To determine whether any changes in the chemical composition take place, a series of chemical analyses of bled and unbled timber has been made, which indicates that the resinous contents of the heartwood are in no wise affected by the bleeding, the oleosins of the heartwood being non-fluid, the whole turpentine flow is confined to the sapwood.

FLAMELESS EXPLOSIVES IN THE NOVA SCOTIA COAL MINES.

Many of the coal mines in Picton County, Nova Scotia, are so fiery that it has always been dangerous to use gunpowder for blasting purposes. Before the days of flameless explosives it was absolutely necessary to close down some of the pits. Up to the year 1890 nothing but gunpowder was known in Nova Scotia. In that year roborite was first introduced from England, and almost simultaneously the manufacture of "acadine" was commenced by the Acadia Powder Company, at Waverley, N. S. Mr. H. S. Poole gives some account of the experience gained there with these two flameless explosives in a paper read before the Mining Society of Nova Scotia. So far most of the work has been done with roborite. At first the miners complained loudly of missed shots—of shots that only did half the work expected of them, and of charges that failed to explode on the detonation of the cap. The trouble chiefly arose from the men failing to comply with the instructions. They persisted in tamping in the same way as they had been accustomed to tamp powder, although they were urged not to press home the first six inches of stemming, and informed that if the cartridge was rammed hard, not only was there danger of the cap exploding, but if the roborite was consolidated it would not explode, or only partly explode. The irresistible desire to ram hard arose from fear that part of the shot would be lost and that the coal would cut where the hard tamping began and not at the back of the shot. Other men found a difficulty in understanding the difference between warmth and dryness. They would open cartridges an unnecessarily long time before use, let them lie on the damp pavement and cover them over with a coat with the idea that they were keeping the damp away. Difficulty also arose from some of the cartridges being quite hard when they arrived from the makers. The men were told to roll or work them in the hand until they were soft, but some of this form of cartridge failed to completely explode and so caused discontent amongst the men. Another source of trouble came from the holes not being properly rounded. Cartridges would jam in a cornered hole and when forced back were so consolidated that the roborite failed to explode. All these difficulties are now past and gone and the only two grievances remaining are that we have to pay for the cartridge paper at the price of the roborite, and that it is necessary to use a detonator more powerful than that required by acadine.

Up to the present time about 7,300 lbs. have been used, and the number of times that flame has been observed is small. In four cases the roborite was set on fire by the detonation of the cap and burnt without explosion in the hole behind the tamping. What the roborite was made of in these cartridges was not ascertained, and no satisfaction was obtained by inquiring of the makers in England. The light or glow reported to have been seen in one or two cases may have come from a back in the coal or from a short circuit of naked exploding wires.

At first the men used too much roborite, but have with practice learnt the right amount to use. At present it is found that weight for weight, it is about $2\frac{1}{2}$ times stronger than gunpowder. It has the advantage of not being affected by cold, but it produces a larger proportion of small coal. It has the disadvantage common to all compounds containing ammonium nitrate, i. e., of absorbing moisture on exposure to the atmosphere, by which it is at first weakened and ultimately prevented from exploding. The cartridges as usually made are dipped in paraffine and so made waterproof, but it has been found desirable to store these cartridges in magazines where the air is dried by a steam pipe, taking care not to raise the temperature above 90° F.

Acadine is an explosive which is not used much in any other country in the world. It is a mixture of ammonium nitrate with nitro-glycerine. In England the manufacture of mixtures of ammonium nitrate with gumcotton or nitro-glycerine is prohibited because all ammonium salts when exposed alternately to moist and dry air at slightly elevated temperatures lose traces of ammonia and become acid; and gumcotton and nitro-glycerine are seriously affected by traces of acids, and are decomposed sometimes violently by them. In Picton County, however, it has been used with impunity, but care has always been taken to use it as short a time after making as possible. It can be kept for many hours in a specially made box which holds hot water, and so it can be used in the coldest weather. Cartridges that harden otherwise than from cold have been found efficient, and hard tamping does not reduce the explosive power. As, however, it requires also a detonator to explode it, it is well not to tamp the first few inches of stemming next the charge. The strength of the explosive is about 50% greater than gunpowder. It is cheaper than roborite and requires a less expensive detonator. If a charge fails to explode on the detonation of the cap, a primer with a fresh cap will explode the charge. This is not the case with roborite, as the detonation of the cap consolidates it and prevents its subsequent explosion. In only one case has a light been observed during the use of 6,400 lbs. A 3-ft. bench cut on the low side had a 3-ft. 6-in. hole charged with 12 oz. of acadine. The shot cracked the back and along the high side, lifting the bench. The light was shown along the high side.

The firing of the shots is done entirely by electricity. Both magneto-electric and dry-cell batteries are used. The latter are preferred by the men on account of their greater lightness, but their lives are short. The magneto-electric firers are low tension and consequently heavy to carry about. It is not considered advisable to use high tension generators on account of the fiery character of the coal.

A novel form of heavy freight engine for mineral traffic has been built for the London & North Western Railway in England, from the designs of Mr. F. W. Webb, Locomotive Superintendent. It has eight wheels, all coupled, 4 ft. 6 in. in diameter. The boiler is 15 ft. 6 in. long, and the tubes are divided into two lengths by an intermediate combustion chamber. The two cylinders are 19½ in. in diameter and 24 in. long and the initial steam pressure is 160 lbs. per square inch. The total weight of the engine is 104,916 lbs. and the tender weighs 56,000 lbs. This engine is the most powerful freight engine in use in Great Britain.

THE DESILVERIZATION OF LEAD-SLAGS.*

By H. A. Keller.

After an absence of over two years, the writer returned to Leadville in March, 1890. The change which had taken place in the conditions of smelting during so short a time seemed almost incredible. Lead-carbonates had been still further replaced by refractory sulphides, and clean dry ores had been crowded out, to a large extent, by magnesian "fines." The same furnaces which in 1887 had averaged with ease 160 charges daily (of 800 lbs. ore and lime), and had made clean slags, could now put through scarcely 50% of their former tonnage. Several thousand tons of rich slag had already been accumulated, owing to the large amount of impurities—notably zinc—contained in the ores, and to a correspondingly rapid falling off of that valuable ingredient lead.

After many trials, it proved impossible, under the circumstances, to avoid rapidly adding to this undesirable stock, without resorting to treatment in a separate furnace. As early as 1888, the writer had desilverized rich slag-shells in a furnace without crucible. At that time, by reason of the small percentages of zinc, a mere re-smelting, with the addition, when practicable, of small amounts of copper-sulphides or oxides, was found amply sufficient.

A large proportion of zinc causes the molten matte to be mushy, and also decreases its specific gravity. This circumstance increased the difficulty of the Leadville problem. Determinations made while slag-assays ran high showed the specific gravity of the matte to fall as low as 4.5, while the slag reached 3.75. The consequently unavoidable imperfect separation could be rendered complete only by producing a liquid slag together with additional quantities of heavy matte. With this view, pyritic smelting was first tried, with fair success. But not until the introduction of copper were really satisfactory results obtained. I give below the record of a run made in January, 1891:

Smelted: Pyritic ores, 83 tons; copper ores, 319 tons; total ore, 402 tons, containing 4,447 oz. silver and 40 tons copper; slag, 3,107 tons; grand total, 3,509 tons material (113 tons daily); coke used, \$3,092, being 384 tons at \$8 = 10.9%; labor, \$2,077; direct expense, \$5,149, or \$1.47 per ton.

Produced: Matte, 186 tons, containing 17,350 oz. silver and 37 tons copper = 20% copper; average of resulting slag: silver = 0.785 oz. per ton; SiO_2 = 33.3%.

Other runs gave similar results; the desilverized slag averaging as low as 0.76 oz. silver per ton. Since the supply of pyritic and copper ores was limited, they were at times replaced with siliceous ores averaging 71% SiO_2 . All the results proved the advisability of desilverizing many slags which it had heretofore been customary to consider as refuse.

Of the 17,350 oz. silver contained in the resulting copper matte, 4,225 oz. represent 95% of the silver in the ores, leaving 13,125 oz. silver obtained from the slag.

As it is likely that about 3,200 tons of slag were produced, the original slag must have contained: 13,125 oz. silver obtained in matte, 2,512 oz. silver thrown over in slag, 823 oz. silver, an extra allowance of 5% metallurgical loss, a total of 16,460 oz. silver, or 5.3 oz. per ton, 80% of which was saved.

The furnace used for that purpose was one of the regular 36 × 80-in. lead-furnaces. Its crucible was filled by tamping with a mixture of sand and loam, on top of which one course of firebrick was laid edge-wise. The tap-jacket was provided with two tapering openings (1½ in. in diameter at the small end), the centers of which were 4 in. apart. The 3-in. tuyeres were raised so as to bring the line of their centers about 15 in. above the upper tap-hole.

From the latter the slag ran almost continuously, overflowing into slag pots through a settler. The latter was changed hourly; and, during this operation, the blast was cut off and the furnace was relieved of all its matte, by tapping through the lower opening, directly into three or four slag pots, in which it was then allowed to cool. From the cold cones the matte was broken and added to that obtained in the settlers, which, for more convenient handling, were also emptied and cooled in small pots. The regular blast, which was varied in accordance with the running of the furnace, averaged about ¾-lb. pressure per square inch.

Under different circumstances many improvements might be suggested which would still further reduce expenses. For example, automatic feeding, and better facilities for removing the refuse; a continuous slag flow by tapping the blast, together with a heavily lined, large settler, which would answer for a long time before changing. With suitable sulphides, where such are available in large quantities, hot-in place of cold-blast will effect savings in fuel proportional to the local difference between the price of coke and that of coal. A furnace specially constructed for this purpose has now become almost a necessity to large lead works.

A few remarks on the smelting of such ore mixtures as above described are here added.

Contrary to former custom, slags with greater percentages of lime are now preferred where large quantities of zinc are present. Of the approved slag types, the well known 1:1 slag, with 26% CaO, is often run when economical.

Large furnaces, 42 × 120 in. at the tuyeres, are now most in favor. They give large tonnage together with much space in the shaft for "hangings." A small (6-in.) bosh all around the furnace does not decrease the tonnage, and seems advisable, both as a means of introducing a back tuyere, which is sometimes of great assistance, and also to permit a more spacious shaft.

If, besides carrying the impurities named, the charge has not sufficient lead to insure good furnace work, bullion of the lowest possible grade should be fed back, to avoid larger losses caused by scattering, and necessary subsequent re-melting of high-grade scrap lead.

* A paper read at the Baltimore meeting of the American Institute of Mining Engineers, February, 1892.

A NEW ELECTRIC MINING HOIST.

A new electrical mining hoist has been recently brought out by the General Electric Company. It is constructed with the object of obtaining a wide range of hoisting speed, to which end the controlling apparatus has been carefully perfected. The drum is of unusually large diameter and is connected by an intermediate gear to the armature shaft of a 25 kilowatt (30 H. P.) motor of the General Electric Company's regular bi-polar type. The controller for the motor, which is not shown in the cut, is similar to that used in street railway service, and is operated on a separate support conveniently within reach of the operator and directly to the right of the levers. These can then be operated with the left hand, and the controlling switch with the right. The series method of electrical control is adopted, the speed being increased or decreased to meet requirements by the movement of the switch handle. The hand brake is of the band type, lined with wood, and extends almost entirely round the drum. The drum is thrown into operation by a clutch operated by the second lever. The range of speed obtained on this hoist is very wide. It is designed to raise loads of 1,300 lbs. at a rate of 600 ft. a minute, and has successfully accomplished this. It can also raise loads 100 lbs. at a speed not exceeding 20 to 30 ft. a minute. The motor is erected on its own bed-plate bolted to the bed-plate of the hoist proper, the whole apparatus occupying comparatively little space owing to its compact construction.

VARIATIONS IN THE MILLING OF GOLD ORES.—III. CLUNES, VICTORIA.

Written for the Engineering and Mining Journal by T. A. Rickard.

(Concluded from page 78.)

We next come to the wells, which are cleaned up once per week. The mercury is squeezed through cloth and the excess of quicksilver separated from the amalgam. The skimmings taken from time to time

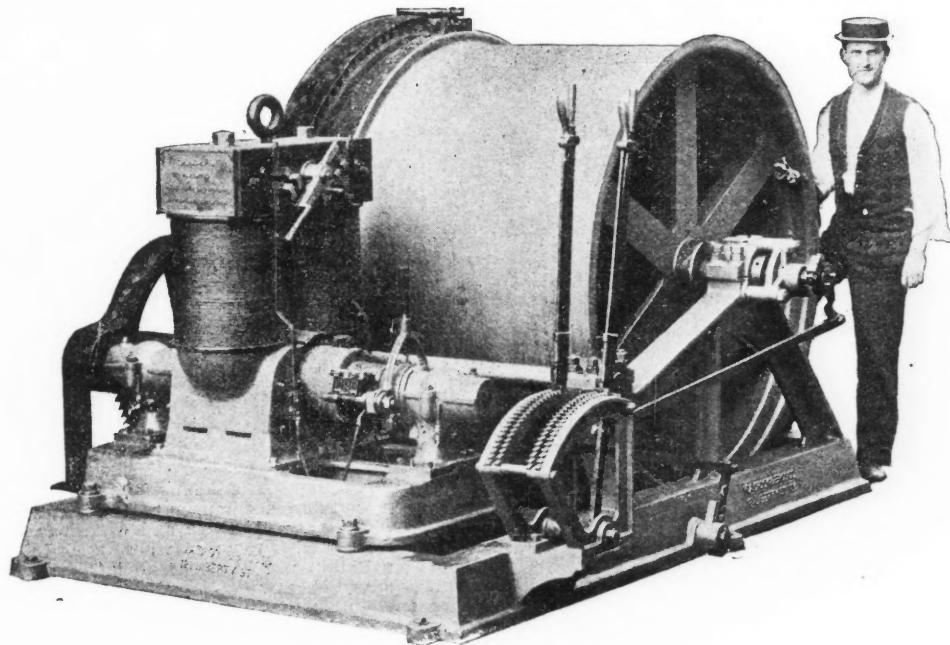
from the mortar box the gold is actually saved as such and it is only in the after treatment that mercury is used to collect it.

The loss of mercury for the past seven years has averaged 5½ grs. per ton of ore crushed. Occasionally the loss has risen up to 1½ oz. per ton of ore, this being due to copper which formed copper amalgam. Such copper amalgam floats upon the surface of a bath of mercury* and is readily carried away with the tailings. This was not due to the abrasion of the copper gratings as might be imagined, but was owing to the presence in the ore of particles of native copper. At one time as much as 80 oz. of copper were collected in one month from the skimmings of the wells. The wearing of the copper of the gratings does not appreciable harm.

The total cost of mercury, including the treatment of pyrites by Chilian mills as well as in the mill proper, during 11 years—from July 1st, 1881, to June 30th, 1892, has been 3,302 lbs. During that time 309,400 tons of ore were treated, so that the loss amounts to about 3 dwts. per ton of ore. The loss at the Port Phillip and Colonial Mill during seven years was, including treatment of pyrites, about 5½ dwts. A good deal of this loss was, however, subsequently recovered.

The gratings or screens used invite examination. Mr. Hewitson, the manager, informed me that up to the year 1879 the gratings used were imported from England. They were made of copper plate, 1-16th of an inch thick, and drilled with 81 holes per square inch. When in full work the imported article lasted 12 months, or during the passage through the grating of 2,200 tons of ore†. At the Port Phillip, owing to the smaller area of discharge, the life of a grating reached one and a half years.

The protective tariff caused the imported grating to become too expensive, and the domestic article took its place. This wore for less than half the time of the imported one. As compared to the ordinary punched iron it lasted, however, six times as long. The experience with the present lighter type of copper grating has been very good. During the past seven years 258 gratings have been used up; their cost



A NEW ELECTRIC MINING HOIST.

from off the surface of the mercury in the wells, and consisting largely of heavy pyrites, are treated in Berdans,* of which there are three, each of 3 ft. in diameter. The blankets are washed in tubs, the first row every hour, the second every alternate hour, and the third every third hour. With rich ore the washing is done more frequently. The blanketings or residues from the washing of the blankets are treated in the amalgamating barrels in much the same manner as described in the case of the mortar box residues. The material collected by the "ties," straight troughs in which heavy pyrites, escaping amalgam, etc., collect by the action of gravity alone, is also treated in a barrel. The tailings from all the barrels go to certain of the buddles. The pyrites obtained from concentration on the buddles is roasted in a reverberatory, and then ground in a Chilian mill with the addition of mercury, which collects the gold in the form of amalgam.

The total yield of the mill is variously distributed. In one month 2,973 tons were crushed, yielding 981 oz. 19 dwts. 12 grs. of gold. Of this total the different parts of the mill contributed as follows:

	Amalgam.	Bar gold.	Retort Percentage
Mortars (beds)	955 oz. 5 dwts.	840 oz. 19 dwts.	36 to 48%
Wells (boxes).....	644 " 19 "		
Blankets (by the barrels)	364 " 15 "		
Skimmings (by the Berdans)	167 " 14 "	53 " 2 "	32%
Tailings (by ties and barrel).....	24 " 10 "	7 " 5 "	30%
Concentrates (pyrites), 17 tons.....	310 " 4 "	80 " 13 "	26%

It will thus be seen that of the total amalgam saved in the mill itself (neglecting concentrates and tailings) the percentage is thus distributed: Mortar boxes, 44.8%; wells, 30.2%; blankets, 17.1%; skimmings, 7.9%. It must be remembered that in the case of the yield

was £197 6s. 0d., and during that period 181,792 tons were crushed, or at the rate of 355 tons (397 short tons) during the life of a grating. It was found that the ordinary round punched Russia iron lasted scarce a week as against a month for this type of copper grating.

Baize is used for the blanket strokes. For one year the cost under this item amounted to £47 9s. 2d. During the same period the wages at the mill amounted to £1,306 4s. 9d. for the treatment of 28,820 tons of ore, or 10½d. (21c.) per ton. The total cost of milling, including supplies, wear and tear, treatment of pyrites, etc., amounted to 2s. 3d., or 54c. per ton of ore.

The Dixon's North Clunes Mill is very similar to that just described. A few minor differences may be noted. The first grating is of copper, 180 holes per square inch, while the back grating is of brass wire, 230 to 240 holes per square inch. In this mill there are six of Munday's patent buddles with iron scrapers, two to each 10-stamps. At the South Clunes United there are only five to the 60-stamps; not enough. Assays are made daily, and the tailings are found very clean. The pyrites is washed and then treated in a Chilian mill. Cost per ton, £1 16s. 11d. The roasting of 85 tons 1 cwt. cost £89 6s. 7d.; grinding, £67 15s. 11d., or a total cost of £157 2s. 6d. The furnace is a reverberatory, 40 ft. by 5 ft.

Returning to the examination of the figures given in the comparative table it will be noted that both the newer mills follow very closely upon the lines of the old Port Phillip. The weight of the stamps—8 cwt.—is that which is most usual in the Colonies. Of the three mills the South Clunes United is the only one without a rockbreaker, and the result is to be seen in the smaller crushing power. The Dixon's North Clunes used the finest grating, but in so far as this affects the rate of

* Small pans placed at an inclination in which the grinding is done by a ball which remains at the lower end and turns round as the pan revolves.

* Lead amalgam, behaves similarly.

† That is, the front and back gratings together passed through 4,400 tons.

crushing it is fully compensated for by a less depth of discharge. The weight of the drop is practically the same in the three mills. Although the gold in the Dixon's is probably coarser than that in the ore treated at the South Clunes, the retort percentage is not quite so high because the finer size of grating used at the Dixon's produces finer crushing, and causes the amalgam to be somewhat more contaminated by pyrites. The large quantity of water consumed at all these mills is necessitated by the double discharge and the use of very wide blanket tables. The consumption of mercury is extremely low. The chief source of loss in a mill, that due to the flouing of the mercury by its violent agitation with the particles of the pulp when under the stamps, is here avoided, since none is put into the mortar box; 5½ grs. per ton is probably the smallest loss of mercury in a goldmill of which we have record.*

Before venturing to criticise the methods of gold extraction employed at the mills of this district it will be necessary to consider the character of the ores. These are broken from veins of quartz traversing slate and sandstone beds. When sent to the mill the quartz is accompanied by a comparatively small admixture of country rock. The quartz is white, often honey-combed, and sometimes sugary. The gold which it carries is coarse, of very high caratage, often visible to the naked eye, and arranged for the most part along the faces of small fractures and seams traversing the quartz. A blow tends to readily detach the gold from the quartz. Occasionally the quantity of "mullock" or waste rock increases considerably, and the gold is accompanied by pyrites, chiefly arsenical iron sulphides, or occurs in a matrix composed of quartz and slate intermixed.

Such, briefly, is the nature of the ore. The accompanying record † covering 14 years, will give a good idea of the completeness of the extraction and the proportion of the value saved by the several contrivances which together make up the treatment. It is taken from the mill book of the Port Phillip & Colonial Company.

THE PERCENTAGE OF GOLD OBTAINED.

	Beds.	Boxes.	Blankets.	Mills.	Blankets and mills.	Yield per ton.	
						Dwts.	Grains.
1865....	63.60	22.09	16.55	3.76	11.21	7	133½
1866....	65.60	21.63	8.73	4.04	12.77	6	15
1867....	65.44	22.50	8.48	3.58	12.06	9	5
1868....	63.22	24.63	8.11	4.64	12.75	8	23
1869....	61.33	24.77	8.02	5.88	13.90	7	8
1870....	60.15	26.69	2.74	10.42	13.16	4	2.34
1871....	62.59	25.39	12.02	12.02	5	17
1872....	64.48	21.60	1.06	12.86	13.92	4	17¾
1873....	59.20	20.67	10.35	9.78	20.13	3	23½
1874....	56.14	22.54	13.24	8.78	21.32	4	11½
1875....	54.81	25.14	11.22	8.83	20.05	4	23¼
1876....	58.17	21.24	11.12	9.47	20.59	5	4
1877....	52.84	21.56	15.40	10.20	25.60	6	20¼
1878....	52.84	17.12	17.11	12.93	30.04	7	20¾
1879....	57.99	10.50	12.84	13.67	31.51	8	19¾

It will be noted that in 1870 the use of blankets was discontinued and during 1873 it was again resumed. During the interval, it will be remarked, the yield from the Chilian mills, which treated the concentrated pyrites, increased considerably. Looking down the first two columns it is seen that while the proportion of the total yield coming from the mortar boxes (or "beds") and wells (or "boxes") amounted to 87.03% from 1865 to 1868, it declined to an average of 73.08% for the last four years. In 1879 it was only 68.49%. In the meantime the yield from the blankets and concentrates (as shown by the product of the Chilian mills) increased correspondingly. The first two columns represent that part of the gold contents which is essentially "free," while the third and fourth columns represent the remaining portion which is less easily extracted or "refractory."

The explanation of the figures above referred to lies in the fact that the mine workings having become deeper, the ore, by the steady increase of the percentage of pyrites contained in it, had become less "free milling." On referring to the returns obtained from the pyrites this reasoning is confirmed, for while in 1866 the yield of concentrates amounted to 268 tons, averaging 2 oz. 19 dwts. 4 grs. from the crushing of 59,578 tons, in 1879 the pyrites amounted to 421 tons, averaging 4 oz. 15 dwts. 20 grs. resulting from the treatment of 56,766 tons.

To consider the methods in use: It will be allowed that in milling the use of costly chemicals is to be carefully avoided. Mercury is the one chemical most generally used. Since a large (55% to 65%) percentage of the gold in the ores treated at the Clunes mills can be arrested in the mortar boxes by the action of gravity alone, the practice of the district is altogether correct in so far as concerns the non-employment of mercury in the battery. When under the stamps, mercury is always subject to "flouing," that is, the breaking of it into minute globules which, collecting impurities, become covered with a film which causes them to refuse to coalesce, and so to be carried away upon the surface of the water. Together with the direct loss of mercury, there must always be also an indirect loss of gold, particles of which have entered into amalgamation with the escaping globules of mercury.

The absence of copper or other amalgamating plates is remarkable. This also, keeping in view the character of the ore, is correct. Wells are excellent gold-saving appliances for ore of this type, in which the precious metal is both free and coarse. They require less attention, their first cost is less than that of amalgamating plates and they are less affected by the occasional presence in the ore of minerals, which are injurious to amalgamation.

* The other record, that for extreme waste, is held by the Caledonia Mill, at the Thames No. 2, where it is stated that one ton of mercury was used up in two weeks by a mill of 20 heads only!

† The terms "beds," "boxes," "mills," correspond to "mortar boxes," "wells," "Chilian mills," respectively.

Blankets, when they are intelligently used, are also among the best of the simple contrivances known to the millman. Instead of having the bad arrangement, seen in so many mills, of giving them a width much less than that of the amalgamating tables of mortar boxes, which precede them, the blanket tables here have the full uninterrupted width of two batteries. At the South Clunes United there is a clear blanket space of 10½ ft.

Ordinarily, the slope of the blanket strakes or tables would be from 1¼ to 1½ in. per ft., but at Clunes, owing to the employment of a larger quantity of water^o one is able to work them with an inclination of only ¾ in. per ft. This is in itself an important factor, though apt to be overlooked.

The after treatment in the barrels may appear crude, but practice has shown that it is very effective. The bad custom, observable in some California mills, of putting pieces of iron into the barrel (with the idea of mixing up the pulp and grinding it), does not prevail at Clunes. It is a device which serves mainly to cause excessive loss of mercury which, quite as much as the pulp, becomes ground, and so "floured."

The double discharge, front and back, presents no striking features. It is successful in increasing the crushing capacity of the mill, though it will be noted that it also requires the use of a much increased supply of water.

The depth of discharge is a factor in milling, the importance of which is almost invariably overlooked. The mills of this district are not guilty of the vicious practice of allowing a wide difference between the minimum and maximum depth of discharge, caused by the wearing down of the dies. An endeavor is made to keep the depth of discharge fairly constant, first by regulating the packing up and under the dies, and then by the placing below them (as they wear down) of a false bottom.

Though the self-feeders used are not automatically perfect, they do their work well, and, it is needless to add, are a great improvement upon the bad, irregular hand-feeding, which prevails in the majority of Colonial mills.

The concentrating machinery may, with reason, be considered somewhat out of date, but the modified Cornish buddles in use are doing most excellent work, and it is doubtful whether they would be replaced to advantage by the more costly Frue vanner.

Speaking generally, the treatment which the ore undergoes is remarkable, most of all on account of its simplicity, but so is the ore; and in this way the practice of the district carries out the first postulate of intelligent milling, viz.; that the treatment should be varied according to the character of the ore to be treated.

After a careful examination of the ore mined at Clunes, and of the milling to which it is subject, it is not possible but to speak in words of commendation. To a millman, Clunes is almost solitary among the gold mining districts of the Colonies, in being a quartz milling center which does not leave a feeling of dissatisfaction and an impression of disappointment. The old Port Phillip is still working, but as a great mining and milling establishment, it is a thing of the past. That past has, however, been a glorious one, not so much by reason of the dividends which it has paid, but because of the successful experimental work which it carried on for so many years, at a time when such work was especially needed. The immense good it has done as an educational center and a trading ground for millmen is not known save to those acquainted with the work which was done at Clunes from 1857 to 1880. You may visit mills in the most distant part of Australia and almost without exception, wherever you find good, intelligent milling (and that does not happen too often to be monotonous) you will also learn that that knowledge and experience were obtained at the small Victorian mining town, of whose record we are speaking.

The Port Phillip was the first to introduce the system of taking daily assays as a check upon the work done in the mill. In this respect Clunes is still, unfortunately, a striking exception.†

In another department, this mill was almost a solitary pioneer. The rock breaker was introduced by the Port Phillip in 1865. Can it be believed that in these days of improved milling machinery, when the rock-breaker is accepted as an absolutely necessary portion of a complete mill equipment, that in the great gold mining colony of Victoria, there are only 12 rock-breakers! Of this number three are accounted for by Clunes, two belonging to the Port Phillip, and one to the Dixon's North Clunes.

In closing this short account of the milling practice of a district but little known beyond the Colonies, it will be pardoned if I express the opinion that the work done at the Port Phillip & Colonial Company's mill has been of more wide-reaching usefulness and more permanent benefit to the mining industry of Australia and New Zealand than that of any other company which has gone into operation since the days of the discovery of gold. I wish to record my conviction of the debt which quartz milling in the Colonies owes to the manager—Mr. R. H. Bland—of the Port Phillip, who started the operations in 1856, conducted the numerous and valuable experiments which did so much to establish the correct basis of milling practice, and to-day still assists the industry by his sterling good sense.

Foreign Marble for Government Buildings.—Complaints have been made by Tennessee and Georgia marble men that in the construction of the new Congressional Library building at Washington, D. C. the native marbles have been discriminated against in favor of the foreign marbles, and that of the native marble used Vermont furnished the bulk. The complaint is that \$600,000 worth of foreign and only about \$38,000 worth of native marble have been purchased. Representative Houk, of Tennessee, has had some correspondence on the subject with General Casey, who is in charge of the work on the library building, and it is probable that the General will find his conduct the object of a resolution providing for Congressional investigation, although he has written to Representative Houk denying any discrimination on his part.

^o Due, as pointed out, to the use of the double discharge.

† I recollect another instance in Australia, the mill of the Harrierville Gold Mining Company, Ltd.

THE NATIONAL MACHINERY COMPANY'S ROCK AND ORE CRUSHER.

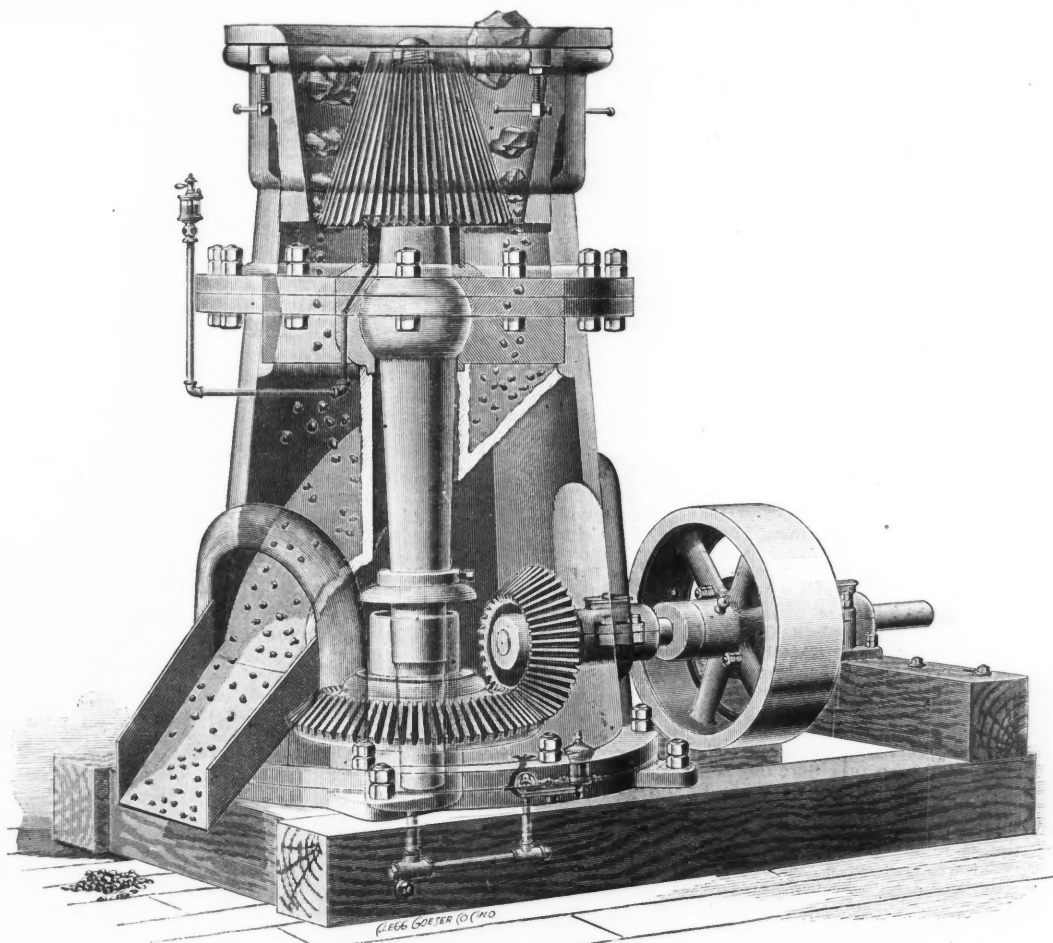
In our issue of December 5th, 1891, we described the rock and ore crusher brought out by the National Machinery Company, of Tiffin, O. Since that time several alterations and improvements have been introduced into the machine so that the latest form which we here illustrate presents some novelties. In this machine the crushing head is mounted on the top of a vertical rotary shaft, which is held in a ball and socket bearing and driven by bevel gearing below. The hopper is entirely open to permit the dumping of whole carloads of material directly into the machine. The belt is applied to the heavy cast iron band wheel which is attached to a brake hub by means of two common machine bolts. The brake hub is only keyed to the horizontal countershaft. Should the crushing head come in contact with anything of an unbreakable nature, the strain becomes so great at the pulley that the bolts would be stripped of their threads. To the countershaft is attached the pinion which drives the large gear at the bottom, and to this large gear is attached a brass eccentric bushing, the throw of which varies from $\frac{3}{8}$ in. to $1\frac{1}{4}$ in., according to size of the machine. The lower end of the heavy upright shaft rests within this eccentric and gyrates with it. As the gear wheel and eccentric revolve the upright shaft will receive a gyratory motion. The chilled iron liner is fitted within the outer shell so that it may be raised or lowered by means of the jack screws on the outside of the machine. This will regulate the size of the product and also take up the wear on the head

CONDITION OF THE MINING INDUSTRY IN 1892.
COLORADO.

Written for the Engineering and Mining Journal by Thomas E. MacMeechen.

The chief and most characteristic features of mining in Colorado during the year 1892 have been the remarkable activity in the silver and lead producing districts, despite the radical depression of silver; the enormous amount of capital, mostly from the East, which has been invested in new milling processes for reducing the cost of gold treatment; the direct influences of the several sessions of the Western Slope Congress upon the railroad and smelter questions and the important railway extensions into new mineral-bearing territory, materially increasing the state production, which has exceeded \$36,000,000 in 1892. There has also been a noted shortage of lead flux, occasioned by the absorption of the Mexican lead ore by the smelters recently established in that country, and this created a brisk local demand for good lead properties. The ores of Mexico are now treated at the Mexican smelter instead of seeking, as formerly, United States reduction.

Among the more important gold and silver processes introduced in the past year, and which are now operated in low grade districts, are the Russell lixiviation, MacArthur-Forrest cyanide, the Luckenbach, a hydraulic process, the Meach or chlorine system, the Austin system of pyritic smelting, and the Bennett Amalgamating Company's electrical treatment. Each of these methods has undergone tests, and been



THE NATIONAL MACHINERY COMPANY'S ROCK AND ORE CRUSHER.

and liner. The crushing head has the greatest motion at the top and the least motion at the bottom. This movement produces a most uniform product. This crusher is adapted for fine crushing, as the crushing head can be set up very close to the inside liner or concave, there being very little motion at this point. The machines are made in nine sizes, giving a product ranging from 5 to 175 tons per hour.

The Government and the Nicaragua Canal.—The committee appointed by the New Orleans National Nicaragua Canal Convention has issued a historical letter in support of its position that the United States shall build the canal, own and control a majority of the stock and fix the tolls on the canal after completion. The letter shows that after the Mexican war President Polk negotiated through Judge Hise, of Kentucky, with Nicaragua for concessions for this canal. Later, during President Grant's administration, this concession was again taken up. Then during President Arthur's administration concessions were again made to the United States Government, but all these negotiations failed on account of diplomatic relations with England. The letter further shows that England's diplomacy has for more than 40 years delayed the construction by the United States of this canal; it shows that the only solution of this diplomatic difficulty is in the incorporation of a private company with the government as owner of over four fifths of the stock, appointing or voting for 13 out of the 15 directors, and indorsing the bonds and controlling the building of the canal and the disbursements of the funds.

pronounced more or less successful. The capital invested in them is said to exceed \$5,000,000.

The main railway extensions have been those of the Rio Grande and Union Pacific into the Irwin coal district of Gunnison county, now under survey, the Colorado Midland into Cripple Creek, Rio Grande Southern into Rico, and various short branches of the Rio Grande and Union Pacific into the southern coal fields, most notably those of Las Animas county. Several new branches have also been projected into the northern coal fields, which will be placed under construction early this year.

The last Western Slope Congress, which convened at Durango last month, succeeded in the attainment of favorable railroad reductions in the ore freight rate to points in eastern Colorado, and has given assurances of the support of a very extensive smelting plant to be located at the most advantageous point for the mineral resources of that section, some time in 1893. Another reason for gratification during the year just past is the unusual interest taken by the new President of the Rio Grande Railway, Mr. E. T. Jeffrey, in the advancement of the state's mining industry.

The total capitalization of all the mining companies incorporated during the year in Colorado is about \$417,700,000. They brought into the State treasury in fees, \$39,039. From a statement issued by the Surveyor-General of Colorado, ranging from January 1st to the end of December, 1892, there were seven hundred and twenty-one orders for

surveys and fifteen hundred orders for lode locations. The survey orders cancelled were thirty-one, and the number of lode locations cancelled sixty, leaving a total of six hundred and ninety survey orders issued, and fourteen hundred and forty lode locations. During the same interval five hundred and fifty-six surveys and eleven hundred and fifty lodes were approved.

The assessed valuation on the gross output of mining properties for 1891 was \$6,338,402, as against \$7,118,223 for 1892. These figures were obtained from the Auditor of State. The number of carloads of ore shipped into Denver during the year was twenty-two thousand one hundred and twenty-nine, a monthly average of 1,844 cars, or 442,580 tons, as against 390,000 tons for 1891. These figures are from the records of the Merchants' Railway Bureau of Denver. The number of tons of ore shipped into Pueblo was about 290,000, and into Leadville about 190,000, while Durango received about 100,000 tons, showing a marked increase for this point over 1891.

The report of the State Labor Commissioner for 1891 and 1892 shows that there are now in operation 895 metalliferous producing mines in Colorado, employing 16,926 miners, who draw \$14,265,000 in wages annually from the pay-rolls of these corporations. Daily earnings of miners in Colorado at this date range from \$2.50 to \$3.50 per day, being the same standard that has governed this class of labor for years. The increase in operation in the gold districts since the fall of the price of silver may be noted from the fact that Clear Creek and Gilpin counties which produce 60% of the gold yield in the state, together employ 3,465 miners, while Lake county and Aspen, constituting the heaviest silver producing district, employ 4,310. An advance statement of production statistics compiled by the State Labor Commissioner from material furnished him by the mining properties numbered in his report gives an estimate for 1892 of \$4,818,700 in gold, \$25,300,000 in silver, \$600,000 in copper and \$5,000,000 in lead, giving a total of \$36,318,700; this estimate, however, is shown to be over four millions too high, when compared with figures obtained by the Denver "Republican."

The excessive production of metalliferous ore in the state and the unusually large importations from outside sources have been due to increased capacity in existing plants, and have also necessitated the erection of a number of new reduction works. The Boston & Colorado Smelting Company filed during the year new capitalization papers for \$1,500,000, to cover additions to their already large plant at Denver. The most notable and extensive addition, however, made by any smelting plant in the state, or for that matter in the entire country, was that of the Omaha & Grant Smelting and Refining Company, which will cost when completed over \$1,000,000.

Among the new smelting companies incorporated are the National Reduction Works at Pueblo, \$1,000,000 capital; the Boulder Reduction Company, \$100,000; the Hardinge Smelting Company, of Aspen, \$500,000; the Holden Smelting and Refining Company, of Aspen, \$1,000,000; the Bi-Metallic Smelting Company, of Leadville, \$500,000; the Cripple Creek Gold and Extraction Power Company, \$250,000; the Denver and Golden Smelting Company, \$100,000; Amalgamating, Chemical and Electrical Reduction Company, of Denver, \$500,000; the Standard Smelting and Refining Company, of Durango, \$500,000; the Cripple Creek Reduction Company, \$500,000; the Aspen Mining and Reduction Company, \$2,000,000, and the Pike's Peak Sampling and Ore Reduction Company, of Cripple Creek, \$500,000.

Two incorporations of 1892 marking the opening of new lines of industry are those of the American Asphalt Company, capitalized at \$1,000,000, an aluminum company, at \$2,000,000. Asphalt in large bodies has been discovered near Grand Junction, and several corporations have been formed lately to handle this product.

The petroleum production of the Florence oil fields will show a slight increase over that of the previous season. There is, however, no radical change in this output year after year. The only matter of interest in connection with it is the fact that the petroleum residuum, formerly wasted, is now utilized for fuel purposes in the mines and smelting furnaces of Leadville and Aspen. The annual production of oil in this section attained this year a total of between 650,000 and 700,000 barrels, distributed about as follows: Crude oil, 300,000 barrels; refined oil, 140,000 barrels; greases, 160,000 barrels; the highest yield of a single well per diem being about 200 barrels.

The sandstone output has become one of Colorado's chief industries, and during the past year the quarries have turned out over \$2,000,000 worth of this building material. There are now in the state 71 quarries, employing 1,521 men, and the marble, granite and onyx quarries have received more attention during the past year than at any previous time in their history. The brick-clay and kaolin beds have also been largely developed.

The capacity of the Bessemer Steel Works, at Pueblo, has attained a combined iron and steel annual output of between 53,000 and 54,000 tons, giving it the distinction of one of the greatest plants of its kind in the world. Its output may be itemized as follows:

Pig iron, 25,000 tons; steel rails, 16,000 tons; iron castings, 1,300 tons; cast iron pipe, 1,200 tons; merchant bar, etc., 4,700 tons; nails (100-lb. kegs, 45,000), 2,250 tons; spikes, 2,500 tons.

During 1892 there have been 77 producing coal mines, and while their total output for 1891 was 3,358,496 tons, valued at \$10,075,448, the output for 1892, as near as can be ascertained at this writing, will be 3,927,000 tons, worth, at the market price, \$12,959,100. This valuation is based on an average of \$3.30 per ton. There are now 140,933 acres of coal lands operated in the state, the combined area of all coal territory covering 18,100 square miles, which exceeds that of Pennsylvania by nearly 50%. At present there are 8,164 people deriving a livelihood from this industry, and the wages disbursed among them averages \$5,905,159, according to figures based on estimates obtained from employers and employees. Instances of the increased amount of capital placed in the coal industry during the past year are the consolidation of the two greatest coal and iron corporations in the West—the Colorado Fuel Company, and the Colorado Coal and Iron Company—under the title of the Colorado Fuel and Iron Company,

with a capitalization of \$13,000,000; and the incorporation of an immense "trust" combining all of the coal interests of northern Colorado, under the title of the United Coal Company, whose lands covers over 3,045 acres, and contain 50,000,000 tons of coal. The latter concern estimates its output for 1892 at 500,000 tons. During 1891 and 1892 about 7,000 acres of coal lands were purchased from the government in one county alone, La Plata, at \$20 per acre, and improved by costly machinery. The coal analysis of all districts shows the Colorado product to be equal, and in many respects superior, to that of Pennsylvania. The State Inspector of Coal Mines says in a quite recent report: "The increase in population throughout Colorado, Kansas and Nebraska points out a great future market for northern Colorado coals, for owing to their location geographically, they can be offered at a much lower price than the coal from southern Colorado fields, and judging from the geological research, which has fully demonstrated beyond all reasonable doubt the extreme scarcity of coal beds throughout Nebraska and Kansas makes it evident that they must ever look to Colorado for their fuel supply." Furthermore, in connection with the southern coal fields, he speaks of the entire absence of coal in Texas and the barrenness of the wood fuel supply, together with the demand of the increased ocean steamship travel whose ports are upon the gulf boundary of the state, and says that this entire territory must henceforth rely upon the adjacent coal fields of southern Colorado for an immediate and ample supply of coal. The year just past is a remarkable one in the history of the coal industry in this state, from the fact that more capital has been put into the development of the fields, and more modern machinery has been introduced with which to handle the great demand, than at any previous time since the beginning of its history.

Reverting to the metalliferous producing districts, Leadville of course heads the list, with its almost unvarying annual output. All of the paying properties at this point during 1892, including the A. Y. and Minnie, Colonel Sellers, Henriette, Maid of Erin, Louisville and other large and familiar groups, have either only departed slightly in part from their customary production or increased it by several thousands of tons.

Aspen's production is thought to have exceeded that of 1891 by a very pronounced amount, notwithstanding that it is essentially a lead and silver camp, and that there has been a heavy falling off in the market price of the white metal. The fame of the Mollie Gibson is now world-wide. Its improved plant is sufficient to sink over 2,000 ft. on the contact, while the average value of its production has remained close to 600 oz. of silver to the ton. One car of 23½ tons during the past year gave \$44,000 net; one car of 22 tons, \$60,000 net; one car of 24 tons, \$76,500 net; one car of 22 tons, gave \$60,400 net; one car of 28 tons, \$64,100 net. Five sacks, averaging 112 lbs. to the sack, returned \$5,670, and at another time the same amount returned \$4,260 net. Nearly all of this ore has been handled at the Omaha & Grant Smelter by contract. The Holden Smelting Company, a recent enterprise in Pitkin County, is the first corporation to introduce a new treatment of much importance for the low grade ores in this vicinity. Its plant cost in the neighborhood of \$300,000, and the exclusive right for this territory, of treating ores by the Russell process of lixiviation, is its privilege. The Aspen Mine has been working mainly on new ore bodies at the lowest levels, and leaving their reserves until some fixed price for silver is made. The famous consolidation of the Della S. and the J. C. Johnson, which followed the litigation between these two companies in the United States Court early in 1892, has been the means of bridging about a development on Smuggler Mountain far exceeding that of any previous year. The plants of the consolidation have been augmented until the combined power is now sufficient to sink to a depth of 2,000 or 3,000 ft. on the vein. The gross tonnage output of this property will be enormous when its accurate total has been set forth. The Mollie Gibson, on the same hill with the Della S., has made the production of the Smuggler Mine vie with the hitherto unapproachable output of Aspen Mountain on the other side of the hill.

At Creede the development has been slow but steady, and the camp has now taken its rank as fourth in production in the State. The Last Chance filed new incorporation papers a few months ago, naming as its capital \$5,000,000, and the Delmont duplicated this. The Amethyst, New York, Little Maid and other well known producers have held their own during the year.

From January 1st to October 1st, last year, Rico had shipped a total of 12,830 tons, a production at the rate of 15,396 tons for twelve months, and the value of this output, which is of a grade lower than that of the previous year, is \$2,000,000 against \$1,250,000 for 1891. A small sampling works was erected here early during the past year, and the most sanguine of its citizens predict the establishment of a smelter at or near the town sometime during the first part of the new year.

Continued tests in Gilpin County show an average in gold mill retorts and bullion assays of about 787 parts gold, 198 silver and 15 copper, emphasizing its claim of producing 60% of the gold yield in Colorado. There are now 510 stamps crushing ore in this district. The combined smelting and milling output for 1892 is estimated to have certainly exceeded \$3,000,000. Russell Gulch and Yankee Hill have furnished the surprises of the year in that section, and Jupiter-Belmont, at the former, and the Alice at the latter, have accomplished perhaps the most noteworthy development.

Onray properties have also accomplished a great deal of development work, particularly in the Red Mountain district, where the American Girl and Guston are still large shippers, while the Robinson, Silver Belle and the Saratoga on Round Mountain continue to pay. Virginia is now operated altogether by an electric plant located ten miles from the mine, but the American Nettle still leads the district with its enormous production.

Cripple Creek, the new gold camp, is still a puzzle to mining operators as far as its geological structure is concerned. They are aware, however, that the "rock" impregnated with the yellow metal is there, and they are still industriously "quarrying" it out. The production of the

camp up to January 1st, 1893, is placed at about \$1,200,000 to \$1,500,000. Copper Rock properties have not been worked as heavily as the indications warrant, although the gold yield of that camp for 1892 will prove a surprise to many of those who have been incredulous.

The San Juan country has preserved its reputation for heavy output during 1892. The mines in the Sheridan Basin, notably the Sheridan-Mendota, have produced 400 to 500 tons per week, and the Smuggler-Union about the same amount, which product has averaged \$50 in gold and silver. The Belmont group has output some 50 tons gold ore daily, valued at \$10, while the mines and mills of the San Miguel Consolidated have helped to make the total for 1892 between \$2,500,000 and \$3,000,000. The Sheridan company has just completed a system of inclines for the delivery of its ores at the end of the railway. The Smuggler has put in a Bleichert aerial tramway 500 ft. in length, and having a capacity of 750 tons every 24 hours. The San Miguel Consolidated has introduced an electric plant system, consisting of a dynamo of 750 H. P., communicating from its location over seven miles to the point where the power is used. It is intended to drive two or three mills aggregating 300 stamps, which means a capacity of 600 tons daily. The principal advancement in the San Juan country for 1892 has been among the gold leads, a large number of which have warranted continuous operation. At Ophir, 15 miles from Telluride, there has been considerable activity in gold mining. These veins average \$45

ELECTRICAL FORGING MACHINE FOR ROUND SHAPES.

The machine here illustrated is claimed to be the first successful machine ever put on the market for forging round shapes. It is made by the Electrical Forging Company, of Boston. The machine is designed and built for rapid and accurate work. It is rotary in all its movements, and thus no time or power is lost in the return of the dies to their working position. It may be worked at any speed, from slow to fast, according to the nature of the work required. It is quickly and easily adjusted and automatic in all parts. Articles from 1/2 in. up to 6 in. long, and from 1/2 to 1 in. in diameter can be turned out by the machinery shown in the illustration. The machines are built in ten sizes.

A great variety of things now produced are made of iron or steel of low carbon in order that they may be turned out economically. By this machine, however, highly carbonized steel may be worked equally as well as iron or soft steel. It is within the range of these machines to roll successfully steel of the highest grade of crucible down to the open-hearth and Bessemer. Copper and brass are also successfully worked.

By the electrical rolling process 100 perfect handles can be made in the time required to make one by former methods. Anti-friction steel balls from 1/4 up to 2 in. in diameter are made by the electrical-rolled forging process at a speed unapproached by other methods.

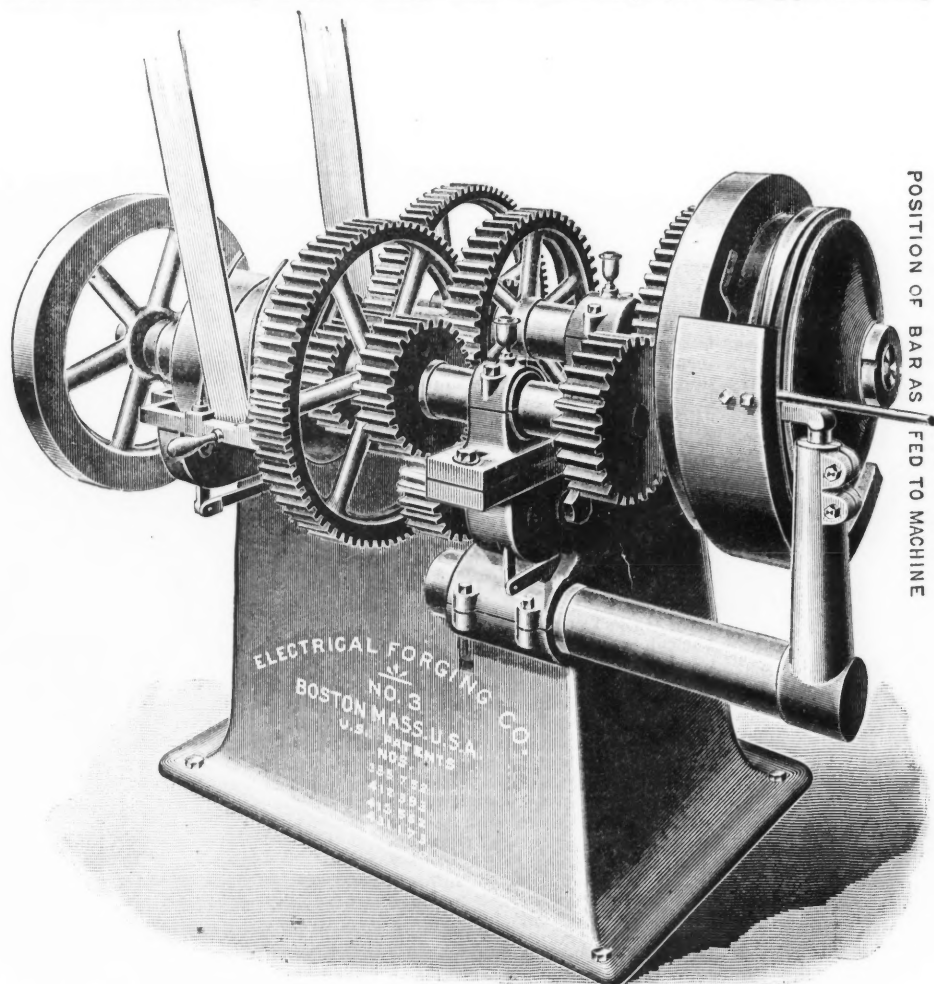
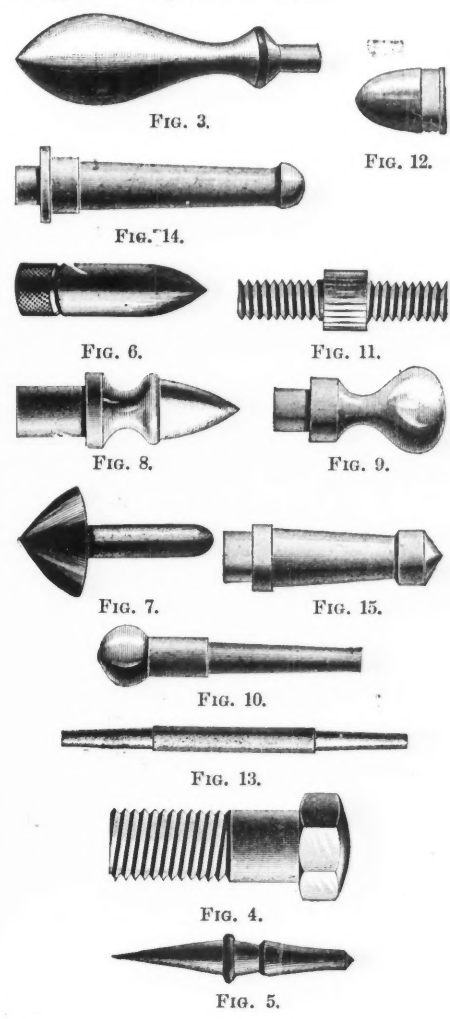


FIG. 1. ELECTRICAL FORGING MACHINE FOR ROUND SHAPES.



per ton and have during 1892 given a yield that will surprise the doubtable Gilpin county.

Among the mining companies incorporated during 1892 which have played an extraordinary role in the history of the year are the Rico-Aspen Consolidated, Consolidated Rico-Return, the Enterprise, Union Carbonate and Atlantic Cable Consolidated Mining Company, at Rico; the New York Chance Consolidated, at Creede, with a capital of \$1,000,000; the Anaconda Gold Mining Company, at Cripple Creek, whose capitalization is \$5,000,000, and a long list of corporations at other camps.

Boulder and Las Animas counties now lead in the number of producing mines, the former having 18 and the latter 10. This relates only to metalliferous mines.

In conclusion it only becomes necessary to say that the product of Colorado for the past year, in the face of numerous financial adverses, has been very gratifying to the people of this State.

An Underground Railroad for Brussels.—It is proposed to build an underground railroad in Brussels in the form of a belt line with 11 stations. Electricity will be used for driving purposes. Each train will consist of one car on four-wheel trucks, and will be driven by a motor on one of the trucks. The traffic will be regulated by the automatic electric block system adopted on the Liverpool overhead railroad. The engineer is Mr. J. H. Greathead, London.

A red hot steel bar is inserted between the revolving dies (the position of the steel bar is shown in the cut of the machine), and for every revolution of the dies a ball is forged, or a conical shot, a chair screw, a bolt with thread and head complete, a boiler rivet, calks for lumbermen's shoes, or a spindle or taper pin may be produced.

The other illustrations show a few of the many samples of work made on this improved rolling machine. Fig. 2 is an electrically heated and rolled forged steel ball; Fig. 3, a rolled forged machine handle made in several shapes and sizes; Fig. 4, rolled forged hexagon head bolt, head and thread made at one operation, square and round headed bolts made by the same dies complete at one operation; Fig. 5, shoe calk, made in four sizes; Fig. 6, conical shell; Fig. 7, shuttle tip; Figs. 8 and 9, hinge tips; Fig. 10, hames start, made in several sizes; Fig. 11, right and left hand thread, made at one operation; Fig. 12, rolled steel cane and umbrella tips; Fig. 13, rolled bicycle spindles, all sizes; Figs. 14 and 15, rolled caster pins.

SooySmith's pneumatic system of making foundations is to be applied in the erection of the high building of the Manhattan Life Insurance Company, at 64 Broadway, New York. This building is to cover 67 ft. by 120 ft. and it will be 16 stories high. The foundations will be in fine running sand, saturated with water, 50 ft. deep to rock. Sixteen steel caissons will be used, and each will support two to four pillars which in turn will support the building.

CONDITION OF THE MINING INDUSTRY IN 1892.
ARKANSAS.

Written for the Engineering and Mining Journal.

Zinc: There has been unusual activity in the zinc regions of Marion, Boone and Searcy counties. Development work is being carried on at a number of mines, and ore is being taken out for shipment. At the Morning Star Mine mining is being carried on and the ore hauled to the White River, from which point it will be transported by water; 350 tons, spot value, \$20.50 per ton, is on the river bank at Buffalo City. Lack of transportation has prevented shipments being made from many mines in this locality.

Iron: No iron ore has been mined in this State since 1860, at which time there were two bloomery forges in operation. Deposits of ore occur in Lawrence, Sharp, Pulaski and Saline counties.

Copper: The Tomahawk Mine in Searcy County (P. O. Tomahawk) has produced a total of 150 tons of ore averaging about 36% copper, none of which has been shipped. Work has been suspended for the last fifteen months and will probably not be resumed until facilities for transportation are obtained.

Antimony: The principal antimony mines in Sevier County are known as follows: The Stewart lode, May Shaft, Valley, Bluff and Otto mines. The ore is stibnite of remarkable purity. The only operations of recent date have been carried on by the United States Antimony Company. A small smelter has been erected, but no shipments have been made during the year.

Gold: At the present writing there is no well authenticated account of the discovery of gold having been made in this State, although a great deal of prospecting has been done.

Some of the Bear City (Montgomery County) companies are still at work experimenting, and have succeeded in disposing of some of their stock during the year.

Silver: The Kellogg Mines, ten miles north of Little Rock, are now being worked. The minerals mined are galena, zinc-blende, gray copper and chalcopryrite, all of which are argentiferous.

Shipments for the year are as follows: One car (13 tons) zinc-blende, value at mine, \$22 per ton; two cars (40 tons) lead silver ore, shipped to Joplin, Mo., for concentration, gave 37 2-10% of concentration which yielded 11.8% lead, 25.4% zinc, and 32.4% oz. of silver.

This property has been worked at intervals since 1848. During this time the value of the total output has probably been sufficient to pay all the legitimate costs of mining the ore.

A diamond drill has been purchased by the company and will be put to work during the month of January, 1893.

There is considerable activity in the Silver City mining district. Work has been resumed during the year and some ore has been taken out.

Coal: There has been a marked increase in the output of coal during the year 1892, the output for this year reaching 739,300 short tons.

The largest operations are carried on at "Jenny Lind," by the Western Coal and Mining Company, and at Huntington by the Kansas & Texas Coal Company. These two companies have investments in land and plants estimated to be worth upward of one and one-half million dollars value.

The Kansas & Texas Coal Company have recently put in a plant for the manufacture of "eggette," which is made by mixing the coal slack with asphalt, and pressing it into convenient sizes for fuel. The capacity of the "eggette" plant is 200 tons per day.

The Western Coal and Mining Company have purchased 5,000 acres of coal lands near Altus, in Franklin County, and are now opening up mines.

All coal mines in the State that work on an extensive scale are well equipped with machinery for mining. The plant of Stilwell & Co. and the Ouita Coal Company include machinery for washing and grading.

A very superior quality of coke has recently been made from the slack of Jenny Lind coal at Fort Smith, by Mehlburger Bros., who use it for foundry purposes.

PRODUCTION BY MINES AND COMPANIES IN 1892 AND VALUES.

Counties and collieries.	Operators.	Total production in short tons.	Total value.
Sebastian County:			
Huntington mines.....	Kansas & Texas Coal Company.....	233,000	
Jenny Lind.....	Western Coal and Mining Company.....	245,000	
Greenwood.....	Greenwood Coal Company.....	13,000	
Greenwood.....	Southwestern Coal Company.....	13,000	
Petty Slope.....	E. B. Petty.....	10,500	
Massard Prairie and other openings.....	Thompson, Degan and others.....	2,100	
Total Sebastian County (av. price, f. o. b. mines, \$1.90 per ton).....		576,600	\$922,560
Johnson County:			
Allister Slope.....	Ouita Coal Company.....	48,000	
Coal Hill Shaft.....	Stiwell & Co.....	75,000	
Eureka Shaft.....	Stiwell & Co.....	15,000	
Felker Shaft.....	Black Diamond Company.....	3,000	
Philpott Shaft.....	L. S. Philpott.....	1,200	
Total Johnson County (av. price, f. o. b. mines, \$1.75 per ton).....		142,200	248,850
Pope County:			
Ouita Slope.....	Ouita Coal Company.....	16,500	
Shin and other openings.....		1,500	
Total Pope County (av. price, f. o. b. mines, \$2 per ton).....		18,000	306,000
About 40 small openings in different counties.....		2,500	5,000
Grand Total.....		739,300	\$1,212,000

Building Stones: Granite occurs in the counties of Pulaski, Saline and Hot Springs. Although the stone is much sought for as a building and paving material; the quarrying industry has now fully developed. The output for the year of the quarries of Pulaski county will not exceed \$85,000.

Sandstone: Large quantities of sandstone for building purposes are shipped from Cabin Creek, Johnson County. Expensive deposits of marble occur in Searcy, Marion and Newton counties, but owing to lack of transportation they are not quarried. Slate suitable for roofing and tile is found in Pulaski, Saline and Garland counties.

Manganese: The output of manganese ore for the year amounts to

7,060 tons, all of which is from the Batesville (Independence County) region.

Large deposits of kaolin of good quality occur in the counties of Pulaski and Saline. No attempt has been made to utilize the clay. Pottery of good quality is manufactured at Texarkana, Benton and other points on the St. L., I. M. & S. R. R. from clays in the vicinity of the works. Vitrified brick of superior quality are manufactured from shale at Fort Smith. The output for the year has been nine millions.

Various Products: Lime is burned in large quantities in the counties of Independence and Crawford. The total output for the year of Dennie's kilns in Independence County amounts to 22,000 barrels.

"Fullers Earth:" "Fullers earth" is prepared and shipped from Alexander. The total output for the year amounts to 300 tons. The demand is principally confined to refiners of cottonseed oil.

Considerable lignite of good quality is taken out in Ouachita County near Camden, and at Lester on the Camden branch of the St. L., I. M. & S. R. R. It is used locally as a fuel. Deposits of novaculite occur in Garland County near Hot Springs. The most reliable estimates placed the output of finished stones at 15,000 lbs. per year; value, \$1 per pound.

The following table shows the value of the mineral production for 1892:

Silver.....	\$100.00
Lead.....	50.00
Zinc.....	5,000.00
Coal.....	1,212,410.00
Building stone.....	95,000.00
Lime.....	20,000.00
Mineral water.....	5,000.00
Manganese ore.....	53,720.00
Novaculite (finished stone).....	15,000.00
Mineral specimens and quartz crystal.....	12,000.00
Estimated value of unclassified products.....	4,300.00
Total.....	\$1,422,880.00

Saniter's Process for Desulphurizing Iron and Steel.—In our issue of December 10th we gave a full account of the new process discovered by Mr. E. H. Saniter, of Wigan, England, for desulphurizing iron and steel by mixing a certain proportion of lime and calcium chloride to the molten pig. Further information has been given by Mr. Saniter in a paper read toward the end of December before the Cleveland Institute of Engineers, England. From this paper we gather that the new process has been tried by leading metallurgists in England since its first announcement, and that the claims put forward by its inventor have in all cases been substantiated. Also, additional details of the process are given. If it is desired to remove the sulphur alone without touching the silicon the calcium chloride must be dried before being mixed with the lime, whereas, if it is desired to remove the silicon as well as the sulphur, the calcium chloride must be used wet. About 25 lbs. of calcium chloride and 25 lbs. of lime are required to treat a ton of iron, and the cost of these materials is 12 cents per ton of iron. Mr. Saniter gives examples of working where the poorest qualities of pig have been used in producing steel of excellent quality, and he states that he has produced wrought iron equal in quality to Swedish iron at much less cost.

The Hall Aluminum Patents.—A decision was entered upon the record of the United States Circuit Court of Ohio, January 11th, 1893, in favor of the Pittsburg Reduction Company, controlling the Hall patents. The suit was brought by the company against the Cowles Electric Smelting and Aluminum Company on the Hall electrolytic process patents for the production of pure aluminum, and the plaintiff's case was sustained on every point. The final argument was heard by Judges Ricks and Taft, the former of Cleveland, the latter of Cincinnati. An opinion prepared by Judge Taft will be filed by the 20th inst. This decision is said to give to the Pittsburg Reduction Company practically a monopoly of the pure aluminum business of this country. The attorneys for the Pittsburg Reduction Company were George H. Christy and Thomas W. Bakewell, of Pittsburg, and the chief expert witnesses on their side were Prof. Charles F. Chandler, of Columbia College, Prof. John W. Langley, of the Case School of Applied Sciences of Cleveland, and Dr. Rossiter W. Raymond, expert metallurgist and chemist of New York, and Charles M. Hall, the inventor of the process. The Hall electrolytic process is the only process employed to-day for the manufacture of aluminum in this country or abroad. By it the prices of pure aluminum have been reduced from \$15 per lb. down to 50 cents per lb., at which price it is bulk for bulk, about as cheap as copper and cheaper than nickel or tin. By this process working on a large scale it is estimated that the cost of making pure aluminum can be brought down to perhaps 17 cents a pound. The process consists in reducing the oxide of aluminum by dissolving it in a fused bath, consisting of a fluoride of aluminum together with a fluoride of some other metal more electro-positive than aluminum, and precipitating the metallic aluminum from this ore by electrolysis. The fused fluoride bath referred to remains practically constant, and therefore costs but little. The ore is simply dumped into this bath, and upon dissolving the metal is immediately electrolyzed out by the current at the negative pole, and falls to the bottom of the pots. The pots are then either tapped or laded out without disturbing the operation of the process, which is therefore continuous, and the purity of the metal thus obtained is higher than has ever been attained by any other process.

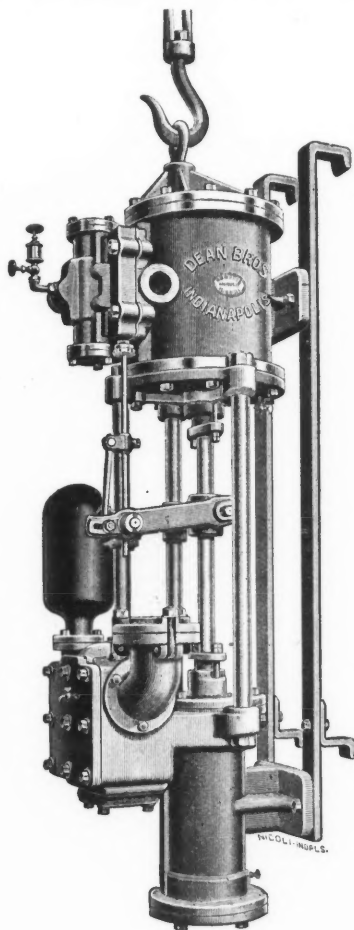
The consumption of aluminum is increasing rapidly and it will soon take a position in the metal world quite as important as that of copper, tin or lead. The Hall process and that of Heroult, whose large works are now running at Neuhausen on the Rhine, in Switzerland, are identical. Both Heroult and Hall applied for patents in the United States Patent Office about the same time in 1886, and after an interference suit, which lasted a year, Hall was judged the prior inventor. This same question of priority was of course one of the points at issue in the present case which was again decided in Hall's favor. The Cowles Electric Smelting and Aluminum Company abandoned their electric smelting process for making aluminum alloys when they commenced using the Hall method two years ago. The Cowles company can carry the suit up to the new Supreme Court for the hearing of patent cases only, and this, we understand, will be done.

DEAN BROTHERS' MINING PUMP.

We here illustrate a new mining pump made by the Dean Brothers Steam Pump Works, Indianapolis, Ind. The pump is intended for use in mines, shafts, wells, etc., and can be operated either, while suspended from a hoist or while attached to the side of the shaft. It is fitted with Dean Brothers, noiseless valve gear with adjustable stroke. All the parts are made strong to resist rough usage and the water cylinder can be made of gun metal or bronze if the mine water is corrosive on steel. This form of pump is made in a great number of sizes. That shown in the illustration has a steam cylinder 14 in. in diameter and a water cylinder 8 in. in diameter with a common stroke of 12 in.; the suction is 6 in. and discharge 5 in. wide.

BATES' NUMBERING HAND STAMP

The Bates Manufacturing Company, of this city, are bringing out the improved form of numbering hand stamp shown in the accompanying illustration. It is entirely automatic, and will stamp numbers from 1 to 999,999. The impression is given by figures cut in the steel face of a series of six discs, and the ink is supplied by a pad ordinarily underneath the figures. By moving the index finger the numbering can be made consecutive, or two impressions can be made for each number, or the same number may be repeated indefinitely. All the motions



DEAN SINKING PUMP.



BATES' HAND STAMP.

between stampings are entirely automatic, so that the stamp can be used by one of small intelligence without a mistake being made in the numbers. The weight of the stamp does not exceed 1 lb., and the price is low.

COPPER MINES AND WORKS IN THE CAUCASUS, RUSSIA.

In our issue of January 7th we published a translation of portion of an article by M. Weiss, in the "Annales des Mines" on Copper Smelting in Russia. We only dealt then with the Bogoslovsk works in the Ural Mountains, as those works are the most successful of any in Russia. M. Weiss's article also treats of the works at Tagilsk in the Ural Mountains and those at Kedabek in the Caucasus. The Tagilsk works are owned by Prince Demidoff, but they are of less importance now than formerly, as the production of copper in 1890 was only 700 tons as compared with 3,305 tons in 1852. The only point of interest here is the Herreshoff water jacket, with movable forehearth, which was introduced in 1888. The arrangement has not been a success, as it has been found difficult to prevent the water-cooled joint between the furnace and receiver from enlarging by corrosion. In 1891 the Hunt & Douglas process of extraction by sulphate of iron and salt was introduced, to treat the poorer ores that cannot be smelted. The ores smelted at these works are mixed oxides, carbonates and sulphides, and contain only 2-4% of copper, but they make up for their poorness by the great purity of the copper obtained from them.

The Caucasus mountains contain a great many deposits of copper ore, but the mountainous nature of the ground and the absence of fuel have made it impossible to work the greater number of those that have been discovered up to the present time. During the year 1888 the total production of copper in the Caucasus was 1,500 tons from 10 works, of which 1,113 tons were produced at the two works of Kedabek and Kalakent, belonging to Siemens Brothers. The average yield of all the mines has been 5.7% to 12% of copper. The mines and works of Kedabek are 33 miles south of Dalliar on the Tiflis & Baku Railroad, and are connected with that station by a road which rises 4,000 ft. in the 33 miles. There is no fuel in the neighborhood, and so crude naphtha is obtained from Baku and wood and charcoal from Kalakent, which is 14 miles away and connected with Kedabek by a narrow gauge railroad. The naphtha is brought by railroad to Dalliar, from whence it is pumped up through Mannesmann tubes, to near the works. The naphtha is cheaper than the charcoal and the supply is also greater; besides it has a much greater heating power weight for weight.

The total yield of the Kedabek mine during 1890 was 30,769 tons, of which 21,373 tons were available for smelting. Most of the ore is treated on the spot, but part of it is sent to Kalakent as return freight on the charcoal trains. The ore may be classified into three main divisions: The first consists of irregular masses of chalcopryrite containing 15 to 24% copper with about 5% of barite and 7% of blende. The second class is very friable and mostly in the form of sand; it contains from 5 to 12% of copper, some blende, barite and a considerable quantity of iron pyrite. The third class includes all the ore that contains less than 5%.

The third class of ores, containing from 2 1/2 to 5%, are separated into two grades of large and small pieces. The larger pieces are burnt in heaps and the smaller in four Gerstenhofer calciners. The gases from the calciners are absorbed in water and the resulting acid solution is passed through the roasted ores which are arranged in heaps on an asphalt floor. The solution then passes to wooden tanks containing scrap iron. The precipitated copper is taken out from time to time and sent to the smelters. The consumption of scrap iron is 1.2 ton to 1 ton of 60% precipitate, and about 110 tons of pure copper is obtained every year from this source.

The smelting operations are comparatively simple on account of the purity of the ore. The large pieces of ore are calcined in kilns and the smaller in Gerstenhofer calciners heated with naphtha. The roasted ores are then fed gradually into a large circular furnace through a long inclined flue through which the hot gases of the furnace escape. About 38 tons of 7% ore mixed with 2 tons of iron ore as a flux are melted in 24 hours with a consumption of 4 tons of naphtha. The copper matte resulting contains 23% of copper, and the slag contains 50% of silica and 0.25% copper. The furnace has a dome roof and is heated by the flames of two naphtha burners. The flames pass over the metal in a horseshoe shape, and heat it by radiation and not by direct contact. Some of the ores are treated in charcoal furnaces, but when the pipe line is in full operation charcoal will cease to be used as a fuel. The refining furnace is fired by naphtha and consumes 24 cwt. for eight tons of blister copper refined in 24 hours.

At the Kalakent works the first and second grades of ore are at present smelted in low blast furnaces and the low grade is electrolyzed. The low grade ores are first ground in a Carr disintegrator and roasted in a Gerstenhofer calciner. The roasted ore is washed with clean water in wooden vats to remove the copper sulphate. The solution is then acidulated and passed to the electrolytic baths. The anodes are of blister copper and the cathodes of thin sheets of pure copper. During 1890 the production of the vats was 81 tons of pure copper. The current used was 400 amperes at 20 volts. The new Siemens process, described in our issue of April 16th, 1892, is at present being introduced at Kalakent and Kedabek.

DECISIONS OF THE DEPARTMENT OF THE INTERIOR AFFECTING THE MINING INDUSTRY.

MINING CLAIM—*bona-fides*—DISCOVERY—LOCATION.

1. A discovery of mineral must be treated as an entirety, and the proper basis of but one location, and, therefore, not susceptible of sub-division for the purpose of two locations having a common end-line that bisects the discovery-shaft.
2. Good faith is required of those who locate lands for minerals and make entry thereof, and no valid location can be made unless there has been an actual discovery.
3. The mining law evidently contemplates that the discoverer shall have the right to locate his claim to the exclusion of others, and if the discovery is made by two parties but one location can be by them, for it is but a single discovery.
4. No man, nor association of men, being rational, would discover a vein or lode and so describe the location as to make one of the end lines run through the center of the discovery shaft, thus leaving territory not located in which it was demonstrated ore existed, and which might have been included in the description.—*In re the Poplar Creek Consolidated Quartz Mine* (comprising the Pine Nut and Gorilla locations, Marysville, Cal.)—[Secretary's decision Jan. 3, 1893.]

RES JUDICATÆ—MINERAL LAND—PREFERENCE RIGHT.

1. An order of cancellation is final as to the rights of the entryman in the absence of appeal, and no right under the canceled entry can be subsequently asserted as against the intervening adverse claim of another.
2. The preferred right of entry accorded a successful contestant by the act of May 14th, 1880, may properly include an agricultural claimant who successfully contests a mineral claim, and clears the record thereof.
3. A *bona-fide* pre-emption claim, lawfully initiated prior to the repeal of the pre-emption law is protected by the terms of the repealing statute.—*Dorneu v. Vaughn*, (involving 99.71 acres at Sacramento, Cal.)—[Decision January 5, 1893.]

PERSONALS.

Mr. W. S. Austin, mining engineer of the Pyritic Smelting Company, Limited, has been in this city.

Mr. O. H. Hahn has resigned his position as general manager of the Transvaal Silver Mines, Limited, and will shortly return to the Western States.

Mr. N. W. Chapman, superintendent of the Buxton Mining Company, Deadwood, S. D., has resigned his position to accept one with a large bridge building firm.

Mr. T. Spencer Miller, of the Lidgerwood Manufacturing Company, New York, and who has but lately recovered from a severe illness, has started on a short trip South. Mr. Miller goes on business connected with his company, and for his health, which his many friends trust may be benefited greatly.

E. P. Broughton, formerly local agent of the C. & E. I. Railroad, Chicago, has been appointed general superintendent of that road. This gives coal men doing business over that road a great deal of satisfaction and pleasure, as he is thoroughly conversant with their requirements, and already a material change has been wrought by his energy and capability.

Mr. Charles G. Eddy has resigned the vice-presidency of the Norfolk & Western Railroad to become second vice-president of the Philadelphia & Reading Railroad, vice Charles Hartshorne, who will be made third vice-president in place of Robert H. Sayre. The latter becomes fourth vice-president, and Mr. J. R. Young, at present fourth vice-president, will be made fifth vice-president. The duties of Messrs. Hartshorne, Sayre and Young are in no wise changed or disturbed. The operating department will be in charge of First Vice-president Theodore Voorhees, while Second Vice-President Eddy will have general supervision of the traffic department.

SOCIETIES.

The Society of German Engineers has offered a prize of 5,000 m. (\$1,250) for the best essay on "The Development of Steam Engine Construction During the Last 50 Years in the Principal Industrial Countries." The communications must be written in German, and must be sent to the society before the 31st of March, 1893. The following eminent men, professors and engineers, have consented to act as judges, and their decision is final: Professors Bach, of Stuttgart; Busley, of Kiel; Doerfel, of Prague, and Stribeck, of Darmstadt, besides the practical engineers, Huber, Stuttgart-Berg; Krumper, Augsburg; and Zueblin, Winterthur. The composition of the awarding jury is all that could be asked, as it will ensure the proper theoretical and practical treatment of this important subject. There is, perhaps, not a single steam engine now at work that comes up to the full measure of its capacity for transforming heat into work, as great as have been the advances during the past century, we are still lagging a long way behind theory. The contest for this prize is not limited to the members of the Society, so that we may expect some notable papers from the liberality of the conditions. Further information may be had from H. Caro, Verein deutscher Ingenieure, Berlin.

The sixty-fourth meeting and the twenty-second annual meeting of the American Institute of Mining Engineers will be held at Montreal, Canada, beginning February 21st, 1893. The headquarters of the Institute will be at the Windsor Hotel, but the sessions will be held at McGill University. The Mining Society of Nova Scotia, the General Mining Association of the Province of Quebec, and the Provincial Mining Association of Ontario are expected to hold meetings, including a general mining conference in Montreal, during the week of the meeting. The following programme is provisionally announced. Tuesday: Formal opening and reception in Windsor Hall; an address of welcome is expected from His Excellency Lord Stanley, the Governor-General. Wednesday—Sessions of the Institute, sleigh rides and entertainment by the Montreal and St. George Clubs. Thursday—A morning session of the Institute, in the afternoon the institute will take part in the General Mining Conference, and in the evening will attend the formal opening of the new engineering buildings at McGill University. Friday—Continued first session of the General Mining Conference, sleigh rides, in the evening a fancy dress carnival, given by the Victoria Skating Club. Saturday—Excursions to Radnor Forge, visit to works of Canadian Iron Furnace Company, and visits to Lac-a-la-Tortue and Grand Piles, visiting bog and lake ore deposits. A large number of papers have been announced for the meeting. It is expected that the attendance of the ladies will be unusually large. Communications as to hotel arrangements should be addressed to Mr. B. T. Bell, secretary of the local committee, whose address will be Ottawa, Canada, until the 18th inst. Arrangements for transportation may be made with Thomas Cook & Son, 260 Broadway, New York.

The Engineers' Society of Western Pennsylvania held its thirteenth annual meeting on Jan. 17th, President Alfred E. Hunt in the chair. The secretary gave the present membership to be 426. Of

the 116 admitted during the year, 57 are engineers or managers of industrial establishments, 51 chemists, 5 specialists and 2 unclassified. Ten regular meetings were held, at all of which papers or reports were submitted and discussed. The address of the retiring president was then read. It referred to the many large engineering plans now being developed and the possibilities for next year. By ballot the following officers were elected for the ensuing year: Max J. Becker, president; Thomas H. Johnson, vice-president; Walter E. Koch and Emil Swensson, directors; A. E. Frost, treasurer; R. N. Clark, secretary. The annual meeting of the Chemical Section was held January 24th, Prof. Francis C. Phillips in the chair. The following officers were elected by ballot: Mr. Joseph H. Eastwick, chairman; Mr. Fred Crabtree, vice-chairman; Mr. James O. Handy, secretary; Mr. Jaunes Camp and Mr. George Faunce, additional members of Board of Directors. Prof. F. C. Phillips, the retiring chairman, delivered an address, in which he referred at length to the giving of expert evidence before the courts. He deprecated the disrepute into which such evidence was sometimes thrown by the too great zeal of chemical experts, to make out a strong case for clients by whom they were employed. Such zeal might often lead to the suppression of certain facts and undue emphasizing of others. The secretary, Mr. Jas. O. Handy, then exhibited a large number of results obtained by several members in investigating the determination of sulphur in pig iron. The effects of hydrochloric acid of different strengths and temperatures when used as a solvent in the evolution method were fully shown. Acid of strength 3 parts acid to 1 part water and temperature 90° gave the highest results obtainable by the evolution method, and solution took place most rapidly. All these results in sulphur determination in pig iron by the evolution method were still from 14 to 34% lower than results by the aqua regia method. Mr. F. Crabtree said that vanadium had caused especially low sulphur determinations when present in pig iron made in Missouri. The annual dinner was held at the Duquesne Club on January 26th.

INDUSTRIAL NOTES.

The Bucyrus Steam Shovel and Dredge Company, Bucyrus, O., is making good headway in the erection of the new works at Milwaukee, Wis.

The blooming department of the steel mill and old rail mill of the Bethlehem Iron Company, South Bethlehem, Pa., started up on the 30th ult.

The Anchor Foundry and Machine Company, of Pittsburg, Pa., owned by Wharton McKnight, failed on the 1st inst. Liabilities about \$124,000; assets about \$100,000.

The Jeffery Manufacturing Company, manufacturers of elevating and conveying machinery and chain belting, etc., have issued a new illustrated catalogue for 1893, showing their various lines of products, including their coal mining machinery.

The Carpenter Steel Works, of Reading, Pa., has just shipped two car loads of projectiles to the government. This is the largest shipment as yet made. This finishes the second contract with the government. The third contract will require nearly two years more for its completion.

The Berlin Iron Bridge Company, of East Berlin, Conn., will build the new machine shop for S. F. Hodge & Co., Detroit, Mich. The building will be 150 ft. long, and of the modern type, the central portion being 40 ft. in width, controlled by a traveling crane of 20 tons capacity, with a wing on each side 22 ft. in width, the wings being two stories high.

Harrington Brothers, of the Shandon Chemical Works, Cork, Ireland, whose advertisement will be found on another page, are manufacturing large quantities of chemicals of guaranteed purity for analytical work, and photographic, medicinal and technical chemicals. There is a large demand for these products, we understand, from nearly all of the principal scientific institutions of Great Britain.

The Pennsylvania Railroad Company last year straightened its main line tracks at Union Furnace, Pa., and, in so doing, removed and appropriated a limestone mountain belonging to John Wallace. Wallace had been shipping the limestone to the Carnegie Company at Pittsburg for use in Bessemer steel works. He asked \$20,000 damages for his loss, and a jury in Judge Landis' court at Hollidaysburg, Pa., awarded him \$4,500.

The stockholders of the Southeastern Coal and Iron Company held their annual meeting in this city on the 30th ult. The board of directors and all the officers of the company were re-elected unanimously. These are C. Lawrence Perkins, president; T. G. Condon, first vice-president and general manager; W. R. Varker, second vice-president; R. P. Perkins, secretary and treasurer; and directors, C. Lawrence Perkins, Treadwell Cleaveland, Sheppard Gandy, R. P. Perkins, T. G. Condon, W. R. Varker and J. B. Gilchrist.

A new scale of wages at the Edgar Thompson Steel Works of the Carnegie Steel Company (Limited), has just been announced. The wages of laborers, tonnage men and the employees of other departments are to be reduced. A reduction of wages has also been ordered at the Braddock Wire Works. The men do not take kindly, and there may

be a strike. All departments named committees for a conference on the 2d inst. Andrew Carnegie, accompanied by President H. C. Frick, Secretary Lovejoy and a number of other officials of the Carnegie Steel Company visited the works at Homestead and Braddock on the 1st inst. The object of the visit, according to the officials, was to inspect the works and to get a general knowledge of the kind of work being done. Mr. Carnegie always visits the mills when in Pittsburg, and the trip to Homestead had no other significance.

Messrs. Fraser & Chalmers, of Chicago, are introducing into this country mining pumps and compressors of the Riedler type, of which they have control. The salient feature of these pumps is positive closure of the valves, which is so effected as to obtain the full lift, with increased speed, greater simplicity of construction, smaller number of valves, reduced wear and improved efficiency. These advantages over the usual type of construction are proved by over 300 installations in Europe, in deep mines, city water works (notably in the city of Paris), and for every pumping and compressing service. These pumping engines are to be supplied to the city of Boston, Mass., and Fraser & Chalmers are installing the first Riedler mining pump in the United States for the Boston & Montana company. This has 5½-in. and 8-in. plungers, 16-in. and 25-in. steam pistons, all 24-in. stroke. Its duty is 900 gallons per minute, lifted 600 ft.

A press dispatch from Pottstown, Pa., states that Messrs. Jacob Fegely and William M. Gordon were appointed receivers for the Pottstown Iron Company by Judge Biddle on the 30th inst., and fixed their security at \$500,000. The liabilities are placed at \$2,000,000. The company employs about 2,000 men, operates large rolling mills, blast furnace, nail factory and steel works. The company has a product on hand in process of manufacture worth nearly \$400,000. The bill in equity filed by creditors for large amounts alleges that the corporation is insolvent, and sets forth the need of receivers "to take charge of large and scattered assets and protect the business plant of the company, now in full operation, and fulfill the contracts already made." In the bill it is also asserted that "the business is so extensive and valuable that, if it is maintained, it will probably be able to pay a large amount of its indebtedness, if not all. The company's representatives at Philadelphia, Pa., say that the business will be continued.

Justice Landon, in the Kings County (N. Y.) Supreme Court, appointed Reginald P. Rowe receiver of the National Lead and Oil Company, on the 30th ult., under proceedings taken for the voluntary dissolution of the company. The company is one of the corporations absorbed by the National Lead Company, of New Jersey, the successor of the National Lead Trust, of which it was a constituent part. The petition for dissolution was signed by Reginald P. Rowe, the vice-president; W. P. Thompson, B. C. Webster, J. G. Stecker and John L. Steen, who make up a majority of the Board of Directors. There was some opposition from a small majority. Elihu Root, appeared for the company. Speaking of the significance of the action taken, he said: "The trustees of the old trust held stock of different corporations. There was a New York company known as the National Lead and Oil Company, and also corporations in New Jersey, Missouri and other States. In the reorganization over in New Jersey, when the National Lead Company was formed, these old corporations which made up the trust conveyed all their property to the new company. That still left a corporation existing here. It has conveyed away all its property, paid all its debts and gone out of business. This was merely the statutory method of burying it decently. It is dead and buried now. The directors took proceedings for a voluntary dissolution of this old company. Messrs. Unkles and Bailey were the only men who tried to organize any opposition, but they were defeated. A few days ago Justice Andrews, here in New York, also overruled a demurrer made by them against the trustees of the old National Lead Trust. I do not know whether or not similar proceedings will be taken to dissolve the absorbed corporations in other States. That is left to counsel in those States."

Representative C. W. Stone, of Pennsylvania, has reported from the House Committee on Coinage, Weights and Measures a bill fixing a standard gauge for the measurement of sheet steel and iron. In the report submitted on the 31st ult. Mr. Stone says that at present there is no uniform or standard gauge and the same numbers in different gauges represent different thicknesses of sheets and plates. This has given rise to much misunderstanding and friction between employers and workmen, and mistakes and frauds between dealers and consumers. There are, it is said, a dozen different gauges in use in the United States, and no two are alike. All use descriptive numbers to designate the different thicknesses of plates and sheets, but in no two does the same number indicate the same thickness. One gentleman stated before the committee that in a single contract made by him it would make a difference of \$40,000, dependent upon what gauge regulated its performance. Workmen contracting under one gauge might lose a quarter of their wages, if compelled to settle by another gauge. The United States imposes tariff duties on sheet iron and steel by their descriptive gauge numbers, but there

is no legal authoritative standard for determining the thicknesses of sheets their numbers describe, if dispute should arise. To remedy all this the standards reported by the committee have been indorsed by the Amalgamated Association of Iron and Steel Workers, the Association of Manufacturers of Sheet Iron and Steel, and the National Iron Roofers' Association as providing the best practical gauge. The bill with the gauge recommended has been submitted to the superintendent of the Coast and Geodetic Survey, who has charge of the government standards of weights and measures, and approved by him. It is also approved by the Secretary of the Treasury.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting machinery or supplies of any kind will notify the Engineering and Mining Journal of what he needs, his "Want" will be published in this column and his address will be furnished to any one desiring to supply him.

Any one wishing to communicate with the parties whose wants are given in this column can obtain their address at this office.

No charge will be made for these services.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

All these services are rendered gratuitously in the interest of our subscribers and advertisers; the proprietors of the Engineering and Mining Journal are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

Goods Wanted at Home.

- 2,890. 220 tons 40-lb. second-hand steel rails, suitable for relaying. Georgia.
- 2,891. Two-in. line shaft, 55 ft. long. North Carolina.
- 2,892. A moulding machine and a matcher. North Carolina.
- 2,893. A swing cut-off saw and a resaw. North Carolina.
- 2,894. 300 tons second-hand 35 or 40-lb. steel or iron rails. Alabama.
- 2,895. A gig saw and a shaper. North Carolina.
- 2,896. A lathe. North Carolina.
- 2,897. A planing mill. Virginia.
- 2,898. A 20 HP. stationary tubular boiler. North Carolina.
- 2,899. A spoke lathe. Virginia.
- 2,900. 3,000 ft. water pipe, 4 in. to 6 in. diameter, inclusive, to stand 150 lbs. pressure. South Carolina.
- 2,901. A bark mill. Virginia.
- 2,902. A dry kiln and a combined tile and brick machine. Mississippi.
- 2,903. Stave machinery. Virginia.
- 2,904. Machinery, etc., to supply and operate water works. West Virginia.
- 2,905. A hand saw mill complete, with trimmers, edgers and planers. Florida.
- 2,906. An engine and boiler. Virginia.
- 2,907. An electric light plant. West Virginia.
- 2,908. A rope transmission, direct drive from engine to counter shaft. Kentucky.
- 2,909. A 75 H. P. engine and boiler. Florida.
- 2,910. A small canning factory outfit; capacity about 3,000 cans per day. Texas.
- 2,911. Staves, kiln dried and jointed, 29 in. x 4 in. x 3/8 in.; also heads, kiln dried, 17 1/4 in. in diameter, and patent coiled hoops, 6 ft. 6 in. Florida.
- 2,912. A small second-hand steam hammer. Mississippi.
- 2,913. 30-lb. second-hand iron or steel rails. Alabama.
- 2,914. A 25 HP. portable boiler. Florida.
- 2,915. Hand or power threshing machinery. South Carolina.
- 2,916. Pipe threading machine, 2 in. to 4 in. Kentucky.
- 2,917. A good second-hand tram engine to run on wooden tram, to haul 5 to 10 tons. Florida.
- 2,918. A grist mill, including fixtures, elevator, etc. Georgia.
- 2,919. Prices, etc., of excelsior machinery. Texas.
- 2,920. Addresses of manufacturers of ferroid. New Jersey.
- 2,921. 1 1/2 miles of 40-lb. steel T-rails. North Carolina.
- 2,922. A saddle tank engine about 15 x 24. North Carolina.
- 2,923. Machinery for a canning factory of a capacity of 2,000 to 5,000 cans per day. Florida.
- 2,924. Prices, catalogues, etc. of machinery for oil mills. Florida.
- 2,925. A second-hand turbine water wheel with register gate of sufficient capacity to drive saw mill under 6 ft. head. North Carolina.
- 2,926. A good second-hand saw mill. North Carolina.

GENERAL MINING NEWS.

ARIZONA.

Cochise County.

Copper Queen Mining Company and the Holbrook & Cave Company.—According to the Tombstone "Prospector" these companies have consolidated. The capital stock of the former has

been increased from 140,000 shares to 200,000 shares of the par value of \$10 per share. The increase of 60,000 shares has been given to the Holbrook & Cave Company for its mines, which include the Neptune group. The papers on record are said to show that the indebtedness of the Queen company is but \$150,000, and that the capital stock, \$1,400,000, is all paid up.

Maricopa County.

Water-vale Mining Company.—The Supreme Court has rendered a decision in the case of this company, owner of the Black Eagle mine, versus the owners of the Big Comet mine. The owners of the Big Comet mine followed the vein of the Black Eagle, and the latter corporation began suit in ejectment. The lower court decided in favor of the defendant, basing its finding on four decisions of the Supreme Court of Colorado, and one by United States District Judge Hallett, of that State, who construed Section 2326 of the revised statutes to apply to the crossing of veins on a strike. The case was appealed, and the appellant pointed to the fact that Section 2322, which applies to transverse veins, is directly opposed to the theory of the Colorado courts, and was virtually repealed by those decisions. The Supreme Court took a similar view of the same, and reversed the judgment of the lower court.

CALIFORNIA.

(From our Special Correspondent.)

The Senate Committee on Mines and Mining of the State Legislature, will report favorably on an important measure introduced for the purpose of providing that hydraulic mining may be carried on wherever it can be done without injury to navigable streams. The bill also provides for the creation of a Board of Delbris Commissioners and the appropriation of \$20,000 for the construction of dams and retraining works, provided Congress appropriates at least a similar amount.

Mono County.

Bodie Consolidated Mining Company.—About 6 in. of fair-grade ore is showing in the face of the north drift No. 3 on the 300 level.

COLORADO.

Denver Natural Gas and Oil Company.—The derrick, engine, drilling tools and all other property of this company situated on the W. C. Henry ranch, about six miles below Morrison, were sold at sheriff's sale on the 19th inst. to satisfy a judgment of \$2,030 held by Messrs. McVay & Canfield, who had the contract for drilling the well. The whole outfit was knocked down to McVay & Canfield for \$850. The attachment also included all pipes and fixtures at wells Nos. 1 and 2 on the Spickerman ranch. The well on the Henry ranch is down 425 ft., and there are many favorable indications of oil. Whether or not the work of drilling will be continued cannot be definitely stated now.

Dolores County.

A press dispatch states that nearly all the mines in the Rico district shut down on the 1st inst. because the union miners positively refused to work for \$3 a day, their wages having been \$3.50. The sheriff has sworn in a large number of deputies.

El Paso County.

Calumet Mining and Milling Company.—At a meeting of the directors of this company held in Manitou on the 24th ult. the following officers were elected: President, Major John Hulbert; vice-president, W. Pittman Page; treasurer, Senator M. A. Leddy; secretary, D. L. Sterling. The meeting was the occasion of considerable interest, as it followed a stormy meeting of the stockholders, at which the first officers named, together with L. R. Ehrlich and R. E. Newbury, were chosen directors by rather a close margin of stock. The interest centers in the fact that some time ago a lease was taken on the Burnes lode of the Calumet company, which involved a bond to sell for \$30,000. Shortly after the lease was taken the mine proved to be a very valuable property, and it is now claimed that this fact was known to two of the directors, and that they were in collusion with the leasers to defraud. A quorum of the late directory recently took action rescinding the lease, and the new directory has employed attorneys to protect the company's interests in the matter, which means that the leasers will be at once enjoined pending a suit to recover the property. The company claims to have ample evidence to sustain their case, and as the leasers are disposed to fight, the matter will be thoroughly ventilated in the courts.

Gilpin County.

Spur Daisy Mining Company.—High grade ore is being taken out of the Two Sisters mine, at Black Hawk, by this company. The property is an old location which has been practically abandoned for a number of years, and is one of the numerous mines which has been reopened during the past two months. The company is at present taking out of the Two Sisters mine six cords daily, which is said to run as high as 18 oz. gold per cord, with an average of 8 oz. The president of the company, Mr. L. W. Tatum, has leased 50 stamps in the Black Hawk mill, where the entire product of the mine is being handled.

The old Buel mine, which was reopened a short time ago, made its first shipment of ore to the smelters last week. The water has been lowered to the 400-ft. level. A new Cameron pump is be-

ing placed in the mine, which will facilitate the draining of the mine; a large force of miners will then be given employment.

Lake County.

Tabor Mining and Milling Company.—In the United States Court at Denver on the 20th inst. papers were filed in the suit of Anna L., Mary H. and Cecelia L. Finnerty vs. Peter W. Breene, John McComb and the Tabor Mining and Milling Company. Anna L. Finnerty lives in St. Louis and the other two plaintiffs are residents of Iowa. The action grows out of a one-eighteenth interest which the plaintiffs claim in the Big Chief lode mine in the California mining district. It is alleged that Messrs. Breene and McComb, who claim to own the entire property except the one-eighteenth interest of company, have paid nothing to plaintiffs of their lawful share in the proceeds of the mine, but have appropriated the entire profits to themselves. Further it is alleged that Breene and McComb have taken many more thousands of tons of ore from the Big Chief mine than they admit, with a view to defrauding the plaintiffs, and have pretended to take larger quantities of ore from adjacent mines also controlled by them with the same purpose. The plaintiffs claim that this plan has been systematically pursued with regard to the Monte Cristo, Catalpa and Castleview mines, which are adjacent to the Big Chief. The plaintiffs ask for a receiver to be appointed and an accounting rendered in their favor.

Ouray County.

Belmont.—This mine, near Telluride, has been sold to Thomas J. Waters for \$47,600. The sale (according to the Denver "News") was the direct result of the failure of the electrical machinery to do its work. It is claimed the dynamo was too small, and the application of the direct current principle in an altitude where electrical storms are frequent proved disastrous to the experiment. Mr. Waters was seen, and stated that the mine would be started up again about the 1st of June. Owing to heavy snows, the new machinery cannot be taken to the spot before the 1st of May. "With present facilities, under favorable conditions," said Mr. Waters, "the mine is capable of producing 60 tons of ore a day, yielding an average of \$10 in gold on the plate and 3% concentrates, worth \$50 per ton. A new dynamo will be purchased, and the alternating current will be made use of instead of the direct current."

Pitkin County.

Emma.—Judge Riner, sitting in the United States District Court, at Denver, has made his decree in the case of Margaret Billings and others against Jerome B. Wheeler and the Aspen Mining and Milling Company. It confirms the decision of the United States Circuit Court, and declares the title and right of the widow and children of William J. Wood established against the defendants. The plaintiffs are adjudged to be entitled to possession of a one-third interest in the Emma mine, and one-third of the entire proceeds of that mine from the time it became a paying property. It is also decreed that defendants shall account to complainants for one-third of all the capital stock of the Compromise company, which they received in consideration of their conveying to said company a portion of the Emma mine. The complainants are declared to be entitled to one-third of the value of the stock of the Compromise company, and also to one-third share of the company's dividends received by defendants up to the present time. Further, the complainants are decreed one-third of any and all sums of money in any company realized by the defendants in consideration of ore taken from the Emma mine, also lawful interest on all the sums of money mentioned above. The accounting is ordered to be made before S. C. Hinsdale, master in chancery.

San Miguel County.

Shipments of ore and concentrates from Telluride since January 1st to January 27th amounted to 1,419 tons.

CONNECTICUT.

New Haven County.

The trouble at Stouy Creek, between the granite cutters and quarry owners, which has continued since last May, has been adjusted, and the men returned to work on the 30th ult., at the old wages.

IDAHO.

Alturas.

Idaho Gold Company (Limited).—January 12th, Mr. G. A. McCornick, superintendent of the Idaho Gold Company (Limited), states that the rumor that the Alturas gold mine, near Rocky Bar, had lost the ledge, and that the mill had closed down in consequence "is absolutely false; the vein has not been lost at any time. On the contrary, the vein has been drifted on for 600 ft. on the 700 or lowest level, showing a strong and well defined ledge averaging from 4 to 10 ft. of low grade quartz."

Red Elephant.—Last week ore was struck on what is known as "the 48-level," which is about 650 ft. from the surface, on the pitch of the vein. The ore vein has since widened to 22 and 24 in. of solid gold galena carrying a good percentage of gray copper.

Star.—The new shaft of the Star mine reached the level of the crosscut yesterday at a depth of about 160 ft. from the surface. It will be con-

tinned to the 250-ft. level, which point is expected to be reached in about a month. In the meantime the tunnel will be connected with the shaft, and the old workings thus thoroughly ventilated and drained, and a lift of 160 ft. thus saved, both in pumping and hoisting. When the shaft attains the 250-ft. level it will open 100 ft. of "backs" in virgin ground, and by drifting both ways the extent and value of the ore vein can be ascertained. The shoot was 208 ft. long where the leasers worked it, and it is not likely to be any less in depth.

ILLINOIS.

Streator.—Three men were killed January 30th in a small coal mine operated in this city by Peter Ryan. The mine had been closed down while repairs in the hoisting apparatus were being made, and about 1 p. m. cries were heard from the bottom of the shaft. Those who rushed in found the three men lying horribly crushed and mangled under a huge rock that had fallen.

MICHIGAN.

Copper.

Agate Harbor.—A valuable discovery of mass copper at this mine is reported to have been made a few days ago.

Atlantic Mining Company.—It is reported that the average cost price per pound of copper, based upon the treatment of 300,000 tons of rock, was 19.75 cts., the average selling price being 11.89 cts. The net surplus on December 31st was \$295,515. Net mining profit for the year \$42,681.

National Mining Company.—At this mine they have come upon another nest of mass copper, which at present is looking promising. They have taken from it one mass weighing about four tons, besides considerable small copper, and are now working on another mass that is well exposed and promises to be a large one. These masses are coming from the 130th level, on the fissure vein which has been productive in copper from the surface down.

Quincy Mining Company, Quincy.—It is reported that this company is about to undertake the refining of its own copper for the market. It has purchased quite a strip of land on the shores of Portage Lake, and will erect a smelting works and in all probability manufacturing works, says the Ontonagon "Miner."

Tamarack Mining Company.—This company has purchased the Cliff mining property for the timber which it contains.

Iron.

(From our Special Correspondent.)

Another shaft is to be put down in the Lake Angelina basin, somewhere near the eastern end. An extensive system of electrical underground trams are to be put in by both the Cleveland and Lake Angelina companies, a fact which the Engineering and Mining Journal noticed several weeks ago. The output of this basin for several years to come will be measured only by the demand for ore; it alone could produce a million tons annually, if called for.

Lake and rail shipments for 1892 from Escanaba foot up 4,176,959 tons. This year they will be at least a million tons more. The celebrated Schlessinger syndicate is to erect at that port extensive coke furnaces of the latest improved patterns. One is somewhat overwhelmed in thinking of the prospective iron manufacturing importance of Lake Superior basin as the great Northwest grows. Truly it "doth not yet appear" what we shall be.

Unusually large stock piles are growing at all the mines. Some of them find it difficult to get ground upon which to deposit the ore as raised. Higher shaft houses and higher stock piles would seem to be one way out of this difficulty.

Gradually those living at the Saginaw, now closed forever, are moving away and getting work at other mines. The exodus in the spring from Marquette County to the Mesaba promises to be very large. The Marquette Range being the "mother" range, this is not at all surprising.

Hitherto, explorations at the Winthrop, south side, have been conducted too far south. Lately, core drill borings close to the south foot of the diorite have shown much brighter indications. A workable body of ore is now found, and about 60 tons per day are raised to surface. This promises to be a "big thing," as development goes on.

Iron—Gogebic Range.

Palms.—Fire broke out in No. 3 shaft of the Palms mine on the 26th ult. The fire spread to No. 4 shaft, despite the exertions made to subdue it. Steam was forced into the mine, and the shafts were partially filled with snow. The miners were all rescued. All operations at the mine have ceased save those of extinguishing the fire.

Iron—Marquette Range.

Fitch.—Work with a small force of men has been resumed at this property. It is more of an exploration than anything else, and it is hoped new and larger lenses than those now showing will be found. The ore is of excellent quality, but thus far the vein has been very irregular, and mining is thus rendered difficult, and the ore expensive to secure.

Foxdale.—The drift from the bottom level, 200 ft. from surface, is now all in ore of good quality,

and it is thought that a mine of value will be developed at this point. They are now following the trend of the ore, and will run a cross-cut in the near future to determine something as to its probable thickness.

Iron—Menominee Range.

Lincoln.—It is thought that work will be resumed at this mine.

MONTANA.

Humboldt County.

Satherland Antimony Mine.—This property was purchased in 1891 by a New York company, who erected reduction works, which, so far, have given poor results, and have produced but little regulus. Fifteen miners are now at work. The workings are down 250 ft., and three levels from 300 to 700 ft. are driven on the vein. The ore assays in places as high as 69%, but the average shipments run 55%. All told, 200 tons were shipped in 1892 to Mattison, of San Francisco. It is expected by Francis M. Gore, manager of the mine, that about 600 to 800 tons will be shipped during the first six months of 1893.

Jefferson County.

Boston.—This property is said to be flourishing. The shaft is 200 ft. deep, and the drifts and stopes contain a 5-ft. body of free milling gold rock that will work \$10 per ton. Sixteen inches of this body on the hanging wall has milled \$60 per ton at the Butte Reduction Works. The Montana company is interesting itself in these mines, and in one of them the company has a shaft down 200 ft., and two tunnels cross-cutting the ledge from the mountain side. The prospects thus far are very encouraging, as the assays are high.

Missoula County.

Missoula.—Petitions asking for the opening of a portion of the Flathead Reservation have been circulating for some time. The petition covers an area of 600,000 acres, and it is said that the Indians are willing to dispose of this amount to the government.

Silver Bow County.

Blue Bird Mining Company.—The Blue Bird company, in the past, prior to the shut-down, had done much prospecting on property belonging to it and adjacent to the Blue Bird shaft. The Poorman, that lies a little south of west, had a three-compartment shaft sunk to the 300, and a drift at that point connected with the 500 of the Blue Bird. In running this drift much vein matter was encountered, enough to demonstrate that the ore continued in depth, though in running this drift only bunches of ore were encountered. The Blue Bird proper is about the only lead of any consequence on that ridge that slopes toward the gulch, and the small seams that crop out on the surface in so many places are claimed by many to be feeders to the Blue Bird vein only. As to the intentions of this company in the future, it can not yet be ascertained to a certainty. The shaft is full of water, but all the pumps were hoisted to the surface, and the pipes could be put into position in a short time were the company to come to the conclusion to work through the old shaft without sinking a new one. This vein dips to an angle of many degrees south, and if another 100 ft. were to be sunk, the expense of cross-cutting from this point would be greater than to sink a perpendicular shaft at or near the site of the old office, and between it and the mill.

Butte & Boston Mining Company.—This company has commenced operations on the Anderson, adjoining the Solid Muldoon on the west. The property is directly west of the Belmont and the Ground Squirrel. The former only last week, after a year in developing, commenced to take out ore. Operations on the Ground Squirrel, just east, are now suspended.

Estella.—The lease on this mine, which was taken by F. Augustus Heinze from James A. Murray, of Butte, is now the subject of litigation. In our issue of January 28th an article from the Butte "Intermountain" was published giving Murray's claims. These were met when the case was heard in court by a general denial. An injunction on the working of the property was granted, to be in effect when Murray filed a bond in the sum of \$125,000. It is generally regretted in Butte that Mr. Heinze should be so impaired in his work, as he has shown remarkable enterprise in developing this mine, and in erecting a smelter to work the ores of it and of other mines, in the unprecedented time of 70 days. Murray's suit and claims are generally regarded as attempts to injure Heinze's credit, so as to oblige him to relinquish his undertaking. Murray's connection with the Bluebird suits and with the suits brought on account of his mineral location of a portion of the town site are well known, and his methods are condemned by mining men as prejudicial in the extreme to the best interests of Montana, and by many are characterized as disreputable, while Mr. Heinze has an unsullied record. We regret that this case should have slipped into our columns through an oversight.

NEVADA.

During December, 1892, the Enreka & Palisade Railroad Company received for transportation to Salt Lake City 1,381 tons of ore. Owing to prevailing storms the shipments were lighter than during any previous month of the past year. Eureka District—From the Diamond mine, 605 tons; Eu-

reka Consolidated mine, 334½ tons; Jackson mine, 131½ tons; Hamburg mine, 43½ tons; Richmond mine, 31½ tons; Bullwhacker mine, 30 tons; and Delaware mine, 14 tons. Total Eureka district, 1,190 tons. White Pine—From T. Cornell, 158 tons; Rocko Craguaza, 2½ tons; and Zooni Brothers, 11½ tons. Total White Pine, 191 tons.

Elko County.

Del Monte Mining Company.—At the annual meeting of this company, the old board was re-elected. The following are the officers: E. Scott, president; J. W. Pew secretary; and R. M. Catlin, superintendent. The company has an indebtedness of \$208,244.33.

North Commonwealth Mining Company.—At the annual meeting of this company the old board of directors was re-elected, together with the following officers: E. Scott, president; F. A. Berlin, vice-president; and J. W. Pew, secretary. The company has \$1,713.34.

Esmeralda County.

(From our Special Correspondent.)

Fort Diablo Mining Company, Gaudelaria.—A bullion shipment, consisting of 5,508 fine ounces, has been received at the San Francisco office.

Eureka County.

(From our Special Correspondent.)

The Eureka & Palisade Railroad Company transported during December, 1892, to Salt Lake City, 1,381 tons of ore. From the Eureka district there were 1,190 tons; and from White Pine, 191 tons; The shipments were lighter than during any previous month in the year, owing to heavy storms.

Gould & Curry Mining Company.—Stringers of quartz are showing in the face in the west cross-cut, started 432 ft. from main west drift, 200 level. To the end of 1892 the mine produced \$15,726,711.56, and up to October 6th, 1870, the date when the last dividend was paid, the sum of \$3,826,800 had been disbursed to stockholders. Assessments have been more continuous, and to date \$4,623,600 has been collected.

Storey County—Comstock Lode.

Belcher Mining Company.—The latest weekly official letter says: "The west cross-cut from the south drift on the 350-ft. level is now out 84 ft. There is a small streak of ore in the face, assaying between \$10 and \$20 per ton. The north drift from the winze on the 350-ft. level is out 138 ft. The face is in porphyry. The west cross-cut, 25 ft. north of the winze on the 350-ft. level, is out 38 ft. The face is in porphyry, with small seams of quartz through it. Have been engaged during the greater part of the week in repairing on the 200, 300 and 400 ft. levels."

Consolidated Imperial Mining Company.—The latest weekly official letter says: "We are hoisting and shipping to the Brunswick mill for reduction some ore found in small streaks and old filling on the upper levels."

Crown Point Mining Company.—The latest weekly official letter says: "The west cross-cut from the southwest drift 150 ft. south of the shaft on the 400 level, is out 219 ft. The face is in a mixture of porphyry and clay. There is no change of importance in the streak above the 160 level. Have shipped to the Mexican mill for reduction during the past week 124 tons and 1,490 lbs. of ore, the average battery sample of which was \$18.06 per ton."

Justice Mining Company.—The latest weekly official letter says: "The south drift from the north stope, on the \$22 level, is out 94 ft. The streak is 3 ft. wide, and assays about \$25 per ton. We are stoping out 7 tons of ore per day, the car samples of which average about \$25 per ton."

Savage Mining Company.—The latest official weekly letter says: "The amount of ore hoisted was 625 carloads. Shipped to Nevada mill, 525 tons of ore, which were milled. Average car sample assay, \$21 per ton. Average battery assay, \$20.72 per ton. Bullion yield for the week, \$7,612.50. Shipped to United States mint at Carson, January 24th, 432 lbs. of crude bullion. On the 950 level are running a prospecting drift north from the eighth floor of the old stopes. The face is in quartz and porphyry. On the 1,100 level are stoping ore from the eleventh floor up to the twenty-second floor. On the 1,400 level, in the north drift, 50 ft. north of the ore stopes, have started an east cross cut and advanced the same 10 ft. Are still repairing the main south drift and the east drift connecting with the ore chute on this level. Or the 1,450 level are stoping ore upward from the end of the west cross-cut, started 100 ft. from the south boundary. The joint north drift with the Gould & Curry Company, on the Suro tunnel level, is advanced 850 ft., and has reached the north boundary. All work in this drift by the Savage company was discontinued January 22d, and hereafter the further extension of this drift will be carried on by the Gould & Curry and Best & Belcher companies."

Utah Consolidated Mining Company.—At the annual meeting of this company, the stockholders re-elected the old directors, with H. B. Havens as president, A. W. Havens, secretary, and D. B. Lyman, superintendent.

(From our Special Correspondent.)

The following is the weekly tabulated statement of ore hoisted from Comstock mines and milled,

COAL TRADE REVIEW.

New York, Friday Evening, Feb. 3d.

PRODUCTION OF BITUMINOUS COAL for week ending January 28th, and year from January 1st: EASTERN AND NORTHERN SHIPMENTS.

Table with 4 columns: Company Name, 1892 Week, 1892 Year, 1893 Year. Rows include Phila. & Erie R., Cumberland, Md., Barelay, Pa., Broad Top, Pa., Clearfield, Pa., Allegheny, Pa., Beach Creek, Pa., Pocahontas Flat Top, Kanawha, W. Va., and a Total row.

Table with 4 columns: Company Name, 1893 Week, 1893 Year, 1892 Year. Rows include Westmoreland, Pa., Monongahela, Pa., and a Total row.

Grand totals. 403,999 1,492,694 1,585,113

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending January 28th, 1893, and year from January 1st, in tons of 2,600 lbs.: Week, 121,697 tons; year 413,754 tons; to corresponding date in 1892, 487,127 tons.

Anthracite.

There are two important features of the trade this week. The first is the decision of Judge Metzger, of Lycoming County, in the Arnot suit, and the second is the report of State Senator McMahon to the New York Legislature.

Several months ago Mathias Arnot, of Pennsylvania, brought suit against the Philadelphia & Reading Railroad, alleging that in its contract of February 11th, 1892, with the Lehigh Valley Railroad, by which a lease for 999 years was effected, it had violated section 4, article XVII. of the Constitution of the State. This section forbids the ownership or control by a railroad, canal or other corporation or by its lessees of any parallel or competing line, and the suit was to determine whether or not the Philadelphia & Reading and the Lehigh Valley were parallel or competing lines in the sense of the statute. The case had been tried before the Master, W. W. Hart, and Judge Metzger merely passed upon his report. The decision sustained the Master, and was in favor of the railroad company. So far, therefore, as concerns these two decisions the lease is legal and will stand. The Philadelphia & Reading and the Lehigh Valley are declared not to be competing or parallel lines in the meaning of the law. The Judge holds: "Mere parallelism of two lines of railroad without any competition or any possibility of competition between them, we think would not be construed to be in violation of this provision of the constitution. There would be no purpose in prohibiting the combination of such lines. We must, therefore, hold that the framers of the constitution intended by the word parallel to mean such lines as by reason of their location would make it not only possible but practicable for them to become competing lines of railroads. We have been unable to find any direct authority upon this subject, but have been referred to some authorities which incidentally bear upon this question, and which seem to sustain the view of the learned Master, that mere incidental competition which might arise by reason of branches or spurs to the main line of either consolidating company will not prevent the consolidation of such main lines. . . . Whether we regard this question of the parallelism of these lines as being a question of fact to be established by testimony, or a fact of which the Court will take official notice, is immaterial in this case. We can come to no other conclusion than that the lines of these two systems of railroads are not parallel within the meaning of the constitution.

"Are they competing lines? Competing lines of railroads, we think, are such as by reason of their location can collect traffic from the same transporters or shippers and convey it to the same point or destination.

"Unless, therefore, the lines of railroad in controversy tap the same territory, that is, were furnishing traffic from the same portions of the State, they could not be in any sense competing within the meaning of the constitutional prohibition. The main lines of these railroads, as we have already observed, traverse different portions of the State, and between them large mountains and one or more counties intervene for the whole distance, and it is therefore rendered physically impossible for shippers along the line of either to be reached by the other for the purpose of transportation. While both roads were engaged in the carrying of anthracite coal from the regions of Pennsylvania, the main lines of the Philadelphia & Reading Railroad and the Lehigh Valley did not reach the same collieries in the same territory. There was, therefore, no competition between the main lines of these two systems of railroad."

We must express our amazement and dissent from this curious opinion. It seems to us that the intention of the framers of the constitution was to prevent the very thing that Judge Metzger says they allow, viz., combination between roads which are or may be competitors for the same traffic. It could not reasonably have been their intention to limit the operation of the constitution to the main lines of such roads, leaving them free to construct branch lines which, while rendering competition

possible, in fact would render them irresponsible to the law.

What has been the effect of the combination of these roads upon the anthracite trade? It has been to advance the price of coal, to cripple independent operators, and to put the control of the trade into the hands of the railroads: that is, most emphatically to destroy competition. We may take it for granted that such could not have been the intention of the framers of Section 4, Art. XVII., and any view of the case which tends to justify the overriding of the plain meaning of the section does violence to the spirit of the law. Main lines and branches, whether under different corporate titles or not, so long as under one administrative control, are a single line to all intents and purposes, and so long as two systems of roads take the coal from the anthracite fields of Pennsylvania and deliver it in "competitive markets" they, no matter what route they take to get them there, are for practical purposes "parallel and competing" roads.

Judge Metzger is quite right in saying that the object of the framers of the constitution was to insure reasonable rates; but his decision will operate to allow just what he says the constitution was framed to forbid. The proof of the wisdom of the framers of the constitution is shown in their attempt to forbid what has really come to pass, viz., an unreasonable advance in the price of one of the great necessities of life.

If this is to be permitted simply because the main lines of two roads are not mathematically parallel while their branch roads do tap the same territory and deliver the coal in the same markets we shall soon have need of a law defining main and branch lines.

We hope and believe that this decision will not stand. Senator McMahon's report to the New York Legislature briefly reviews the testimony given before the committee of which he was chairman, and then says:

"The consolidation of railroad and coal producing companies herein described and known as the Reading Combination has created a substantial monopoly of anthracite coal in the management of the Philadelphia & Reading Railroad Company. The roads involved, which are the Delaware, Lackawanna & Western, the Lehigh Valley, the Central of New Jersey, the Philadelphia & Reading and the New England, are substantially parallel, and the mines controlled by them are the source of the largest supply, and were competitors in the coal business until this combination was formed. The most natural and obvious benefit to be derived by them from consolidation is an increase in the price of coal, which may be advanced to an unreasonable and extortionate rate. Since the combination was formed material advances in the price of coal have been made and others are threatened, and the combination is contrary to public policy and dangerous to the interests of the State and the welfare of the people."

The committee has recommended a bill to the Senate which, in our opinion, is extremely unwise. By a system of licenses known respectively as a coal carriers' license and a coal dealers' license it is proposed to regulate the prices at which anthracite coal is to be transported and sold. These prices are to be fixed by the Board of Railroad Commissioners, which is to have the right to examine the books of carrying companies, and wholesale and retail dealers. The attempt to regulate such prices by legislation would create dangers still more formidable than those which now exist. The principle underlying this present anthracite combine, and which will underlie all combines of like nature, is the consolidation of interests that transport with those that mine. The inevitable squeezing of the independent element and of the consumer follows.

The fundamental principle of free government is to leave to private interests the management of all industrial pursuits under general laws which provide for the protection of the citizen. The State can prohibit (it has prohibited) combinations and monopolies which have for their object the restriction of free competition and the undue advancement of prices. The State can ascertain the facts and, without attempting to prevent the evasion of the spirit of the law in this or that detail, it can leave to the companies the full liberty of action, provided the spirit of the law is observed. If the facts show that free competition has been destroyed, and that there is a practical monopoly in anthracite coal, which the law prohibits, the State can forfeit the charters of the corporations and can punish their officers who join in this practical monopoly and who no longer allow free competition. The final fact of a violation of the intent of the law is sufficient ground for the State to withdraw the rights which it has given. It is not necessary for the State to attempt to regulate prices by law. It is enough that it secures natural competition and freedom in trade, and this it can do very simply and effectively if its officers so desire.

The anthracite coal tonnage for 1891 and 1892 is given in the following table:

Table with 4 columns: Company Name, 1891, 1892, and a Total row. Rows include Coxo Bros. & Co., Delaware & Hudson, Erie, Jersey Central, Lackawanna, Pennsylvania, Penn. Coal Co., and Reading & Lehigh.

According to this statement the Reading, Lehigh

Valley and Jersey Central together lost 1,272,805 tons or 59% of their output in 1891, and 62% of their output of 1892. Taking the freight per ton at \$1.90, the loss reaches \$2,418,320. If we consider, further, that the highest price of Reading stock in February, 1892, at the time of the combine, was 65, and is now 33%, having reached 48% in January, and that the Delaware, Lackawanna & Western, Delaware & Hudson and Jersey Central have all shown a considerable decline, it begins to look as if the financial end of the combine was in need of repairs.

The Reading company has established a new classification of its coal, by which dealers can name the especial district from which they desire shipments. Under white ash there are grouped: Mahony, 17 collieries; Shenandoah, 8; Locust Mt., 14, and Schuylkill white ash, 6.

The special coals are classed as: Lykens Valley, 2 collieries; Lorberrry, 3; Shamokin, 5, and Schuylkill red ash, 4.

From the average of \$2.646 for coal sold in January the Schuylkill Coal Exchange has determined that the rate of wages until the middle of February shall be 5% above the \$2.50 basis.

Bituminous.

The trade is in a better condition than it was a week ago, and there is now a good prospect of the resumption of shipments that have been hindered by the severe weather and lack of cars. It is thought that by the end of next week things will be moving along satisfactorily. The heavy accumulation of ice in the Delaware and Chesapeake bays is gradually passing down, and may be expected to be out of the way within a week.

Charter rates are nominal, and no reliable quotations can be given at this writing. There is very little interest in the Nova Scotia coal mines deal. The bill authorizing the sale of the lands has passed the Nova Scotia Legislature, in spite of the doubt that this body had no right to make this sale.

Advices from Nova Scotia under date of January 28th say that there is much surmising as to what properties the "deal" will include. Rumor says about all. The Cape Breton coal mines are to be absorbed, and possibly the Spring Hill mines, in the Cumberland field on the Bay of Fundy. It is said also that the Drummond & Acadia have been "sounded," and that the New Glasgow C. and I. and Ry. Co., in Pictou County, will go in.

This last, however, is doubtful. Even should the duty of 75c. per ton be taken off, and there is no probability of this within a year at least, this coal cannot seriously interfere with American coal. While we will probably have a repeal of the duty we are not apprehensive of any injury to American interests. It is true that Nova Scotia coal can compete in the market with inferior domestic coal, but there is so great a difference between this and our standard coals that they need fear no restriction of output, and it must not be forgotten that the cost of mining in the Nova Scotia mines is on the average very nearly double that in Maryland and Pennsylvania and more than double that at some West Virginia collieries.

(From our Boston Correspondent.) Feb. 2.

The mild weather of the past two weeks has had its anticipated effects. The receipts of coal have increased, and prices have eased off considerably. The arrivals of steamers and barges loaded with anthracite have been sufficiently large to replenish retailers' stocks, so that now they are in fair condition, in comparison to what they were. The receipts, however, have not been heavy as yet, but it is expected that ere long the arrival of vessels will be quite free. Rate cutting has cropped out this week. It is understood that the Lehigh & Wilkes-Barre company are cutting prices on coal to counteract the greater prices they are obliged to pay on freight rates. Cuts have been made to the extent of 25c. per ton.

The prices quoted here are those f. o. b. net at New York: free burning coal, stove, \$4.75; egg, \$4.40; free broken, \$4.00; chestnut, \$4.65. Lykens Valley (at Philadelphia): broken, \$4.85; egg, \$5.45; stove, \$6.00; chestnut, \$5.00.

The relaxation in the stringency of the soft coal market has not been as great as in hard coal. Arrivals have been but moderate, and with such large gaps to fill as exist, it seems but small. Most of the manufacturing companies I noted a week or two ago as being short of coal have secured enough to ease their condition considerably. The arrival of coal at Providence, New Bedford and Boston has helped the Old Colony Railroad Company considerably, so that it is practically supplied to-day. The Boston & Albany R. R. Co. is also all right. The New York & New England R. R. Co. is still short. It is now reported that the Standard Sugar Refinery Company, of this city, which is the local branch of the trust, is short of coal, and has hardly sufficient to carry them going three days longer. The Pocahontas people, who are supplying the latter, will probably be able to supply them before their heap is exhausted. George's Creek coal on cars here is worth \$6 per ton and Clearfield \$5.50.

Freight rates are gradually declining and ere long will probably be back to their old level. The New York rates run anywhere from \$.75 to \$1.25; Philadelphia \$1.75; Baltimore \$2 asked; Newport News \$1.25. About 30 vessels have been chartered to go to Newport News. There is still considerable delay in loading at Newport News and Norfolk. There is plenty of coal at Baltimore to ship.

In a retail way trade is fair, but not a circumstance to what it was two or three weeks ago

25 10s. @ £6; smalls, £5 @ £5 10s. Fullers' earth quiet; best lump, 55s.; fine impalpable ground, £7: "Emerald" ground, 80s. Scheelite, wolfram, tungstate of soda and tungsten metal are much sought after, and prices are unaltered. Chrome ore is in good demand for best qualities, and prices firm. Antimony ore steady at £12 and metal £43@£45. Asbestos very firm. Potters' lead ore, smalls, £10 10s. @ £11. Calamine stromia sulphate (celestine), quiet. Limespar steady, especially for English manufactured, old G.G.B. brand in demand at 50s. (ground). Feldspar quiet. Fluorspar: Best quality scarce. Ferromanganese in better demand. Plumbago: Spanish, £5; best Ceylon lump at last quotations; Italian and Bohemian, £4@£12 per ton; "Founders," £5@£6; Blackwell's "Mineraline," £10. French sand, 20s.@22s. 6d. Ground mica; £45@£50. China clay steady; common, 18s. 6d.; good medium, 22s. 6d.@25s.; best, 30s.@35s. (at Runcorn). Irish moss: Common rather freely offered at low prices, while the best is scarce at advanced figures; medium, £12 10s. Bog ore (oxide of iron), scarce; finest quality 25s.@30s.

Chemicals steady. Bleaching powder rising at £7 15s.@£8. Soda ash, £5. 6s. 3d. up. Caustic soda, 60% cream, £9; 70% white, £10. Bicarbonate, £6 15s. Nitrate of soda, 9s.@10s. Soda crystals, £3 5s. Salt

cake, 35s. Chlorate of potash, 8½d. Arsenic, £13@£13 10s. Oxide of uranium, 15s. 6d. Sulphate of copper, £16 10s. Chloride of magnesium (antiseptic), strong at 45s.@50s. Montreal ashes: Pot, 25s.@26s.; pearl, 45s.@46s.

Liverpool. Jan. 25.

(Special Correspondence of Joseph P. Brunner & Co.)

There is a fair trade passing in heavy chemicals, but at the same time the position is very unsettled. Soda Ash.—It is impossible to give any reliable quotations at present, as manufacturers are cutting rates, and the only way to test the position is to make bids. The nominal values may be quoted at about as follows: Caustic ash, 48%, £5@£5 5s.; 57 and 58%, £5 15s.@£6 per ton. Carb. ash, 48%, £5@£5 5s.; 58%, £5 15s.@£6 per ton. Ammonia ash, 58%, £5 2s. 6d.@£5 7s. 6d. per ton, all net cash. Special concessions will be made for contracts over all 1893.

Soda Crystals are quiet at £3 2s. 6d.@£3 3s. 9d. per ton, less 5%.

Caustic Soda is in light request and quotations vary considerably, according to the export market. On the spot nominal values range about as follows: 60%, £8 10s.@£9 per ton; 70%, £9 10s.@£10 per ton; 74%, £10 10s.@£11 per ton; 78%, £11 5s.@£12 per ton, all net cash. For parcels under 10 tons, 5% per ton

extra is charged. Special reductions would be made to home consumers for contracts over 1893.

Bleaching Powder firm at £8@£8 5s. per ton, net cash for hardwood casks.

Chlorate of Potash is rather easier, in spite of the article being in small compass. For early delivery the quotations range from 8¼d. down to 8d. for February-March. We quote 7¼d.@8d. for April-June, 7½d.@7¾d. and 7d. for July-December. At the close to day there is some little movement in this article, and holders have withdrawn for the moment.

Bicarb. Soda is steady at £6 15s. per ton, less 2½% for one cwt. kegs, with usual allowances for larger packages.

Sulphate of Ammonia is in a strong position, and it is difficult to find any sellers for prompt delivery. The nearest values are about £10 10s.@£10 12s. 6d. per ton for good gray 24%, and £10 15s. for 25%. Both in double bags, less 2½% f. o. b. here, but the article is very scarce. The tendency is to still higher prices. Nitrate of Soda has further advanced and is now quoted at £9 12s. 6d.@£9 15s. per ton, less 2½% for double bags f. o. b. here, and a further advance is anticipated.

Carb. Ammonia.—Lump, 2¼d. per lb.; powdered 3¼@3½d. per lb.

CURRENT PRICES.

These quotations are for wholesale lots in New York unless otherwise specified.

Table listing various commodities and their prices, including Acetic acid, Alcohol, Alum, Ammonia, Asbestos, Barium, Bauxite, Bleaching powder, Borax, Bromine, Cadmium, Calcium, Carbide, China Clay, Chromic acid, Chrome iron ore, Cobalt, Copper, Cyanide, Epsom salt, Fluorspar, French chalk, Fuller's earth, Glauber's salt, Gold, Iron, Kaolin, Kieserite, Lead, Litharge, Magnesia, Manganese, Mercuric chloride, Metallic paint, Mineral wool, Nitre cake, Ochre, Oil, Oxide, Potassium, Pyrites, Quartz, Rotten stone, Salt, Sal ammoniac, Soda ash, Soda crystals, Sulphur, Sulphuric acid, Talc, Terra alba, Tin, Vermilion, Zinc, and Zinc white.

Table listing various commodities and their prices, including Glauber's salt, Gold, Iron, Kaolin, Kieserite, Lead, Litharge, Magnesia, Manganese, Mercuric chloride, Metallic paint, Mineral wool, Nitre cake, Ochre, Oil, Oxide, Potassium, Pyrites, Quartz, Rotten stone, Salt, Sal ammoniac, Soda ash, Soda crystals, Sulphur, Sulphuric acid, Talc, Terra alba, Tin, Vermilion, Zinc, and Zinc white.

Table listing various commodities and their prices, including Sylvinit, Talc, Terra alba, Tin, Vermilion, Zinc, and Zinc white.

THE RARER METALS.

Table listing various commodities and their prices, including Aluminum, Arsenic, Barium, Bismuth, Cadmium, Calcium, Cerium, Chromium, Cobalt, Didymium, Erbium, Gallium, Glucinum, Indium, Iridium, Lanthanum, Lithium, Magnesium, Manganese, Molybdenum, Niobium, Osmium, Palladium, Platinum, Potassium, Rhodium, Ruthenium, Rubidium, Selenium, Sodium, Strontium, Tantalum, Tellurium, Thallium, Thorium, Tungsten, Uranium, Vanadium, Yttrium, and Zirconium.

Table listing various commodities and their prices, including Aspen, Colorado, and other metals.

Colorado Springs, Colo. Jan. 31.

Table listing various commodities and their prices, including Anaconda Gold, Buena Vista, Calumet, Cleopatra, Fanny Rawlins, Gold & Globe, Isabella, Jack Pot, Jeff Davis, Lemhi, Manitou Park, Malva, Orphan Bell, Perce-Jensen Reduct'n Co., Pharmacist, and Work.

Duluth. Jan. 31.

Table listing various commodities and their prices, including Biwabik M. Iron Co., Cincinnati Iron Co., Clark Iron Co., Cosmopolitan Iron Co., Great Northern Min. Co., Kanawha Iron Co., Keystone Iron Co., Lake Superior Iron Co., Little Mesaba Iron Co., Mountain Iron Co., Minneapolis Iron Co., Mesaba Moun. Iron Co., Shaw Iron Co., Security Land & Exp. Co., and Washington Iron Co.

UNLISTED STOCKS.

Table listing various commodities and their prices, including Allegheny Iron Co., Aurora Iron Co., Athens Iron Co., Buckeye Iron Co., Chandler Iron Co., Chicago Iron Co., Charlestoia Iron Co., Champion Iron Co., Comstock Iron Co., Columbia Iron Co., Detroit Iron Co., Dayton Iron Co., Great Western Mining Co., Horton Mining Co., Homestead Iron Co., Kentucky Iron Co., Kankia Iron Co., Lackawanna Iron Co., McKinley Iron Co., Mesaba Chief Iron Co., Myrna Iron Co., Northern Light Iron Co., New York Iron Co., New England Iron Co., Ohio Mining Co., Oneota Iron Co., Pennsylvania I. & S. Co., Rouchleau Iron Co., Republic Iron Co., Red Hematite Iron Co., Standard Ore Co., Towanda Iron Co., and Zenith Iron Co.

STOCK MARKET QUOTATIONS.

Table listing various commodities and their prices, including Anaconda, Bangkok-Cora Belle, Brownlow, Claudia J., Diamond B., Gold Rock, Justice, Pharmacist, and Work.

Deadwood. Jan. 21.

Table listing various commodities and their prices, including Deadwood Terra, Double Standard, Golden Reward, Iron Hill, Isadora, Mutual, Ruby Bell, Seg. Iron Hill, and Tornado.

NEW YORK MINING STOCK QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table of New York Mining Stock Quotations, divided into Dividend-paying and Non-dividend-paying mines. Columns include Name and Location of Company, dates from Jan. 28 to Feb. 3, and Sales figures.

*Ex-dividend. †Dealt at in New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 1,870. Non-dividend shares sold, 18,600. Total shares sold, 20,470.

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations, listing company names, dates from Jan. 27 to Feb. 2, and sales figures.

Dividend shares sold, 1,905. Non-dividend shares sold, 1,555. Total shares sold, 3,460.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Large summary table of mining stock data, organized into columns for Name and Location of Company, Capital Stock, Shares, Assessments, and Dividends.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns for Name and Location of Company, Capital Stock, Shares (No., Par), Dividends (Total Levied, Date and amount of last), and Assessments (Total levied, Date and amt of last). The table lists numerous mining companies across various states, including Colorado, Idaho, Utah, Nevada, and Montana.

G., Gold. S., Silver. L., Lead. C., Copper. B., Borax. * Non-assessable. † This company, as the Western, up to December 10th, 1881, paid \$1,100,000. ‡ Non-assessable for three years. § The Deadwood previously paid \$275,000 in eleven dividends and the Terra \$75,000. ¶ Previous to the consolidation in August, 1884, the California had paid \$31,320,000 in dividends, and the Cons. Virginia \$42,90,000. ** Previous to the consolidation of the Copper Queen with the Atlanta, August, 1885, the Copper Queen had paid \$1,350,000 in dividends. †† This company paid \$190,000 before the reorganization in 1880. ††† This company acquired the property of the Raymond & Kly Company which had paid \$3,075,000 in dividends. †††† Previous to this company's acquiring Northern Belle, that mine declared \$2,400,000 in dividends against \$425,000 in assessments.

COAL, RAILWAY AND OTHER STOCKS.

Table with columns for stock names, dates (Jan. 28, 30, 31, Feb. 1, 2, 3), and sales. Includes entries like Adams Express, Am. Sugar Ref., Am. Tobacco, etc.

COAL, RAILWAY AND OTHER STOCKS.

Table with columns for stock names, dates (Jan. 28, 30, 31, Feb. 1, 2, 3), and sales. Includes entries like N.Y. Chi. & St. L., N.Y. & N. Eng., N.Y. Susq. & W., etc.

Total shares sold, 2,428,282.

San Francisco, Cal.

Table with columns for stock names, dates (Jan. 27, 28, 31, Feb. 1, 2), and closing quotations.

Foreign Quotations.

Table with columns for stock names, dates (Jan. 27), and highest/lowest prices. Includes entries like Alaska Treadwell, Amador, Can. Phosphate, etc.

St. Louis.

Table with columns for stock names, dates (Feb. 1), and closing quotations. Includes entries like Adams, American & Nettie, Bi-Metallic, etc.

Baltimore, Md.

Table with columns for stock names, dates (Feb. 2), and closing quotations. Includes entries like Balt. & M. Car., Corrad Hill, etc.