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It seems reasonably certain that if the railroad through the cañons of the Grand and Colorado Rivers is ever completed, a large and heretofore inaccessible region containing deposits of various minerals will be opened to the miner, or at least to the prospector. In the cañon of the Grand River, in Colorado, placer deposits extending for 40 miles are said to exist, and near the course of the river are beds of coal and iron ores. Further south ledges of mineralized matter are seen cutting the cañons from top to bottom. These, it is true, have never been proved to have value, but it seems reasonable to believe that among them will be found some workable deposits.

THE census of 1890 showed that there were 3,930 artesian wells on farms, of an average depth of 210 ft., irrigating 51,896 acres, in existence in that year. Over one-half of these were in the state of California. The wells are sunk in rocks of all geological epochs, although the later series are the most pervious and fruitful of merits.

While an experimental well is too costly to be sunk by the average farmer, it would seem probable that there is a great amount of territory that could be irrigated if wells were bored. It would seem advisable, therefore, for a number of farmers in a region whose geological structure does not militate against the occurrence of water to unite in sinking the test well; then if the existence of the subterranean bodies of water is proved, each can sink his individual well in comparative safety. There can be little doubt that in many cases the existence of subterranean streams can be located with considerable accuracy by such professional water finders as Mr. Heerdegen and the indications he gives might greatly lessen the chances of failure in boring.

**THE COST AND SELLING PRICE OF STEEL RAILS.**

The stereotyped argument of the apologists for combinations, trusts, consolidations, etc., is that "they enable their participants to introduce various economies into their business by which they are enabled to reduce costs and selling prices and thereby benefit the general public." With this argument in view we should expect that the several consolidations of steel rail mills that have taken place within the last few years, by which practically all the steel rails made in the United States are made by six large companies, would have tended to bring down the price of rails.

It is the boast of the engineering departments of our steel works that they have recently made marvelous strides in perfecting their machinery, so as greatly to increase the capacity of the mills and to reduce the labor cost. This might be expected to bring down the price of rails, as should also the reduction of nearly \$4.50 per ton in the price of Bessemer pig iron during the past two years.

The old political economist used to teach that prices are governed by the law of supply and demand. If this law governs the price of rails, they should be at a lower price than they have been for many years, for the ratio of the demand to the supply, or to the capacity for supply, of the mills was never lower. Finally, if sympathy with the general market has, as many writers claim, any influence on prices, then steel rails should go down in price from that cause, for in the general iron market prices are the lowest ever known.

Not one nor all of these causes combined seem to have any influence upon steel rails. They are a law unto themselves, and neither BARRING BROTHERS' failure, the McKinley bill, the elections of 1890, the subsidence of the Southern boom, the vast crops of 1891 or the floods of 1892 have any effect upon them. They not only violate all the laws of political economy, but they are superior to all convulsions of nature or of finance. Unlike other iron products, they do not even give a market reporter a chance for the use of his imagination or of his gift of prophecy. For eighteen long months, or ever since December, 1890, he has had to rewrite the same old story, "Steel rails are firm at \$30 at mill, but the demand is insignificant."

One of the most remarkable things about steel rails is that no one financially interested in them as a consumer seems to complain about their price, and that there is no concerted effort anywhere to reduce their price. No attack has even been made in Congress on the rate of duty upon them. Half a dozen railroad magnates by agreement among themselves to postpone purchases of all rails not absolutely needed for one year, or until the price was made \$25 per ton, could bring the price to that figure inside of a month, if they would agree to give long contracts at that price. But no such effort is made, the price serenely remains at \$30, and the railroads pay it without murmuring.

A comparison of the prices of steel rails at mills in Pennsylvania and of Bessemer pig iron at Pittsburg during and prior to the period when steel rails began to violate the laws of trade, may prove of interest. Here are the figures for the four years, 1888 to 1891, inclusive, taken from Mr. SWANK's annual reports.

	1888.	1889.	1890.	1891.	June, 1892.
Steel rails .....	\$29 1/4	\$29 1/4	\$31 1/4	\$30	\$30
Bessemer pig .....	17 1/2	18	18 1/4	16	14
Difference.....	\$11 1/4	\$11 1/4	\$13	\$14	\$16

Rails were quoted \$27 at Pittsburg in May, 1889, and were sold as low as \$26 at the mill.

The report of the United States Commissioner of Labor, CARROLL D. WRIGHT, for 1890 gives the cost in detail of making steel rails and shows that according to the books of the several mills this average cost was \$24.67 per ton, of which the cost of direct labor was \$11.60 or 47 per cent. The Commissioner, however, adds: "The Department has been positively informed relative to the cost of making steel rails in several of the very largest establishments in the United States and there is no shadow of doubt in the mind of the writer that in these establishments the actual cost of standard steel rails is and has been for some time within a few cents of \$22 per ton at the works."

Since 1890 the cost of nearly every item entering into this aggregate has very greatly decreased and improvements in plant have enabled the workmen to produce much more to the day's labor than ever before. Indeed, so great has the output per day's labor increased that the Carnegie Company has reduced the wages scale, thus causing the Homestead strike. It is, therefore, more than probable that the actual cost of making steel rails at such works as those of the Carnegie Company and the Illinois Steel Company to-day does not exceed \$20 a ton. This cost, of course, is where the steel works makes its own pig iron. When rails sold at \$26 a ton and the cost of the Bessemer pig iron was \$16 a ton, the large mills were earning dividends, now the same brand of pig iron is \$14 and rails are \$30 a ton.

The product of standard steel rails was in 1890, 1,867,838 tons; 1891, 1,487,011 tons. The profits must have reached, last year, the comfortable aggregate of \$10,000,000, this year will probably add \$2,000,000 to that figure; \$25 or \$26 a ton would, no doubt, now leave a satisfactory dividend to the mills, and the saving of \$4 or \$5 a ton, or \$5,000,000 to \$7,000,000 a year to the railroads, and through them to the public by reductions in freight, would be a very welcome and just "division of profits."

The railroads apparently have made no protest against the exorbitant prices they have to pay for rails, being able to recoup it by a small increase in freight rates. Nevertheless, it is certain, that if rails were \$26 a ton many more roads would be built, and the country would be benefited to an amount far beyond the profits to the rail makers, while every department of the iron industry, from the mining of the ore upwards, would feel the beneficial effects of this activity.

If the great steel makers are solicitous about the growing tendency to reduce the prohibitory war tariffs that this country has so long maintained, it would be only wisdom on their part to forestall an action which, when instigated by oppressive or extortionate charges, is apt to go beyond a fair reduction, and themselves reduce the prices of rails to moderate figures.

The following comparison of prices in the United States and in England, in April, 1885, and in May, 1892, are instructive in this connection:

	Pittsburg.			England.		
	April, 1885.	May, 1892.	Difference.	April, 1885.	May, 1892.	Difference.
Steel rails, per ton.....	\$26	\$30	+\$4	\$23.17	\$19.44	-\$3.73
Bessemer pig per ton....	17	14	-3	10.69	12.15	+1.46
Difference.....	\$9	\$16	+\$7	\$12.48	\$7.29	-\$5.19

That is, in England, notwithstanding an increase in the cost of pig iron of \$1.46 per ton, the price of steel rails decreased \$3.73 per ton, while in the United States, on the contrary, a decrease in the cost of pig iron of \$3 per ton, the price of steel rails advanced \$4 per ton. The difference in price between steel rails and pig iron decreased \$5.19 per ton in England and increased \$7 per ton in the United States.

Those who favor a moderate tariff for the benefit of American manufacturers will do well to see to it that such examples as this be supplemented by a voluntary reduction in price by the beneficiaries of the high tariff.

#### THE UNDERSTANDING IN THE COPPER TRADE.

Some weeks ago, in commenting on the situation of the copper trade, we questioned the wisdom of such extraordinary accession of production as that recently reached by the Anaconda mine, and attributed it and similar apparent eccentricities of copper producers to other influences than those due to sound business principles. Since then the Anaconda has returned to a more restricted output. There must have been a motive for such violent alterations of policy and production, and we presume that motive is to be found in the determination by the managers of the Anaconda to answer by act rather than word the criticisms that have been so liberally bestowed upon them by the foreign press.

The Anaconda claims capacity and ability to turn out over ten millions of pounds of fine copper per month. The claim was publicly and rudely questioned in some quarters. The returns of the past few months show a monthly yield in excess of the capacity claimed.

Having demonstrated its strength, it is understood the "Anaconda" does not wish to use it harshly, and will confine its output within the limits indicated by us some time ago. But this wonderful *tour-de-force*, admitting it to be no more, is a significant warning of what can be done if the larger mining enterprises are not controlled by economical considerations; though the largest copper mines in the world are not inexhaustible; though but few mines of any size have been opened within the past five

years, and though, therefore, the available visible supply, the world over, of ore which can be profitably extracted at present prices, and with existing methods can be calculated with a certain approximation to accuracy, it is equally certain that with the aid of mechanical appliances the largest mines of the world can be so rapidly emptied as to dump on the market an amount of metal far in excess of its immediate requirements.

The conditions of the copper trade are peculiar. Copper is a metal which cannot be altogether dispensed with in the arts, inasmuch as no substitute for certain of its applications has been found. Iron can be used instead of brass and bronze in architectural decoration and in the manufacture of domestic utensils. Copper can be omitted, with loss of efficiency, from machine bearings. Ships need not be copper sheathed if sacrifice of speed and power be willingly sustained. But no cheaper metal can replace copper in appliances for generating and transmitting electricity. While, therefore, an excessive price might curtail and almost efface its optional uses, copper will necessarily be still in demand.

The experience of late years has shown that a high price immediately checks the activity of even electrical enterprises; for undertakings which perhaps would consume electrolytic copper by the thousands of tons not unreasonably postpone the consummation of their plans in the hope of a fall in price, if copper be temporarily at an extravagant figure. Thus demand grows and shrinks, and with its vacillations prices oscillate. When demand for a moment threatens to outstrip production the price responds by a sudden and rapid rise. The high cost then soon checks consumption and prices fall. But, despite these ups and downs, production has gone on in a steadily increasing ratio year by year, and, taking consumption for a sufficiently extended period, it also has maintained the same average ratio of increase.

These violent fluctuations in price have, however, been seriously detrimental to trade—to the interests of both producers and consumers—of miners and manufacturers. For instance, the year 1890 closed and 1891 opened with Lake copper at 15¢. 1891 closed and 1892 opened with the same grade of copper at 10¢ to 11¢. A manufacturer, therefore, who laid in his stock or made his contracts in the beginning of 1891 must have seen his profits wiped out by depreciation of 5¢ per pound when he took stock at its close, and a miner was either making exorbitant profits at the beginning of the year or losing money at the close.

No one will deny that if production could be so regulated as to supply the consumer at a fair and steady price, the miner, the manufacturer and the public would be benefited and the ideal of theoretical socialism would almost be reached. The principal copper producers on both sides of the Atlantic appear to be aspiring towards a realization of this particular "iridescent dream."

While we have never advocated trade combinations, our observation having coincided with the experience of most of those who have conceived and managed these economic machines, that they break down before they have run far, it is nevertheless undeniable that disturbance of trade and commercial disaster have frequently resulted from the war of unchecked competition, and these are evils which everyone must regret and strive to abate, if he cannot abolish. Therefore we look with much benevolent interest on the present endeavors to bring about a harmonious understanding and concurrent action among the large copper producers the world over.

The sole object of this understanding is to restrict the output of ten or a dozen of the largest producers to a very moderate degree, and rather by their agreement not to flood the market, to steady it at such moderate prices as will allow about 40 per cent. of the supply to come from small and unrestricted producers, and that will leave a fair margin of profit to the large and cheap producing mines. There is to be no control over the prices asked and none over the quantity produced by all the small mines, which will consequently produce all they can.

It is easy to point out that the minimum price under such an arrangement, honestly observed, would be that at which the small mines could produce or were willing to sell, and if the maximum price should leave, or promise to leave, a very large profit, the free mines would increase capacity; new mines would be opened, and some of the large mines would find it difficult to resist the temptation to evade the spirit of the understanding, and thus, after making full preparations for increased output, would naturally demand an increased quota. All of these seeds of dissolution are planted in every form of combination to regulate trade, and are quite familiar to the gentlemen who are active in this, so that it is reasonable to assume that they have provided against their rapid growth. They may have given their plan such elasticity as will enable it to adapt itself to the varying conditions which usually bring discontent and finally disaster. Such an ideal plan would be wholly beneficial to the trade and could meet only general approval.

Evidently the calculations of the managers are based on the assumption that production will grow at somewhat the same rate of increase which we indicated in our annual review as having been that of the past. They, therefore, propose to apportion among themselves a fair share of this probable increment. We use the term "apportion among themselves" advisedly, for as we understand it the movement has not been impelled by

any outside speculative influence, but has originated within the circle of large producers, and has been the outcome of conferences by the few men who make the major part of the world's copper, and yet who, strange to say, have never heretofore attempted to agree upon some course of concurrent action. For another peculiarity of the copper trade is that 58% of the world's supply is made by ten corporations, or groups of corporations under the same management.

On this side of the Atlantic, taking our own figures for last year for the production of all the companies during 1891, except "Anaconda," and replacing its production for 1891, when it was closed for seven months of the year, by its production for 1890, and accepting Merton's statement for foreign production, we get the following interesting table:

COPPER PRODUCTION, 1891.

	Tons of 2,240 lbs.	Per- centage.	16 Co's.	10 Co's.
United States.....	111,162	48.25		
Foreign.....	151,365	51.75	%	%
World.....	292,527	100.		
Rio Tinto.....	32,000	10.94	10.94	10.94
Tharsis.....	10,500	3.59	3.59	3.59
Mason & Barry.....	4,150	1.42	1.42	1.42
Cape Copper.....	5,000	1.71	1.71	1.71
New Quebrada.....	6,500	2.22	2.22	2.22
Chili.....	19,875	6.79		
Mansfeld.....	14,250	4.87	4.87	4.87
Japan.....	17,000	5.81		
Australia.....	7,500	2.56		
Boleo.....	4,100	1.40	1.40	1.40
Calumet & Hecla.....	29,018	9.92	9.92	9.92
Quincy & Franklin.....	6,497	2.22	2.22	2.22
Tamarack.....	7,231	2.47		
Osceola.....	2,869	.98		
Boston & Montana.....	11,958	4.09	10.31	10.31
Butte & Boston.....	8,095	2.77		
Anaconda.....	28,600	9.78	9.78	9.78
Parrott.....	6,405	2.18	2.18	2.18
Old Dominion.....	3,138	1.07	1.07	1.07
Arizona Copper Co.....	3,000	1.03	1.03	1.03
United Verde.....	2,942	1.01	1.01	1.01
Copper Queen.....	4,480	1.53		
Holbrook & Cave.....	1,218	.42	2.59	2.59
Detroit.....	1,872	.64		
Other United States.....	21,694	8.44		
Other Foreign.....	23,635	10.14		
Total.....	292,527	100.	66.26	58.15

We thus see that sixteen companies make 66% of the world's total production and ten companies alone make 58% of the world's total production. Though this year the order of procedure will not be the same as in 1891, inasmuch as mines are not exempt from the inevitable growth and decay which attends all things animate and inanimate, the order will not be materially disturbed. Were the Anaconda and associate mines to maintain throughout the year their May and June output they would produce more than all the Spanish mines together. The Verde mine, in Central Arizona, has increased its facilities for production. The Buffalo and Long Island group of mines, in Globe, Ariz., are being reopened, but the mines around Clifton have not so far realized last year's yield, and oxidized ores are there gradually passing into sulphurets.

The quantity, therefore, which each American mine claims the privilege or capacity to make differs from last year's production, but necessarily bears some relation to it. We believe we were substantially correct in our statement of apportionments made some time ago and that the present allotments are based on the assumption that the United States output for the coming year will be about 315 millions of pounds, of which forty thousand long tons will be available for export. This basis is certainly moderate and reasonable.

Looking back over the past ten years we find that our production between 1882 and 1891, included, and our consumption, obtained by deducting exports from production, have been as follows:

Year.	Production, pounds.	% Increase.	Consumption, pounds.	% Increase.	Exports.
1882.....	91,819,458		85,574,095		6,245,363
1883.....	117,151,795	27.50	96,283,056	12.51	20,868,739
1884.....	147,805,407	26.16	87,512,961	-9.11	60,292,446
1885.....	170,362,324	15.67	77,812,866	-11.08	92,549,458
1886.....	161,263,043	-5.07	94,947,382	22.01	66,315,661
1887.....	185,227,331	14.85	116,622,578	22.81	68,604,753
1888.....	223,481,588	20.65	119,853,456	2.78	103,628,132
1889.....	243,676,000	9.00	169,600,000	41.51	119,488,050
1890.....	265,581,000	9.00	189,584,000	11.8	65,088,050
1891.....	301,820,000	13.64	216,820,000	14.37	110,000,000
Average.....		14.53		11.95	

While there have been remarkable annual variations the average percentage of 14.53% increase in production and 11.95% increase in home consumption are probably fair indices of the growth of the copper trade and, if so, our consumption during the next 12 months ought to warrant a production considerably in excess of 300 millions.

The proposed plan is not open to the objection that it aims at unduly raising the price by curtailing production. It allows for a normal increase of output and leaves prices to regulate themselves, simply under the assurance of the miner to the manufacturer that such immoderate hursts of production by the larger mines as have heretofore destroyed the stability of the market will be checked.

As copper is virtually not a protected article since we produce much

more than we consume the price ruling on both sides of the Atlantic is the same, and as Europe has heretofore been the largest consumer her markets fix values. The disturbing element on the European exchanges has been the fear and threats of enormous American shipments rather than the shipment themselves, for our copper is as necessary to Europe as that of Chili formerly was.

The only large European producer outside of Spain and Portugal is Germany, and she makes only twenty thousand tons, while she consumes so largely as to be capable of absorbing nearly our total export. To give stability to the European market it is therefore understood between the American producers and the large English producing companies that not more than forty thousand tons of our copper will be exported to Europe, while the large English companies and Boleo will curtail production five per cent. from the aggregate last year's output. No effort is being made to bring within the circle of influence any but the large and influential producers and consequently a very great proportion of the mines of the world have not even come to an understanding with their more powerful rivals.

It would seem, therefore, that the recent conferences have had for their object the creation of an "entente cordiale" among the few large producers, on both sides of the Atlantic, with a view to harmonious action, and that no intention is entertained of using the recognized means of regulating price by pooling production or otherwise, and that no effort is being made to obtain the concurrence of at least 30 to 40% of the world's copper producers.

The arrangement, if it can be carried out, will apparently fill the functions of an International Copper Exchange.

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.

Allit—Shall We Rename Aluminum?

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Your issue of July 2d contained a letter from "Mem. A. I. M. E., Corburn, Va.," proposing the use of the letter combination "Allit" as a substitute for the name aluminum. We would ask why should the name be changed at all? Is the gentleman so pressed for time that "Aluminum" is found oppressive in length? If so, then why not call it simply "Al"—or to be familiar and "for every day and convenient use," "old Al" or "Al old boy?" Even this latter is one syllable shorter than "Aluminum" and no doubt the time saved by its use would put many dollars in one's pocket in the long run.

BUFFALO, N. Y.

The Kings Mountain, N. C., Gold Mine.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I have read with much interest and a little surprise the article entitled "A Southern Gold Mine," in your issue of July 9th. While there is no doubt in my mind that the property is good, yet it is certain that the facts given in the article are open to criticism. The grade of ore has, as I am well informed, never averaged \$8 per ton. The poor ore, said to average \$4.47 a ton, might as well have been called the rich, for if I am well informed, little of the ore goes above that figure, the "brown ore" being worked out.

It is said that the presence of some ore of lead, possibly a telluride of lead, interfered with amalgamation, and the mill is in need of extensive repairs. The estimates of \$694,000 in profit, or 138,000 tons of \$8 ore in sight, are probably very highly colored; nevertheless, the mine is by no means worthless. Labor is cheap, and with systematic and skillful work it may yet become worthy of its ancient reputation.

NEW YORK, June 17.

Gold Mines of South Africa.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In reply to your remarks in your edition of the 2d inst. criticising my prediction of the yield of the gold mines of South Africa, I make the following explanations:

My predicted yield was formed entirely upon the appearance of the veins with the large quantity of paying ore in sight, and the time estimated to develop the mines and erect the necessary reducing machinery.

Since then 2½ years' work has been done, which shows that my estimate of the mines and ore contained therein was correct, but my estimate of the time required to develop the mines and erect the works was too short.

No one could have anticipated the complete paralysis of all mining business following the collapse of the crazy speculation of 1888 and 1889, which culminated in the Barings failure in 1890. Many parties bought at high prices shares in worthless farms called mines on strength of good results shown on remote mines, probably 100 miles distant; because these turned out swindles and failures, the public came to the conclusion that all South African mines were of the same class. This made it very difficult for good mines to get the necessary working capital, and consequently the development has been much delayed, far beyond what I calculated.

It is now two years since I visited these mines; from the best information that I can get, the opinion I then formed of them has been fully confirmed by subsequent work, which shows that their yield will be very continuous and permanent.

The remarkable—I may say the unheard-of—fact has been developed that all the mines have continued to improve as worked, although many have been worked extensively for two and three years. In depth the veins appear to hold their width, while the ore improves in quality.

I see no reason to change my opinion of the future yield of the South African Mines, though the time for development will be longer than I anticipated.

Yours most truly,

F. BATES DORSEY, M. Am. Soc., C. E.

JUNIOR TRAVELLERS CLUB, LONDON, July 12th, 1892.

The Geological Survey Bureau.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: There is much discussion and excitement over the Senate reduction of the appropriation for the survey in the Sundry Civil Bill, which decreases the amount, viz., usually named for its support and direction, by about \$180,000. As the House has virtually no concurrence in this reduction it is not likely that any change will be effected while the bill is in conference.

Till the bill becomes a law it is likely no determinate action will be taken by Director Powell to respond to the probable new condition of affairs, but when that result is reached it is understood that there will be a conference with the Secretary of the Interior in order to adjust matters to the situation.

Meanwhile the Director has telegraphed to all of his subordinates in charge of field work to make no more expeditions until further notice from headquarters.

There are some 650 or 700 employes in the field scattered throughout the states and territories, a large force being engaged in the Appalachian Range in Pennsylvania, Maryland, Virginia and West Virginia. It is indicated that the entire system of field work will undergo reorganization.

The reduction particularly does away with the office of Prof. M. D. Baker, but it is very probable that a place will be made for him elsewhere. Important changes will also be necessary in the Geological and Paleontological Corps. Of the former branch there are now employed thirty geologists who are paid salaries ranging from \$1,000 to \$4,000 per annum. It will be decided also whether the expenditures of the Bureau will be reduced by a graduated cut in salaries or by absolute dismissals.

There are not so many paleontologists as geologists employed, but the same problem is to be met regarding their retention or dismissal. It is understood that there will be no material changes in the clerical force of the office except that the discharge of each shorthand writer assigned to geologists will be rendered imperative if the services of the respective chiefs are dispensed with.

CLINTON RICE.

WASHINGTON, D. C., July 21, 1892.

#### THE COMPARATIVE VALUE OF BRIMSTONE AND PYRITES IN THE MANUFACTURE OF SULPHURIC ACID.

Written for the Engineering and Mining Journal by J. H. Kelley.

In the following paragraphs I shall give as briefly as possible the results of my experience in the manufacture of sulphuric acid from both pyrites and brimstone.

The only advantage that pyrites possesses over brimstone is that the sulphur in this form costs from one-third to one-half less than in the form of brimstone, while the advantage possessed by brimstone over pyrites may be given as follows: As pyrites contains an amount of iron requiring oxidation, more air is used in the burning process than with brimstone in producing the same amount of sulphuric acid; consequently the burner gas from pyrites contains a larger percentage of nitrogen and a smaller percentage of sulphurous acid and free oxygen than that from brimstone. In exact figures, the burner gas from pyrites should contain, with good working, from eight to ten per cent., and that from brimstone from eleven to thirteen per cent. SO<sub>2</sub>. This increase in the amount of nitrogen and decrease in SO<sub>2</sub> and free oxygen requires an increase of from two to three per cent. of nitre in the amount of sulphur charged, and it also requires an increase of from one-fourth to one-third of the capacity of the chambers. I find the average amount of nitre used with pyrites to be six per cent. and with brimstone four per cent. of sulphur charged.

I find that 100 lbs. of sulphur charged, in the form of pyrites, produces 430 lbs. of chamber acid and that 100 lbs. of sulphur in the form of brimstone 490 lbs. of chamber acid 50° B., these figures being equivalent to 246 and 300 lbs. of pure acid respectively. This difference is due to the amount of sulphur remaining in the cinder, averaging 3%, and also to the sublimation of sulphur and the nonformation of sulphurous acid due to the high temperature of the furnace. This increase in temperature combined with the greater amount of nitre used with pyrites shortens the life of the chambers by at least one-half. On this account we calculate the wear and tear on the brimstone plant at 6% per annum, and in the pyrites plant at 10% per annum. Our pyrites-plant, which produced nine tons 50° B. acid per day, we valued at \$30,000; and our brimstone plant, using the same chambers and producing 12½ tons per day, we valued at \$27,000. The difference in cost is due to the difference in the cost of the furnaces.

With pyrites the services of four men were required for charging (two during day, two night), besides the extra expense of breaking and preparing the ore for the furnace; while with brimstone two men were sufficient for all purposes.

In the following table I give the average expenses for a day, first with pyrites, second with brimstone:

COST OF PRODUCING 9 TONS CHAMBER ACID WITH PYRITES.		
5 tons pyrites @ \$5 to \$8, from.....	\$25.00	to \$40.00
270 lbs. nitrate @ \$2.50 per hundred.....	6.75	" 6.75
*360 lbs. acid @ 40c. per hundred.....	1.45	" 1.45
Breaking ore and loss @ 25c. per ton.....	1.25	" 1.25
Four men @ \$1.25.....	5.00	" 5.00
Wear and tear.....	9.00	" 9.00
Office and other expenses.....	5.01	" 5.00
	\$53.45	\$68.45
Producing 50° B. acid at from \$5.91 to \$7.60 per ton.		
COST OF PRODUCING 12 TONS CHAMBER ACID WITH BRIMSTONE.		
2¼ tons brimstone @ \$21 to \$29.....	\$52.50	to \$72.50
200 lbs. nitrate @ \$2.50 per hundred.....	5.00	" 5.00
*200 lbs. acid @ 40c. per hundred.....	.80	" .80
Two men @ \$1.25.....	2.50	" 2.50
Wear and tear.....	6.00	" 6.00
Office and other expenses.....	5.00	" 5.00
	\$71.80	\$91.80
Producing 50° B. acid at from \$5.98 to \$7.65 per ton.		

\* This difference in the amount of acid used is caused by the difference in temperature, and by the fact that the nitrate pot in the pyrites furnace is stationary, so that the nitrate cake must be liquid enough to flow out.

This table shows that if pyrites can be obtained at from \$5 to \$8 per ton delivered, brimstone should be bought at from \$21 to \$29 per ton delivered. At present pyrites can be bought at from \$10 to \$11 per ton, delivered,

and brimstone at \$28 to \$30 per ton, delivered, so that the comparison is even more in favor of brimstone than appears from the table. This calculation does not take into consideration the value of the cinders in the case of pyrites, as we have never been able to make anything on them.

So far, I have taken the value of a ton of acid produced from pyrites to be the same as one produced from brimstone. This is true only where the presence of a small percentage of arsenic is of no consequence. There is always some arsenic in pyrites and it is almost impossible to eliminate it.

In the manufacture of superphosphate or sulphate of soda to be used in alkali, or in glass making, or in the purification of petroleum, there is no objection to arsenical sulphuric acid, but where the acid is to be used in the manufacture of food products, such as starch, sugar and molasses, it is necessary that brimstone acid should be employed. Where a chemically pure article is required in pharmaceutical and analytical work, it is absolutely necessary to use the brimstone acid.

Brimstone possesses the advantage of producing an acid averaging from 5 to 10° stronger than that produced by pyrites. The pyrites burner gas has a higher temperature, and in order to reduce this sufficiently for the chamber process it is necessary to introduce more steam than with brimstone. I am not prepared to give the exact difference in the cost of concentration.

[For some time Mr. Wm. H. Adams has been advocating the use of pyrites in place of brimstone for the manufacture of sulphuric acid, and recently a series of articles on the subject from his pen has appeared in the pages of the *Journal of Analytical and Applied Chemistry*, from which we take the following estimates. The chief reason for the substitution is the greater cheapness of the sulphur contained in pyrites, and the second reason is that pyrites are comparatively abundant in the States, whereas brimstone has to be imported. He gives in his writings a comparative statement of the costs in producing sulphuric acid by the two processes. This may be put in the form of a table:

COST SULPHURIC ACID MADE FROM PYRITES.	
10 tons pyrites, all costs as above, at \$5 per ton.....	\$50.00
Nitrate of soda, 4¼% on sulphur contents, or say 400 lbs. at \$2.50 per 100 lbs.....	10.00
Coal, two tons daily, at \$3 per ton.....	6.00
Labor, five men for all purposes, at \$1.25 per day.....	6.25
Superintendent and office cost.....	6.00
Wear and tear as above.....	10.00
Total.....	\$88.25
(or \$4.90 per ton of chamber acid.)	

COST OF PRODUCING SULPHURIC ACID FROM BRIMSTONE.	
Four tons brimstone, all cost including freight, losses in transit and burning, etc., at \$24 a ton, used in producing 18 tons daily.....	\$96.00
Nitrate of soda, 6% of brimstone used or 538 lbs. daily at \$2.50 per 100 lbs.....	13.45
Coal, two tons daily, at \$3 per ton.....	6.00
Labor, five men for all purposes, at \$1.25 per day.....	6.25
Superintendent and office cost.....	6.00
Wear and tear per day, 10% per annum, on works, costing \$35,000.....	10.00
Total.....	\$137.70
(or \$7.65 per ton of chamber acid.)	

It will be noticed that Mr. Kelley's and Mr. Adams' estimates vary considerably. Mr. Adams estimates that with brimstone costing \$24 a ton chamber acid will cost \$7.65 a ton, and that with pyrites at \$5 a ton chamber acid costs \$4.90, while Mr. Kelley estimates the cost of acid from brimstone at from \$5.98 to \$7.65 and from pyrites \$5.84 to \$7.60, taking pyrites as costing from \$5 to \$8 per ton and brimstone at \$21 to \$29 a ton.—Ed. E. AND M. J.]

#### NEW DYNAMITE CONVEYING PLANT AT THE WORKS OF THE 'AMERICAN FORCITE COMPANY.

About a year ago a serious explosion took place at the works of the American Forcite Company at Hopatcong, N. J. It was then the custom to convey the nitroglycerine from the tank house to the five mixing houses on the side of the hill by means of slightly inclined pipes. A destructive explosion occurred in one of the mixing houses, and it was communicated by the nitroglycerine through the pipes to the tank house and to the other mixing houses. In rebuilding the plant it was obvious that a new type of conveying apparatus would have to be adopted in order that any subsequent explosion should be confined to the particular locality in which it occurred. The owners of the works therefore asked the Union Wire Rope Tramway Company to design a form of aerial rope line which would meet the circumstances of the case. This has been done and the plant is now in operation again.

The rope tramway starts from the engine house, which is close to the tank house, and runs past the five mixing houses in the side of the hill. It consists of a double rope instead of a single line. There are four wheels to the carriage, two at each end, and instead of the two wheels at each end traveling on the same rope, one is on one rope and the other on the other, though their axles are at the same distance apart as if they ran on one rope. The object of this arrangement is to convert the sudden jerk when the carriage passes a support into an easy rocking motion. The grooves in the wheels are padded with strips of india rubber, in order to deaden the vibrations. The frame of the carriage is provided with 10 pivoted hooks, each of which carries a bucket of nitroglycerine. When the carriage rocks or runs on a sloping course, the pivoted hooks allow the buckets to preserve a vertical position, and the charge is therefore not disturbed. In order to insure safety still further, the buckets are made of fibre. The capacity of each bucket is 18 lbs. When the fully loaded carriage starts from the tank house a man goes with it and unhooks two buckets at each mixing house. On the return journey two empty buckets are taken up at corresponding points. This rope tramway has been designed and made with the very greatest care, in order that there shall be no possibility of accident or breakage of any sort.

**Foreign Mining in China.**—It is reported that by the decision of Li Hung Chang, the broad-minded Viceroy of China, foreign capitalists will be permitted to invest in Manchuria, where lead, silver and gold mines are known to exist. In Siberia, near the border of Manchuria, auriferous placer gravel is now worked to a profit.

A MAGNETIC SEPARATING PLANT AT MONTEPONI, SARDINIA.

The zinc ore of Monteponi, a low grade calamine, is concentrated by wet methods. A full account of the method employed will be found in the *Oest. Zeitschrift für Berg und Huttenwesen*, No. 37, 1889. The tailings consist of calamine, iron ochre and dolomite in varying proportions. As these minerals have nearly the same specific gravity, it is impossible to further concentrate the zinc in the usual way. Experiments showed that a magnetic separation was economically possible, and after some trials the following apparatus was designed for that purpose, the description being taken from an article by Mr. E. Ferraris, Director at Monteponi, in the journal cited, No. 20, 1892. The ore after being mixed with 2% of fine coal, slides through a tube into a rotary furnace where the iron is reduced to the condition of magnetic oxide.

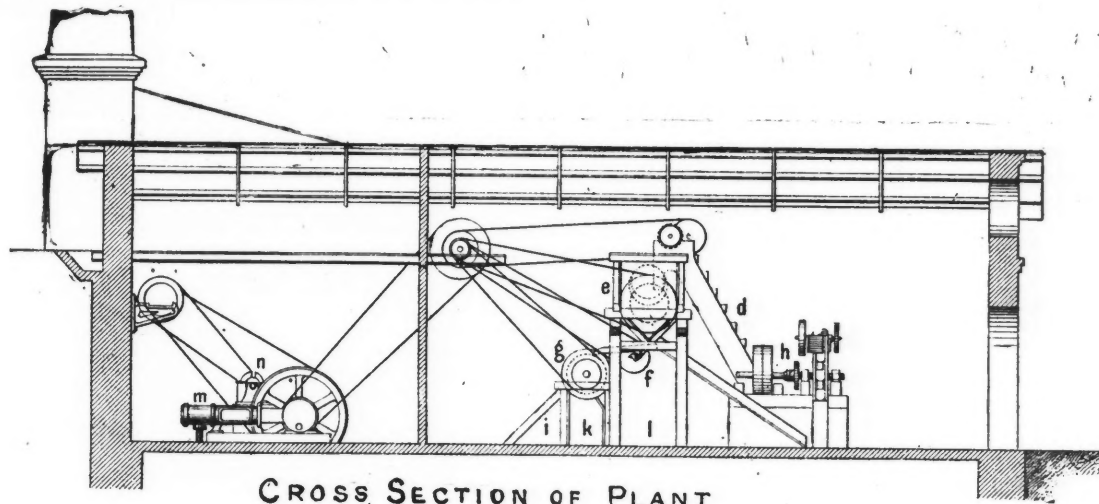
The furnaces, of which there are two, are 13 metres long and made of forged boiler iron, lined with wedge-shape, fire-proof brick. They revolve upon eight wheels in front of a fire-place one metre in diameter,

the two diametrically opposite brushes *l* touch at least two segments at once.

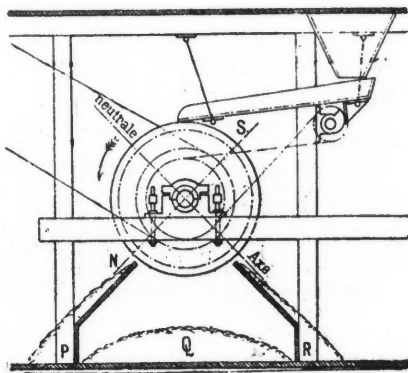
The current passes from the brushes *l* to the circuit of the bobbins, and excites a positive and negative current in the two halves of the wheel, but as each brush sets upon the segments of the commutator at once, no magnetism is developed in the inclosed bobbin, and consequently there is a neutral zone on each side. These two neutral zones divide the wheel into a positive and negative semicircle.

The axis of the neutral zone can be so inclined by the proper adjustment of the commutator and bobbins that all the non-magnetic substances fall in front of the magnets *P*, while all the strongly magnetic minerals follow the wheel to the neutral zone, where they are scraped off and fall in *R*. The space *Q* is intended for the collection of the weakly magnetic minerals.

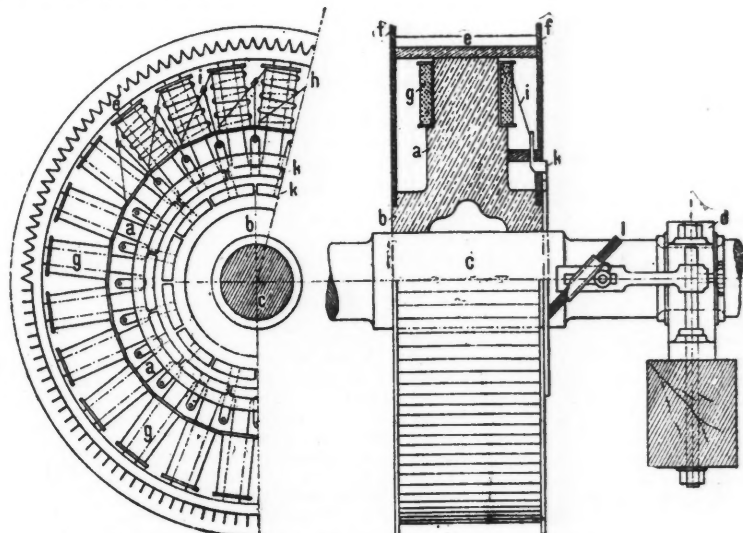
The magnets make from 12 to 20 revolutions per minute, and use on an average a current of 6 ampères and 30 volts. The German patent is No. 61,056.



CROSS SECTION OF PLANT



SECTION OF SEPARATOR



SECTIONS SHOWING CONSTRUCTION OF SEPARATOR

FERRARIS' MAGNETIC SEPARATING PLANT AT MONTEPONI, SARDINIA.

the rotary motion being produced by a tympan and cog wheel. The furnace makes 16 revolutions per hour.

The operation is continuous, the ore, which is constantly fed, passing through the furnace in six hours and dropping into a closed vault. While still warm it is removed, spread out and then moistened to hydrate the calcined dolomite, causing it to disintegrate and fall to a fine dust. The ore is then taken by a bucket elevator *d* to classifying from mels *e*, by which it is divided into five sizes, the limits being 0, 1, 1.6, 3 and 6 millimetres. The first four are conducted on brass shaking tables directly to the magnets *g*, which separate the ore into zinc concentrates, tailings and iron ore. Size 6, together with the tailings, are passed through rollers *h*, and added to unclassified ore, to be again passed over the trommels.

The construction of the magnets is shown in the illustrations.

The wheel consists of a body *b* having an even number of spokes *a* inclosed by the cast iron rim *e* and the two zinc discs *f*.

Four wheels are arranged on a common shaft *c*. Upon each spoke a bobbin *g* is placed, and all the bobbins then connected allowing a free and uninterrupted passage of the current.

Between the bobbins a wire *i* passes from the connecting wire *h* to the commutator *k*, which passes through the covering plate *f*.

The commutator consists of as many strips of copper as there are bobbins, and placed alternately upon two concentric circles so arranged that

In 1891, 5,000 tons of low grade ore containing 20.46% zinc were treated, from which 1,530 tons of concentrates, containing 41.67% zinc, were obtained. During the present year the percentage has been increased to 45%.

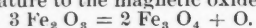
**Action of Sea Water on Portland Cements.**—In the opinion of Dr. Michaelis, of Berlin, the greatest enemies to the permanency of the Portland cement used in marine structures are the sulphates contained in sea water. If there is any great quantity of alumina and ferric oxide in the cement the structure breaks up sooner than otherwise. This is accounted for by the fact that the sulphate forms with the aluminate and ferrate of lime a number of crystalline compounds such as basic sulphate of lime, aluminosulphate and ferrosulphate of lime. These compounds take up a large quantity of water of crystallization so that the total volume is much increased. Hence the weakness and disintegration of the cement structure. Dr. Michaelis considers that the separation of hydrate of magnesia is quite innocuous, for it is only displaced from its solution in the form of a flocculent slimy hydrate which, if anything, is useful in stopping up the pores. His general recommendation to users of concrete for marine work is to choose a cement rich in silica, and as poor as possible in alumina and ferric oxide; and to envelop the structure with an impermeable mixture composed of one part of cement with 2 to 2½ parts of sand of mixed grain, of which at least one-third should be very fine sand, and to this the requisite amount of ballast should be added.

## OXIDE FILMS ON IRON WIRE.

Written for the Engineering and Mining Journal by Charles Platt, A. C.

In the ENGINEERING AND MINING JOURNAL, Vol. LII, No. 21, page 588, a notice appears of a patent of P. Henry Betrand for the production and use of a magnetic oxide film as a rust proof and rust preventing covering for iron. His method, as there noted, consists of a galvanoplastic deposition upon the iron to be coated, of a metal susceptible of volatilization at about 1,000° C. In the heating and volatilization of this metal the iron becomes oxidized to  $Fe_3O_4$ , there not being a sufficiently free access of oxygen to convert to the higher oxide  $Fe_2O_3$ . The operation, requiring only a few moments, provides an even coating of the magnetic oxides, forming a perfect protection against rust for any length of time.

This subject of oxidation as providing a permanent coating for iron had already been in my mind and experiments had been conducted successfully in that direction. Being called upon to provide a non-rusting, electrically resisting coating for iron wire to be used in motor construction, the following line of experiment was conducted: The magnetic oxide, naturally, was not to be thought of, being entirely unsuited for the purpose to which the wire was to be placed and consequently high temperature for oxide production was also abandoned—the sesquioxide decomposing at high temperature to the magnetic oxide and oxygen according to the reaction



(Query: Does not M. Betrand first produce sesquioxide?) A magnetic oxide is also obtained at temperatures of 200° to 300°, the film of oxide being in two layers, the more reduced oxide represented by the formula  $6 FeO \cdot Fe_2O_3$  being in conjunction with the iron while a higher oxide containing more  $Fe_2O_3$  and more highly magnetic in character is formed upon the surface.

The higher temperature oxides as well as those produced at a low red heat being then out of the question owing to their magnetic properties, my attention was turned entirely to chemical methods of oxidation—water and acids. A few brief experiments were first made with fuming nitric acid as giving in the so-called passive state of the metal the required coat of oxide; but this method was so beset with difficulties that it was at once abandoned.

A coating of oxide on iron acts as a conveyor of oxygen for the oxidation of the unruined iron beneath. Whether the action be termed thermo-electric, or voltaic, or purely chemical, matters but little, the results are the same, namely, a continuous oxidation, greatest at first when the film is thin and limited only by temperature and time. An object of small diameter, such as iron wire, soon becomes oxidized to the core and is thereby completely destroyed. Hence, the first question in our line of experiment was to completely destroy the action when the oxide film should have reached a certain required thickness, and this was done by heating after oxidation to a temperature of 100° and a little over—ordinary iron rust with the formula  $Fe_2O_3 \cdot Fe_2(OH)_2$ , formed by action of water or aqueous vapor and accelerated by the presence of acids, gives off part of its water when heated to between 80° and 100° C. At this temperature, however, as noted, the water is not entirely driven from the oxide, and to prevent further oxidation and re-absorption of water the wire must be covered with a thin film of an oil mixture prepared for the occasion, by which means the air is completely excluded and further oxidation from that source thereby prevented. The oil itself, however, if allowed to remain untreated upon the iron, would loosen and eventually remove the coating of oxide altogether. A second baking operation solved this point, however, and the results were finally found to be perfectly satisfactory. The two coatings of ferric oxide and oil were together but one-half of a thousandth of an inch thick measured on the radius of the wire, and provided a covering unaffected by the atmosphere and permanent within itself.

The procedure by which these results were attained may be of interest to some and will be given briefly below. For the purpose of obtaining a hydrated ferric oxide I had constructed a wooden flue box 12 ft. in length by 1½ ft. square section. This was set in an incline and its upper end connected with a chimney draught. Dilute acids were evaporated slowly at the lower end, an upward current of the acidified, aqueous vapor being maintained by an arrangement of gas burners throughout the length of the box. The wire for oxidation ran upon a wooden pole of the length of the box and was there so suspended as to be easily removable. Arrangement was also made that the wire might be inspected without delay of the process. This method was, however, eventually abandoned as the oxidation was in all cases too rapid and of too loose a structure—the rust formed in loose flaky particles and whenever the wires crossed or touched the rust formed a bridge. Various processes of dipping in highly dilute acids, or rather in slightly acidified water, and in saline solutions were also tried, but always with exaggerated results. The rust invariably collected on the lower parts of the coils as they hung upon the poles and even a vigorous skaking to free from the surplus water and constant turning of the coils did not remedy this defect. The water was always in excess and the result was a highly hydrated loose oxide, gradually changing by prolonged exposure to the red amorphous oxide  $Fe_2O_3 \cdot H_2O$ .

A modification of this method was now tried and finally adopted as a perfect success. For experimental purposes I had a "lean-to" constructed without the laboratory and carried there to a steam pipe with its open end a foot and a half from the floor. The valve for regulating the flow of steam was placed for convenience within the laboratory itself. Arrangements were made for evaporating dishes of porcelain to be placed in the floor of the "lean-to" and thus heated by connection alone—the evaporation of the acid solution (dilute HCl) being accomplished by the raise in temperature of the room. The wire was strung out upon poles, the coils being carefully separated and these poles placed in wooden sockets 6 ft. above the floor. A few hours exposure, the time varying according to the steam introduced, strength of the acid solutions, etc., suffices to give a fine brown cohesive coat of oxide covering all parts of the wire equally. When this is accomplished the poles are removed with their burden of wire and carried directly to an oven in which they are supported as before, the doors of the oven closed and the temperature raised to 100° to 125° C. This temperature is maintained for an hour or so and then gradually lowered when the wire is removed and dipped while still warm in a mixture of oils. The excess of oil is then shaken off and the coils placed in a centrifugal machine, which rapidly removes the superfluous coating of oil, leaving only

a fine thin brown film of shiny appearance. The wire is again slipped on the poles and heated as before, the result being as previously stated—an electrical and rust resisting film of perfect pliability bending with the wire without cracking until the latter is broken.

This procedure is of interest more particularly in an experimental sense, as in the oxidation and coating of large quantities of wire daily it would hardly prove economical. Modifications have since been introduced, however, which have placed the process upon a commercial basis, and it is now being so used in a plant of my design where, from report, it is giving eminent satisfaction.

## THE LOSS IN DRESSING MIXED LEAD ORES IN GERMANY.\*

The author gives examples of three different methods of treating lead and silver ores as carried out at the Himmelfahrt and Churprinz mines at Freiberg, and at Ems in Nassau. The vein stuff at Himmelfahrt is derived from the so-called pyritic lead formation, and it contains galena (assaying 75-85% of lead, and 58 oz. to 87 oz. silver) associated with blende (assaying 35-40% of zinc, and 9 oz. silver), iron and arsenical pyrites both poor in silver (1.4 oz. to 58 oz.) and copper pyrites (assaying 20-35% copper and 12 to 18 oz. silver). The waste contains quartz, spathic iron ore, barytes, dolomite, fluor, calcite, and occasionally fragments of the country rock, gneiss, and mica schist. In bulk the metallic contents are—lead, 2.75; zinc, 0.275; silver, 0.023; arsenic, 0.5; copper, 0.01, and sulphur, 0.205%. The treatment is a combination of hand-picking, sorting by dry-sizing sieves, jigging, stamping, and washing on percussion tables, and, to a small extent, crushing by rolls. As a whole about 25% of the stuff is hand-picked, and 75% goes to stamps. The sizing-sieves give for the picking-table, 28%; for stamps, 21%; for spalling and cobbing, 21%; and small grublenklein, 30%; the first three kinds, making 70% of the total extraction, are subjected to treatment without water, giving waste, 35; stamp-stuff, 22; crusher-stuff, 6; and finished ore 7%. The proportion requiring to be treated with water is, therefore, 58%, made up of the following items: smalls, 30; stamp-stuff, 22, and crusher-stuff, 6%. The smalls in the jigging process give 40% of stuff requiring further reduction by stamps and rolls, and the crusher gives 30% of stamp stuff. The 28 parts of stamp and crusher stuff contain 17 that are treated in the washing processes proper, which, added to the 58 parts, makes 75% of the figures previously given, as the proportion to be stamped and washed. The quantity of material handled on the picking tables is 98 cubic metres, or 196 tons per week. The finished lead ore is dressed up to lead 85, and silver 0.3%; the blende to zinc 40, and silver 0.03%, and the pyritic ores to sulphur 40% and silver 0.95%. The loss upon the gross contents of the different components of value are: silver, 21; lead, 38, and sulphur, 60%. These high losses are largely due to the presence of an intimate mixture of pyrites and blende in the vein stuff, both argentiferous, but which cannot be separated, and is therefore useless for smelting. This amounts to, and sometimes exceeds, 20% of the stamp stuff. Comparative experiments, with a view of substituting crushing rolls for stamps, have resulted in favor of the latter; the proportion of merchantable products being four times the value of that obtained by the former, for although the loss of lead is larger, there is a considerable quantity of silver saved in dry or pyritic slimes by the stamps, which are saleable to the smelters, but remain as intractable intermediate products when the reduction is effected by the crusher.

The vein stuff of the Churprinz mine contains lead 3, and silver 0.0095%; it is dressed up to lead 70, and silver 0.05%. The losses calculated on the gross contents are—silver 22.8, and lead 14.9%.

The mineral treated at Ems contains lead 4, zinc 2.5, and silver 0.0054%. The lead ore is only concentrated up to a yield of lead 36, and silver 0.030%, while the dressed blende assays 44.5% of zinc, and is not argentiferous. The losses on the initial contents are—silver 8, lead 6, and zinc 34%.

**Basse & Selve Method of Cobalt and Nickel Separation.**—Messrs. Basse & Selve, of Westphalia, have invented a process of separating cobalt from nickel when the two occur alone. To the boiling hydrochloride or sulphuric acid solution of the oxides solution a mixture of hypochlorite and carbonate of soda is added little by little until all the cobalt is precipitated. This precipitate,  $Co_2O_3$ , is digested with dilute hydrochloric or sulphuric acid to remove any traces of nickel which may have been thrown down.

**Antimony in Electrolytic Copper.**—Herr W. Hampe states in *Chemiker Zeitung* that all the specimens of electrolytic copper which he has examined contained a small proportion of antimony ranging from 0.007 to 0.02%. The precipitation of antimony from the copper ore might be checked if the sulphuric acid electrolyte were not used for so long a time, and thus did not become so highly charged with impurities, but except for laboratory purposes the extra expense involved in the increased consumption of acid would not be proportionate to the advantages gained by the elimination of the antimony.

**Iron in British India.**—The *Pioneer*, a leading British Indian newspaper, has once more drawn attention to the possibilities of developing that country into a great iron producing center. There are great stores of the very purest ores such as hematite and limonite in the Jubbalpore and Chanda districts, excavation is cheap, while limestone and charcoal can be had in abundance and at ridiculously low prices. In addition to all these favorable circumstances, skilled labor can be had at about a dollar a week. How is it therefore that it does not pay to start iron works in British India? In the first place the government in London has control of all civil engineering works in the country, and consequently the orders for structural iron for bridges, etc., and for steel rails go to firms in England. Secondly, the Indian government will not grant long leases for the mining lands. Many years ago the government would only give one-year leases to iron smelters, and it was only after much agitation that they could be induced to grant twenty-year leases. This was in 1886, but as yet no new smelting works have been started. Capitalists wanted and still want at least a forty-year lease, and it is not probable that any development will take place until their desires are acceded to. It is a great pity that the resources of a great country should remain unworked while the inhabitants are either starving or living on rice.

\*From an elaborate monograph on ore dressing in Germany by Maurice Bellom in *Annales des Mines*.

ELECTRIC TRANSMISSION OF POWER IN THE WEST AND SOME HINTS ON IT.

We are indebted to our contemporary, *Electrical Engineer*, for the following information concerning the electric installations at the Belmont and Sheridan mines at Telluride, Colo. The mines belonging to the Sheridan-Mendota Consolidated Mining and Milling Company are among the most productive mines in Colorado. The mouth of the main cross-cut tunnel of the Sheridan mine is  $1\frac{1}{4}$  miles distant from and 2,700 ft. above the Rio Grande Southern Railroad. The ore from the mine, after being sorted in the orehouse, is brought down to the concentrating mill below on a double track inclined cable road. The mill contains crushers, stamps, Frue vanners, lighting dynamo, etc., and this machinery is driven in summer by four Pelton water wheels and in winter, when the water supply falls short, by two steam engines of 120 H. P. and 35 H. P. respectively.

The dynamo is of 30 kilowatt capacity and is driven in summer by a 28-in. Pelton wheel and in winter by the 35 H. P. steam engine. The current lights the inclines, which are snow-shedded throughout the greater part of their length, the ore house, the miners boarding house at the mouth of the mine, the tunnel and the main shaft, and it also furnishes the power for the crushers in the ore house and for the mine hoists. The dynamo circuit follows the inclines up the mountain for a distance of 8,000 ft. to the ore and boarding houses, and then passes consecutively along the tunnel a distance of 3,300 ft. up the Sheridan shaft, a distance of 1,000 ft. to the upper levels of the mine. There are about 300 lights in the circuit, and also a 10 H. P. motor in the orehouse and a 5 H. P. hoist in one of the shafts.



ELECTRIC POWER HOUSE FOR THE BELMONT MINE.

The dynamo has been in constant use day and night since starting and it works excellently under varying conditions of load. Indeed the throwing out of the circuit of the two motors has hardly any perceptible effect on the lights.

The Belmont mine is situated near the Sheridan mine, but is higher up in the mountains. The plant installed here is of larger capacity and is used entirely in the operation of the concentrating mill. The mill is situated near the top of the range of mountains in what is known as the Savage Fork of the Marshall Basin, and the power is generated at a distance of 11,000 ft. away, 3,000 ft. below. The generating plant consists of two 30-kilowatt C. & C. dynamos, which are driven by a 36-in. Pelton water-wheel under a head of 670 ft. The machinery in the mill above consists of two electromotors, two Dodge crushers, one set of large duplex Cornish crushing rolls, three 5-ft. Huntington mills, three Frue vanners and six bumping tables. The loss of power along the power line is only about 8%. In constructing this line great care was used to keep it away from the locality of snow slides, and in one place where the line crosses a very heavy snow slide the line is suspended from a  $\frac{1}{2}$ -in. cable, which is securely anchored at each end.

The water supply for the power station is taken from the same stream that supplies the Sheridan concentrating mill and the tailwater from the Peltons is carried over the gulch and so passed on to the Sheridan Mill.

The electric plants and connections of these two mines were manufactured and installed by the C. & C. Electric Motor Company and the mining machinery was supplied by Fraser & Chalmers.

Another and more remarkable instance of the application of the electric current for conveying power to a distance is found at the Gold King Mill near Telluride. Here an alternating current is employed for carrying 100 H. P. over the mountains for a distance of three miles. The power station

contains a Pelton wheel driven by water entering through a 2 ft. steel pipe at a head of 320 ft., and a Westinghouse alternating which generates a current at a pressure corresponding to one of 2,000 volts at the motor in the mill.

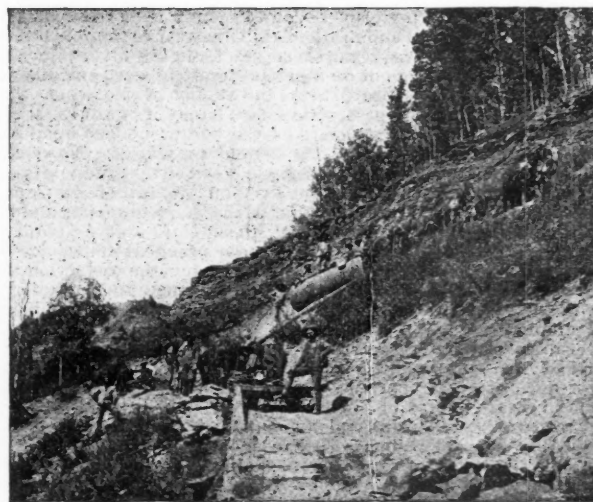
The pole line runs from the power station up the mountain to a height of 2,500 feet, and then it crosses a rough but comparatively level country to the mill. This region is peculiarly subject to thunderstorms, and special lightning arresters had to be devised. The motor in the mill is of the same type and size as the generator, but it differs in the method of exciting the fields. A small Tesla motor is used for starting the larger motor. The operation of starting requires only one man, and is accomplished in about two minutes. When the motor is running the only things to be looked after are the brushes and the bearings. The high tension brushes will run for a week without adjustment.

The plant has been in regular work since June of last year, and from the middle of July until the 1st of May, 1892, an accurate record of the breakdowns was kept. During these nine and a half months the machinery was generally working six and a half days a week, and the total stoppage from accident amounted to 48 hours. The stops resulted from a variety of causes, such as the replacing of an armature coil damaged by lightning, the renewing of fuses, the fixing loose contacts and the examination of the line after a storm. On one occasion the machinery ran continuously for 27 days without a stop of any kind whatever.

The alternating current plant is very efficient and, considering the great natural difficulties encountered, it reflects great credit on the designers and installers. It is very seldom that such a system is used in America for any sort of purpose, but it has never before been employed in mining operations.

The transmission of electrical energy derived from water power, as thus described, is highly interesting and instructive; but while new water powers are being employed from time to time, no one seems to have looked for any other non-waste source of power. It was suggested some two years ago in the columns of the *ENGINEERING AND MINING JOURNAL* that the waste heat of the burning volatile gases of coke ovens be used for generating steam, and that the power thus obtained be transmitted to neighboring cities. This seems logical and may in time be adopted.

A portable plant could be erected at the forests, and 70% of the power obtained could be delivered at the mill or mine by the use of high voltage alternating currents. The equation of economy would be the cost of the wood increased by 30% loss in transmission, plus the interest on the extra plant and the maintenance of the installation against the cost of the wood and the freight, and it is safer that the balance would be in favor of the electro-transmission, the amount of labor at either plant being nearly



DIFFICULTIES OF TRANSPORTATION—HAULING BOILERS UP THE MOUNTAIN.

equal. A margin of \$7 a cord seems sufficient to pay interest on the plant, to stand a loss of 30% in transmission, and to make necessary repairs.

There are many metallurgical operations where the waste heat is excessive, particularly in the West, where the plants for the reduction of the precious metals have not been designed with that admirable view to economy of heat characteristic of our modern iron and steel plants. Certain economies could doubtlessly be effected, but they would be less important than another source of cheap power, which is paramount in the West. The question is, would it not be cheaper to place the power station where fuel can be obtained more cheaply, that is, at the mines or forest, and transmit electrically the power obtained, than to transport the fuel over the rough and devious trails to the mill or works frequently at a much higher elevation than the source of the combustibles. Fuel, usually wood in the West, for there are but few mines in proximity to coal beds, is a source of great expense. Coal in many places cannot be obtained at all, and wood ranges from \$5 to \$20 a cord, with perhaps an average cost of \$8. This cost is due to the long haul from the forests. Many of the mines being at a great distance from them. The cutting alone and delivery within the radius of a mile should not cost over \$2 a cord. This cord of wood if transported say 30 miles by burros would cost \$9 at the mine, and about \$7 if carried in wagons over the average Western road.

When we consider that to generate 100 H. P. for 24 hours it requires approximately eight cords of wood, leaving a margin of \$56 a day, or about \$20,000 a year, in favor of placing the generator at the forest. There are a thousand localities in the West where this could be done, and will be done in time. The illustration, for which we are indebted to the courtesy of the *Electrical Engineer*, gives some idea of the difficulties to contend with in the transportation of machinery and supplies, including fuel, in many of the Western States.

## EARLY ATTEMPTS AT WORKING THE SILVER ORE OF THE COMSTOCK.

Written for the Engineering and Mining Journal by Dan de Quille.

When the many assays made in California (at Grass Valley, Sacramento and San Francisco) had dissipated all doubts that the strange looking black material found in the mine of the Ophir Company was an ore of silver, and very rich, the problem that next presented itself was, "What can we do with it?" It must be borne in mind that at that time Americans knew next to nothing about silver mines or the working of silver ores. A few might have learned something of the processes in use in Germany, Mexico and South American countries for the extraction of the metal from its ores from books, but none among them had any practical knowledge of the business.

Though the owners of the Ophir mine continued to work their ore in rockers—for the gold it contained—for some time after it was known to them that the "black stuff" was silver ore, they no longer threw it away as at first. After being run through the rocker and the free gold extracted from the loose decomposed material, the whole—both the finely pulverized and the coarse, lumpy ore—was piled up and saved to be sacked for shipment to San Francisco, for ore buyers were early in the field. One of the first of these was Donald Davidson, who gave his name to the mountain peak which towers above Virginia City, on the west, to the height of nearly 2,000 ft. above the town site and the mining works.

However, as the cost of transporting ore to San Francisco in 1859 (by pack trains and teams to Sacramento), was very great, no ore was shipped that assayed less than \$1,000 a ton. Ore of lower grade was piled up on the dumps to be worked near the mines as soon as mills for crushing it could be erected.

In 1859, and during the first half of 1860, Mexican miners were in great demand—were "at the top of the heap." With the first news of a "great silver find" hundreds of these men who had worked in and about the silver mines of Mexico rushed over from California to "Washoe." As our people had a white elephant on their hands in their big silver discovery, and were all at sea with their prize, the incoming Mexicans—supposed silver experts—were "cocks of the walk." They were courted and consulted by all. Every American was anxious to get a Mexican for a partner. It was supposed that there were great mysteries connected with the mining of silver and the reduction of the ore, the secrets of which were only to be obtained through the initiated, who had inherited the methods and traditions handed down for hundreds of years by men of the mining guild in Mexico. Indeed the Mexicans spoke in a mysterious way about the many things to be done and the times and seasons to be observed in order to win silver from its ore. Many of them appeared to be so awed by the subject that they would only speak in hints and vaguely of the mysterious operations to be performed—doubtless for a good reason.

Men who had been slighted and insulted as "Greasers" in the gold mines of California, found themselves regarded as oracles in the silver mines of Washoe. Every man striking out on a prospecting trip was anxious to take a Mexican with him as a "pard." As the supply of Mexicans was not equal to the demand many prospectors were happy if one of the sages of the land of the Aztec condescended to look at and pronounce upon the samples of ore they brought in from the surrounding wilds. No doubt scores of Mexicans who had very little knowledge of silver mining passed themselves off for experts and for months lived on the fat of the land. Show one of these fellows almost anything in the shape of quartz and he would make you happy by crying out: "*Mucha plata—mucha plata!*" Those among the Mexicans who really had some practical knowledge of the patio and other processes used in their country for the reduction of silver ores were very soon secured by the mine owners and capitalists, leaving to the prospectors a lot of cunning adventurers who were mere quacks in mining.

The silver discovery also attracted from California a number of Germans who had been educated at Freiberg, and these men brought with them knowledge of the barrel process of amalgamation, and much useful information in regard to ores of silver. However, as the barrel process called for ore-crushing apparatus and a vast deal of machinery, it could not be adapted at once. This being the case the owners of mines turned to the Mexicans, by means of whose simple and primitive methods ore might be worked on almost any scale, even the smallest—one man power. Soon many arastras were at work grinding the ore. The gold being secured in the arastra, the pulverized silver ore was turned over to the Mexicans to work by the patio process.

Also there was some little something done on the lode. In November, 1859, Gabriel Maldonado, a Mexican who had been working a gold mine (quartz) in Sierra county, California, bought of Penrod & Comstock, for \$6,000, the 100 feet of the lode segregated to them when the Ophir Mines was first located. This property was at first called the Spanish and afterward the Mexican mine. Immediately after obtaining possession of the property Mr. Maldonado put up two small furnaces, one for smelting and the other for cupeling, and began making working tests of the ore by smelting and refining it after the Mexican method. Though the smelting furnace would hold only about 50 pounds of ore at a charge he managed to extract a considerable amount of bullion, gold and silver mixed, and so rich was the material operated upon that it was almost pure metal. Owing to the gold it contained the cakes of bullion produced were worth \$2.25 an ounce. An ordinary blacksmith's bellows was used to furnish the blast for the furnace. This slow process was soon abandoned, the richest ore being sold for shipment to England, and that worth less than \$1,000 a ton worked by arastra and patio.

In working with arastras and patio they are very expert. With these, as with their furnaces, they are able to work on a very small or quite a large scale. A single Mexican with one arastra and his little yard square patio, stirring his pulp by hand, is able to do as good work as his rich neighbors with his many arastras and huge patio. When several arastras are used for grinding the ore the patio is 20 or 30 ft., indeed, often 40 ft. in diameter, and horses and mules are used for stirring the pulp, being driven around as on an old-fashioned threshing floor. A patio 40 ft. in diameter, covered to a depth of 4 in. with pulp, contains a charge of about 20 tons of ore. It is a slow process, and in Mexico the contents of a big patio are often stirred and manipulated for from 20 to 30 days before being washed up. Though the floors are paved with stone and tamped with clay, immense quantities of quicksilver and also amalgam are lost.

As salt, bluestone (sulphate of copper), and quicksilver are mixed with the pulverized ore under treatment, the poor beasts condemned to tread the patio soon fall victims to these poisonous ingredients. The bluestone cuts the hair and skin off their legs, sores are formed that absorb the mercury, and soon the animals are salivated and reduced to walking skeletons. The horses and mules put to this use—poor and cheap to begin with—soon go to the boneyard.

At the big Gould & Curry mill in Six Mile Canyon, in the early days, the experiment of working tailings and slimes in a large patio was made, and miners living in the neighborhood asserted as a fact that on dissecting some of the dead patio animals they found considerable quantities of amalgam in the stomachs of some of them. On questioning the superintendent in regard to the story, he thought it was not improbable. He said he had never examined any of the dead animals, but had observed that they were constantly in the habit of biting at their legs when they began to become sore, and in this way they might get hold of and swallow small quantities of amalgam.

In the patio process the pulverized ore, in the condition of soft mud, is spread out upon the paved floor, called by the Mexicans a *patio* (or *circa*, when circular in form). Quicksilver is then sprinkled over it by straining or squeezing it through a canvas bag, thus distributing it evenly in a finely divided state over the whole charge. Salt and bluestone, in solution, are then sprinkled over the whole batch of pulp or pulverized ore, and then the work of stirring by men or treading by animals begins and continues for six or eight hours a day. After this thorough mixing the pulp is raked up in a heap in the center of the patio and allowed to stand till the next day to sweat and digest. Then it is again spread out and stirred or trodden to give it the benefit of the air, when it is again heaped up for another sweat; and so the work goes on for a month or so, time not being much considered by Mexicans. The dose of salt, bluestone and quicksilver is proportionate to the quantity and quality of the silver operated upon—the richer the ore the greater the amount of quicksilver required. Tests by washing in a horn are made from time to time, and when it is thought that the operation of amalgamation is completed the contents of the patio are drawn into tanks and washed up. By the time this is done and the amalgam rudely retorted about 1 lb. of quicksilver has been lost for each 8 oz. of silver saved.

In this crude process, however, exists all that is essential to the successful working of free milling (non-smelting) silver ore by the rapid pan methods now universally in use for the reduction of Comstock ores. The iron pans in use may be regarded as so many small patios; machinery takes the place of animals in stirring the pulp, and steady artificial heat replaces the heat of the sun, and that induced by sweating and fermentation in the heaped up masses of ore and chemicals. By introducing steam beneath the pans (by means of false or double bottoms), such a degree of heat is secured and steadily maintained that an operation which extended over thirty or forty days (according to the weather), in the open air patios of the Mexicans, is completed in five or six hours. In the chemicals used the mill men of the Comstock have now all got back to the old, simple dose used for generations in the Mexican patio. Indeed, the pan process now in use here is nothing more nor less than the old Mexican patio method taken in doors and forced.

The patio process of the Mexicans, and also the barrel process of the Germans, being too slow for our people, they were not long in making improvements in these old methods of amalgamation. This improvement—the American method of pan amalgamation—was seen in the very first silver mill that went into operation, the Pioneer mill, at Silver City, just below the Devil's Gate. The utilization of iron pans in the amalgamation of silver ores was the result of a timely and happy thought by Almarin B. Paul, the man who erected this first silver mill. Mr. Paul being perfectly familiar with all the processes in use in the mills for the working of gold-bearing quartz at Grass Valley, and other places in California, while casting about in his mind for some more speedy method of working silver ores, pending the erection of his mill, luckily thought of the iron pans used at the gold-quartz mills for grinding and amalgamating concentrates. The best of these was what was known as the "Knox Improved Pan." Taking this pan, which contained in the bottom a steam heating chamber, charging it with finely pulverized silver ore and adding the proper proportions of salt, bluestone and quicksilver—the same as used in the patio process—he was delighted to find that with strong artificial heat and thorough and rapid stirring of the pulp, the work of amalgamation was perfectly performed in a few hours. Thus it happened that pans of the pattern mentioned were placed in Mr. Paul's new mill, and so the first silver mill put in operation in the "Washoe" region started up with the new American pan method of amalgamation in use. It was a method that came to stay and it is here to this day.

As the Mexican patios had below them tanks into which their contents were drawn off to be settled and washed when a "clean up" was to be made, so large wooden tubs called "settlers," stirred by machinery, were placed below the pans (little iron patios) for the same use, and they still hold the place at first assigned them.

The success of the Knox pan resulted in the bringing out scores of others, as the Hepburn, Wheeler, Varney, Wak-lee and many more. For a time all the inventors turned their attention to amalgamation pans and tubs—they were "pan mad." All the pans now in use are provided with wooden covers which prevent the escape of heat and steam, also contain shoes and dies between which the pulverized ore is ground till it is almost impalpable.

Although Paul's "Pioneer" mill was the first steam mill started up in the Washoe region, and the first to work silver ore, it was not the first mill for quartz crushing. The first mill was one that went into operation in October, 1859. It was driven by horse power, had four stamps, and worked gold bearing quartz from the surface of the lode at Gold Hill. It was merely an experimental concern, erected by Messrs. Logan & Holmes, on the banks of the Carson River, near Dayton, and gave place to a water mill of 38 stamps and three arastras in the summer of 1860. Paul's "Pioneer" mill contained 24 stamps (in Howland rotary batteries), and the same number of pans, with Paul's concentrators. It was a race between the "Pioneer" and the Coover & Harris mill, at Gold Hill. The owners of the latter claim to have blown their steam whistle a day before the "Pioneer" started up; they, however, at first worked gold-bearing quartz. Following these, mills of all kinds—driven both by steam and by water power—went up thick and fast—started up like mushrooms after a warm rain.



THE PRIESTMAN OIL ENGINE FROM AN AMERICAN STANDPOINT.

In the issue of London *Engineering* of yesterday's date (July 22d) there is an article on "The Priestman Oil Engine from an American Standpoint," written by our distinguished countryman, Dr. Coleman Sellers, of Philadelphia. A year ago the firm of Priestman Brothers, of Hull, England, determined to introduce into this country their new engine, in which the explosions of the vapor of petroleum are utilized as a source of power. In order to make it a commercial success on this side of the Atlantic, they wisely decided to adopt the latest American engine practice in its construction.

They have started a branch works at Philadelphia under the supervision of Mr. Henry G. Morris, and who, together with Professor Sweet, redesigned the engine on American principles. It is built on the straight line principle and differs in important points from the English prototype. Dr. Coleman Sellers has acted as consulting engineer to the firm in Philadelphia, and the article in *Engineering* is the result of his preliminary investigation. He states that in a short time, when a standard type of engine has been arrived at, he will give a complete illustrated account of it. In the meantime his account of the scope and uses of this class of motor will be of great interest, especially as it will form an efficient substitute for steam engines which derive their power from anthracite coal.

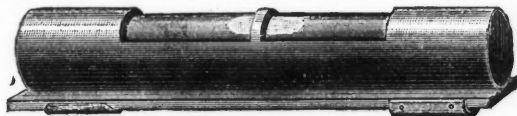
There is a great demand in this country for a quick running motor that can be adapted for lighting and pumping, for farm work and for driving light machinery in places where steam and coal are not available. For independent small installations such engines will be invaluable. Then, again, the uses of the petroleum engine will be very great in mines for such purposes as compressing air for the drills or even driving the drills direct. It is expected that there will be a demand for it from the railroad companies who want an engine of small capacity to drive a lighting dynamo independent of the locomotive. The great economy of fuel in a petroleum engine is remarkable and the amount of skilled labor required in its supervision is very much less than with a steam engine. The Board of Underwriters state that the fire risks from the use of petroleum are no greater than when petroleum is used for any of the ordinary purposes. Altogether the engine seems to have, in Dr. Seller's opinion, a very great future before it.

THE McCULLOUGH PATENT TAPE LEVEL.

This little device, a California production, is meeting with deserved favor wherever used. The above cut is full size; the weight of the level is only one ounce. It is used by clamping to the tape, about one foot from the handle, by means of the two springs shown, and can be attached and detached instantly.

It is attached to the tape about 8 or 10 ins. from the end. In measuring 15 ft. or less the bubble should be in the middle, with a proper tension. For greater distances an allowance must be made for sag. The tape is tried on a level surface and the position of the bubble is marked on the tube for distances of 25, 50 or 100 ft. In measuring, when the bubble comes opposite these marks, the ends of the tape are at the same height.

The level is used on the forward end of the tape when "breaking chain"



McCULLOUGH TAPE LEVEL.

in going up hill, and is reversed when going down. This instrument, which is meeting with much favorable comment from civil engineers, is the invention of the manufacturer, Ernest McCullough, of 507 Montgomery street, San Francisco; price is \$1.50.

**Removing Nickel from Iron.**—Nickel or copper-nickel plating on iron can be removed by heating the iron in crucibles to a red heat, adding sulphur, and again bringing to a red heat, the crucible being closed. The sulphides of nickel or copper so produced are brittle and can be separated from the iron by hammering.

**French Patent Law.**—According to a recent decision of the French courts an invention, for which a patent has been demanded in Germany, cannot be patented in France if the claims made in the patent have been published in the Official Journal of the Empire, in conformity with Articles 22 and 23 of the Law of May 3, 1877.

**Electro-Thermic Nickel Plating.**—If carbon monoxide be passed over heated nickel reduced by hydrogen a volatile nickel compound is obtained, to which Mond, the discoverer, has given the name nickel tetracarbonyl. This substance dissolves easily in petroleum and the solution can be used in nickel plating. Regaud has with this solution succeeded in nickel plating copper wire, it being done in the following manner: The wire is unrolled and placed in a tray filled with the solution, where it rests upon two metal plates. A current of sufficient intensity is then turned on to heat the wire to 90° to 100°. At this temperature the nickel compound decomposes and the nickel is deposited upon the wire. It seems to adhere well.

**Balanced Cams for a Stamp Battery.**—Hitherto it has been the custom in building a five-stamp battery to place all the cams on one side of the stem, and consequently the stamps revolve in the same direction. The results are, first, that there is a side thrust on one cam shaft-bearing; second, that the stamps fall to one side of the dies and wear them unevenly; and third, that the ore is caused to silt up to one end of the mortar box. To remedy these defects, Mr. Charles Raleigh, says *Engineering*, has invented a balanced cam by means of which each stamp is lifted alternately on its right and left hand side, and thus revolved in these two different directions. There is always a right and left hand cam engaged at the same time, and as their thrusts equalize each other the cam shaft is balanced between its bearings. These cams are being made by Fraser & Chalmers, and by R. Hornsby & Sons.

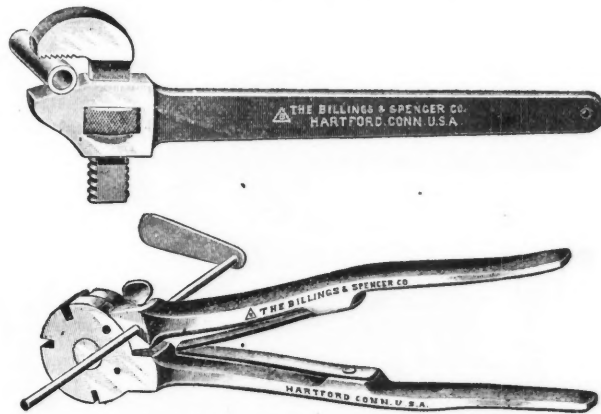
WIRE CUTTER AND PIPE WRENCH.

The tools shown in the accompanying illustrations are the latest products of the Billings & Spencer Company, of Hartford, Conn. The Billings wire cutter is shown in Fig. 1. This device will be appreciated by any one connected with electrical industries or those engaged in the many operations in which wire forms so important a feature. The uses for which this tool is adapted will be readily seen from the cut. The tool is drop forged from the best tool steel, and provided with four cutting edges on the rim and two which are enclosed. It also has an adjustable gauge so that wire can be cut accurately to any length. The workmanship is of a high quality. The total length of the tool is 10 in.

Fig. 2 represents the Billings pipe wrench. The jaws of this wrench are drop forged of the best tool steel, and the handles of the best grade of machinery steel. This wrench has several peculiar features, being simple in design, few parts, and characterized by the best workmanship and finish. A special feature of superiority is found in the fact that no matter how large or small the size of the pipe for which it is adjusted, the angles of the jaws always remain the same. The total length is 14 in., and is made to take pipe from 1/4 in. to 1 1/2 in. in diameter.

The Detection of Chlorides and Bromides in Presence of Iodides.

Dr. D. S. Macnair describes in the *Chemical News* a new method of detecting chlorides or bromides in presence of iodides. When freshly precipitated moist silver iodide is heated with potassium bichromate and concentrated sulphuric acid no iodine is set free. The precipitate readily dissolves, forming silver iodate, which is precipitated, along with some silver bichromate, on diluting moderately and cooling the solution. Silver bromide, when treated in the same way, gives silver sulphate, the whole of the bromine being set free; while silver chloride behaves like the bromide, giving free chlorine and silver sulphate. These reactions furnish an easy method of detecting chlorides or bromides in presence of iodides. It is only necessary to precipitate with excess of silver nitrate, filter off and wash the precipitate, and heat it with powdered potassium bichromate and a little strong sulphuric acid. If any chloride or bromide



BILLING'S PIPE WRENCH AND WIRE CUTTER.

is present, even with a very large excess of iodide, its presence is easily detected by the evolution of chlorine or bromine. The author is at present making further experiments with a view to determining the delicacy of the reaction, and also whether it can be conveniently employed for the quantitative separation of iodine from chlorine and bromine.

**Electric Motors as Substitutes for Steam Locomotives.**—Mr. Arthur T. Woods communicates an important article on this subject to a recent issue of our contemporary, the *Railroad Gazette*. There is a mistaken idea among engineers and the people in general that electricity is going to replace the steam engine without much delay. It is quite a common idea that electric propulsion will soon oust the steam locomotive from its present position, but if exact facts are looked at it soon becomes evident that such an event is in the far distance. In making a comparison between electric distribution of energy from a stationary central engine to the electromotor with the ordinary steam locomotive, the first point to be noted is that though at full load the stationary triple expansion engine uses only half the amount of coal per horse power that the locomotive uses the efficiency of the stationary engine is much less at a small load, and so the general average efficiency is brought down considerably. Secondly, the loss in an electric distribution system is at least 40%. Messrs. Crosby & Bell calculate that with this 60% efficiency, electricity becomes more economical than steam, only when a speed of 140 miles an hour is reached, and that for 80% efficiency the two are equal at a speed of 60 miles an hour. This efficiency, it is stated, has never yet been obtained. The following are Mr. Woods' conclusions: 1. There is no prospect of electricity replacing steam for long distance freight traffic. 2. There is a possibility of electricity becoming an economical substitute for steam locomotives for high speed service wherever the traffic is sufficiently heavy and constant to warrant the construction of lines of track independent of those used for moderate speeds. 3. There are very few localities in the United States in which the conditions are such as to make such a substitution commercially possible, with the efficiencies at present obtained with electrical machinery. 4. If the electrical equipment could be purchased at reasonable prices, there are a few short lines of steam railroads on which the passenger traffic is such as to make electricity a possible form of motive power at present speeds. 5. It is probable that electric locomotives will be used in tunnels and for switching in cities where freedom from smoke is important. 6. No electric locomotive capable of doing the work of a medium weight steam locomotive has as yet been constructed.

## THE CRAWFORD CRUSHING AND AMALGAMATING MILL.

The Crawford mill is a new invention and one which is attracting considerable attention from mining men. As it will be seen from the illustrations, it is a variety of the common Ball mill, but one in which many of the disadvantages of that pulverizer are completely eradicated. It is in addition an exceedingly good amalgamator. This mill undoubtedly possesses several novel features, and as a fine crusher has given good results. To pretend that any mill will crush and treat every kind of material is a mistake that is often made, and in many instances blame has been laid on the machine where it was really due to those employing it. To attempt to crush material finely in one operation is also a great mistake, and wherever attempted has invariably ended in failure. The Crawford mill is pre-eminently a fine crusher, and in order to obtain the best results the material fed into it should be previously reduced by a rockbreaker, which is the most economical form of coarse crusher for reducing material down to say  $\frac{1}{2}$ -in. to  $\frac{1}{4}$ -in. size.

The special features of the Crawford mill are: The feed is central, not to one side, thereby insuring an even wear of the roller-path. No screens whatever are employed, and a constant source of expense and trouble was thus removed. The crushed material, instead of being discharged at the periphery of the machine, where the swirl is great, passes out in a steady flow near the center, so that there is no danger, it is claimed, of any particles of gold being carried over with the tailings. A current of clear water is admitted at the center, passing over the surface of the mercury, and rising up through an annular slot below the crushing-path of the balls. The action of this rising current of water is to carry off all the material as



FIG. 1.—CRAWFORD MILL.

fast as it is sufficiently finely reduced, and is light enough to pass out at the center of the machine. Any gold freed from the quartz, or from sulphurets, owing to its greater specific gravity, can not be lifted by the rising column of water and sinks down, it is claimed, through the slot below the roller-path, and becomes amalgamated with the quicksilver in the annular well.

Further, as the mercury well was out of the swirl of the pulp, and as the water flowing over it keeps any base mineral from coming in contact with it, there is no loss due to "sickening," and it is possible in these mills, say the patentees, to treat refractory ores, which could not be treated in an ordinary stamp battery, with copper plates. The mercury is easily withdrawn from time to time to remove any amalgam, and fresh mercury added to the machine by means of the pipe and funnel. In many ores the gold is so exceedingly finely disseminated that no amount of pulverizing in an ordinary stamp battery can eliminate it from its surrounding matrix. For such ores the Crawford mill is suitable, since by it there is no difficulty in reducing the ore so that it can pass a 120-mesh sieve. Stamps seldom pulverize finer than 40 to 45-mesh. The wearing parts of these machines are rough castings, which can easily be renewed, and at less expense than the dies of ordinary roller mills. These machines are self-contained, easy of transport, and on arrival at the mine can be erected and put to work in a day or two. Clayey ores, which are difficult to treat in a stamp battery owing to the slimes produced, have been very successfully reduced by these mills, little or no gold being carried over with tailings. The following advantages are claimed for the mill:

1. Minimum outlay in capital.
2. Great economy in transport and erection.
3. Low consumption of water.
4. Small power required for driving.
5. Extreme fine grinding.
6. Simplicity of construction.
7. Ease of management.
8. Greater efficiency than any other mechanical process.

The cost of crushing and amalgamating is stated by representatives of

the company to be from 60c. to \$1.00 per ton, according to the hardness of the ore.

The following table shows a comparison of results obtained with this mill with those from stamps:

Name of Mine.	Location.	Value of ore.	% ext'd by stamp mill.	% by mill.
Waverly Mine.....	Nova Scotia.....	\$4.00	75	95
Mac Mining and Milling Co.....	Montana.....	77.00	52	91
Marmora.....	Ontario.....	*	*	90
Ropes.....	Michigan.....	3.30	62½	86
Ravenswood.....	Queensland.....	*	25	90
Mount Morgan.....	".....	*	*	82½
".....	".....	*	*	92½
Montana Co., Limited.....	Montana.....	1.60†	.....	50

\* The percentage extracted by plate amalgamation is inappreciable.

† Tailings from pan amalgamation.

In addition to this table, which shows the efficiency of the mill, other tests have been made with like results. Thus, at Helena, Mont., the mill extracted \$46 per ton from an ore where a stamp mill extracted but \$21. The mill is made at present in two sizes, 8 in. and 12 in., with a capacity of 2½ and from 8 to 10 tons respectively. The cost of the smaller sizes is \$1,000, and of the larger \$2,500.

When working, the machine is under lock and key, and one man can attend to at least 12 machines capable of dealing with a minimum quan-

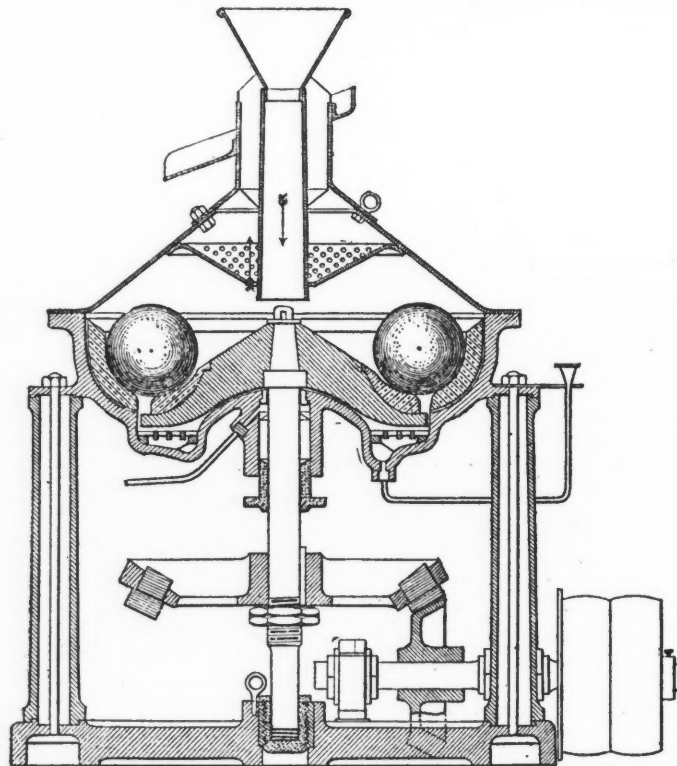


FIG. 2.—CRAWFORD MILL (SECTIONAL VIEW).

tity of 100 tons a day. Mills have already been placed in the following mines: Six mills at Cane Spring, Tooele County, Utah; four mills at the St. Lawrence mine, Ophir, Auburn County, Cal.; at the Lewiston mine, Granite Mountain, White Pine, Colo.; the Fire Centre Mining and Milling Company, near Ishpeming, Mich., and at the Malone mine, Ontario, Can

**The Production of Minerals in New South Wales.**—The official statistics relating to the production of minerals in New South Wales during 1891 have just been published, says the *Iron and Coal Trades Review*. The value of the minerals produced during the past year exceeded that of the previous year by £1,487,260, the figures being for 1891, £6,655,000 and for 1890, £3,485,000. This favorable result was principally due to the great production of silver at the Barrier Range mines—quite one-half of the total mineral production. Nearly the whole of the silver and lead is shipped as base bullion. After silver, coal is the most important mineral, and last year there was a production equal in value to nearly £1,750,000, as compared with £1,250,000 during 1890. There is a steadily increasing use for coal in Australia, but the amount exported, principally to China and California, fluctuates considerably. Gold used to have the premier place on this list in years gone by, but it has now sunk to a bad third, though as compared with 1890 the value of the gold raised shows an improvement equal to £98,000. After gold comes tin, the production of which decreased during the year 1891. The best alluvial deposits have been worked out and the market is not in a sufficiently satisfactory state to induce any great outlay in lode mining. The value of copper produced in 1891 was only about £205,000, though this was a slight advance on that of the previous year. These are all the minerals that have been produced in great quantities. There are, however, several minerals, such as iron ore, bismuth, antimony, manganese, zinc, alumite and cobalt, which have been worked to a limited extent and hold out hopes for future profitable development.

PRODUCTION OF PIG IRON IN THE UNITED STATES IN THE FIRST HALF OF 1892.

The American Iron and Steel Association has received from the manufacturers complete statistics of the production of pig iron in the United States in the first six months of 1892, also complete statistics of the stocks of pig iron which were on hand and were for sale on the 30th of June last.

The total production of pig iron in the United States in the first half of 1892 was 4,799,056 gross tons, against 4,911,763 tons in the second half of 1891, a decrease of 112,707 tons. Adding the production of the two half years, we have the extraordinary production of 9,710,819 gross tons in twelve months, which is 508,116 tons in excess of the production of 9,202,703 tons in 1890. Our production of pig iron in the twelve months of 1891 fell below that of 1890 because of the serious interruption to furnace activity in the first part of 1891, when we made only 3,368,107 gross tons, the total production in that year being 8,279,870 gross tons.

The production of pig iron by each of the pig iron producing States in the first half of 1892 is given in the following table, in net tons, in comparison with the production in the first half and second half of 1891.

States.—Net tons.	First half of 1891.	Second half of 1891.	First half of 1892.
Massachusetts.....	4,406	5,663	4,679
Connecticut.....	11,125	13,303	11,039
New York.....	161,795	191,130	183,498
New Jersey.....	66,592	36,997	49,596
Pennsylvania.....	1,859,023	2,567,650	2,482,852
Maryland.....	49,992	88,214	55,979
Virginia.....	111,908	188,819	183,776
North Carolina.....	1,003	2,900	2,075
Georgia.....	20,401	35,440	3,790
Alabama.....	376,389	514,765	536,627
Texas.....	8,465	12,437	7,171
West Virginia.....	20,977	75,660	89,866
Kentucky.....	18,779	31,466	36,567
Tennessee.....	145,066	181,681	176,080
Ohio.....	445,113	714,102	762,393
Indiana.....	5,449	3,208	6,083
Illinois.....	204,816	544,690	535,316
Michigan.....	113,376	125,346	102,133
Wisconsin.....	91,098	129,721	80,815
Minnesota.....	.....	1,373	14,804
Missouri.....	9,102	23,634	34,310
Colorado.....	13,646	6,614	11,702
Oregon.....	3,759	6,652	3,852
Total.....	3,772,280	5,501,175	5,374,943

The changes in the production of pig iron in several States in the first half of 1892, as compared with the second half of 1891, have not been of a specially notable character. Georgia, Texas, Maryland, Michigan, Wisconsin and Oregon show considerable reductions, while West Virginia, Indiana, Minnesota and Colorado show considerable increases. In the great pig-iron producing States of Pennsylvania, Ohio, Illinois, Tennessee and Alabama the changes have not been important. Ohio made more pig iron in the first half of 1892 than in any preceding half year, and so also did Alabama. The nine Southern States of Alabama, Tennessee, Virginia, West Virginia, Kentucky, Georgia, Maryland, Texas and North Carolina produced an aggregate of 1,091,871 net tons in the first half of 1892, against 1,131,062 net tons in the second half of 1891. Of the total production of these States in the first half of 1892 Alabama made 536,627 net tons, or nearly as much as all the other Southern States combined.

Much has been said in trade journals during the past few months of the necessity for blowing out furnaces that production may be decreased. Our statistics show that there were 313 furnaces in blast on the 31st of December last, and 279 on the 31st of March last, a decrease of 34 active furnaces in three months. On the 30th of June last there were 256 furnaces in blast, showing a further decrease of 23 active furnaces in three months, or 57 in all since the close of 1891. On the 30th of June, 1891, there were 294 furnaces in blast. The number of active furnaces in the first half of 1892 has been much smaller than in the second half of 1891, and yet the smaller number produced almost as much pig iron as the larger number.

In our issue next week we intend to give analytical tables of the production and of the unsold stocks.

**Herr von Juptner** gives, in *Oesterreiche Zeitschrift für Berg und Hüttenwesen*, No. 46, a valuable series of experiments on the use of Wiborgh's method of determining carbon in iron and steel by gasification, and a determination of the corrections to be applied to results obtained. Correction tables for temperature and barometer, with a number of examples, are given.

**Burning Nitrogen.**—Mr. Crookes gives in the *Chemical News* a most interesting account of his manner of burning nitrogen. He worked with a current of 30 volts and 15 ampères, alternating 130 times a second, producing a flame of burning nitrogen in a tube four feet long, which Mr. Crookes held in his hand during the experiment.

He explains why when nitrogen is once ignited that the flame does not spread throughout the atmosphere by saying that the temperature at which nitrogen ignites is higher than that produced by its combustion.

**Cronquist** gives in the "*Ingenior's förennigens foerhandlingar*" the following intensities of blows required to explode 0.4 grammes of the explosive: Nitroglycerine, 0.3 to 0.8 mkg.; dynamite, 0.5 to 1.8 mkg.; gun cotton, dry, 0.8 mkg.; gun cotton, 20% water, 2.3 mkg.; sebastin, 0.7 mkg.; romite, ordinary, 0.6 mkg.; romite, marine, 1.9 mkg.; gunpowder, explodes only, 37.5 mkg.; bellite, 62.0 mkg. Romite and bellite are very safe in transportation, the latter requiring triple force exploders, but they are not satisfactory in wet mines, while they appear to be very good for fiery coal mines. According to Mallard 20% dynamite and 80% powdered hartshorn are the most satisfactory in firing mines.

**Krieg's Method of Producing Metallic Tungsten.**—Dr. Martin Krieg of Magdeburg, prepares pure metallic tungsten in the following manner: The finely ground tungsten mineral is made into a porous mass with fine carbon and tar or pitch. This mass is placed in the voltaic arc of the Jablochkoff system and chlorine introduced through the hollow candles. The candles can be made to furnish the chlorine by adding chloride of lime and silica to the material from which they are made. In either case chloride of tungsten is produced together with chloride of other metals. If these chlorides be boiled in concentrated hydrochloric acid, oxide of tungsten is thrown down, the other chlorides are dissolved. The oxide is separated by decantation and washed. This oxide, mixed with carbon, can be easily reduced in the voltaic arc in an atmosphere of neutral gas.

**The Storage of Petroleum.**—When petroleum is stored in bulk either in a tank steamer or in large tanks on shore some means has to be provided to allow the oil to expand when the temperature rises. Hitherto all such appliances have had the great drawback of admitting air to the tank on the subsequent contraction of the oil. This disadvantage has led Mr. Thomas Mudd, the manager of the Central Engine Works, West Hartlepool, England, to devise some safer apparatus which will prevent all access of air. He builds a series of vertical cylindrical domes on the top of the tanks, and fits pistons within them. The piston rods project upward through the top of the domes, and are quite free to move up and down. The pistons rest on the surface of the oil, and rise and fall on its expansion and contraction. They never let any air pass below them when the temperature falls, and thus there is never any space over the oil to be occupied by air or petroleum vapor.

**The Specific Heat of Aluminum.**—Mr. J. W. Richards describes in the *Journal of the Chemical Society* his experiments for the redetermination of the specific heat of aluminum at temperatures between 16° and 22°, by noting the reduction in temperature produced by 100 grammes or 200 grammes of aluminum in a known weight of water at a higher temperature; at temperatures between 22° and 100°, by dropping aluminum, from suspension in steam, into water in a calorimeter; and at temperatures from 120° to 600° by heating a ball of platinum and a ball of aluminum placed together on a platinum support in the same air bath or furnace, and dropping them simultaneously into two exactly similar calorimeters. The true specific heat at 0° was found to be 0.2220, making the sp. heat at 20° 0.2240; at 100° 0.2320; at 625°—melting point—0.2845, giving total caloric capacity to the melting 158.3. This gives 6.13 as the atomic heat, using the mean specific heat between 0° and 100°.

**Polybasite and Tennantite at the Mollie Gibson Mine, Aspen, Colo.**—Messrs. Pennfield & Pearce, of the Sheffield Scientific School, New Haven, give a description and analyses of polybasite and tennantite found at the Mollie Gibson Mine, Aspen, Colo., in the July number of the *American Journal of Science*. Large quantities of polybasite, nearly free from gangue have been worked, assaying from 10,000 to 16,000 oz. of silver per ton; and there is an abundance of pink barite containing polybasite, the whole assaying 1,800-2,700 oz. of silver to the ton of ore. The analyses of the mineral do not give uniform results, but a constant formula is obtained after the deduction of varying quantities of galena. This polybasite free from galena gives an analysis as follows: Sulphur, 18.13%; As, 7.01%; Sb, 0.30%; Ag, 56.90%; Cu, 14.85%; and Zn, 2.81%. Among the blacker formations of polybasite there are found patches of steel gray tennantite. This mineral gave an analysis: Sulphur, 25.04%; As, 17.18%; Sb, 0.13%; Cu, 35.72%; Ag, 13.65%; Fe, 0.42%, and Pb, 0.86%.

**Copperplating Sheet Zinc for Building Purposes.**—*Metallarbeiter* says that this has recently been tried with considerable success, and that the process can be especially recommended where mechanical wear takes place. The zinc combines very well with the copper. The electrolytic method of copperplating is advantageously used, but the zinc may also be coated with copper by ordinary means. In the first place, the sheet zinc is cleaned with soda from any adhering dirt and grease, and is also purified by a weak acid bath from the covering of zinc oxide. There are then dissolved in 24 parts of water, one part of refined verdigris, and 12 parts of cream of tartar; the mixture is heated to boiling point, after which three to four parts of Spanish white are added. The Spanish white is here decomposed, and is precipitated as lime tartrate. The dark blue liquid is poured off and filtered, and can be used either as a bath for the sheet zinc or for the production of a copperplating paste. The first mode of application is better, as the fluid forces its way into the corners and angles of the zinc articles, and is uniformly distributed all over. If it be desired to coat an immovable zinc object with copper, the article, after being cleaned, is painted with the copper solution and a chalk compound, and after drying it is brushed. This very simple operation would also prove of value for architectural purposes, namely, where it is desired to remedy the generally unpleasing effect of zinc ornamentations.

**Diamond Mining in South Africa.**—The De Beers and the Kimberley mines are probably the two biggest holes which greedy man has ever dug into the earth, the area of the former at the surface being 13 acres, with a depth of 450 ft., the area and depth of the latter being even greater, says Lord Randolph Churchill in the August number of the *Popular Science Monthly*. These mines are no longer worked from the surface, but from shafts sunk at some distance from the original workings and penetrating to the blue ground by drifts at depths varying from 500 to 1,200 ft. The blue ground, when extracted, is carried in small iron trucks to the "floors." These are made by removing the bush and grass from a fairly level piece of ground; the land is then rolled and made as hard and as smooth as possible. These "floors" are about 600 acres in extent. They are covered to the depth of about a foot with the blue ground, which for a time remains on them without much manipulation. The heat of the sun and moisture soon have a wonderful effect upon it. Large pieces which were as hard as ordinary sandstone when taken from the mine, soon commence to crumble. At this stage of the work the winning of the diamonds assumes more the nature of farming than of mining; the ground is continually harrowed to assist pulverization by exposing the larger pieces to the action of the sun and rain. The blue ground from Kimberley mine becomes quite well pulverized in three months, while that from De Beers requires double that time.

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

- The following is a list of the patents relating to mining, metallurgy and kindred subjects issued by the United States Patent Office:  
 TUESDAY, JULY 19TH, 1892.
- 478,983, 478,981. Apparatus for Recovering Alkali. Henry Blackman, New York N. Y.
  - 479,046. Electric Signal for Mine Shafts. Frederick W. Bacon, Marysville, Mont.
  - 479,066. Machine for Cutting Right-Angle Structural Shafts. Robert W. Grace, Pittsburg. Assignor to John A. Potter, Munhall, Pa.
  - 479,115. Annealing Furnace. Alfred A. Cowles, New York, N. Y., and Joseph F. Gilpin, Ansonia, Conn. Assignors to the Ansonia Brass and Copper Company, Ansonia, Conn.
  - 479,120. Process of Preventing Segregation in Large Ingots. William R. Hinsdale, Newark, N. J.
  - 479,140. Amalgamator and Ore Concentrator. Lavoisier C. Moreland, Ogilby, Cal.
  - 479,260. Air Compressor. Thomas F. Farrell, Paterson, N. J.
  - 479,279. Ore Concentrator. Gottlieb D. Husemann, St. Louis, Mo.
  - 479,290. Process of Treating Nickel Matte. Pierre Manhes, Lyons, France.

## PERSONALS.

Mr. D. J. Danell has been appointed mechanical engineer of the Illinois Steel Company at South Chicago.

Mr. Robert D. Rhodes has permanently accepted the position of superintendent of the Arkansas Valley Smelting Company, of Leadville, Colo.

Dr. Theodore Haeg, having resigned from his position of technical manager of the Cape Copper Company, Limited, of Cape Colony, S. A., Mr. T. D. Nicholls has been appointed in his stead.

Alphonse Pteley, Chief Engineer of the New York Aqueduct Commission, and J. J. R. Croes, consulting engineer, of New York, have agreed to deliver lectures at the Rensselaer Polytechnic Institute in the fall.

Mr. W. A. Akers, late superintendent of the Combination & Black Pine Mining Company, of Montana, will succeed Mr. J. H. Ernest Waters as manager of the Sheridan-Mendota. He will assume his duties about August 1st.

Mr. Robert Peele, Jr., mining engineer, has returned from a two-years' absence in Peru, Bolivia and Colombia, where he has been occupied in making examinations and reports for an English syndicate upon gold, silver and tin properties.

Mr. Edward Chester, mining engineer, of London, has taken Mr. Arthur Payne Galloway, mining engineer, formerly manager of the Ruby & Dunderberg Consolidated Mining Company, of Nevada, into partnership, and the firm will be known as Edward Chester & Co.

At the annual meeting on the 11th inst. of the Associated Brokers of the San Francisco Stock and Exchange Board, San Francisco, Cal., the old Board of Directors was re-elected, consisting of Homer S. King, J. M. Shotwell, H. L. Van Wycke, George Hickox and George Marye. Officers will be appointed at a subsequent meeting. A resolution authorizing the directors to sell the building and lot of the San Francisco Stock and Exchange Board was introduced, but all discussion upon the subject was postponed for six weeks.

## OBITUARY.

W. H. H. Bowers, a dealer in mining machinery in Denver, Colo., died recently in Deadwood, S. Dak. He was well known in mining circles in the West.

John Flynn, one of the oldest coal operators in the Wilkesbarre section, died on the 18th inst. in Ireland, aged 56 years. He was general manager of the Old Forge Coal Company's mines, and he was also a member of the large coal firm of Mears & Flynn.

William Pollock, a pioneer iron manufacturer, of Youngstown, O., died July 18th at his home, aged 80 years. In early life he was an engineer on the Ohio and Mississippi rivers, and in 1847 went to Youngstown and engaged in the manufacture of pig iron, being one of the original members of the Brier Hill Iron Company. His youngest son, William G. Pollock, is engaged in the ore business in Cleveland.

Francis Aquila Stont died on the 18th inst. at Alexandria Bay, aged 60 years. He was born in New York City. About 20 years ago he was instrumental in having a trigonometrical survey of New York State made. He was also one of the principal promoters of the Nicaragua Canal Construction Company, of which he was the first president. From this office he resigned about two years ago, retaining, however, large holdings in the company. Mr. Stont took an active interest in the work of various scientific societies.

## SOCIETIES.

The regular meeting of the Civil Engineers' Club of Cleveland was held in the club rooms July 12th. The committee appointed to take action on the death of John Whitelaw, ex-president of the club, and for many years superintendent of the Cleveland Water-Works, made their report. Wendell Phillips Brown was elected an active member. The paper of the evening was read by Dr. C. S. Howe, of Case School of Applied Science, on the subject "A Mathematical Discussion of Some Census Reports, with Special Application to the Population of Cleveland, Past and Future." The formula  $P = A + Bt + Ct^2 + Dt^3$  (where  $t$  represents the time after a certain fixed date,  $A$ ,  $B$ ,  $C$  and  $D$  are constants to be determined, and  $P$  represents the population at the time  $t$ ) was assumed and the constants determined from the census reports of the population of Cleveland from 1820-1880. Using the formula the population was predicted for 1890 and agreed with the census report within 539. A new formula was then constructed, including the data for 1890 and the population predicted for the future. The final formula was  $P = 18012.5 + 18790.9t + 6998.2t^2 + 877.3t^3$ . Using this formula the predicted population for 1900 was 396,587; 1910, 572,196; 1920, 1,065,417; 2000, 4,835,461. The formula showed that Cleveland has never experienced a boom, but has had a strong, steady growth.

The regular June meeting of the Engineering Association of the South was held at the association headquarters in Nashville, Tenn., on Thursday evening, June 9th, 1892, with Vice-President James Geddes presiding. After consideration, it was decided to hold the regular meetings of the association on the regular dates, viz., the second Thursday evening of each month, and not to suspend during the summer, as heretofore. The paper of the evening, entitled, "Notes on Mine Surveying," was read by Mr. Benjamin W. Robinson, Mining Engineer of the St. Bernard Coal Company, of Earlinton, Ky. The paper called attention to the rapid advances in mining during the past few years and in the general adoption of more scientific methods; and that the work of mine surveying proper had not received the attention its importance warranted, either in standards of precision or in reliability of results. Tunnel surveying has reached a high state of perfection simply because of the high standards demanded. The author considered as essential to good work the following outfit: The complete mining transit arranged for vertical sighting and provided with extension tripod, vertical circle with bubble on telescope and stadia wires for outside topography, also a sensitive needle for checking vernier angles. Steel tapes should be used for linear measurement and plummet lamps for sighting. The old compass and the link-chain should be discarded for mining work. The author outlined a desirable system for an underground survey with manner of connecting it with the surface system; important points in the underground system should be duplicated on the surface and monumented.

## INDUSTRIAL NOTES.

The iron miners at Belvidere, N. J., are on strike because of a proposed reduction in their wages of 50 cts. per ton, to go into effect August 1st.

The proprietors of the Helmbacher & Tudor Iron Mills, at St. Louis, Mo., have refused to sign the wage scale submitted by the men and a lock-out has resulted.

The Farrel Foundry and Machine Company, of Ansonia, Conn., are making 10 Blake crushers of improved pattern for the Calmet & Hecla Mining Company.

Work was resumed on the 19th inst. at the Joliet (Ill.) mill of the Illinois Steel Company, an agreement having been reached with the Amalgamated Association.

The Reno Reduction Works has secured from the Central Pacific Railroad the concession of a rate of 1c. per ton per mile on ores in earload lots from points along the road to that place.

Robert A. Keasbey, of 58 Warren street, manufacturer of magnesia sectional covering and magnesia blocks, has issued a new and interesting trade catalogue containing certain reductions in his price list.

The roller mills of the West Superior Iron and Steel Company, at Superior, were shut down on the 16th inst., and "the men supposed to be connected with the Amalgamated Association were discharged."

The puddling department at the mills of the Crum Creek Iron and Steel Company, in Ridley Township, Pa., resumed operations on the 20th inst. with non-union men, paying the new Amalgamated scale. A number of the old hands returned to work.

The failure of the Bradford Iron Works on account of the disappearance of Manager Edward C. Webb appears to have been complete, and outside of the help and L. C. Smith, the mortgagee, the creditors will get little or nothing, according to the Boston "Herald."

The puddlers of the Oxford Iron and Yale Company, whose mills are at Oxford, N. J., went out on strike on the 18th inst., and the mills must all come to a standstill. The strike was caused by a recent order issued by the company reducing the wages of the puddlers 50 cts. on each ton of iron.

Actual work has been commenced on the Hennepin Canal that is to connect the great lakes with the Mississippi at Davenport, Ia., under the contract of Commodore A. J. Whitney. A large force of men will be worked, and the excavation for three or four miles will be done before winter, possibly connecting the Mississippi and Rock Rivers.

In about 18 months the Edison filament patent will run out and English manufacturers will be able to commence work again, says London "Industries." It may be impossible for English makers to pick up lost ground, and to compete with foreign makers who have had some eight years' more experience. The great thing in incandescent lamps is to avoid the necessity of experimenting during manufacture.

The Homestead steel workers' strike has indirectly caused the indefinite suspension of the Braddock Wire Works plant at Rankin Station, Pa., and about 600 men are out of work. The company will take the present opportunity to make important improvements at the plant and eight new barbed wire machines will be put in, which means 30 additional men when the plant starts. It is not known when the mills will start.

The "Whaleback Steamship Company, Limited," with a nominal capital of £250,000, has just been registered in England. The proposition to proceed with the construction of a fleet of whaleback cargo ships is thus beginning to assume a practical form. Messrs. E. & W. Johnson, the ship owners of Liverpool, will be the general managers, and among the first subscribers to the company are Messrs. Colgate Hoyt, C. L. Colby and C. W. Wetmore, of 36 Wall street, this city.

The Haskell multi-charge gun was again tested at Reading, Pa., on July 18th, for penetration into iron plates. The projectile penetrated through six plates of the best flange iron, making 6 ins. This is three plates more than this gun has ever penetrated before. The projectile, which was manufactured in Reading, was found to be as perfect as when it came from the lathe. It is now proposed to make some alterations in this gun by which it will be enabled to use more powder and penetrate eight inches of iron.

The Berlin Iron Bridge Company, of East Berlin, Conn., have received the contract for the new tin plate works which Hughes & Patterson are to erect at Philadelphia, Pa. The buildings will be of iron from the designs of the Berlin Company. The main building will be 40 ft. wide by 253 ft. long, with a wing of the same width 300 ft. long, both two stories high. The rolling mill will be 120 ft. wide by 160 ft. long, with an annealing room 75 ft. wide by 160 ft. long. The whole plant will require about 800 tons of iron to be used in its construction.

Special Agent I. Ayer has made a report to the Treasury Department stating that the production of tin and terné plates for the quarter ended June 30th, 1892, as shown by the sworn statements of manufacturers is over 8,000,000 lbs., as against 3,004,087 lbs. during the previous quarter, and about 5,240,000 lbs. for the previous nine months, the total production for the whole year being 13,240,830 lbs. Of the 8,000,000 lbs. produced during the last quarter over 5,000,000 lbs. were made from American black plates.

Among the orders recently received from foreign countries by the B. F. Sturtevant Manufacturing Company, of Boston, Mass., were one for six standard kiln rooms from the Russian Government and a three-room drying apparatus which went to Chili, South America. Seven large fans, so constructed as to hang from a rope in the mine shaft, were recently shipped to a silver mine in Bolivia. Four of these are driven by the Sturtevant double inclosed steam engines, two of them by the Sturtevant compound steam engines and one by a Sturtevant electric motor, all direct attached.

The Hercules Iron Works, of Chicago, Ill., have added to their already extensive line of ice machinery and other specialties the manufacture of a new line of forging and bending machines for forging and forming iron and steel to any desired shape. One special feature of their machine is the rapid manufacture of turn buckles of all sizes. They have also begun the manufacture and already placed on the market a new design of a light spring hammer, which takes the place of more expensive tools where a hammer with a blow ranging from 15 to 30 lbs. is needed. The hammer is so arranged that one or more can be operated with a single belt. They are to be attached to posts or the side of the shop.

The preliminary special meeting of the Fort Payne Coal and Iron Company July 19th at Boston was attended by about 200 stockholders. After two hours' session it was voted almost unanimously to recommend to the meeting of the stockholders to be held in Fort Payne, Ala., next week, that a reorganization of the company be effected by scaling the capital stock one-half and by authorizing an issue of \$1,000,000 5% 30-year gold bonds. It is proposed to place \$600,000 of the latter at 85 and to take up the \$280,000 outstanding old bonds at par and accrued interest. The present indebtedness of the company, including these old bonds, is about \$350,000, and the issue of \$600,000 new 5's will not only provide for this, but give the company about \$116,000 of new working capital.

The Pennsylvania Railroad Company is now testing two differently built compound engines on its New York division. One is a Baldwin locomotive with high-pressure cylinders 14 ins. and low-pressure 24 ins. in diameter and 24 ins. long, and three pairs of drivers 6 ft. in diameter. Its weight is 66 tons. The total heating surface is 2,134 sq. ft. The other engine was built by the Schenectady Locomotive Works. The high-pressure cylinder is 20 and the low-pressure 30 ins. in diameter and 24 ins. in length. There are three pairs of drivers 6 ft. 2 ins. in diameter. The weight of the engine is 71½ tons. The heating surface of the firebox and boiler tubes is 1,953 sq. ft. The company is having a compound locomotive with drivers 6 ft. 6 ins. in diameter built at Baldwin's. This type of engine has a maximum record of 92 miles an hour.

The trustees of Columbia College, New York, have authorized the construction of a small observatory on the new grounds at Bloomingdale. It will contain a zenith telescope that is being made by Wanschaff, of Berlin. It is one of a pair that are exactly alike, the other having been ordered by the Italian Government for the Royal Observatory of Copodimonte, near Naples. With these two instruments

simultaneous observations are to be made to determine accurately the variation of terrestrial latitudes recently discovered in Germany. The two observatories are situated very nearly on the same parallel of latitude. Professor Rees, director of the college observatory, and his assistant, Harold Jacoby, will conduct the New York observations, while M. Fergola will make those at the Italian observatory. The college has purchased from M. Struve, former director of the National Observatory at Pulkowa, Russia, his library of astronomical and physical works.

**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.**

- 2,728. A good second-hand 100-H. P. boiler. West Virginia.
- 2,729. A small second-hand prospecting quartz mill; capacity 4 to 10 tons daily. California.
- 2,730. A second-hand concentrator. California.
- 2,731. A second-hand gasoline engine, 6 to 10 H. P. California.
- 2,732. A saddle tank locomotive, 3-ft. gauge, cylinder about 7 x 12. Maryland.
- 2,733. One mile 25 to 30 lb. T rails, fit to relay. Maryland.
- 2,734. A 25-H. P. horizontal slide valve engine, and a locomotive boiler 30 to 40 H. P. Maryland.
- 2,735. A good second-hand cupola complete, 3 to 5 tons, and a good second-hand Sturtevant blower No. 5. Alabama.
- 2,736. A double surface planing, matching and molding machine. Tennessee.
- 2,737. A resaw, swing, cut-off saw. Tennessee.
- 2,738. Electric light plant for a cotton mill. Alabama.
- 2,739. Roofing, belting, shafting and pulleys. Virginia.
- 2,740. A small second-hand locomotive, 3-ft. gauge, saddle tank; weight about 16,000 or 18,000 lbs. Virginia.
- 2,741. A second-hand gasoline engine, 10 H. P. Virginia.
- 2,742. Two heating furnaces for school building; one for wood and one for coal. North Carolina.
- 2,743. Phosphate machinery. North Carolina.
- 2,744. Cloth and paper bags large enough and strong enough to hold 50 lbs. and 100 lbs. of dry metallic paint. Cloth bags must be closely woven. Alabama.
- 2,745. Dolomite. Ohio.
- 2,746. Artesian pumping outfit and electric motor to operate same. Texas.
- 2,747. Light iron tubular columns for support of light roof; patent iron trusses; light iron tables, marble-tops, for meat market; fruit vendors' market tables; iron water piping 2 in. in diameter; iron skylights with glass panes; different styles of crystal roofing. These goods are to go to Mexico.
- 2,748. Second-hand rails in good condition for relaying, 25 to 30 lbs., with or without spikes, but with splice joints. South Carolina.
- 2,749. A shingle mill. Maryland.

**GENERAL MINING NEWS.**

**ALABAMA.**

**De Kalb County.**

Fort Payne Coal and Iron Company, Fort Payne.—The stockholders of this company, at Boston, Mass., on the 19th inst., voted to reduce the capital stock from \$5,000,000 to \$2,500,000, and issue \$1,000,000 new bonds to pay off the \$350,000 present indebtedness and give a working capital.

**ARIZONA.**

**Gila County.**

Old Dominion Copper Company, Globe.—The employees at this company's mine have been notified that all work on Sunday will be suspended hereafter. This is said to be due to the desire of the company to restrict its output in order to keep within the allotment fixed by the "combine."

**Graham County.**

Arizona Copper Company, Clifton.—It is reported that extensive improvements are being made to this company's plant. A new 240-H. P. water wheel is

being put in, and the smelter is being thoroughly repaired.

**Pima County.**

Mohawk, Tucson.—This gold mine, adjoining the Mammoth, has been purchased by Hartford, Conn., parties. The amount paid was \$40,000. A 50-stamp mill will be erected on the property at once.

**Yavapai County.**

(From an Occasional Correspondent.)

Hillside.—The work of development at the Hillside mines is progressing rapidly and fine ore bodies are being uncovered. Tests are being made with a view to determining the best method of treating the ore. Among other methods the treatment by cyanide is being investigated. So soon as these trials are completed a suitable plant will be erected and the mines will become large producers.

**CALIFORNIA.**

**Butte County.**

Everything indicates a mining boom in Butte, says the Oroville "Register." The gravel mines of Bangor, Magalia, Nimshew, Butte Creek, Gravel Range and other sections have attracted men of capital and energy. These mines are being opened and developed rapidly. On every side new mines are being taken up and prospected. It is thought that a thousand men will be at work within a few miles of Bangor within one year, yet this was one of the abandoned mining camps of the county. A 60-stamp mill will be soon erected at Forbestown; the Stow mine is doubling its stamps and will soon have 40 at work; the Golden Queen will soon be crushing again; the Banner is being pushed ahead with 27 men; the Palo Alto has 35 men getting out rich rock, while encouraging reports are heard from French Creek, Gravel Range and many other places.

**Colusa County.**

The Lower Lake "Bulletin" of a late date says that Mr. Lenus has commenced the erection of a quicksilver furnace at the glades near Sulphur Creek.

**Mono County.**

The following are the latest official weekly letters from the superintendents of Bodie mines:

Bulwer Mining Company.—During the past week 210 cars of ore were extracted from the stopes and put into the main ore chute. The ore stopes are looking well. The mill has been kept running steadily, average battery samples \$28.43; tailings, \$7.97.

Mono Consolidated Mining Company.—West cross-cut 700 level was extended 11 ft. Each cross-cut 50 ft. above the 700 level was extended 10 ft. West cross-cut 600 level was extended 8 ft. North drift from upraise 150 ft. above the 600 level was extended 12 ft.

Summit Mining Company.—South drift from east cross-cut on ledge 4,200 level extended 5 ft.; the ore in this drift is from 10 to 12 in. wide. We are stopping out ore from main north drift ledge 4,200 level.

(From our Special Correspondent.)

Bulwer Consolidated Mining Company, Bodie.—The mill is running steadily, the battery samples averaging \$28.43 and the tailings \$7.97. There were no cars of ore hoisted during the week from the stopes.

Summit Mining Company, Bodie.—In the main north drift ledge, 1,200 level, ore is being stoped out. The ore in the south drift, from east cross-cut on ledge No. 4, 200 level, is from 10 to 12 in. in width and of good grade.

**Monterey County.**

New Idria Quicksilver Mining Company.—The celebrated "McGarrahan claims" passed the House of Representatives on the 18th inst. In our issue of June 11th we dwelt at length upon this matter, which is now settled finally, after 34 years of efforts on the part of Mr. McGarrahan to arrive at a settlement of his claim.

**San Bernardino County.**

San Jacinto Estate, Limited.—The San Francisco "Examiner" states in a late issue that the Temeseal tin mines at San Jacinto are an utter failure, according to John J. Quick, a miner of long experience in Cornish tin mines, and who worked in the San Jacinto mines. Mr. Quick declares that the mines are not producing sufficient tin to keep a mill going, and that the little ore in sight will soon be exhausted. No large body of ore, the working of which would pay, has been found in any part of that district. The mines commenced operations in April, 1891, and notwithstanding expectations that they would produce from 100 to 200 tons of ingot tin monthly the average production for the past two months is said to have been less than 12 tons. During that time the English stockholders, it is alleged, have been sending out upward of \$8,000 per month to meet deficits. The production for the past three months was from scraping out leavings in the old stopes, the new workings not revealing any pay ore. The English stockholders have summoned to London Captain Harris, late superintendent of the mines, who resigned his position because he was convinced that the property would not pay. Harris left San Jacinto on the 13th inst. for London, and in a few days there will be a meeting there of the stockholders of the company at which facts in connection with the mines will be made public. On the other hand, the Associated Press has a dispatch from Los An-

geles in which Mr. Gervase Purcell, a civil engineer and financial agent of San Jacinto Estate, is quoted as saying in relation to the above statements that so far from being exhausted the mines are in the infancy of development. There are 150 men at work and new machinery has just been ordered. Shipments of tin ore are made by carloads, and the output of the mines in June was double that in May. Purcell says the company owns a tract embracing many thousands of acres in which a large number of tin-bearing lodes have been traced for long distances on the surface. They have every indication of being of true fissure character, and Purcell says he has no doubt of their permanency.

**Shasta County.**

Hornet, Shasta.—A proposition is being considered to place reduction works at this mine on Iron Mountain, says the Shasta "Free Press." The ore is low grade, but the ledge is said to be 300 ft. in width.

**COLORADO.**

Colorado Fuel Company.—It is announced that this company has absorbed the Grand River Coal and Coke Company, of which the principal stockholders were J. B. Wheeler, J. R. Busk, Rathbone Bros., W. B. Deveraux and S. S. Sands & Co. The Grand River Company had a capital stock of \$2,000,000 and first mortgage bonds of \$768,000. The Colorado Fuel Company pays for it 10% of the par value of the stock in cash, 25% in 8% preferred stock and 15% in the Colorado Fuel Company's common stock. After absorbing the Grand River Company the stock and bonded debt of the Colorado Fuel Company will be as follows: Preferred stock outstanding, \$1,986,000; common, \$2,641,000; first mortgage bonds outstanding, \$1,043,000. The Colorado Fuel Company shows a surplus after charges for the year ending June 30th of \$138,540.

**El Paso County.**

Coronado Mining Company, Cripple Creek.—At a meeting of the stockholders of this company, with David H. Moffat representing the Anaconda Mining Company, held at Colorado Springs on the 14th inst., a consolidation of these two companies was formed. In the meeting 1,057,650 shares of the two companies were represented, and with unanimous consent of the holders the two leading mining companies of Cripple Creek were consolidated into one.

**Hinsdale County.**

Carson Tunnel Company, Carson.—This company will drive a cross-cut tunnel through the brow of Mineral Hill, about 1,500 ft. from the St. Jacobs mine. The company has several leads in place, and expects to cut the first lead in about 200 ft.

Ute & May Mines, Limited.—These mines are shipping from 10 to 15 carloads of concentrates weekly with a force of over 300 men. The damage sustained from high water a few weeks ago has been remedied and everything is running smoothly.

**Lake County.**

(From our Special Correspondent.)

Arkansas Valley Smelting Company.—This company is adding two new blast furnaces and three roasting furnaces. This will increase the smelting capacity from 2,000 to 4,000 tons per month.

A. Y. & Minnie Mining Company.—Shipments were increased over the previous month by about 300 tons. In June about 1,400 tons of carbonates and 300 tons of sulphides were shipped from there to the smelters in this vicinity, making a total of 1,700 tons, against a total of 1,400 tons during the previous month.

City Mines.—Pumping has just been resumed at the three city properties, the Sixth street, Penrose and Bohn shafts, and is now to be steadily carried on until the water in the Leadville basin has been placed under control. This problem is indeed a difficult one, but at last it seems that the united action on the part of the three properties mentioned will soon meet with success. The Sixth street, being the lowest, is encountering more water than the others, but the pumping plant has been increased. The Penrose has also had a hard time in sinking, but was more fortunate in that line than the Sixth street. The shaft was sunk through about 316 ft. of wash, or glacial moraine, and at that point struck hard black porphyry, solid and in place, showing that the erosion, if any occurred, had not interfered with the contact at that point. From there a diamond drill was sunk to an additional depth of about 230 ft., and there cut through 10 ft. of fine contact matter overlying the blue limestone. So satisfactory did this appear that the drill was taken out and sinking was at once resumed in the shaft in order to explore that body. When the shaft had been carried down to a depth of 49.5 ft. a body of argenteriferous iron ore was encountered. Work was resumed last week, and is now to be continued until some definite finale.

**Pitkin County.**

Della S. Mining Company and Smuggler Mining Company.—There was filed in the Clerk's office at Aspen on the 12th inst. a mining deed from the Della S. Mining Company to the Smuggler Mining Company, conveying certain areas of ground on Smuggler Mountain, Roaring Fork mining district. Among other things specified in the deed is that it is made "for the purpose of settling certain disputes and matters in litigation between the grantors and party of the second part."

Holden Lixiviation Works, Aspen.—Late advices from Aspen report that these works are now run-

ning to their full capacity on the low grade ore of the camp.

#### Saguache County.

Amethyst Mining Company, Creede.—The completion of the Amethyst tramway, says the Creede "Chronicle," renders certain the daily delivery at the Upper Creede depot of 50 tons of ore from this mine, which will be increased as soon as better facilities are afforded for hoisting in the old shaft and the three-compartment shaft is completed.

#### San Miguel County.

Shipments of ore and concentrates from Telluride since Jan. 1st, 1892, to July 7th amounted to 18,176 tons, and for the week ending July 14th as follows: Smuggler-Union, 330 tons; Sheridan Consolidated, 308; Hector Mining Company, 11; W. F. Beattie, 11; total, 660.

### FLORIDA.

#### Marion County.

(From an Occasional Correspondent.)

The Anthony Phosphate Company.—This company has recently been organized to operate on leased land 1¼ miles northeast of Anthony. J. W. Wells, of Winter Park, Fla., is president of the company, and H. S. Kedney, secretary and general manager. Its capital stock is \$100,000, and the daily capacity of its plant will be 100 tons. It will use double-screen washers, two screens running side by side in the same tank of water.

### IDAHO.

(From our Special Correspondent.)

Tyler Mining Company.—The transcript on appeal in the case of this corporation against C. Sweeney, F. R. Moore, J. Hanley, J. Quackenbush, A. Ross, J. Preasley, F. Hyatt, the Last Chance Mining Company, Idaho Mining Company, and the Republican Mining Company has been filed in the United States Circuit Court of Appeals at San Francisco. The plaintiff owns a mining claim in the Yreka mining district, and charged the defendants with having tapped a rich body of ore in their property and extracted quartz to the amount of \$200,000. The Circuit Court of Idaho gave judgment for the plaintiff against the Idaho and Republican mining companies, but in favor of the other defendants. From this decision the plaintiff company appeals.

#### Kootenai County.

Homestake.—According to the Helena "Independent" a vein of ledge matter 27 ft. wide carrying 2½ ft. of galena has been struck in the shaft now being sunk on this property. The ore assays 70 oz. of silver and 78% of lead to the ton. The Homestake is on the Cabinet Mountain range and is an extension of the Eldorado mine. The Eldorado is said to be a true fissure vein, and is almost 6 ft. wide and assays as high as 96 oz. of silver to the ton. A fair average assay gives the value of the ore as 74 oz. of silver and 45% of lead to the ton.

#### Lemhi County.

Leesburg.—A large consignment of machinery is at Red Rock awaiting shipment to this place. It was purchased by a syndicate to be used in working the placer mines in the vicinity.

#### Owyhee County.

Black Jack.—The drift is still being pushed south in the lower level, and a good quality of silver ore has come in on the hanging wall. This streak is from 2 to 8 ins. in width. The ledge is now between granite walls, where a short time ago one of the walls was of porphyry. This is considered a favorable indication. The face of the drift is 1,257 ft. from the tunnel house, 945 ft. of cross-cut to the ledge and 312 ft. of drift.

De Lamar Mining Company, Limited.—The following is the return for the month of June: Crushed during the month, 2,250 tons; bullion produced in the mill, \$63,000; estimated value of ore shipped to smelters, \$19,000; miscellaneous revenue, \$650; total produce, \$82,650; total expenses, \$36,500; net profit, \$46,150. Have cut a vein on the 8th level 70 ft. south from the last reported; average width 4 ft. 6 in.; average value, \$50 per ton, about equally divided in gold and silver.

Mammoth.—It is reported that John McMahon is erecting a 5-stamp mill. The mill will be run by water power and will have the necessary plant for treating ores by the leaching process. The mine has been developed by a tunnel and by a winze which is now down 40 ft.

Phillips & Sullivan.—A force of men are now engaged taking out ore, and some 80 or 90 tons of first-class milling ore is now ready for shipment. This ore is being taken from the short drifts and stopes in the Hick's winze. The connection has not been made in the Belfast cross-cut yet. The water is being taken out of the winze and a drift will be run from there to make connections.

Poorman.—The stopes in this mine are showing better at present than for many months past, one stope being 8 ft. wide and all good ore, says the Silver City "Avalanche."

Ralph Mining Company.—Excavating for the mill, which has been in progress for five months past, is now finished. At the mine all work is concentrated on sinking the winze to No. 3 tunnel. This winze shows a rich but small streak of ore. Until this winze is finished no work will be attempted in No. 3 tunnel.

South Central.—This mine is being developed very rapidly. Drifts both ways from where the tunnel cuts the vein are in some distance and show the ore to be continuous in width and value. The ore in these workings has an average value, it is claimed, of over \$80 per ton, says the Silver City "Avalanche," being nearly double the value of the ore in the ground immediately above, showing a very good increase as depth is gained.

Trade Dollar.—No. 3 tunnel is now 139 ft. into the shoot of ore, says the Idaho "Avalanche." The first 50 ft. is good milling ore and the ledge is 5 ft. wide, 3½ ft. of which assays from \$16 to \$85 per ton, gold predominating. The remaining 89 ft. has a shipping shoot which varies from 10 to 30 ins. in width and assays from \$110 to \$2,700. Present face 4 ft. wide, and about 14 ins. of \$500 ore. In the stope there is about 20 ins. of ore on footwall averaging \$400 per ton, and 6 ins. on hanging wall valued at about \$250. About 25 ft. south of winze C in tunnel No. 3, winze D is being sunk to connect with the Blaine tunnel. The cross-cut being driven west from No. 3 is now in 32 ft. and still in quartzite. One carload is sacked ready for shipping and there are two more in the ore house awaiting sorting. There are now ten carloads of machinery at Nampa for the new Trade Dollar mill.

Venus.—The cross-cut is now in 670 ft., in solid porphyry which is impregnated with pyrites of iron. Recent surveys demonstrate that a total length of 800 ft. will have to be run before cutting the ledge. A depth of 271 ft. will be gained at the point of intersection.

### Shoshone County.

Bunker Hill & Sullivan Mining Company.—Telegrams received in San Francisco, Cal., on the 19th inst. from Superintendent Clement, of this company, show that he has resumed work at the mine and mill. He sends no details, but gives statements of production which show that the works are no longer idle. It is understood that nearly all the 200 California miners have gone back to work at Bunker Hill. A later dispatch confirms the news that work has been resumed at the mines. Troops guard the tramway and no disturbances are reported.

Coeur d'Alenes.—The Coeur d'Alene "Miner" gives the following as the ore shipments from that section at present: The Gem is now shipping 2 carloads of concentrates a day; the Sierra Nevada 1, Tiger 1, Poorman 2, Bunker Hill & Sullivan 5. Most of these companies began shipping about June 21st. The Bunker Hill & Sullivan commenced July 5th and has shipped 18 carloads. The Union, while working, brought down 123 carloads of crude ore and shipped four or five loads of concentrates. The Frisco has shipped eight carloads.

Idaho.—This mine has been bonded, says the Spokane "Spokesman," to a Milwaukee syndicate. The vein is said to be from 30 to 40 ft. wide and to run from \$4 to \$7 per ton. The property is developed by a double-track main tunnel, cross-cuts and upraises, so that the ore body can be easily experted.

### KANSAS.

#### Cherokee County.

During the week ending July 16th the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 1,973,520; rough ore, pounds sold, 1,604,870; zinc ore, pounds sold, 899,500; lead ore, pounds sold, 356,860. Sales aggregated a total value of \$18,638.

### MICHIGAN.

#### Copper.

Calumet & Hecla Mining Company.—The hoisting of the Red Jacket shaft has not begun yet. There is yet some trouble with the small Corliss hoist. The wire rope does not run satisfactorily over the combination of wheels which is to serve in the place of the old-fashioned drum. Just what the trouble is cannot be stated, but it will doubtless be obviated soon and the hoisting started, says the Calumet "Conglomerate."

Calumet & Hecla Mining Company.—The work of tearing down No. 4 shaft house, Calumet branch, is going on rapidly, and in a few weeks it will be replaced by one of the large modern shaft and rock houses combined, such as have been erected at South Hecla, Hecla and No. 2 Calumet.

Centennial Mining Company.—The new engine is doing excellent work. It is reported, says the Calumet "Conglomerate," that the management is seriously considering the exploration of the Osceola amygdaloid vein. Officers from the east will be here soon and will look over the ground.

Osceola Mining Company.—The double skip road in the Opechee shaft is about completed. The bottom of this shaft is now passing through a course of ground far above the average of the mine for copper, says the Torch Lake "Times."

Quincy Mining Company.—Developments are showing up a lode much richer in copper than was expected. Never before was there so much rich ground in sight, says the Torch Lake "Times."

### Iron.

On July 1st, 1891, says the Marine "Review," shipments of iron ore from all upper lake ports amounted to a trifle less than 700,000 tons. On July 1st, 1892, they are about three times that amount. The following are the estimated shipments: Ashland, 664,447 gross tons; Two Harbors, 303,614; Marquette, 196,875; total Lake Superior, 1,164,936.

### Iron—Marquette Range.

Lake Superior Iron Mining Company.—Section 21 of this company's mines has closed down for an indefinite period. This action has been pending ever since July 1st. About 60 men were employed at this mine, some of whom will be given work at one of the company's other mines.

### Iron—Menominee Range.

Commonwealth Iron Company.—Another body of ore which promises to be one of large proportions, says the "Diamond Drill," has been found upon the lands of this company near the Big Badger mine. The ore was found quite near the surface, and an exploring shaft which is going down is some 12 or 15 ft. in the pure ore. The ore is of a soft blue character and looks even better than the product yielded by the Badger. It analyzes very high in metallic iron and is said to be non-Bessemer.

Florence Iron Company.—The following table shows the total output and shipments of the Florence since the first of January, together with the amount of ore now on hand:

	Florence	Eagle.	Totals.
Ore produced.....	131,394	10,779	142,173
Shipped '92.....	18,109	8,795	26,904
Bal. on hand.....	113,285	1,984	115,269

Mastodon.—According to the Diamond "Drill" affairs have never been so inactive as at present for the mines of this locality. They comprise the Mastodon, Delphie, Alpha, Atlas and others, and the Mastodon is the only one now being worked.

Sheridan Iron Company.—This mine, in the Iron River district, is working a force of 90 miners. The mine is in good condition. The other mines in the district, the Isabella, Iron River, Nanaimo and Beta, are idle and show no prospect of a resumption of operations this year, says the "Diamond Drill."

### MISSOURI.

The following is the June report of Arthur Winslow, State Geologist of Missouri, to the Governor: The excellent weather which has prevailed since the early part of the month has much facilitated the progress of the work in the field. Zinc and lead deposits have been examined in Franklin, St. Francois, Madison, Washington, Crawford, Jasper, Lawrence and Newton counties; about 110 sq. miles have, in addition, been mapped in detail in Jasper County. Clays have been examined in Adair, Randolph, Warren, Montgomery, Audrain, Jackson, Lafayette, Saline, Howard, Callaway and Pike counties. Iron ores have been inspected in Mississippi, Dunklin, Scott, Ripley, Butler, Carter, Shannon, Howell, Oregon and Ozark counties, and the stratigraphy of the country along current river has been studied in connection with these deposits. The mapping of the crystalline rocks has been resumed in Wayne, Iron and Reynolds counties. The study of the Quaternary formations has been prosecuted in Saline, Howard, Boone, Callaway, Montgomery, Warren, Ray, Macon and Randolph counties, and the terminal line of the drift has been traced almost entirely across the State. In the office the preparation of the reports on the iron ores, on the zinc and lead ores and on the paleontology has continued, and the manuscript of the report on the mineral waters has nearly all been transmitted for revision and preparation for the printer; the Higginsville map and section sheet and the accompanying report have been printed and will soon be ready for distribution. During the past month arrangements have been perfected for intimate co-operation between the World's Fair Commission and the Geological Survey, such that the material accumulated and the great amount of knowledge acquired by the latter organization concerning the geology and the mineral deposits of the State will be applied in the interests of the prospective exhibit in Chicago. The plans adopted and the progress already made in the execution of these plans yield abundant promise that the display in this department will be of the greatest possible credit and advantage to the State.

### Jasper County.

(From our Special Correspondent.)

July 18.

Saturday evening closed an active week in the lead and zinc mines of this entire district. There was a large output of ore and heavy sales at Carterville and Webb City. The market opened the first of the week at \$26 per ton for zinc ore and closed at \$26.50. Lead ore remains unchanged at \$24 per thousand. Following are the sales from the different camps: Joplin mines, 1,400,520 lbs. zinc ore and 212,580 lead, value \$22,608.45; Webb City mines, 1,289,180 lbs. zinc ore and 99,890 lead, value \$18,462.15; Carterville mines, 3,028,780 lbs. zinc ore and 99,740 lead, value \$41,060.85; zincite mines, 144,750 lbs. zinc ore and 7,800 lead, value \$1,977.35; Oronogo mines, 128,470 lbs. zinc ore and 21,700 lead, value \$1,794.70; Carthage mines, 100,850 lbs. zinc ore, value \$1,262; Wentworth mines, 40,000 lbs. zinc ore, value \$480; Alba mines, 40,000 lbs. zinc ore, value \$492; Galena, Kan., mines, 899,500 lbs. zinc ore and 356,860 lead, value \$18,638; district's total value, \$106,775.50. The Webb City and Carterville district made a large production last week, and it is a noteworthy fact that this was produced by eight companies of Webb City and eleven companies of Carterville. Work is still progressing on the incline shaft at the Troup mines to reach the cave ground and to search for the bodies of the three men buried in the cave. A party of St. Joseph and

Kansas City capitalists have organized a company with a capital stock of \$100,000, and taken a lease on 120 acres of the Rex. M. & S. Co. land. The company have let a contract to sink 24 drill holes on their land in order to prospect it for the ore bodies and test the formation. E. O. Bartlet and Picher Bros., of the Picher Lead Company, have also taken a lease on 40 acres of the Rex. M. & S. Co. land and let a contract for 1,000 ft. of prospect drilling. This 40 acres is directly south of the Columbian Mining Company operated by the Electric Lead and Zinc Company, on which Capt. Hemmingway has made a very important strike by drilling and is now sinking a development shaft.

**MINNESOTA.**  
**Iron—Mesaba.**

Biwabik.—The Cleveland "Leader" quotes as follows from the report of John T. Jones on this mine: "There is a body of ore averaging some 60 ft. thick which will average 66.50 in iron and below .020 phosphorus. The average of the entire ore body, so far as we have uncovered it, is about 64 iron and .040 phosphorus. This puts the entire Biwabik in the Bessemer limit. One remarkable fact in connection with the operations of the Biwabik is that in not one of the test pits or shafts as far as sunk, ranging from 60 to 215 ft., has a pound of powder been used. Pick and shovel have done the whole work."

**MONTANA.**

**Deer Lodge County.**

Bimetallic Extension. The drift on the first vein in the north cross-cut is being extended. The drift is now in 53 ft. The showing at this point is good, the entire face being in vein matter, says the Phillipsburg "Mail." On the north vein the work is being pushed, but foul air has retarded the work considerably.

**Jefferson County.**

Elkhorn Mining Company, Limited.—The following is the cabled return for the month of June: Mill worked 23½ days and crushed 1,011 tons; bullion produced in the mill, \$36,195; 402 tons of smelting ore sold, \$24,900; total produce, \$61,095; total revenue expenses, \$25,548; estimated profit for the month, \$35,547.

King Solomon.—The mineralized matter is 110 ft. wide, and within this space there are three veins carrying ore. There is a shaft on the property 60 ft. deep and 80 ft. of levels. The rich ore lies in streaks from 20 ins. wide to mere streaks. The other contents of the veins are concentrating ore. The ore is very silicious and carries from 3.8% to 24.8% of zinc. Six shipments to the smelter yielded the following returns to the ton: \$15.82, \$148.58, \$129.56, \$146.76, \$278.94, \$234.68.

**Park County.**

Red Lodge.—It is reported that large deposits of sulphur have been found on Trail Creek, at the foot of Cedar Mountain, about 10 miles east of Marquette and 50 miles from Red Lodge. There are a large number of extinct geysers in the locality and a number of hot springs, which discharge sulphurous gas. The sulphur is found in the fissures surrounding the geysers and is mixed with gypsum, being from 40 to 60% pure.

**Silver Bow County.**

Boston & Montana Mining Company.—The company has \$50,170 of sinking fund money available for the purchase of its first mortgage bonds, and the trustee has accordingly called for offers of the same. The management has made arrangement for the temporary treatment of its silver bearing matte by the electrolytic process. This is to fill the gap until the company's own plant at Great Falls can be built.

Gem.—This mine, located north of the Speculator, has started up, after a long lease of idleness. Machinery has been placed upon the property and the work of pumping out the water will be commenced immediately. The shaft on this property is developed to a depth of 200 ft., and the water is now within 50 ft. of the surface.

**NEVADA.**

**Esmeralda County.**

Mount Diablo Mining Company.—This company's mill started upon ore from the mine on July 8th, and regular shipments of bullion will be received.

**Eureka County.**

(From our Special Correspondent.)

Connection has been made between the Lord Byron and Alexandria mines, situated upon Prospect Mountain, Eureka district, by sinking a winze from the Elize tunnel of the Alexandria Company and running a drift therefrom to a pipe vein of rich ore that dipped from the Lord Byron. It is stated that the work was done at the joint expense of the foreman of the Diamond mine and the manager of the Ruby Mining Company, Limited, who are jointly interested in adjacent properties. By a survey made about two years ago it was known that a large pipe of high grade ore was dipping from the big chamber in the Lord Byron in a northerly direction through the end of that claim into the Alexandria ground. The discovery was kept quiet, so the story goes, until a lease was obtained from the Alexandria Company. The "pipe," at last accounts, was turning out about 10 tons of ore per day, which gives employment to eight miners.

**Storey County—Comstock Lode.**

Belcher Mining Company.—Following is the latest official weekly letter: The north drift on the 400 level is now out 208 ft. from the turn. The face is in porphyry, with a streak of low grade quartz in the face 14 in. wide. In the north stope, 300 level, the pay lies in streaks, but is of good grade. The south stope on this level is more mixed with porphyry than it has been. Are preparing to open the second floor at this point. Shipped to the Brunswick mill during the past week 363 tons and 1,940 lbs. of ore, the average battery sample of the portion worked being \$30.03 per ton.

Best & Belcher Mining Company.—At the annual meeting of this company, held last week in San Francisco, 91,618 shares were represented and the following officers elected: George R. Wells, president; Charles H. Fish, vice-president, and W. Edwards, E. B. Holmes and Robert Sherwood, directors. L. Osborn was re-elected secretary and P. Kervin superintendent. The secretary's financial statement showed a balance on hand of \$2,817.25.

Crown Point Mining Company.—Following is the latest official weekly letter: The main west cross-cut on the 230-ft. level is now out a total distance of 297 ft. The face is in porphyry with stringers of low grade quartz through it. We continue to extract from the 160-ft. level stopes about 15 tons of ore per day, but the pay lies in small streaks and seams, and requires careful assorting, and is precarious and uncertain. The grade of what we are able to save is very good. Have shipped to the Mexican mill for reduction during the week 103 tons and 1,160 lbs. of ore. The average battery sample for the week was \$36.62 per ton.

Hale & Norcross Mining Company.—In an interview in the San Francisco "Report" Superintendent Joseph R. Ryan, of this company, is quoted as saying that the mine under his charge was now running under a very light expense. The 1,800-ft. level has been reached in the main incline and a large working station is now being excavated on the east side. When the station is completed north and south lateral drifts will be extended and the ledge will be further explored therefrom by east and west cross-cuts. Mr. Ryan says he has given much study to the situation, and is confident that good discoveries of ore will be made in that part of the company's ground, where there is a large block of unexplored ground. During the month of June there was worked at the Brunswick mill 1,815 1620-2000 tons of Hale & Norcross ore, which produced: Gold, \$6,768.38; silver, \$13,042.15; total, \$19,810.53. The average battery assay was \$17.16.

Savage Mining Company.—The following is the latest official weekly letter: We have hoisted 481 cars of ore from the 950, 1,100, 1,400 and 1,450 levels, shipped to the Nevada mill 450 tons and milled 450 tons. Average car sample assay \$25.23, average battery assay \$22.21. Bullion yield for the week \$7,000. The usual prospecting and repair work is being carried on throughout the mine. A prospecting drift west from the 7th floor above the 1,100 level discloses two sets of average grade ore. We have also encountered the downward continuation of this ore in a west drift from the sill floor of this level at a point 120 ft. from our southern boundary. The joint upraise with the Gould & Curry Company from the Suro tunnel level was connected on the 11th inst. with the joint winze from our north drift, 1,500 level. This furnishes good air for the joint north drift with the Gould & Curry Company, and work will be resumed in the face of the drift this week.

(From our Special Correspondent.)

The following is a tabulated statement of the ore hoisted from Comstock mines and milled during the past week, with the car and battery assays, bullion shipments, etc.:

Mine.	Tons hoisted.	Car sample assay.	Tons milled.	Average bat. assay.	Bullion product for week.	Bullion shipped.
Belcher.....	.....	\$ 363	30.63	.....	.....	.....
Crown Point.....	.....	\$ 503	36.62	.....	.....	.....
Con., Cal. & Va.....	850	25.11	840	22.60	.....	25,807.44
Hale & Norcross.....	.....	.....	.....	.....	.....	19,810.53
Occidental.....	180	24.20	180	22.40	.....	.....
Overman.....	263	21.55	215	15.78	.....	.....
Potosi.....	386	22.93	381	22.99	.....	.....
Savage.....	481	25.23	450	22.21	7,000.00	.....
Yellow Jacket.....	210	.....	.....	.....	.....	.....

<sup>1</sup> Bullion shipments for June.

<sup>2</sup> Cars.

<sup>3</sup> Incomplete and illegal reports.

Consolidated California & Virginia Mining Company.—This corporation made over \$22,000 on last month's run of the mill, and the outlook is more satisfactory just now as there is a balance in the treasury. How much over the above named sum was made on the month's run is not reported, but stockholders are content that the levying of an assessment has been postponed at all events.

Hale & Norcross Silver Mining Company.—A copy of the proposed statement on motion for a new trial has been served on the plaintiff by the defendants' attorneys in the celebrated suit. The statement consists of 2,848 foolscap sized pages, closely typewritten, and forms five bulky volumes. It is a

digest of the evidence given in the suit, with a memorandum of the errors and exceptions. It will, in all probability, take plaintiffs' attorneys fully 30 days to read this lengthy document, compare it, and, should such be necessary, make amendments. The engrossed statement will then be filed in Department 4 of the Superior Court, and a day set for hearing the motion for a new trial. During the month of June there were worked at the Brunswick mill 1,815 tons 1,620 lbs. of ore, which produced as follows: Gold, \$6,768.38; silver, \$13,042.15; total, \$19,810.53. The average battery assay was \$17.16. This is the report made public and affords no insight into the working of the ore.

Potosi Mining Company.—Following is the official statement of the working of ore and the bullion produced for account of this company at the Nevada mill for the month of June: Tons of ore worked, 1,860; gross proceeds in bullion, \$38,178.69; cost of reducing, \$11,160; net proceeds in bullion, \$28,910.59; assay per ton, \$23.70; 65% of assay, \$15.40 per ton; gross average per ton, \$20.53; net average per ton, \$14.53. The ore was worked up to the unusually high percentage of 87% of its assay value.

Segregated Belcher Mining Company.—In this mine the east cross-cut from the south lateral drift on the 1,300 level is now out a total distance of 313 ft. It has passed through a body of low grade quartz of nearly 30 ft. in width, and the face is now in a mixture of porphyry and quartz of low assay value.

West Consolidated Virginia Mining Company.—On the 20th of the present month the suit of Oscar C. Steele versus the above corporation will come up for hearing before Judge Rising at Virginia City. When the suit was filed a full account was given of it in these columns. Briefly, Mr. Steele seeks to recover arrears of pay as superintendent, but, as before pointed out, he is simply the tool of the ore mill ring who have long sought to gain control of this property. The trouble began about a year ago when the Consolidated California & Virginia people were working in the west ledge and were taking out ore from West Con. ground. An injunction was sought out and an application made to Judge Rising for permission to make a survey of the Consolidated California & Virginia workings. The law specifically states that the owners of an adjoining property are entitled to a survey provided they are willing to pay the expenses incurred. Judge Rising rose superior to all such legal provision, and ruled that it would not be competent for him to grant a survey until a suit was filed. Since then it has transpired that this most learned judge is one of the puppets of "the ring." His name figures in the books of Alvinza Hayward as a borrower of money, and the inference is that Judge Rising also is one of the paid attaches of the mill ring. This being so, it will be no surprise if a decision is given against the West Con. Virginia Company two weeks hence when the case comes to trial.

**NEW MEXICO.**

**Grant County.**

Late advices from Silver City announce that the Bremen mill at that place, which has been idle for some months, has been leased to W. H. Newcomb and put into operation on ore from Pinos Altos and Chloride Flat. The Flagler Works will, it is said, be started next month, and the Colchis mill, which is now in course of construction, will be completed some time this fall. It has been determined to put in the mill, in addition to the 20 stamps and three Sturtevant crushers, a Jenkins pulverizer, a machine invented by C. D. Jenkins, of Boston, one of the members of the Colchis Company. It is expected that this will make the capacity of the mill more than 200 tons of ore a day, which amount of ore can be produced from the company's mines on Legal Tender Hill.

The Silver City correspondent of the New York "Sun" writes that the daily output of the gold mines at Pinos Altos is only about half as much as it was at this time last year, and the mines are now producing but little more than the gold mines in the Hillsborough district. Three mills are in operation at Pinos Altos, the largest of which is a 15-stamp mill. Some work is being done in the lead mines on the west side of Pinos Altos camp, and some large bodies of lead ore are said to have been discovered. The ore carries some silver, but it is not high grade enough to pay to ship to smelters without concentration.

It is reported that Mr. L. W. Barringer, of Philadelphia, Pa., one of the members of the syndicate which purchased 31 iron mines in the Hanover district last March, is on his way thither for the purpose of making arrangements for building a railroad from this place to Hanover over which to ship the ore from the mines. The Silver City & Northern Railroad Company, over whose line all the ore shipped from Hanover is taken, charges local rates on iron ore which prevents the Pennsylvania syndicate from shipping ore from the mines purchased last winter. Another line of railroad to Hanover would be of great benefit to the miners there, as the competition would be likely to result in a considerable reduction of rates on ores shipped out.

Manhattan Gold Mining and Milling Company.—This company is making preparations to drive the Montana tunnel to the vein. It was expected that the work would be completed so that the mill could be started up before the end of the year, but considerable time has been lost in getting to work on the

tunnel, and it is doubtful whether the mill will be started this year.

Mountain Key.—This mill is treating about 30 tons of ore from the Pacific mine daily.

#### Sierra County.

The daily output of the gold mines in the Hillsborough district is estimated to be more than 300 tons, and is said to be increasing.

Silver Mining Company, of Lake Valley.—Recent shipments from this company's mines at Lake Valley have been lighter than usual, but it is reported that a strike of rich ore has been made in the Johns shaft, which will probably increase the shipments.

#### PENNSYLVANIA.

##### Coal.

The Coleraine Colliery at Hazleton is now working on full time, for the first time in several months.

The Woodside Colliery, near Minersville, has been purchased by Harry McCready, of Minersville, and George Beddow, of Frackville.

Coxe Bros. & Co. are having the No. 7 breaker at Stockton enlarged to twice its present size. New jigs and machinery will be placed in it.

The Jeddo tunnel is now in 2,650 ft. from the Butler end. There remains 110 ft. of the Lattimer slope to be driven, and when this is completed work can be pushed from both ends.

Additional particulars concerning the Shippen and Wetherall tract near Brockville, recently purchased by Lyman & Smith, show that tests had previously been made by Wyoming operators, notably Simpson & Watkins, who failed to regard the deposit as worth working. Their tests do not go far enough down. It is said that the deepest hole came within 16 ft. of tapping the Mammoth seam. The contractors, who are engaged in developing the tract, have a large force of men at work sinking test pits. These pits show a good quality of coal varying in thickness from 8 to 18 ft.

Ellangowen Colliery.—A severe explosion occurred shortly before noon of July 18th at this colliery, which is operated by the Philadelphia & Reading Coal and Iron Company. A number of men were engaged at their work in a heading when some one entered with a naked lamp, firing a body of gas and instantly killing a miner and badly burning and mutilating seven or eight others.

Leligh Valley Coal Company.—Packer Colliery No. 4, of this company, which has been idle for the past six months, started up last week, giving employment to over 400 hands.

Northwest Coal Company.—This company's colliery at Carbondale has been closed down for the remainder of July, during which time the repairs and improvements annually made about the works will be done.

#### SOUTH DAKOTA.

##### Custer County.

Golden Reward Reduction Works.—The large roasting at the works is being repaired, and it will be three or four days before it is in running order. In the meantime the Buckner roasters are put in requisition to keep the works running.

Keystone Mining Company.—This mine is now being systematically worked. The lower tunnel, which is being run on the vein has now reached a length of more than 400 ft., says the Deadwood "Pioneer." The breast is immediately under the discovery shaft at a depth of 260 ft. About 260 ft. from the entrance an upraise is being driven to connect with the tunnel above. This upper tunnel is 124 ft. above the lower one and has reached a length of over 300 ft. An upraise will be driven to connect with the discovery shaft, 135 ft. above. At frequent intervals, in both these tunnels, cross-cuts have been made which reveal an ore body from 40 to 50 ft. in width. The ore in all the openings has been carefully sampled and a yield of \$8 to \$10 per ton may be relied on.

Mand & Custer Mining Company.—This company, better known as the Big Missouri, has issued \$53,500 worth of bonds, with their mining property as security. The bonds draw 7% interest and were taken by the Deadwood National Bank, says the Deadwood "Pioneer." The sum derived from the sale of the bonds will be used in developing the mine and paying off the obligations due.

##### Lawrence County.

Bullion.—It is reported on good authority, says the Deadwood "Daily Times," that the deal which has been pending for some time between the owners of the Bullion mine at Galena and a Colorado syndicate has been closed, and that the syndicate will take hold of the property at once and fully develop it.

Hawkeye Mining Company.—The work of raising the timbers for the mill is now nearly finished. The construction is in charge of J. F. Saunders, who built the Montana mill. The building will be enclosed inside of 30 days, and stamps will begin dropping probably before September 1st.

Oro Fino Mining Company.—All machinery is in place at this mill in Strawberry Gulch. As soon as the workings are cleared operations will commence, and by another week the mine will be ready to deliver ore to the Deadwood & Delaware smelter.

Syndicate.—This lode, together with the Mason and Security, have been sold to Thos. White for \$3,000. The Black Hills "Times" reports the Dead-

wood & Delaware smelter as having purchased a number of claims in the vicinity.

Victoria Mining Company.—An important strike has been made on this property at Carbonate, says the Black Hills "Times." Two tunnels of considerable depth had exposed several large shoots of manganese ore, but the recent strike was made by running a tunnel between the old ones, and a vein of galena ore was encountered, which is 9 ft. thick. It assays well.

(From an Occasional Correspondent.)

Deadwood & Delaware Smelter.—The works are laying idle. They have been completed now over one year, and have not run altogether over 90 days, and never will, in my opinion, until a change is made.

Golden Reward Mining Company.—The mill is running along smoothly, working about 75 tons of ore per day.

Hawkeye Mining Company.—This company has commenced work on their new 40-stamp mill.

Horseshoe.—Thos. H. White has purchased this group of mines, paying about \$60,000 for them, and is making arrangements to commence active operations. This property adjoins the Welcome. It is deep ground and will require a shaft about 300 ft. deep to reach the contact. It has very little development on the surface yet. It is supposed he is working in the interest of a Messrs. McCre & Sumner, of Montreal, Canada.

Esmeralda.—This property, which was abandoned in the early '80s after the erection of a 40-stamp mill, has been recently reopened by the bank which foreclosed the mortgage. According to the Black Hills "Times" a large body of fine milling ore was encountered in drifting on one of the lower levels, and arrangements have been made to again start the mill.

#### Pennington County.

Welcome Mining Company.—This company has made arrangements to prospect with a diamond drill. The drill engine is mounted on wheels and is easily portable to any part of the company's ground.

#### UTAH.

##### Emery County.

Blake Asphalt Company.—This company, recently organized, proposes to develop the asphalt beds near Price. The company controls 4,030 acres of asphaltum deposits in Whitmore canyon, 25 miles east of Price. An order for 300 carloads has been placed in Denver, where several large contracts for paving have been made. The asphalt lies in vertical veins of several feet in thickness, inclosed in walls of sandstone.

##### Juab County.

Annie Consolidated Mining Company.—This company has been organized to work four claims in the Tintic district. A shaft is now down 53 ft., from which ore was extracted running 15 oz. silver, \$4 in gold and 25% lead.

Hungarian.—The shaft is being sunk on a 2-ft. vein carrying 70% lead and 60 oz. silver, it is claimed. A shipment will be made the last part of July.

Imperial.—This mine, together with the Fraction, comprising 600 ft. wide and 1,759 ft. on the vein, has been bonded for a Colorado syndicate for \$45,000. They lie between the Mammoth and Centennial-Eureka.

Mercur Mining Company.—Six more new leaching tanks are being put in at the mill at Camp Floyd, using the cyanide process of ore reduction. There is a large amount of ore in sight at the mine.

Tintic.—None of the mines of this district, with the exception of the Bullion-Beck, is being worked to its fullest capacity. At this mine 200 men are at work and from 75 to 80 tons of ore are raised per day.

##### Salt Lake County.

American Gas Company.—John Wolfe, a natural gas expert from Findlay, O., has made a test of the natural gas well owned by this company, and from his report we take the following: "Measurements of the volume or quantity of gas flowing from two wells, called No. 3 and No. 4, gave 807,000 cu. ft. and 4,901,700 cu. ft. in 24 hours respectively. The flow of gas in No. 4 well is kept back in part from the fact that the pipe in the well is only 2 ins. in diameter. The quality of the gas is good and in my opinion is permanent."

Commercial.—The Salt Lake "Tribune" reports the owner of this mine as making arrangements to treat the ore by the cyanide process.

Holden Concentrator.—The concentrating mill at the South Galena mine was burned to the ground on Friday, July 15th. The loss is about \$30,000. Sixty men will be thrown out of work.

Julia S.—The tunnel is now in 115 ft. on a vein of ore 4 ft. wide. A chimney was recently opened which assays 45 oz. silver and \$1.40 gold. A strike made this week shows iron quartz with native silver.

Mohawk Consolidated Mining Company.—Two shifts are being worked and a great improvement is noticed in the ore.

Salt Lake.—According to the Salt Lake "Tribune" the next meeting of the Mining Congress will take place at Salt Lake, beginning the first Tuesday in December.

Starlus.—The upper tunnel is now in 90 ft. and is

being driven as fast as possible. A shipment of 15 tons was recently made and 10 tons more are now ready.

#### Tooele County.

5-20.—A 6-ft. vein in contact with blue and gray limestone has been discovered. Average samples of ore assay 50% lead, 33 oz. silver and 0.95 gold.

Stockton Mining and Smelting Company.—This is a new company formed to work the El Dorado mine near Ophir. The company has purchased the old Waterman smelter.

#### Utah County.

Sioux Mining Company.—This company, located at Lehi, has been testing the leaching process with different grades of ore. The work was commenced on June 23d, and 28 tests have been made. By grading the ore and using proper screens 80 or 90% of the gold and silver could be saved. From the best arranged samples all but a trace of gold has been extracted and only 60 cts. in silver found to remain. The mill under contemplation will not be built at present.

#### Wasatch County.

Salt Lake Gilsonite Company.—This company is working the Parlette mines. Furnaces have been put up and large quantities of refined gilsonite are being turned out, 4,000 sacks being now reported ready for shipment.

#### Weber County.

La Plata Mining Company.—Ten men are now at work and the water will soon be pumped out, after which the shaft will be sunk 100 ft. further. A tunnel already 200 ft. long is being run in on the Sundown claim.

Ogden.—An iron mine has been located five miles from this city. The ore is a brown hematite, and is said to be of good quality.

#### WASHINGTON.

##### Kittitas County.

Peshastur.—About 200 locations have been made at this place, which is attracting considerable attention.

##### Lewis County.

Michigan Gulch Mining Company.—This company has uncovered a solid vein of ore 18 in. wide, carrying \$70 gold and \$1.50 silver per ton, says the Seattle "Mining News," and an increased force of men are at work.

##### Okanogan County.

Allison.—This group of mines has been, it is said, sold to Boston parties for \$103,000. The group consists of 14 low grade mines on the Smilikameen River.

##### Skamania County.

Cascade.—This group of mines has been purchased by Ed. Bluwert & Co. for \$30,000, which brings to an end the litigation between the Shaffer Gold and Silver Mining Company and Messrs. Waruers, Bash & Donohoe.

##### Stevens County.

Kettle Falls.—Work on the coal recently discovered near the Bonanza mine is being rapidly pushed. Another vein 2.5 ft. thick has been found. A total of 9 ft. has so far been shown.

Silver Queen.—A strike of good ore is reported at this mine by the Kettle Falls "Pioneer." In sinking a new shaft on the vein a second vein was discovered at a depth of 27 ft. It is from 2 to 3 ft. thick.

#### WISCONSIN.

##### Iron-Gogebic Range.

Penokee & Gogebic Consolidated Mining Company.—This company was formed to work the Colby, Palms, Superior, and Comet mines. The Colby still continues to add to its outfit of heavy machinery. The new pump has been lowered into No. 9 shaft.

#### WYOMING.

##### Carbon County.

Gold placers have recently been discovered here, and six miles square are reported to have been located. A ditch will be constructed to carry water from the Snake River into Four Mile Creek, and from there it will be carried 30 miles to the claims.

##### Laramie County.

Cheyenne.—The corner stone for the smelter was laid July 4th, and the first story wall is now up. The smelter will treat 200 tons per day.

##### Owyhee County.

Black Jack.—Good ore is now showing in the face of the tunnel at a depth of 700 ft. and about 315 ft. from the main cross-cut. The ledge is between granite walls and is nearly 4 ft. thick, with a pay streak of 8 in.

##### Uintah County.

Ogden Oil and Coke Company.—This company has been incorporated to work coal and oil lands near Fossil. It owns 1,400 acres of coal and 1,300 acres of oil lands.

#### FOREIGN MINING NEWS.

##### MEXICO.

The new mining law went into effect on July 1st. The most important change due to the new law is the perpetual property rights which it vests in the



miner. Formerly any mine was subject to denouncement which was not worked for a certain time during each year.

**Chihuahua.**

Juarez.—Chicago parties are interested in an onyx mine near this place, and Prof. Langhammer is working it. Several tons are now ready for shipment.

**Lower California.**

San Juan Mining Company.—The output of these mines is estimated at \$40,000 per month, says the San Diego "Sun." Four hundred and ten men are now employed. Two 40-stamp mills run night and day and 80 tons of ore are crushed. The company owns a line of steamers, plying between the gulf and San Francisco, and all business is transacted with that city.

**CHEMICALS AND MINERALS.**

**NEW YORK, Friday Evening, July 22d.**

**Heavy Chemicals.**—The exceedingly quiet condition of the heavy chemical market which we have reported for some weeks past continues unchanged. No business of any consequence is reported for prompt deliveries in any of the articles. There has been some inquiry for future shipments of caustic soda, but sales have been few. Carbonated soda ash and alkali have been neglected. Imports of heavy chemicals into this country for the past month show a falling off as compared with last year. This decrease is attributed to the general dullness in business in the United States during the past three months. Prices are unchanged as follows: Caustic soda, 79%, 2-95@3-10c.; 74%, 2-97½@3-12½c.; 76%, 3-12½@3-25c.; 77%, 3-12½@3-25c. Carbonated soda ash, 48%, 1-55@1-60c.; 58%, 1-47½@1-52½c. Alkali, 48%, 1-55@1-60c.; 58%, 1-47½@1-52½c. Sal soda, English, 1-05@1-10c.; American, 1@1-12½c. Bleaching powder, 2-15@2-20c. on the spot, according to quantity.

**Acids.** Business done in the acid market during the week under review shows no appreciable falling off. Manufacturers all realize that an era of exceptional prosperity is here, and they are taking the utmost advantage of it. Prices do not show any advance in this section, and in all probability will not do so in the near future, notwithstanding the fact that there is no superabundance of stocks available at the present. We quote: Acid per 100 lbs. in New York and vicinity, in lots of 50 carboys or more: Acetic, \$1.60@2, according to quality; muriatic, 18°, 80c.@\$1; 20°, 90c.@\$1.10; 22°, \$1@1.25; nitric, 40°, \$4; 42°, \$4.50@4.75; sulphuric, 85c.@\$1.10; mixed acids, according to mixture; oxalic, \$7.25@7.75. Blue vitriol is quoted all the way from \$3.25@3.50; alum, lump or ground, \$1.55@1.80. Glycerine for nitro-glycerine, 11½@12½c., according to quality and quantity.

**Brimstone.**—Late cables from the other side report that the brimstone market has advanced and remained firm. In this city the market is exceedingly quiet owing to the disinclination on the part of consumers to buy supplies at the present high values. Quotations for goods on the spot are, nominally, \$24.50@25 for best unmixed seconds. To arrive, August shipment, is held at \$24@24.50 for best unmixed seconds, and 90c. less for best unmixed thirds.

**Fertilizers.**—There has been more inquiry for certain fertilizing chemicals, and although actual sales have been unimportant a better feeling is distinctly noticeable in this market. The fall season really will not commence in earnest until next month, but already manufacturers are beginning to look forward to it and are making preparations for it. There is no change to report in quotations, which are as follows: Sulphate of ammonia, \$2.85 for bone goods and \$2.90@2.95 for gas liquor. Dried blood, \$1.95 @2 per unit for high grade and \$1.85@1.90 for low grade. Acidulated fish scrap, \$13.50 f. o. b. factory; dried scrap, \$23.50. Azofine, \$1.85@1.90. Tankage, \$17.50@21, according to grade. Bone meal, \$22.50@23.50.

**Double Manure Salts.**—Quotations are as follows for lots of from 10 to 50 tons ex-vessel New York: 48-53%, \$1.13½@1.23½; 90-95%, \$2.13@2.23½.

**Kainit.**—The market for kainit is very quiet. Sales during the past week amounted to 700 tons. Prices remain \$8.75 for invoice weight and \$9 for actual weight, New York and Philadelphia.

**Muriate of Potash.**—Nothing new to report in this market. It continues quiet. Arrivals aggregated 240 tons. No new sales are reported.

**Nitrate of Soda.**—Quotations this week are \$1.72½ ex-ship. For future shipments, quotations given by various dealers cover a wide range. Shipments near by are quoted as low as \$1.70, but later shipments are held at much higher figures.

**NOTES OF THE WEEK.**

It is announced that two extensive paint firms, C. T. Reynolds & Co. and F. W. Devoe & Co., will consolidate and carry on their business under a single corporate name. F. W. Devoe & Co. are already a stock company. Its president, J. Seaver Page, is quoted as saying that the name of the new company had not yet been fixed certainly, but that it might be "The F. W. Devoe & C. T. Reynolds Company." He said it was desired to retain both the firm names, because the two houses as they now

exist had sprung from the same original stock, and the trade throughout the country knew both equally favorably. All the brands, formulas and mixtures of both firms will be retained in the new company, and the business of both will be carried on under a single head. The headquarters of the consolidated company will be at the store now occupied by F. W. Devoe & Co., at 201 Fulton street. At present F. W. Devoe & Co. have a factory and store here and similar establishments in Chicago. The consolidation may involve the abolition of one store and one factory. This and several other details will be settled within a short time. The capital of the new company will be less than \$1,000,000, and the stock will all be taken by the members of the two firms. None of it will be offered for sale. The original firm from which both sprang was founded in 1857 under the name of Reynolds, Devoe & Pratt. The junior partner in this firm was the late Charles Pratt, of Brooklyn, who left the firm seven or eight years later to go exclusively into the petroleum business, in which he made his great fortune. In 1865 the firm of F. W. Devoe & Co. was founded by Mr. Devoe, and the parent firm continued business as Charles T. Reynolds & Co. The head of the original firm is now advanced in years and no longer engaged in active business in the firm which is carried on under his name.

**MINING STOCKS.**

[For complete quotations of shares listed in New York, Boston, San Francisco, Aspen, Colo., Baltimore, Pittsburgh, Deadwood, Dak., St. Louis, Helena, Mont., London and Paris, see pages 94 and 96.]

**NEW YORK, Friday Evening, July 22, 1892.**

At the Consolidated Stock and Petroleum Exchange the mining market has grown duller until now even the usually sanguine brokers agree in declaring it to be the dullest for many years. Nothing of importance or even of interest has occurred. The San Francisco market is, if anything, in a worse condition and dealing in mining shares just now is at a discount throughout the country.

The following circular has been sent to the stockholders of the Astoria, Hollywood & Middle Bar Gold Mines:

"As there is a combined indebtedness of about \$25,000 against these companies, I have been requested by a majority of the stockholders to form a new company for the purpose of assuming the stock and floating liabilities and of developing the properties. The new company will be organized under the laws of California, and will be called the 'Albany Gold Mining Company.' The capital will be \$1,000,000, divided into 1,000,000 shares of the par value of \$1 each. The stock of 'Albany Gold Mining Company' will be exchanged, share for share, for the stock of the Astoria, Hollywood & Middle Bar Gold Mines, upon the payment of an assessment of 2½ cents per share. The remaining shares of the Albany Gold Mining Company will be used to pay the floating liabilities of the above companies and to pay for an additional mine known as the Littlefield mine. This property, which consists of a full mining claim located between the Astoria and Middle Bar mines, has been purchased and will be deeded to the Albany Gold Mining Company. With this property added to that already held by the old companies, the Albany Gold Mining Company will have a full and indisputable title to mining property over a mile in length, located directly on the great gold belt of California, known as the 'Mother Lode,' which has produced so many millions. The company will have \$10,000 in cash in its treasury, which will be expended in developing the mines. In order to facilitate the exchange of stock and enable the 'Albany Gold Mining Company' to commence its work as early as possible, you are requested to forward your stock and assessment of 2½c. on or before July 25, 1892, to the undersigned at his office, 57 Broadway, New York. A negotiable receipt will be given for it, and the stock of the 'Albany Gold Mining Company' will be issued as soon as possible. H. R. Lounsbury."

Mr. H. R. Lounsbury stated to a representative of the ENGINEERING AND MINING JOURNAL that 275,000 shares of the three companies, of a total of 400,000 shares, have paid the assessment; or, in other words, that a majority of more than two-thirds required by the laws of California, has already been secured. The money will go into the new company's treasury and work will be started up as soon as possible on the Middle Bar and Littlefield mines. A charter has been applied for and the stock of a new company will be listed on the Consolidated Stock & Petroleum Exchange in place of the stock of the old companies.

Trading in the Comstocks shows no features of interest. We note the following sales: 20 shares of Bullion at 55c.; 400 shares of Comstock Tunnel stock at 13c.; 200 shares of Exchequer at 25c.; 150 shares of Mexican at \$1.60; 100 shares of Union Consolidated at \$1; 300 shares of Consolidated California & Virginia at \$3.60@3.75; 400 shares of Crown Point at 85c.; 200 shares of Sierra Nevada at \$1.15, and 200 shares of Yellow Jacket at 75@84c., the first ruling at the close.

Of the Tuscarora stocks we note sales of 200 shares of Belle Isle at 17c. and 200 shares of Navajo at 12c.

Of the California stocks there were sales of 300 shares of Bodie Consolidated at 30@35c.; 100 shares of Standard at \$1.65; 800 shares of Belmont at 39@40c., and 1,000 shares of New Brunswick at 15c. to 18c.

Trading in the Colorado stocks was small in volume and distributed over many of the stock lists. Of Breece 200 shares changed hands at 35@40c. Enterprise was dealt in at the New York Stock Exchange to the extent of 700 shares at \$4.75@5.25. Leadville Consolidated was quiet, only 300 shares being sold at 13@15c. Little Chief shows sales of 500 shares at 26@29c. Transactions in Silver Chord amounted to 900 shares at 35c. Of Small Hopes 400 shares were sold at 95c.

Of the Black Hill stocks there were sales of 100 shares of Father de Smet at 30c. Iron Hill was traded in for the first time in some weeks; 300 shares were sold at 25c. According to the official lists of the Exchange sales of Sullivan Consolidated amounted to 400 shares at 99c.@\$1.

Sales of Horn Silver this week aggregate 300 shares at \$3.40 to \$3.45.

Phoenix of Arizona was the most active stock on the list. It was specially in demand at New York Stock Exchange and total sales this week aggregate 6,500 shares. It is said that friends and prominent stockholders of this company have deposited in a Trust company the funds necessary for the purchase of the mills described in our issue of last week and for the prosecution of the work outlined by the company. We understand that at least \$70,000 has been so deposited. The reason for the activity of the stock during the past week is directly attributable to this information and to the conviction on the part of the public that work is to be prosecuted at the company's property energetically and intelligently.

**Boston.**

July 21.

(From our Special Correspondent.)

The Montana group of copper stocks has been the feature of the market the past week and the pressure to sell them forced prices down to the lowest point so far this year, especially is this true with Butte & Boston, whose financial position is in rather an unsettled condition owing to the failure to furnish funds to provide for the floating debt.

In the early dealing there was a good deal of stock offered for sale, and it was forced down to \$7, the lowest point in its history. At this figure there was evidence of support and all the stock offered was taken, and the price advanced to \$8½, from which it reacted to \$8¼ and has held quite steady to-day at that figure.

Boston & Montana sold down to \$33½, after selling at \$35½ at the close of last week. From this point it rallied to \$35½, with only a slight reaction and closed quite firm. It is stated that there was quite a large short interest in both these stocks, which has been pretty generally covered and a good rally is confidently anticipated. The higher price of ingot copper in London has given a better tone to the market and better prices are looked for in consequence. Outside of these two stocks there has been very little doing and the changes are not marked.

Calumet & Hecla sold at \$275 and Tamarack advanced to \$160, with reaction to \$155. Tamarack Jr. has continued to rule heavy, declining to \$27 on the rumor that the mine is not looking as well as the early reports indicated.

Osceola sold at \$27½ and \$28 on very fair offerings and is quite firm.

Centennial sold at \$8, a decline of ½.

Franklin holds quite steady at \$11¼ to \$12.

Keamsarge declined ½ to 10½ on sale of 200 shares only.

Atlantic dropped to \$9½ on 100 shares. A small lot of Allouez was quoted at 80c., and Santa Fe sold same as last week at 12½.

In silver stocks there is absolutely nothing doing. A small lot of Napa quicksilver sold at \$6, and it is in demand at that figure.

3 P. M. The market showed an improving tendency this afternoon, and Boston & Montana advanced from 35¼ to 36, with sales of about 1000 shares.

Butte & Boston also improved ¼, selling at \$8½.

No other changes are noted.

**San Francisco.**

July 15.

(From our Special Correspondent.)

Favorable reports from the Comstock have been current on the street for the past week, but they have not served any particularly good purpose, the market remaining dull and heavy until the close today. The arrival here in the near future of Bonanza Mackay does not tend to enliven matters, for it is notoriously true that his advent on the scene generally means a decline in prices. Why it is so is hard to say, but the fact remains. In the Hale & Norcross mine the ground lying between the 1,700 and 1,900 levels is all virgin, and the work being inaugurated there gives hopes that something may be found that will not only boom that stock, but enliven the market generally.

The total recorded sales to-day only amounted to 8,300 shares, the largest sale being a block of 1,000 outside stock. The leading Comstocks were not in demand, trading being almost wholly confined to the smaller priced stocks. At the north end Consolidated California & Virginia sold for \$3.60, with 250 shares sold during the regular sessions of the Board. Ophir sold a trifle more freely at \$2.50, and Mexican at \$1.60. Union Consolidated sold for \$1.05 and Utah for 30 cents.

In the middle group of Comstocks sales were light along the entire line. Best & Belcher sold for \$1.75;

Chollar for 65 cents; Gould & Curry for \$1.05; Hale & Norcross \$1.30; Potosi for 40 cents, and Savage for \$1.25.

Of the Gold Hill & South End Comstocks Belcher has been the only stock in demand. While the news from the mine has continued favorable, the ore being found gives no indication of permanence, and consequently the price of the stock has not advanced to any important figure.

The only large offering of outside stocks has been in the case of Commonwealth, a block of 1,000 being sold for 5 cents. Del Monte ruled at the same figures. Of the Bodies, Bodie Consolidated sold for 15 cents, and Bulwer Consolidated for 45 cents. A small lot of Eureka Consolidated also were sold, the ruling price being \$2.15.

The market at the close was perfectly stagnant with prices, however, continuing steady.

SAN FRANCISCO, July 22.—(By telegraph).—The opening quotations to-day are as follows: Best & Belcher, \$1.50; Bodie, 30c.; Belle Isle, 15c.; Bulwer, 40c.; Chollar, 55c.; Consolidated California & Virginia, \$3.60; Eureka Consolidated, \$1.50; Gould & Curry, 95c.; Hale & Norcross, \$1.20; Mexican, \$1.55; Mono, 30c.; North Belle Isle, 15c.; Navajo, 15c.; Ophir, \$2.55; Savage, \$1.05; Sierra Nevada, \$1.05; Union Consolidated, 80c.; Yellow Jacket, 60c.

DIVIDENDS.

De Lamar Mining Company, Limited, dividend of 25 cents per share, payable July 26th, at the office of the company, No. 6 Draper's Gardens, London, E. C., England.

Ontario Silver Mining Company, dividend No. 194 of 50 cents per share, \$75,000, payable July 30th, at the office of Messrs. Lounsbury & Co., Mills Building, No. 15 Broad street, New York. Transfer books close July 25th and reopen August 1st.

Quincy Mining Company, dividend No. 48 of \$3 per share, \$150,000, payable August 22d, at the office of W. H. Daniels, No. 35 Congress street, Boston, Mass. Transfer books close July 22d and reopen August 23d.

ASSESSMENTS.

Table with columns: COMPANY, No., When levied, D't'nc'd in office, Day of sale, Amt per share. Lists companies like Alta, Nev., Belle Isle, Nev., Blue Bird, S. Dak., etc.

PIPE LINE CERTIFICATES.

Table for CONSOLIDATED STOCK AND PETROLEUM EXCHANGE. Columns: Opening, Highest, Lowest, Closing, Sales. Rows for dates 17, 18, 19, 20, 21, 22.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, July 22d. PRODUCTION OF BITUMINOUS COAL for week ending July 16th, and year from January 1st.

EASTERN AND NORTHERN SHIPMENTS.

Table with columns: Company, Week, 1892, Year, 1891, Year. Lists companies like Phila. & Erie R. R., Cumberland, Md., etc.

\*Week ending July 7th.

WESTERN SHIPMENTS.

Table with columns: Company, Week, 1892, Year, 1891, Year. Lists companies like Pittsburg, Pa., Westmoreland, Pa., etc.

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending July 16th, 1892, and year from January 1st, in tons of 2,000 lbs.: Week, 94,122 tons; year, 2,985,900 tons; to corresponding date in 1891, 1,935,348 tons.

Statement of shipments of anthracite coal (approximated) for week ending July 16th, 1892, compared with the corresponding period last year.

Table with columns: Regions, July 16, 1892, July 16, 1891, Difference. Rows for Wyoming Region, Lehigh Region, Schuylkill Region, Total.

Statement of shipments of anthracite coal for month of June, 1892, compared with the corresponding period last year, compiled from the returns furnished by the mine operators.

Table with columns: Regions, June, 1892, June, 1891, Difference. Rows for Wyoming Region, Lehigh Region, Schuylkill Region, Total.

Table with columns: Regions, For year 1892, For year 1891, Difference. Rows for Wyoming Region, Lehigh Region, Schuylkill Region, Total.

The stock of coal on hand at tide water shipping points, June 30th, 1892, was 667,724 tons; on May 31st, 1892, 684,662 tons; decrease, 16,938 tons.

Anthracite.

The official figures of the production of anthracite during June are given in the following table, in which is also included the production in June, 1891, and the aggregate for the first six months of the years 1891 and 1892:

Table with columns: Regions, June, 1892, June, 1891. Rows for Wyoming, Lehigh, Schuylkill, Total. Also includes PRODUCTION DURING FIRST SIX MONTHS OF 1892 AND 1891.

The stock of coal on hand at tide water shipping points on the 30th June, 1892, is given as 667,724 tons, and on the 30th May as 684,662.

As will be seen by looking through the table, the production in the Wyoming district continues to increase considerably, while the Lehigh production shows a slight but steady decrease, and the Schuylkill shows a decrease at present, though an increase when the half year is considered.

The stock of coal on hand at tide water shipping points on the 30th June, 1892, is given as 667,724 tons, and on the 30th May as 684,662. The trade generally is quoted as slow, but we believe that some consumers are waking up and giving out their orders ahead while the price is no higher.

It is an undoubted fact that some producers outside the ring are selling at lower than the ruling rates. It has even been said in some quarters that the Pennsylvania Coal Company were underselling the Reading, but if the starters of this rumor had done business with this company they would soon have found out that they would be forced to pay schedule rates.

tagonistic to the Reading Company in the same way as the Pennsylvania Coal Company, but this also is proving a fallacy. In April last the rate from the mines to tidewater was paid at \$1.44 a ton, or 40% on the selling price at tidewater.

A report to the effect that the Philadelphia & Reading was about to increase its terminal facilities led to the report that the company was about to engage in the retail coal business and that the improvements in the accumulation were in connection with the establishment of such trade.

The litigation between the State of New Jersey and the Reading continues. The sittings of the court recommenced on Tuesday and have been continued throughout the week.

We hear that some adventurous spirits are thinking of reviving the old scheme of forming anthracite culm into briquettes and so starting an opposition to the regular anthracite trade.

Bituminous.

The bituminous coal trade is generally quoted as still in an unsatisfactory state, and it is stated that no improvement can be looked forward to in the near future. The blockades on the Pennsylvania Railroad continue to hinder shipments.

This is either a false report or a bluff on the part of the railways. Perhaps the report may have arisen through confusion with the announcement of an increase in the freight rates on anthracite.

There is a prospect of some riotous proceedings on the part of the strikers at the collieries at Opeokiska, a few miles below Fairmont, in the upper Monongahela coal fields, West Virginia.

In discussing the labor question with leading men in the bituminous trade, there are indications of a feeling among the coal-owners that the time is drawing near when a readjustment of the rate of wages will have to be made.

NOTES OF THE WEEK.

The Philadelphia, Reading & New England Railroad is incorporated as the result of a merger of the Poughkeepsie Bridge and the Central New England & Western. Now that the possession of the bridge

and its connections has been secured, it is the intention of the Reading to throw over the new line an enormous volume of business. One of the losers will be the Erie, which, through a favorable contract with the New England road, has been enabled to place a large anthracite and bituminous tonnage along its line, though with little net profit on account of heavy cost. The recent contract made between the Reading and the New England will place the Reading upon as good and perhaps better terms than the Erie.

**Boston.** July 20. ☐

Buying is still light in anthracite coal. Dealers seem as indisposed to purchase now as they were the first of the month. This is due, perhaps, to their full stocks. Prices are held very firm all around. There is talk of the coal combination making another advance August 1st. These are rather dull times for another advance, yet if it comes it will undoubtedly be to stay.

Quotations are: Net f. o. h., at New York, stove, \$4.50; egg, \$4.20; free broken, \$3.90; chestnut, \$4.40; Lykens Valley, f. o. b., net, Philadelphia, broken, \$4.75; egg, \$5.25; stove, \$5.75; chestnut, \$4.75.

Soft coal is fully as quiet as hard. Dealers seem to have sufficient of this stock for their present needs and are in no hurry to buy more. The companies are still encountering difficulty in getting vessels to move their coal at tidewater. Clearfield coal on cars here is selling at \$3.15, and George's Creek \$3.45 per ton.

Freight rates are quite firm. We quote: From New York to Boston, 60¢/65¢; from Philadelphia to Boston, 70¢/75¢; Philadelphia to Portland, 70¢/75¢; to Bath, \$75¢/80¢; to Providence, 65¢/70¢; from Baltimore to Boston, 80¢; Newport News to Boston, 70¢/75¢; Sound points, 70¢.

The committee on prices has made its final report, and it has recommended that no changes be made this month. The proposition is to advance prices next month if the combination makes another advance, as it is now reported they will. Retail quotations are: Stove, \$6; nut, \$6; egg, \$5.75; furnace \$5.50; Franklin, \$7.25; Lehigh egg, \$6; Lehigh furnace, \$6; wharf prices 50 cents less than the foregoing.

The receipts of coal at this port for the week ending July 16 were 50,108 tons of anthracite and 24,657 tons of bituminous, against 65,810 tons of anthracite and 17,318 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 1,112,789 tons of anthracite and 416,797 tons of bituminous, against 1,016,666 tons of anthracite and 588,154 tons of bituminous for the same time last year.

**Buffalo.** July 21.

(From our Special Correspondent.)

Nothing important in the coal trade to announce, other than dealers expect an advance of 25c. per ton in quotations, to take effect on and after August 1st.

In consequence of severe storms on the lake last week several vessels laden with coal were sunk or driven ashore.

Mr. Joseph D. Hanrahan has the contract for the Buffalo Poor Department. The prices were \$4.75 for stove and \$4.85 for chestnut per net ton delivered.

Lake freights are steady, excepting a decline of 5c. on Racine and Duluth and Lake Superior figures.

The shipments of coal by lake from this port from July 14th to 20th, both days inclusive, were 75,753 net tons, distributed about as follows: 31,400 to Chicago, 14,900 to Milwaukee, 8,850 to Duluth, 3,100 to Superior, 1,845 to Toledo, 700 to Racine, 1,950 to Saginaw, 2,300 to Ashland, 600 to Hancock, 2,473 to Fort William, 600 to Manitowoc; 1,200 to Bay City, 775 to Sault Ste. Marie. The rates of freight were as follows: 60c. to Chicago, Milwaukee and Green Bay; 35 to 30c. to Duluth; 30c. to Superior; 35c. to Bay City, Port Huron and Asland; 25c. to Toledo and Amherstberg; 40c. to Saginaw; 70 to 65c. Racine; 50c. to Kineardine, Portage and Sault Ste. Marie; 70c. to Ludington; 45c. to Fort William, and 50c. to Hancock. Closing steady, with fair demand for tonnage for all lake ports.

Buffalo is to have another iron works. The certificate of incorporation of the Buffalo Furnace Company was filed yesterday, with capital stock of \$200,000. The object of the company is to manufacture and sell all kinds of iron, steel, etc.

It is expected that the Lehigh Valley Railroad will open its new connecting line in this city September 1st, as on that day its lease with the New York, Lake Erie & Western Railroad terminates.

The President has signed the River and Harbor Bill. Among the items is \$300,000 for the improvement of Buffalo harbor and extension of the breakwater.

Mr. E. T. Johnson, General Freight Agent of the Western New York & Pennsylvania Railroad, has been elected chairman of the Buffalo Freight Committee in place of Mr. John Crampton, resigned.

The Poughkeepsie Bridge has been sold under foreclosure of mortgage and will be turned over to the Philadelphia & Reading Company.

Near Snow Shoe, in Pennsylvania, the Lehigh Valley company have a great many coal mines and coke ovens, the product of which has been carried over the Pennsylvania Railroad. Since the Reading company has obtained control of the Lehigh, suitable traffic arrangements have been made with the Beech Creek roads, and a three-mile connection is being constructed.

The coal traffic through the Sault Ste. Marie Canal

this season to July 1st aggregates 1,015,778 net tons, as compared with 806,291 tons in 1891, 684,729 tons in 1890, 419,493 tons in 1889 and 670,007 tons in 1888.

Canal movement of coal for second week in July: Receipts, 632 net tons; shipments, 1,428 net tons.

**Errata.**—Through an unfortunate error of compilation, discovered too late to remedy, mistakes occurred in the footings of the coal movement of the port of Buffalo, published in the last issue of the ENGINEERING AND MINING JOURNAL. The following corrections should be made: "Shipments by lake westward for month of June, 374,069 net tons, etc.," also "For the season, 778,439 net tons, etc.," and "the aggregate shipments by lake westward show a decrease thus far this season of 54,311 net tons as compared with 1891, and an increase of 181,496 net tons as compared with 1890."

**Chicago.** July 21.

(From our Special Correspondent.)

The market is steady on anthracite at wholesale and retail. Orders from consumers and country dealers are coming in a little more freely and are filled at full prices. Both parties seem to have made up their minds that this consolidation, called the "combine" has come to stay for this year at least, and any slip or mistake now made that would let the prices weaken would be disastrous to all the anthracite interests for years to come. In other words, jobbers and consumers would hold off buying, for the reason that they could get their coal later in the season cheaper than they could earlier, and while all of them deprecate (execrate) the evident intention of the "combine" to make up all of their so-called losses in one year by the two large advances in prices, it will have its effect another year if the consolidation is maintained, in a better market all through the earlier months of the year. For the future of the coal trade and the largely increased consumption of anthracite in the west, it appears to many of the dealers here that a wiser course would have been to have maintained a steady market at \$5.50 at wholesale and \$6.50 at retail, which would have been equivalent to \$2.40 at breaker for their coal and a much larger tonnage would have taken during the year. This would have required about two years to have made the same amount of money, but it would have aroused no antagonism in the minds of the public press and consumers, and would have been an injury to no one—seller or buyer. We know of very wealthy parties in Chicago who use 100 to 150 tons a year in their private residences, who as a matter of principle, have decided to and will burn fuel gas in their houses and for their electric light plants, even though they may find before the season is over that it costs more than hard coal. They object to being gouged, as they forcibly express it.

Distribution of coal to outside dealers proceeds very slowly. A salesman for one of the individual coal companies had been out two weeks ending July 18th and had not succeeded in selling a car of anthracite. So that while demand is reasonably fair in some localities it is marked by an entire absence of it in others. There has, however, sprung up a better inquiry during the past week, and the fact of a further advance in August will cause greater activity between now and the end of the month.

Bituminous coal is quiet and current trade is anything but inspiring. By far the greater proportion of contracts for steam coal have been placed for the season of 1892-1893, and business generally is of a light character on account of so many plants being closed down for repairs, etc. Domestic consumption at this season is also very light, and although a good deal of soft coal is required for threshing purposes, the demand at present is not active. Mines in Northern Illinois and Western Indiana are nearly all of them making full time. As to prices, circular rates are more or less shaded.

Coke continues quiet and although there is some improvement it is only comparatively so. Foundries are taking in more work and consequently require more fuel, but in a general way it is dull. It is now beyond a doubt that crushed coke will play a prominent part as a domestic fuel in this city as a substitute for the high-priced anthracite.

Quotations are: \$4.65 furnace; \$5.05 foundry crushed; \$5.40 Connellsville; West Virginia, \$3.90 furnace, \$4.10 foundry; New River foundry, \$4.75; Walston, \$4.65 furnace, \$5 foundry.

Circular prices are at the following rates: Lehigh lump, \$6.50; large egg, \$5.60; small egg, range and chestnut, \$5.85. Retail prices per ton are: Large egg, \$7; small egg, range and chestnut, \$7.

Prices of bituminous per ton of 2,000 lbs., f. o. b. Chicago, are: Pittsburgh, \$3.15; Hocking Valley, \$3; Youghiogeny, \$3.25; Illinois block, \$1.90@2; Brazil block, \$2.35.

**Pittsburg.** July 21.

(From our Special Correspondent.)

**Coal.**—The coal trade is not very active. There has been no shipments by water. It is fair to presume that navigation is suspended until fall.

The lower markets have sufficient stock on hand to last the balance of the year. The amount of coal afloat between Natchez and New Orleans amounts to 536 boats, each containing 2,500 bushels, and by barges with 1,300 bushels each. Iron consumption, 57 boats and three barges. Receipts for June, 113 boats, three barges. Taking these figures into consideration the prospect for high prices is not very bright. The stock of coal at Cincinnati and Louisville is large. The lake business continues good with liberal shipments. Only a portion of the tow boats that went out in the late rise were able to reach

port, the balance are laid up above Cincinnati, where they will have to remain until we have a rise, which may not be before fall.

**Connellsville Coke.**—Trade since our last has been very unsettled. The coke men are waiting patiently for a settlement of the iron question; how long they will have to wait is something that can't be found out. There is a large falling off in shipments compared with previous weeks, as it became necessary to restrict production to keep pace with the falling off in demand. The Frick Coke Company have blown out the remaining 50 ovens at their White mines, closing the plant entirely; also 40 ovens at their Adelaide plant. During the week a total of 358 ovens made five-day runs; the other active ovens, 4,165, only made four days. The McCline Coke Company are restricting production; week's shipments aggregated 96,066 tons against 129,365 the preceding week, a deficiency of 33,299 tons. The distribution was to Pittsburgh, 1,600 cars; points east of Pittsburgh, 1,200; points west of Pittsburgh, 2,537; total, 5,337 cars against 7,196 the preceding week. Prices nominal.

**Coal Shipments by the Ohio River.**

The following are the monthly coal shipments by the Ohio River for the first six months during the past five years—1888 was the largest and 1892 the smallest:

	1888.	1889.	1890.	1891.	1892.
January	11,746,000	3,415,000	11,820,000	3,630,000	4,672,000
February	14,110,000	2,986,000	11,777,000	308,000	9,836,000
March	14,792,000	16,767,000	13,214,000	7,862,000	11,970,000
April	8,881,000	12,355,000	11,371,000	6,576,000	8,539,000
May	9,417,000	1,230,000	8,351,000	none	12,654,000
June	none	8,885,000	4,085,000	14,806,000	4,254,000
First 6 mos.	61,916,000	45,638,000	60,118,000	43,182,000	41,925,000

**METAL MARKET.**

NEW YORK, Friday Evening, July 22d, 1892.

Prices of Silver Per Ounce Troy.

July.	Sterling Exchange.	London.	N. Y. Cents.	Value of sil. in \$1.	July.	Sterling Exchange.	London.	N. Y. Cents.	Value of sil. in \$1.
16	4.88	39 3/4	86 3/4	.671	20	4.87 3/4	39 3/4	86	.664
18	4.88	39 3/4	86 3/4	.671	21	4.87 3/4	39 3/4	86	.664
19	4.87 3/4	39 3/4	86 3/4	.667	22	4.87 3/4	39 3/4	86 3/4	.666

Fluctuations in silver have moved within a narrow range the last week. The shipments to London have been small owing to the fact that rates were higher here than abroad. As it is, between seasons, a large demand for European account is not to be looked for at present.

The United States Assay Office at New York reports the total receipts of silver for the week to be 123,000 ounces.

**Government Silver Purchases.**

WASHINGTON, D. C., July 22 (by telegraph).—Treasury Department purchased to-day 380,000 ounces of silver at prices ranging from '868 to '8687 per ounce fine.

**Gold and Silver Exports and Imports at New York.**

	Week ending July 16	Since Jan. 1.	Week ending July 16.	From Jan. 1.
Gold	\$1,092,950	\$45,954,573	\$26,491	\$6,548,906
Silver	146,758	12,141,440	71,284	947,905
Totals	\$1,239,708	\$58,096,013	\$97,775	\$7,496,811

At this time in 1891 there had been exported \$71,923,180 in gold and \$7,593,652 in silver, against imports of \$1,977,395 in gold and \$1,154,093 in silver. Net exports of gold from Jan. 1 to July 16, 1892, \$39,405,467; for the corresponding period of 1891, net exports were \$70,145,735. This year, too, the United States has exported nearly twice as much silver as in the preceding year.

There have been no demands for gold for export this week, and we think it highly probable that from now on there will be a steady influx of the yellow metal.

**Domestic and Foreign Coin.**

The following are the latest market quotations for the leading foreign coins:

	Bid.	Asked.
Mexican dollars	\$.63	\$.63 1/2
Peruvian soles and Chilean pesos	63 3/4	.65
Victoria sovereigns	4.90	4.92
Twenty francs	3.90	3.93
Twenty marks	4.75	4.78
Spanish 25 pesetas	4.79	4.81

**Copper.**—There has been quite some strength developed locally in Lake copper, though the buying at the higher prices has been confined to speculators and dealers, manufacturers evincing no interest whatever in the course of affairs, claiming that general business conditions warrant no advance, anyhow, and that they are covered for some time to come and therefore have no occasion to come into the market. That they are covered we fully believe, but only for a few weeks, and when their stocks are exhausted they will naturally have to pay whatever price is asked of them, and this price will depend on

whether the Lake companies, or the larger ones, meet the current demand at legitimate values or withhold from selling, except at higher values. If one or two only should pursue such a course, their action can have no permanent effect, as last year we exported 25,000 tons, and still had more than enough to supply the demand at home. Exports this year having amounted to very little, comparatively, there will not be the slightest difficulty in securing sufficient supplies. After closing last week at 11½, the Lake copper market opened this week at 11½ and closes at 11½ to 11¾ with the buying, as already said, purely speculative, though about 2,000,000 lbs. have changed hands during the week. Casting copper has not in the least benefited by the improvement in Lake, and the market for it shows as much demoralization as for weeks past, there being free sellers at 10½ delivered 30 days, or equal to about 10½@½ at refiners' works.

Arizona copper remains unchanged at our last week's quotations of 9½@9¾c.

The G. M. B. market in London has felt the influence of the speculative buying here, and after closing last week at £44 12s. 6d. and £45 for spot and futures, respectively, it opened at £44 15s. and £45 2d. 6d., and closes at £45 for spot and £45 10s. for futures, manufactured sorts remaining unchanged from the last quotations given. Statistics are cabled over as having increased 2,300 tons in the first half of the month, and this can hardly assist a bull movement.

The exports of copper from the port of New York during the past week were as follows:

To	Copper Matte.	Lbs.	
To Liverpool—	Copper Matte.	Lbs.	
S. S. Ernesto.....	2,195 bags	240,460	\$12,000
S. S. Nevada.....	3,945 "	423,810	21,000
To Hamburg—	Copper Matte.	Lbs.	
S. S. Moravia.....	45 casks	56,250	\$6,900
S. S. Normannia.....	16 bars (bull.)	1,057	2,000

**Tin.**—The change here, though in the direction of lower prices, has not been as great as that abroad, because the disparity between the two markets has not yet been fully made up. Against last week's closing prices of 21c. for spot, 21.25c. for August-September, and 21.50c. for the balance of the year, the opening figures were 20.75c., 20¾c. and 21½c., and the closing 20.60c., 20.80c. and 21c. In London the market opened as it closed last week, but on Tuesday there came a drop, the closing figures for the week being £95 5s. for spot, and £95 for three months, against £97 2s. 6s. and £96 15s. last week.

**Lead.**—The tendency to weakness has made further progress, and to-day the market closes with sellers at \$4.10. It is true the quotation for bullion has been reduced to 4c., but that hardly gives a true representation of the market, as there are buyers for moderate quantities at \$4.05. For some time to come the market is likely to keep its present level, as most manufacturers have fair supplies on hand, while those who have not are buying from hand to mouth only and affording no pretext with which to advance values. Speculation is entirely absent. The London market is also lower, English lead being quoted at £10 10s. @ £10 11s. 3d. and Spanish lead at 2s. 6d. less.

**Chicago Lead Market.**—The Post, Boynton Strong Company telegraph us as follows: "The market has ruled quiet, with no business to test values until late in the week, when 200 tons sold at 4c. spot delivery."

**St. Louis Lead Market.**—The John Wahl Commission Company telegraph us as follows: "Lead is still on the down grade, sellers being rather anxious to place metal, and buyers showing no disposition to take hold has caused prices to drop as low as 3.95c. and even this figure appears to be no inducement. We should not be surprised to see lead go still lower."

**Spelter.**—This metal is without much change, what little there is being for the worse, as smelters show more anxiety to realize. We quote 4.75 for spot and 4.70 for futures, delivered at New York. The London quotation for ordinary brands is £21 12s. 6d., and for specials £21 15s.

**Antimony** is in fair demand, Cookson's at 13¾c., L. X. at 12¾c., and Hallett's at 10¾@11c.

Nickel is quiet at 60@62½c.

## IRON MARKET REVIEW.

NEW YORK, Friday Evening, July 22d, 1892.

The most important feature in this week's iron market is the publication of the statistics of pig iron production for the first six months of the year, prepared by the American Iron and Steel Association. These statistics will be found on another page of the JOURNAL. The total production was 4,799,056 gross tons or of 2,240 lbs., and as will be seen from our last week's issue our own estimate (See ENGINEERING AND MINING JOURNAL, July 16, p. 68) was very nearly correct, being 4,795,900 gross tons.

The Homestead troubles are occupying less attention now that all physical danger is past. The leading strikers are being indicted for murder. The works are being gradually filled up by non-union workers, and houses are being built within the inclosure for their occupation. When the mills are to recommence work is not quite certain, but it is stated that there is a prospect of a partial re-commencement next week. The State is fully alive to the necessity of preventing further outbreaks.

**Pig Iron.**—The following tables give the estimated output of the blast furnaces for the week end-

ing Saturday, July 9th, 1892, and for the first 27 complete weeks of the year 1892 up to and including July 7th, together with the output for the week ending Saturday, July 8th, 1891, and for the first 27 complete weeks of the year 1891 up to and including July 6th, 1891:

ESTIMATED OUTPUT OF BLAST FURNACES FOR WEEKS ENDING JULY 9TH, 1892, AND JULY 8TH, 1891.

	Anthracite.		Coke.		Charcoal.		Total.	
	No. of furnaces in blast.	Output in gross tons.	No. of furnaces in blast.	Output in gross tons.	No. of furnaces in blast.	Output in gross tons.	No. of furnaces in blast.	Output in gross tons.
1892	74	32,000	140	127,000	42	10,700	256	169,700
1891..	92	36,900	152	121,600	51	10,700	295	169,200

ESTIMATED OUTPUT OF BLAST FURNACES IN 1892 AND 1891 FOR FIRST 27 WEEKS UP TO JULY 7TH AND JULY 6TH, RESPECTIVELY.

	Anth'cite. Gross tons.	Coke. Gross tons.	Charcoal. Gross tons.	Total. Gross tons.
To July 7th, 1892...	999,400	3,676,900	289,400	4,965,600
To July 6th, 1891..	1,019,300	2,357,700	297,800	3,673,900

The pig iron merchants all say that business is picking up its strength again since the last settlement of prices by the Thomas Iron Company. Inquiries and orders are much more frequent, and consumers are giving up the idea that prices will go any lower in the near future. The decrease in the output of blast furnaces continues, and, perhaps, if some of the makers of Southern iron are forced to give up the manufacture, as seems probable, the prices of Pennsylvania iron will revive. Many of the Southern furnaces were excited by town boomers without much intention of making a profit on their iron. This town booming is not a great success, and the furnaces may eventually have to close down. Whenever we hear of desperate efforts on the part of Southern producers to get rid of their iron at any price, it is clear that they are hard-up, and often on the "ragged edge" of bankruptcy.

During the past week or so one of the Southern firms have succeeded in placing fairly large lots of their irons east and west at lower than schedule rates. No manufacturer here, however, thinks that these sales will influence the general trade. The Pittsburgh difficulties have had no effect yet on the pig iron market here. The freight rates on Southern pig iron by the Queen & Crescent route to Pennsylvania and New York States have been revised, and now stand as follows: From Dayton and Rockwood, Tenn., to New York City (rail and water), \$4.05 per ton of 2,268 lbs.; to Albany, \$4.95; to Philadelphia, all rail, \$4.35, and rail and water \$4.05; to Scranton, \$4.84; to Reading \$4.21. From Birmingham district to New York City, rail and water, \$4.01; to Albany, \$5.65; to Philadelphia, all rail, \$4.31, and rail and water, \$4.01; to Scranton, \$5.09; to Reading, \$4.31.

**Spiegeleisen & Ferromanganese.**—There has been very little business in spiegeleisen, and not very much more in ferromanganese during the past week. Dealers are quoting \$60@ \$61 for ferromanganese, but \$59 is the probable selling price.

**Steel Rails.**—The steel rail trade continues to show the same features as it has done for the past year and more. The only item of interest that we have heard of during the past week is that the Pennsylvania Steel Company has been rolling 100-lb. rails for the Pennsylvania Railroad. The amount supplied was only 2,000 tons, and it is quite an experimental order. The question of heavy rails is one which is attracting the attention of the railroads at present, and we ourselves are of the opinion that more notice should be taken of the necessity of increasing the sections generally. Our present sections are not suited to the very heavy trains and high speeds which are in vogue now. The increase in the strength of the permanent way has not been proportionate to the increase in the weight of the rolling stock and the speed of the trains. Besides this experimental order the only news to be obtained is that a Western railroad has transferred its patronage for rails to an Eastern firm. Prices are still \$30 at mill and \$30.75 at tidewater.

**Rail Fastenings.**—The market for these commodities is quiet and nothing particular is to be reported. Prices continue as follows: Fish and angle plates 1.55@1.65c. at mill; spikes 1.90@2c.; bolts and square nuts 2.50@2.70c.; hexagonal nuts 2.70@2.80c. delivered.

**Tubes and Pipes.**—This market continues to exhibit no special features. The business is very regular on contract and no new business is reported.

**Merchant Iron and Steel.**—We do not hear of any great demand for any particular division of this market. The trade is regular and not very brisk. Quotations continue as follows: Musket's special, 48c.; English tool steel, 15c. net; American tool steel, 6½@7½c.; special grades, 13@18c.; crucible machinery steel, 4.75c.; crucible spring, 3.75c.; open hearth machinery, 2.2 c.; open hearth spring, 2.50c.; tire steel, 2.25c.; toe calks, 2.25@2.50c.; first quality sheet, 10c.; second quality sheet, 8c.

**Structural Iron and Steel.**—This division of the iron trade shows the greatest improvement. It is the usual thing for orders to come in freely at this time of the year, but this year is more favorable than usual. The price of angles is stiffening considerably and nothing can be obtained at less than 2.15c. on dock. Of course the housesmiths' strike in this city is restricting the consumption, but orders are booked so far ahead here that the effect is so far slight. Another influence is being felt here; in some places the union men are refusing to use constructional iron that has been made at the Carnegie Mills and at non-union mills, and the consequence is that some orders for material are coming to Eastern houses. The trade in all branches is good, but except in the case of angles no difference of price is to be observed. Prices are as follows: Beams, 2.2@2.3c.; angles, 2.15c.; sheared plates, 1.90@2.10c.; tees, 2.40@2.60c.; channels, 2.35@2.50c. Universal plates, 2@2.10c.; bridge plates, 2@2.10c., all on dock. The housesmiths' strike continues and is having a bad effect on the local demand for building material.

### Buffalo.

July 21.

(Special report by Rogers, Brown & Co.)

The demand for pig iron has fallen off quite perceptibly. The market is taking on its usual mid-summer quietness with only a fair run of small orders. The feeling is not that another slump in prices is to be expected, but simply a slight letting up on consumption and an entire lack of speculative inquiry into the future. Our quotations remain unchanged, and are for cash f. o. b. cars Buffalo: No. 1 X Foundry Strong Coke Iron Lake Superior ore, \$15.50; No. 2 X Foundry Strong Coke Iron Lake Superior ore, \$14.50; Ohio Strong Softener No. 1, \$15.50; Ohio Strong Softener No. 2, \$14.50; Jackson County Silvery No. 1, \$18; Jackson County Silvery No. 2, \$17; Lake Superior Charcoal, \$16.50; Tennessee Charcoal, \$17; Southern Soft No. 1, \$14.50; Alabama Car Wheel, \$19; Hanging Rock Charcoal, \$20.50.

### Chicago.

July 21.

(From our Special Correspondent.)

The different phases of the troubles in Pittsburg and vicinity continue to be discussed by the press and the general public. A new complication is liable to arise in the building trades' unions when the Carnegie Steel Company resume operations. The Architectural Iron Workers' Council of this city have resolved to refuse to handle any of the product of those mills if made by non-union men. The bricklayers' and stone-masons' unions have adopted similar resolutions. These, if carried out, will seriously impede progress on the large buildings already placed under contract, and those contemplated. In the crude iron market here there is little of special interest to note, if we except the increasing and stronger competition between Northern and Southern furnace companies. Consumption in a general way is fully up to the average for midsummer and contract iron is taken without demur. Beams, channels, angles and other structural and architectural shapes have advanced anywhere from five to ten dollars a ton. This, though, is only temporary, and a reaction will take place as soon as mills resume. Other specialties, plates and bars, have also stiffened in price, due, of course, entirely to idle condition of mills, and will disappear as soon as operatives commence work. Another specialty deserving passing notice is merchant steel, the demand from implement makers being far in advance of last year, which was the heaviest on record.

**Pig Iron.**—Notwithstanding the fact that we are approaching the usual midsummer dullness, and although prices continue as low as ever and weak demand for local brands of pig iron continues fair. Transactions have been moderate in quantities of several hundred tons to two thousand, and most of the larger lots have been renewed contracts. It is not expected that any radical change will occur in the conditions now prevailing for some weeks, but that there will be a steady though quiet demand for pig iron until fall. Lake Superior charcoal iron has now yielded to the pressure, and last week a break in prices was made; this, too, despite the large sales during the past month. Several large contracts were closed at cuts of 25@50c. below our quotations. Inquiries on 50 to 300 tons are still quoted at \$16.50@ \$16.75. With the exception of Nos. 1 and 2 soft, Southern iron is in light demand.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$16.25@ \$16.75; Lake Superior coke, No. 1, \$14.50@ \$15; No. 2, \$14@ \$14.25; No. 3, \$13.75@ \$14; Lake Superior Bessemer, \$16.50; Lake Superior Scotch, \$15.50@ \$16; American Scotch, \$16.75@ \$17.75; Southern coke, foundry No. 1, \$14.75; No. 2, \$14.25; No. 3, \$13.75; Southern coke, soft, No. 1, \$13.50; No. 2, \$13.10; Ohio silveries, No. 1, \$17; No. 2, \$16.50; Ohio strong softeners, No. 1, \$17; No. 2, \$16.50; Tennessee charcoal, No. 1, \$17; No. 2, \$16.50; Southern standard car wheel, \$20@ \$21.

**Steel Billets and Rods.**—There is a good inquiry for billets and rods and prices show advancing tendencies at \$24.50 for the former and \$34.50@ \$34.75 for the latter.

**Structural Iron and Steel.**—Eastern mills are asking 2.15@2.25c. at mill and demand is moderately good. The iron work required for the Union depot, St. Louis, is figured at \$175,000, chiefly ornamental. The contract will be let July 29. Some scarcity is

noticed for beams, etc., and prices are higher. Regular quotations, car lots f. o. b. Chicago, are as follows: Angles, \$2@2.25; tees, \$2.30@2.40; universal plates, \$1.95@2; sheared plates, \$1.95@2; beams and channels, \$2.25@2.50.

**Plates.**—Mills which are running are holding prices very stiffly, and determined to make the most of the situation. Demand is fair from stocks, but there are no large orders in sight. Steel sheets, 10 to 14, \$2.30@2.40; iron sheets, 10 to 14, \$2.20@2.30; tank iron or steel, \$2.10@2.15; shell iron or steel, \$2.75@3; firebox steel, \$4.25@5.50; flange steel, \$2.75@3.00; boiler rivets, \$4.00@4.15; boiler tubes, 2 1/2 in. and smaller, 60%; 7 in. and upward, 70%.

**Merchant Steel.**—The contract tonnage last week has been large and there is also quite a good demand for merchant steels for prompt delivery, helped by the strikes and closed mills. Tool steel is fairly active. We quote: Tool steel, \$6.50@6.75 and upward; tire steel, \$2.10@2.20; toe calk, \$2.40@2.50; Bessemer machinery, \$2.10@2.20; Bessemer bars, \$1.75@1.80; open hearth machinery, \$2.40@2.60; open hearth carriage spring, \$2.25@2.30; crucible spring, \$3.75@4.

**Galvanized Sheet Iron.**—Although this article is in strong demand and mill shipments slow, prices remain unchanged. Stocks, too, are in bad shape. Discounts are steady at 70 on mill lots, and 67 1/2 off on Juniata, and 67 1/2 and 5% off on charcoal from warehouse.

**Black Sheet Iron.**—Inquiry is fair and only a few mills are willing to accept orders for prompt or early delivery. Quotations are firm at 2'90@2'93c. basis of No. 27 Chicago, for delivery before July 1st. Steel sheets are 10c. higher. Dealers quote 3'10@3'20c. from stock same gauge.

**Bar Iron.**—Mills not affected by a strike are asking 1'55c. base Chicago, and a great deal of business has been entered at those figures for prompt or July delivery. There is a fair demand for car iron and season's contracts, and several of the latter have been taken by valley mills at 1'50c. half extras. Jobbers are now getting 1'90@1'92c. from store.

**Nails.**—Standard sizes of steel cut are scarce at mills and in jobbers' warehouses, and the latter are limiting or cutting down country orders. Mill quotations are firm at \$1.60; 30c. average f. o. b. Chicago, and some mills ask 5 cents more. Stock orders are filled at \$1.70. Wire nails are in lively inquiry from mill, and \$1.70 base, is bottom. Chicago jobbers quote \$1.75 in small lots from stock.

**Steel Rails.**—For standard heavy sections demand continues to run to small lots, and we know of two large contracts being placed. Representatives of Eastern mills report several carload lots at \$32.75 f. o. b. Price is steady at \$31@32 as to quantity. Other track supplies are in moderate demand at \$1.70 for iron or steel splice bars; spikes, \$2.05@2.15 per 100 lbs.; track bolts, hexagonal nuts, \$2.65; square, \$2.55.

**Scrap.**—There is no inquiry for wrought scrap; cast machinery and similar grades are in some demand, but the movement is light. Prices entirely nominal. No. 1 railroad, \$15; No. 1 forge, \$14; No. 1 mill, \$9.50; fish plates, \$17; axles, \$19; horseshoes, \$15.50; pipes and flues, \$7; cast borings, \$6.50; wrought turnings, \$9; axle turnings, \$10.50; machinery castings, \$10; stove plates, \$8.50; mixed steel, \$10.60; coil steel, \$14; leaf steel, \$15; tires, \$14.50.

**Old Material.**—Some inquiry is noted for iron rails, but consumers won't pay \$17.50. Steel rails are quoted at \$11.50@13, according to length, condition, etc., and demand very meagre. Old car wheels are stagnant at \$14.50.

**Louisville. July 16.**

(Special Report by Hall Brothers & Co.)

Inquiries have been some better both in number and size; of course there is plenty of iron for every requisition and every inquiry is promptly met with low figures and in some instances at unexpected concessions. A few good sized orders have been placed on the quiet at full figures for short deliveries. Some furnaces refuse to sell for deliveries extended far into the future, while there are others that seem disposed to accept any deliveries asked by the trade. On the whole it may be said that the general situation is not materially changed.

**Hot Blast Foundry Irons.**—Southern coke No. 1, \$14@14.25; Southern coke No. 2, \$13@13.25; Southern coke No. 3, \$12.75@13; Southern charcoal No. 1, \$16@17; Southern charcoal No. 2, \$15.50@16; Missouri charcoal No. 1, \$17@17.50; Missouri charcoal No. 2, \$16.50@17.

**Forge Irons.**—Neutral coke, \$12.50@12.75; cold short, \$12.25@12.50; mottled, \$11.50@12.

**Car Wheel and Malleable Irons.**—Southern (standard brands), \$20@21; Southern (other brands), \$18.50@19.50; Lake Superior, \$19.50@20.50.

**Philadelphia. July 21.**

(From our Special Correspondent.)

**Pig Iron.**—The iron market is about as it was last week. In Eastern Pennsylvania crude iron transactions are light. The inducements held out to place large orders for Fall delivery have resulted in very little business. Eastern makers and buyers are interested in what is going on in Western and Southern crude iron markets, but as for themselves

they report very little change. No. 1 Foundry is still selling quietly at \$15@15.50; No. 2, \$14@14.50; Forge, \$13.50@14; Southern No. 1 has been offered at \$14.50, and sold in a small way, and No. 2 at \$13.75. A few small lots of charcoal and American Scotch have also been taken. Buyers and sellers are watching the changing phases of the markets very carefully.

**Steel Billets.**—Quotations are \$25. Sales light. Immediate requirements only are being covered. There are rumors which cannot be traced up, but if they mean anything they mean that large transactions will be heard of about the close of the month.

**Muck Bars.**—Prices are steady at \$25. It is not likely that good bars will be sold at any less.

**Merchant Iron.**—Prices have advanced a tenth. Demand has improved; inquiries are active; mills are starting up in the interior, and in ten days all will be at work. Stocks are low; storekeepers are making good reports. A further advance in merchant bars is predicted by the 1st of August, making 1'80c. the base price.

**Skelp Iron.**—Under a rather urgent inquiry prices have hardened to 1'75c. for grooved and 1'90c. for sheared. Manufacturers say there will be a good deal of business placed within the next six days at these figures.

**Wrought Iron Pipe.**—Figures have been given upon several large lots of pipe. If things are not soon settled in Pittsburg, Eastern pipe makers will have considerable work, as buyers were unwise enough to allow opportunities for placing orders on very favorable terms to slip by.

**Sheet Iron.**—A very active demand is reported for nearly all kinds of sheet and galvanized. Prices are firm for best refined at 2 1/2@3 1/2c., though for very large orders these figures might be shaded slightly.

**Merchant Steel.**—All the merchant steel mills report an improving demand and stronger prices.

**Plate and Tank Iron.**—Large and small orders have been hurried in during the past few days, and a slight advance has been established. A further advance will probably take place on small lots for early delivery because of the failure of the last conference of iron workers at Pittsburg. Certain large buyers wanted to contract for very large lots of plate early this week, but the manufacturers modestly declined to furnish so much material at the price named at present.

**Structural Material.**—There is a good deal of business in beams and channels; demand is good. There is a probability of some large orders being placed before the end of this month. Careful inquiry has developed the fact that there are a good many large enterprises on hand, and that contracts for material have not yet been placed, the builders relying upon the abundant capacity of the mills to keep them going. Angles are 1'85; sheared plates, 1'90; beams, tees and channels, 2'15@2'20.

**Steel Rails.**—Orders for this week, 15,000 tons. Rumors of orders foot up 50,000 tons. Makers decline to explain regarding these rumors. The market is likely to improve in September.

**Old Rails.**—Old rails are quoted at \$17 delivered, and \$15 for steel, from buyer's standpoint, but sellers, while admitting that sales have been made at these figures, say the average price is a little higher.

**Scrap.**—A good deal of railroad scrap has been gathered up and sold to urgent buyers during the past week at \$17.25.

**Pittsburg. July 21.**

(From our Special Correspondent.)

**Iron and Steel.**—Business during the week has been restricted to limited amounts, caused no doubt by the labor troubles. The situation is certainly a very unsatisfactory as well as a costly one, and how long this condition of affairs is going to continue is a question that no person can answer. Trade at present is a barren subject, barren because it is for the present practically divested of the features which alone invest it with absorbing interest. It is not dead, but it is resting, and there is but little in its present condition that demands industrious consideration. Demand has no spur and the prices that rule are midsummer prices and these, so far as the future is concerned, mean nothing. The business for the past six months, so far as it relates to the managements of industrial affairs, is bad enough, but the last half year starts out with an occurrence, which in irrational proceedings, injurious consequences, horrible tragic features and uncivilized methods, so far belittles any happening recorded in the annals of the past that the gravest of them shrink into insignificance. The shutting down of so many mills at various points has curtailed consumption of pig iron very materially, still the supply continues largely in excess of the demand. The late reduction in prices in the East produced no effect in this market; with Bessemer at \$14 and Grey Forge at \$12.75, holders of standard brands refuse all offers of lower prices. Competition was quite as sharp as it has been at any previous time this season, and brands that do not command the esteem of consumers which may be offered with any pressure have to be let go at rates attractive to the buyer. Pittsburg made iron and steel commands the best prices that rule the market, the fact being well known by consumers that the material purchased will at all times stand the expected tests; consequently buyers run

no risk. The stock of iron in the hands of maker in this district is not large, still the amount is sufficient for all necessary purposes. The demand for some time was confined to the better grades.

The market contains two sets of purchasers of pig iron, the one buying for consumption, the second purchasing on speculation on account of the low prices ruling in the market at the present time. Parties well versed in the value of iron contend that money is perfectly safe that is invested in Billets, Grey Forge and Bessemer at present rates, that as soon as the present labor difficulties are adjusted prices will take an upward turn.

Important from the valleys: The situation is a quiet as it can be under the circumstances. Only one sheet mill is in operation, employing about 35 hands. The other mills are busily engaged in making annual repairs, taking stock and putting in improved and labor-saving devices. In the Mahoning Valley, consolidation of the iron manufacturing industries is still under consideration, one important move in that direction having already been consummated. The steel plant project is so far under way that the location is being considered. Railway officials will meet this week with the incorporators to agree upon terminals and local freight matters. Work will be commenced on the works inside of thirty days. One concern is putting down three additional sheet mills and several tin plate mills are also under consideration. All the furnaces are in blast except Hubbard No. 2, Mory & Struthers; Hannah will shortly blow out for repairs. In the Shenango Valley the Clair, Spearman No. 2, Etna & Sharon and Heshamark are blowing; everything else is at rest.

The new steel plant of the Shenango Steel Company will commence operations on October 1st, as will also the new tin plate mill at New Castle. As soon as the iron makers' scale of wages and the repairs are completed the valleys will be very active in the mill trade, as manufactured stocks are very low and prices have been advanced from one to two dollars per ton.

**Prices of Bessemer and Grey Forge Iron.**

The following are the average monthly prices at Pittsburg, Pa., of Bessemer and grey forge for the first six months from 1888 to 1892, inclusive, for five years. During that period Bessemer touched \$24 per ton. Grey forge, \$18.25; to-day's prices for Bessemer, \$14@14.25; grey forge, \$12.65@12.75 per ton.

Bessemer.					
	1888.	1889.	1890.	1891.	1892.
January.....	\$19.00	\$16.65	\$24.00	\$16.25	\$15.75
February.....	18.50	16.50	23.00	16.50	15.25
March.....	18.32	16.75	20.00	16.50	15.65
April.....	18.25	16.50	18.25	16.50	14.65
May.....	17.00	16.65	18.25	16.50	14.30
June.....	17.00	16.00	19.25	16.25	14.25
Grey Forge.					
	1888.	1889.	1890.	1891.	1892.
January.....	\$16.50	\$15.50	\$18.25	\$14.25	\$13.50
February.....	16.25	14.50	18.00	14.50	13.25
March.....	16.00	14.75	17.00	15.00	12.90
April.....	15.50	14.25	15.25	14.25	13.00
May.....	15.00	14.00	15.50	14.12	12.90
June.....	14.30	14.00	15.75	14.15	12.70

**Standard Bessemer Ore.**

21,500 Tons Standard Bessemer ore on Lake Erie docks.....	400 cash.
Coke Smelted Lake and Native Ores.	
2,000 Tons Bessemer, August, September.....	\$14.00 cash.
2,000 Tons Bessemer.....	14.00 cash.
2,000 Tons Bessemer, July August, September.....	14.00 cash.
1,000 Tons Bessemer, Wheeling.....	13.85 cash.
1,000 Tons Bessemer.....	14.00 cash.
1,000 Tons Bessemer.....	14.00 cash.
500 Tons Grey Forge.....	12.75 cash.
500 Tons Grey Forge.....	12.75 cash.
500 Tons Grey Forge, prompt.....	12.75 cash.
300 Tons Grey Forge.....	12.95 cash.
300 Tons Grey Forge.....	12.75 cash.
200 Tons No. 2 Foundry.....	13.75 cash.
200 Tons No. 3 Foundry.....	13.00 cash.
100 Tons No. 1 Foundry.....	14.75 cash.
100 Tons No. 1 Silvery, extra.....	16.50 cash.
100 Tons Open Mill.....	13.00 cash.
Charcoal.	
100 Tons Warm Blast.....	18.50 cash.
100 Tons Cold Blast.....	26.50 cash.
100 Tons Cold Blast Southern.....	24.00 cash.
75 Tons Cold Blast.....	26.75 cash.
Steel Slabs and Billets.	
2,000 Tons Steel Billets at Makers' Mill.....	23.25 cash.
2,000 Tons Steel Billets, July to January.....	24.10 cash.
1,000 Tons Steel Billets, July to January.....	24.10 cash.
1,000 Tons Steel Billets at Maker' Mill.....	24.60 cash.
500 Tons Steel Billets.....	23.50 cash.
400 Tons Steel Billets.....	23.25 cash.
Muck Bar.	
500 Tons Neutral.....	24.75 cash.
400 Tons Neutral.....	24.75 cash.
380 Tons Neutral.....	23.80 cash.
Ferro-Manganese.	
200 Tons 80% Foreign, delivered.....	61.00 cash.
120 Tons 80% Seaboard.....	59.00 cash.
Spelter.	
100 Tons Spelter.....	4.75 cash.
Mill Cinder.	
3,000 Tons Mill Cinder.....	2.35 cash.
Skelp Iron.	
325 Tons Narrow Grooved.....	162 1/4 m.
Skelp Steel.	
1,000 Tons Wide Grooved.....	145 4 m.
Steel Wire Rods.	
350 Tons American Fives at Mill.....	32.10 cash
Old Iron and Steel Rails.	
500 Tons Old Iron Rails.....	19.75 cash
500 Tons Old Steel Rails.....	15.75 cash
300 Tons Old Steel Rails.....	15.40 cash
Scrap Material.	
100 Tons Soft Steel, net.....	16.50 cash
100 Tons Cast Scraps, gross.....	11.50 cash
100 Tons No. 1 R.R. W. Scrap, net.....	14.00 cash

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

Main table of New York Mining Stocks Quotations, including columns for Name and Location of Company, dates from July 16 to July 22, and Sales. Lists various companies like Adams, Alice, Amador, etc.

\*Ex-dividend. †Dealt at in New York Stock Ex. ‡Unlisted securities. † Assessment paid. ‡ Assessment unpaid. Dividend shares sold, 5,670 Non-dividend shares sold 10,257. Total shares sold, 15,827.

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations, including columns for Name of Company, dates from July 15 to July 21, and Sales. Lists companies like Allouez, Bodie, Bonanza Development, etc.

Dividend shares sold, 6,896. Non-dividend shares sold, 12,735. Total shares sold, 11,631.

COAL STOCKS.

Table of Coal Stocks, including columns for Name of Company, dates from July 16 to July 22, and Sales. Lists companies like Cambria Iron, Cameron Coal & I. Co., etc.

\* Ex-dividend. Total shares sold, 119,778.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations, including columns for Names of Stocks, Closing Quotations, and dates from July 15 to July 21.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS, DIVIDENDS, and NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS. Lists 154 mines with their respective financial details.

G., Gold. S., Silver. L., Lead. C., Copper. B., Borax. \* Non-assessable. † This company has the Western, up to December 10th, 1881, paid \$1,400,000. ‡ Non-assessable for three years. § The Deadwood previously paid \$275,000 in eleven dividends and the Terra \$75,000. ¶ Previous to the consolidation in August, 1884, the California had paid \$31,320,000 in dividends, and the Cons. Virginia \$11,000,000. \*\* 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.

STOCK MARKET QUOTATIONS.

Table with columns: Aspen, July 16. The closing quotations were as follows: Agnes C., Argentum Juniata, Aspen Deep Shaft, Aspen Contact, Best Friend, Bimetallic, Bushwacker, Carbonate Chief, Empire Champion, Justice, Little Annie, Mollie Gibson, Nolan Creek, Park, Mamie & Queen, Pontiac, Sheep Mountain S. & M. Co., Smuggler, St. Joe & Mineral Farm, Yellow Boy.

Baltimore, Md. July 20.

Table with columns: COMPANY, Bid, Asked. Includes entries for Atlantic Coal, Balt. & N. C., Big Vein Coal, Conrad Hill, Cons. Coal, Diamond Tunnel, George's Creek Coal, Lake Chrome, Maryland & Charlotte, North State, Silver Valley.

Pittsburg, Pa.

Prices highest and lowest for the week ending July 21:

Table with columns: COMPANY, H., L. Includes entries for Allegheny Gas Co., Bridgewater Gas Co., Chartiers Val. Gas, Columbia Oil Co., Consignee Mining Co., Consolidated Gas Co., East End Gas Co., Fisher Oil Co., Forest Oil, Hazlewood Oil Co., Hidalgo Mining Co., La Noria Mining Co., Luster Mining Co., Mansfield C. & C. Co., Manufacturers Gas Co., Nat. Gas Co. of W. Va., N. Y. & Cleve. Gas Coal Co., Ohio Valley Gas Co., Pennsylvania Gas Co., People's Natural Gas Co., People's N. G. & P. Co., Philadelphia Co., Pine Run Gas Co., Pittsburg Gas Co., Red Cloud Mining Co., Silvertown Mining Co., South Side Gas Co., Sterling Silver Mining Co., Tuna Oil Co., Union Gas Co., Washington Oil Co., Wmoreland & Camb., Wheeling Gas Co., W. House E. Light, W. House Air Brake Co., W. House Brake Co., Ltd.

Deadwood. July 16.

Table with columns: Bid, Asked. Includes entries for Bullion, Caledonia, Calumet, Cambrian, Carthage, Cora, Deadwood Terra, De Smet, Double Standard, Elk Mountain, Emmett, Equitable, Florence, Golden Reward, General Merritt, Harmony, Hester A., Homestake, Hermit, Iron Hill, Isadorah, Maggie, Monitor, Rainbow, Retriever, Ross-Hannibal, Ruby Bell, Ruby Wilkes, Seabury Calkins, Silver Queen, Spanish R., Stewart, Tornado, Troy, Uncle Sam.

St. Louis. July 20.

The closing quotations were as follows:

Table with columns: Bid, Asked. Includes entries for Adams, Colo., American & Nettie, Colo., Bi-Metallic, Mont., Central Silver, Elizabeth, Mont., Granite Mountain, Mont., Hope, Leo, Little Albert, Montrose Placer, Colo., Mickey Breen, Pat Murphy, Colo., Silver Age, Silver Bell, Small Hopes, Colo., Yuma, Ariz.

Helena, Mont.

(Special report by SAMUEL K. DAVIS.)

Prices highest and lowest for week ending July 16:

Table with columns: H., L. Includes entries for Bald Butte (Mont.), Benton Group, Mont., Bi-Metallic, Mont., California (Castle), Mont., Champion (Oro Fino), Mont., Combination (Phillips'g), Mont., Copper Bell (Cataract), Mont., Cornucopia, Mont., Cumberland (Castle), Mont., Elizabeth (Phillipsburg), Mont., Florence (Neihart), Mont., Fourth of July, Wash., Glengary (Butte), Mont., Helena & Victor, Mont., Ingersoll, Mont., Iron Mountain (Missoula), Mont., Jersey Blue (Butte), Lone Pine Consolidated, Moulton, Mont., Polaris (Beaverhead Co.), Mont., Poorman (Coeur d'Alene), Idaho, Queen of the Hills (Neihart), Mont., Southern Cross (Deer Lodge), Mont., Whitlatch Union & MacIntyre, Yellowstone (Castle), Mont.

Foreign Quotations.

London. July 9.

Table with columns: Highest, Lowest. Includes entries for Alaska Treadwell, Amador, Cal., American Belle, Colo., Appalachian, N. C., Can. Phosphate, Can., Colorado, Colo., De Lamar, Idaho, Dickens Custer, Idaho, Eagle Hawk, East Arenal, Idaho, Eberhardt, Nev., Elkhorn, Mont., Elmore, Idaho, Emma, Utah, Esmeralda, Nev., Flagstaff, Utah, Gardfield, Nev., Golden Feather, Cal., Golden Gate, Cal., Golden Leaf, Mont., Golden River, Cal., Idaho, Jay Hawk, Mont., Josephine, Cal., Kohinoor, Colo., La Luz, Mex., La Plata, Colo., La Valera, Mex., Maid of Erin, Colo., Mammoth Gold, Ariz., Mount McClellan, Montana, Mont., Mona Lake Gold, New California, Colo., New Consolidated, New Eberhardt, Nev., New Gold Hill, N. C., New Guston, Colo., New Hoover Hill, N. C., New Russell, N. C., New Viola, Idaho, Old Lout, Colo., Parker Gold, N. C., Pittsburg Cons., Nev., Poorman, Idaho, Plumas Eureka, Cal., Richmond Con., Nev., Ruby, Nev., Sam Christian, N. C., Sierra Buttes, Cal., Plumas Eur., Cal., Silver King, United Mexican, Mex., West Argentine, Colo., Yankee Girl, Colo.

Paris. July 9.

Table with columns: Francs. Includes entries for East Oregon, Ore., Forest Hill Divide, Cal., Golden River, Cal., Laurium, Greece, Lexington, Mont., Nickel, New Caledonia, Rio Tinto, Spain, Tharsis, Spain, Vieille-Montagne, Belgium.

CURRENT PRICES.

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

Table listing various chemical and mineral products with their prices. Includes entries for Acid-Acetic, Carbonic, Chromic, Hydrobromic, Hydrocyanic, Hydrofluoric, Alcohol, Alum, Ammonia, Aqua Ammonia, Antimony, Argols, Arsenic, Asbestos, Ashes, Asphaltum, Barium, Bauxite, Bicarbonate of Potash, Bichromate of Soda, Borax, Bromine, Cadmium, Calcium, Chlorine, Chrome, Chromalum, Cobalt, Copper, Cryolite, Emery, Feldspar, Fluorspar, French Chalk, Gault's Earth, Glauber's Salt, Glass, Gold, Gypsum, Iodine, Iron, Kaolin, Kieserite, Lead, Litharge, Magnesite, Lime Acetate, Litharge, Manganese, Mercuric Chloride, Nitrate, Potash, Pyrites, Quartz, Saltpetre, Soda, Strontium, Sulphur, Talc, Terra Alba, Vermilion, Zinc, Zirconium.

Marble Dust—bbl. \$1.2

Table listing various mineral and chemical products with their prices. Includes entries for Metallic Paint, Mineral Wool, Mica, Naphtha, Nitre Cake, Ochre, Phosphorus, Plumbago, Potassium, Pyrites, Quartz, Rotten Stone, Sal Ammoniac, Salt, Soapstone, Sodium, Strontium, Sulphur, Talc, Terra Alba, Vermilion, Zinc, Zirconium.