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The index to Volume 54 of the ENGINEERING AND MINING JOURNAL accompanies this number of the JOURNAL.

The volume of the "Mineral Industry," bound in cloth, is now ready for distribution and is being delivered as rapidly as possible to those who have subscribed for it. Subscribers to the ENGINEERING AND MINING JOURNAL at \$5, who are not now in arrears, are entitled to the volume in paper covers, and these copies will be ready in about a week. Owing to its great value and size it will be found desirable to have the book substantially bound in cloth, which costs 50 cents extra, and all subscribers to the JOURNAL desiring bound copies should at once notify the publishers and send 50 cents.

In his message to the New York Legislature last January Governor FLOWER called attention to the possibilities of electric traction for the State canals, referring especially to the use of the trolley system, and suggested the establishment of power-houses by the State at proper intervals. The Legislature has taken action on this recommendation by appropriating \$12,000 to be spent in experiments on the use of electric motive power. The sum is not large, but something may be done with it, if it is properly used. Some experiments in this direction are certainly advisable before the State prepares to spend any large amount in establishing such a system as the governor outlined.

The desire for cheaper transportation and distribution of heavy freights, especially of coal and iron, has led, in recent years, to a revival of interest in the waterways, which, some years ago, were entirely overshadowed by their railroad competitors. Not only do the maintenance and improvement of existing water lines find more advocates, but plans for the construction of new ones meet with favorable consideration. The ship canal from the lakes to the Hudson; the Hennepin canal, which is to connect Lake Michigan with the Mississippi, and the proposed ship canals from New York to Philadelphia, from Baltimore to the sea, and from Norfolk southward, have all been referred to at different times and come within the list of probabilities. The latest plan of this kind is for a canal to connect the Mississippi with Lake Superior, so that lake freight vessels may load at St. Paul instead of Duluth. This is a formidable undertaking, and the project has hardly the probabilities of success which some of the others mentioned present. The great cost of such a work and the engineering difficulties to be overcome do not seem to have been fairly considered by the projectors, and are likely to prevent any serious undertaking of the work.

Two most important failures in the iron trade were announced at a late hour to-day—the Pennsylvania Steel Company, of Steelton, Pa., and the Maryland Steel Company, Sparrow's Point, below Baltimore. The credit of these two concerns, which were closely connected, has been considered very good, and the failure will be a great surprise to many well informed iron and steel men. Major BENT, of the Girard company, has been appointed Receiver of the Pennsylvania Steel Company, and Mr. WOOD, son-in-law of Major BENT, Receiver of the Maryland Steel Company.

The works of the Pennsylvania Steel Company are among the most extensive and best equipped works in the country. There are four stacks, each 60x14 ft. The Bessemer steel works were built in 1865-1867, and consist at the present of two 7-gross ton and three 8-gross ton converters. The annual capacity is 350,000 net tons of ingots. The rolling mill was built in 1867-1868, and a blooming mill was added in 1875-1876, with an annual capacity of 200,000 net tons of rails. There is also a reversing blooming mill and a hammer mill with 4, 6 and 12-ton hammers. The open hearth steel plant consists of two 30-ton furnaces, one 5-ton and two 15-ton furnaces, the annual capacity being 50,000 net tons of ingots. The company has also departments for making frogs and switches, a railroad signal department and machine shops.

The works of the Maryland Steel Company, which were established to secure a location on the seaboard, were built in 1889-1890 and consist of four stacks, each 85 x 22 ft.; two 20-ton Bessemer converters, 48 soaking pits, one 34-in. blooming mill and one 26-in. mill train, having an annual capacity of 300,000 net tons. The Sparrow's Point works have also large shipyards connected with them and operated by an allied company.

"THE Mineral Industry for 1892" is now ready for delivery and will be mailed within a few days to all entitled to the volume. Encouraged by the warm reception its statistical number has met on all hands, not only from mining men of all countries, but those interested in collateral branches, the ENGINEERING AND MINING JOURNAL has successively enlarged its annual number from a few additional pages in the first issue of the year, to the handsome supplement of January 2d, 1892, and finally to the large volume, containing some 770 pages, now published. While the early date of issue of the previous numbers has been considered a noteworthy feat of journalism by all, we believe that by a slight delay a volume

can be prepared of far more service to the industry, and one in which the statistics are much more than "approximately correct."

In point of time it is interesting to note that the "mineral resources of the United States" for 1891, compiled by the Geological Survey and our volumes, containing not only these but those of a year later, were issued almost simultaneously. It is a source of pride to us that we can thus antedate the government with its complex and expensive machinery. It has required incessant labor not only on the part of the large staff of the ENGINEERING AND MINING JOURNAL, but by our numerous correspondents to collect the necessary data, and we must acknowledge our indebtedness to the unvarying courtesy of the producers of metals and minerals in furnishing us with statements of production and other necessary facts. That those who receive this handsome, and indeed remarkable, volume may not think we have reached the *Ultima Thule* of such productions, we may say that the ENGINEERING AND MINING JOURNAL acknowledges no such goal, and that constant improvements will be made from year to year, each successive volume being compiled from entirely new matter and resembling its forerunner merely in the care, thoroughness and rapidity with which it is prepared.

THE FINANCIAL SITUATION AND THE SILVER PROBLEM.

The very unsatisfactory condition of the finances, with the imminent danger of gold going to a premium, is the natural, the inevitable consequence of our wild silver legislation and wilder free coinage theories which have disturbed confidence in our national financial policy, and have induced foreigners to realize on our securities while they will yet bring gold. There could scarcely be imagined a policy more injurious to the value of silver than that of free coinage by this country alone, which has been so generally advocated in the West. If adopted, this would at once put us on the silver basis, would send gold to a premium, and would depress, without steadying, the relative value of the white metal.

The heavy purchases of silver under the Sherman Act, though not nearly so injurious as free coinage, have still unsettled confidence in our ability to keep the metals afloat together in our coinage, and every one knows that they have utterly failed to advance or to steady the price of silver. The great injury and distrust occasioned by the Sherman Act is not so much due to the quantity of silver bought under it as it is to the absolute certainty that it can never make a market for all that is offered, and therefore can never regulate the market—which every one knows is governed by the small unwanted surplus—and that if continued it must inevitably bring us to the silver basis and deprive us of gold, the only universally good money. It is the object of the clearing-house plan the ENGINEERING AND MINING JOURNAL has proposed to take this question out of the hands of the inexperienced and often duped and misled populace, and place it in charge of a permanent commission of experts representing the interests of the whole world, just as nations are now happily accustomed to settle differences of opinion by leaving the decision as to what is right and just to an arbitration commission instead of bankrupting the weaker country by war.

The plan calls for the adoption of bimetallism by all countries. This is necessary, not because it is proved that the business of the world could not be done by gold and paper alone; not because gold is a less desirable metal than silver for money—but because the industry, prosperity and civilization of half the world is built on silver; and if we suddenly destroy its value we bankrupt the world; we break up all the channels of commerce and industry; we set back civilization for a century and the whole world loses, no nation gains. What advantage is it to increase the amount of a debt against a bankrupt debtor? What would the "universal provider," England, gain by bankrupting all the nations that buy her goods or owe her money? How infinitely cheaper and more advantageous it would be for her to give them of her gold for enough of their silver to put them all on the bimetallic basis. It would be wise and prudent in England to do this even at a heavy cost, how much more is it to her advantage to make this purchase when it costs her nothing, except the infinitesimal amount by which the relative value of silver might be lowered by the clearing-house commission, should the conditions of production require a change? Every nation is benefited by the increasing prosperity of the rest of the world, and every nation is ultimately injured when disaster and bankruptcy overtake the others.

1st—The plan proposed by the ENGINEERING AND MINING JOURNAL provides an absolute and permanent solution of the problem. Under it the interests of all nations will be identical: all are on the bimetallic basis, and all equally interested in securing and maintaining a sound monetary policy in all countries.

2d—All the silver and gold offered is taken—there is no surplus to depress the market, and to give two values to the metal.

3d—The reductions which the changing conditions of production may eventually render necessary in the value of the white metal would be made very slowly, and in amount so small as to create no difficulties or dangers to the world's industries: and the loss is borne by the whole world

proportionally to the holdings of money, and not by the individual holder of the coin or certificates for the coin.

4th—The plan is continuous and permanent, and there is consequently no temptation, as in a terminable arrangement, for one nation to unload during the operation of the agreement, in anticipation of a collapse at its close. Under this plan the nations, like banks in a clearing-house, retain absolute independence and can do anything which does not endanger the value of their "money." In consideration of the vast advantages which each nation gains by the practical indorsement or support of its money by all other nations, it can well relinquish to those other nations, that is, to the clearing-house, the right to know and to judge of its every transaction in the buying or selling or making of money.

If a nation should undertake to adopt what we call a "wild cat" financial policy, it would be checked by its associates; and if it persisted, it would have to leave the clearing-house. Then its credit and securities would at once depreciate in the markets of the world; so that in practice no nation could afford to leave the clearing-house, or could long prosper outside of it.

With the absolute assurance of stability and safety in the money of the world, the hoarding which is done to such an enormous degree by the less civilized and enlightened peoples would cease, and all the money of the world would become active in industry. The clearing-house methods would reduce the actual transfer of money from one nation to the other to the settlement of final balances, and thereby vastly increase the efficiency of the world's money. Under the operation of this plan the industry and commerce and prosperity of the whole world would receive an impetus, a "boom," such as has never been seen or dreamed of, and yet without risk, danger or inflation; and this would be gained without cost or sacrifice on the part of any.

These may appear optimistic conclusions, but let those who doubt this study the plan and think out its far-reaching consequences; they may then say, as many have already, "The half of its benefits has not been told."

STANDARD METHODS FOR METALLURGICAL CHEMISTS.

There is perhaps no subject connected with the mining and metallurgical industry of the world that is to-day in worse condition than the methods employed in the sampling and assaying of ores and metals. It is no uncommon thing for differences of five to ten ounces of silver, one-half ounce of gold, one to three per cent. of lead, one-half to two per cent. of copper, and two to three per cent. of iron to arise between assayers of equal ability and honesty. These differences are to be ascribed partly to methods of original sampling before the portion representing the material was received by the chemist, partly to methods employed in the laboratory for preparing the working sample, partly to the analytical methods used, and partly to the ever present "personal equation." The effect of the first three may be largely reduced, if not entirely eliminated, by the use of standard methods of sampling and of analysis. It is by no means easy to sample *correctly* several car loads of ore or metal, so that the final portion sent to the laboratory shall represent the entire shipment.

In the case of ores questions of the relative proportion of lump and "smalls," wet and dry, rich and poor come at once into play. If one has to do with ores of uniform texture, dryness and composition it is not so difficult to work out some sampling scheme, which will answer all practical purposes. But it is not often that the sampler has so easy a task, and a deviation in texture or dryness is the rule, not the exception, in most mineral products.

An instance in our own experience will show how negligent one may become when he has not to abide by certain well established and well understood requirements in the sampling of ores: A certain company was shipping iron ore, part of which was hard and part soft. It was the custom of the sampler to go over the cars with a box and knock off and gather up what he considered a fair sample of the contents of the car. Each car was sampled in turn and all the samples were then ground in an edge mill until the entire mass would pass a $\frac{1}{16}$ -in. screen. The laboratory sample was taken from the finely ground stuff. This method would have been satisfactory had *all* of the stuff been put through the screen, but the grinding was tedious and the sampler found that he could get through his work much more speedily if he threw away the small pebbles and hard nodules that were in the ore! It is no wonder, therefore, that the analysis of the ore sampled in this way did not correspond to the true analysis. But there was no method of sampling specified in the contract and no method by which the sampler was to work, except the dictates of his own capricious will.

Many other instances might be given, and doubtless all who have had to do with ore sampling could furnish scores of them from the pages of their note-books. The practical importance of the matter is well shown by the fact that large and expensive establishments have been erected for the express purpose of sampling ores and metals, and furnishing buyer and seller with samples accurately drawn. But, although this is the case and although such practice is a long step ahead of methods in

vogue only a few years ago, there is still need of a standard method common to all who sample such materials.

It is not meant that the method for sampling iron ores, for example, should be the same as for copper, or gold, or silver or lead ores; for each ore, indeed one may say each class of each ore, requires a method of its own. But that when one buys specular hematite, or brown ore, or red fossil ore, or copper ores of this or that sort he should know the method used in sampling is certainly right and proper. As the case stands now sellers and buyers are at times not informed as to the methods used, and have to rest satisfied with the personal assurances of the samplers that it was correct.

The importance of the subject is not limited by the original sampling so far as concerns this branch of trade, but extends also into the laboratory, and affects the results of the analysis.

If a bar of pig lead, for instance, is brought to the assayer he has to assume that it represents the shipment, or if he does not take this responsibility he says on the test note merely that the sample received contains thus and so, if he has not himself drawn the sample.

But in order to assay the bar he must obtain certain portions of it in a state of minute subdivision, by slicing, sawing or drilling. It is well known among assayers that the assay return of silver in pig lead depends largely upon the position of the points from which the drillings are obtained, and it has happened more than once that sellers have been robbed under their very eyes by dishonest sampling. It is a subject demanding the closest attention, the diffusion of small amounts of metals and of metalloids in a large excess of another metal, as for instance, silver in pig lead and copper, silicon and phosphorus in pig iron, etc., etc., and it is only of late years that chemists have begun to realize the significance of this phenomenon. In certain cases it is something akin to stratification, in others it seems to follow no recognized law, but in all cases it possesses the greatest importance when the substance existing in smallest quantity is most valuable. It is, therefore, necessary to guard against any possible errors of laboratory sampling by using a standard method suited to the substance in hand.

Important as these considerations are, and requiring as they do the most careful and patient attention, they are of far less consequence than the choice of the analytical method to be employed. It is upon this point that a great deal might be said, all of it pertinent to the discussion, but our space forbids more than a brief reference to it. Nearly every chemist is fully aware of the influence his analytical method has upon the results, and nearly every one is anxious to use the best. But what is the best? He sees half a dozen different methods for the determination, we will say, of phosphorus in pig iron. Each one would give a correct result if it were strictly followed, but which one to choose he knows not, and after much anxious thought finally selects the quickest. He is generally right, and always so if the method has been worked out with materials such as he has to analyze.

This is a point to be most carefully observed, if he has to use the colorimetric methods; not only with carbon, but with phosphorus as well. It is not overstating the matter to say that the greater proportion of errors charged to chemists is due to the analytical methods used, and to comparing the results reached by the use of one method with those of another, possibly not even stated.

The personal equation will always be the least important if the chemist has been properly trained. If he has not been so trained, then let us get rid of him at once, for the personal equation of an untrained man has a variant whose coefficient is infinity.

Now, what is to be done? We have this suggestion to make: Let there be formed an association of metallurgical chemists, whose committees shall recommend standard methods of sampling and of analysis, and whose members shall pledge themselves to their adoption. This association could very well be connected with the American Institute of Mining Engineers, forming a sub-section of it, or, if thought advisable, it could be formed on independent lines. In our opinion, however, it would best be intimately connected with the Institute, thus bringing the practical mining men into close communion with the practical metallurgical chemists.

The recommendations of Dr. DUDLEY, of the Pennsylvania Railroad Company, and of Professor LANGLEY fall at once into harmony with this proposal, and indeed it points the way out of many difficulties. It might be well to hold a preliminary meeting of all who may be interested in the matter at Chicago during the week set apart for the meeting of the Institute, the first week in August, and in the mean time we cordially invite correspondence bearing upon the question.

NEW PUBLICATIONS.

TIPS TO INVENTORS. By Robert Grimshaw, Ph.D. New York: the Practical Publishing Company. Pages 84. Price \$1.

This book contains a series of paragraphs or notes suggesting subjects upon which inventors may go to work, the "tips" suggesting problems varying in importance from the production of electricity direct from combustion down to some very trivial ones. Few of the suggestions are new and some of them are of slight moment. As a

book it is hardly worth consideration. A mass of disconnected notes or memoranda does not constitute a book in any proper sense of the word, even if it is printed and bound; nor does the collection and publication in book form, with little apparent effort at editing or digestion, of matter which may have served to fill out a column in some periodical seem to us really worth while. There are, of course, some hints in the book which may be of service to inventors, and it will probably find a public to appreciate it; but it is not a work that we can recommend to our readers.

TWENTY-THIRD ANNUAL REPORT OF THE STATE BOARD OF HEALTH OF MASSACHUSETTS. Boston, Mass.: State Printers. Pages, 920.

Few reports of this kind show more evidences of careful preparation and good work than this. The board is not usually moved by political considerations, and its membership changes but little, while the secretary and engineer both have the advantage of long service and experience. As in the previous year's report, a considerable part of the volume is devoted to the consideration of the water supplies of the State and their sources; their relative degrees of purity and the measures necessary to prevent contamination. This is a subject of the first importance in Massachusetts, where so large a proportion of the population is made up of dwellers in towns and villages, who are dependent on water supplies brought from some distance. This question, however, has not been the only one considered during the year, for there are also special reports on Food and Drug Inspection; on Arsenical Poisoning from Wall-Paper; and on the Geographical Distribution of Diseases, besides several minor papers.

BOOKS RECEIVED.

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

Fortteckning öfver Svenska Teknologföreningens Leda-Möter. February, 1893. Stockholm, Sweden: Published for the Society.

Annual Report of the St. Paul Chamber of Commerce, 1892. St. Paul, Minn.: Issued by the Chamber. Pages, 120; illustrated.

Ventilation and Heating. By John S. Billings, M.D., Surgeon U.S.A. New York: The "Engineering Record." Pages, 500; illustrated; price \$6.

The Silver Situation in the United States. By F. W. Taussig, LL. B., Ph. D. New York: G. P. Putnam's Sons. Pages, 133; with diagram. Price, 75 cents.

Outlines of Forestry. The Elementary Principles Underlying the Science of Forestry. By Edwin J. Houston, A. M. Philadelphia: The J. B. Lippincott Co. Pages, 254.

The Wealth and Progress of New South Wales, 1892. By T. A. Coghlan, Government Statistician, Sydney, N. S. W.: Government Printer. Pages, 960; with maps and diagrams.

The Mineral Industry: Its Statistics, Technology, and Trade for 1892. Edited by R. P. Rothwell. New York: The Scientific Publishing Co. Pages, 640; illustrated. Price, paper, \$2; cloth, \$2.50.

Mines, Year 1892. Summaries of the Statistical Portion of the Reports of Her Majesty's Inspector of Mines. London, England: Printed for H. M. Stationery Office, by Eyre & Spottiswoode. Pages, 30.

Statistical Abstract of the United States, 1892. Fifteenth Number. Prepared by the Bureau of Statistics, under the direction of the Secretary of the Treasury. Washington: Government Printing Office.

Municipal Improvements: a Manual of the Methods, Utility and Cost of Public Improvements for the Municipal Officer. By W. F. Goodhue, C. E. New York: John Wiley & Sons. Pages, 130; illustrated. Price, \$1.50.

Report of the Director of the Mint Upon the Production of the Precious Metals in the United States During the Calendar Year 1892. By Edward O. Leech, Director of the Mint. Washington: Government Printing Office. Pages, 260.

Department of the Interior, United States Geological Survey. Mineral Resources of the United States, Calendar Year 1891. David T. Day, Chief of Division of Mining Statistics and Technology. Washington: Government Printing Office. Pages, 640.

CORRESPONDENCE

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

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

The Use of Burnt Lime in Lead Blast Furnaces.

EDITOR ENGINEERING AND MINING JOURNAL:

Sir: Mr. Herbert Lang's criticism in the "Engineering and Mining Journal" of April 8th, 1893, of my article on the use of burnt lime in the lead blast furnace is very good. In fact, we always have to increase the fuel more than the amount called for by calculation for the additional weight of lime rock when we replace burnt lime with lime rock, and even then, if we have a refractory charge on, the foremen and furnacemen will be anxiously inquiring for the burnt lime on account of the furnace not working as well and running too slow. The fact that burnt lime requires less fuel in proportion than lime rock led me to the conclusion years ago that some such reaction must take place in the blast furnace, as Mr. Lang suggests. Our lead blast furnaces at the American Smelter are deeper than the old style furnaces and also larger; some of them are 40 in. by 112 in. inside diameter at the tuyeres and all 14 ft. in depth between center of tuyere holes and feedplates.

Mr. Lang's statement that 189 lbs. burnt lime instead of 161 lbs., as stated, would be required to replace the 288 lbs. lime rock is nearly correct, but I considered it self-evident that any one adding 127 lbs. more ore would either add the additional lime necessary or they could add 127 lbs. of a neutral ore, and I did not care to write a long article on the subject.

I also read a criticism in the "State School of Mines Quarterly" that burnt lime is too fine. We do not find it too fine, unless we attempt to carry it in stock, but find it about as near the right size for smelting as any one could wish when it is wheeled direct from the cars we re-

ceive it in, to the charging scales. I think the average pieces of burnt lime will measure about 5 in. in diameter as we receive it from the kilns.

LEADVILLE, Colo., April 14, 1893.

S. E. BRETHERTON.

Cheap Mining in Montana.

EDITOR ENGINEERING AND MINING JOURNAL:

Sir: The following statements appeared in your paper of February 18th, showing how cheaply ore is mined and milled at Douglass Island, Alaska: "For 120,002 tons of ore mined and milled, the total costs, including general charges and insurance and freight on bullion, amounted to \$158,324, or \$1.32 a ton. Mining, principally quarrying in benches in an open cut, costs 65 cents per ton; milling and concentration, 33 cents per ton; the chlorination of 2,703 tons of sulphurets, 19 cents per ton, or \$8.42 per ton of sulphurets. General expenses at the mine amounted to 8 cents per ton, and those in San Francisco to 2 cents per ton. The total of \$1.32 was made up by bullion, freight and insurance charges amounting to 5 cents per ton."

This is undoubtedly cheap work, but when it is considered that at the Treadwell mine the ore is quarried rather than mined, and that the company has a 400-stamp mill, which, by operating on such a gigantic scale, is able to do work at the least possible cost, the expense of producing gold in the properties of the Golden Leaf Company, of London, England, at Empire, 25 miles west of Helena, Mont., will bear favorable comparison with the cost of producing gold at the Treadwell mine.

During the year 1891 there were treated in this mill 53,700 tons of ore, and though there were about 1,500 more tons of ore broken in the stopes, the cost of mining was calculated upon the number of tons of ore worked. The number of tons treated was fixed by weighing as often as it was deemed necessary (never less than twice a month) the ore in the tramway cars. The men who loaded the cars were instructed to keep them as nearly even full as possible, and the loader and the receiver each kept and reported weekly the number of cars sent to and received at the mill, and any considerable variation in the amount of ore in the cars was also noted. The moisture was deducted from the weight of the ore, and it was fixed, after much experiment, that each carload contained 5% tons of dry ore. The ore in the Bell Boy, which was purchased in 1892, was weighed in the wagons, and the amount of moisture deducted.

The writer examined the accounts of the mine and found that the cost of mining and milling a ton ore in 1891 was as follows: Mining, \$1.005; mine development, 2,104½ ft. of work, 48 cents; milling, 79½ cents; general expenses, 21 cents; total, \$2.49.

In 1892, the accounts show the following to be the cost of mining and treating a ton of ore: Empire: Mining, \$1.01; mine development, 34 cents; milling, 79 cents; general expenses, 45 cents; total, \$2.59.

Bell Boy: Mining, \$1.89; mine development, 35 cents; milling, 76 cents; general expenses, including hauling, \$1.27; total, \$4.27.

The cost of hauling the Bell Boy ore 2¼ miles was 80 cents a wet ton. The cost of mining in the Bell Boy was higher on account of the property not being opened up at the time of the purchase. There were 46,600 tons of ore mined and milled from the Empire properties during 1892, and 10,880 tons from the Bell Boy.

HELENA, Mont., April 10, 1893.

H. M. BEADLE.

The Russell Process and Pyritic Smelting.

EDITOR ENGINEERING AND MINING JOURNAL:

Sir: Referring to the letter of Mr. Willard S. Morse ("Engineering and Mining Journal" of April 1st) asking my opinion as to the applicability of pyritic smelting to the ores now being treated at Aspen by the Russell process, I wish to inform Mr. Morse that previous to advancing the opinion which he refers to I had already attentively studied the composition of those ores, as given in the publications of the Russell company. I do not wish it to be thought by any one, whether interested in the processes under discussion or not, that I could be capable of publishing a rash or ill-considered assertion, more especially if its tendency were to injure or discredit any one engaged in the profession of metallurgy. On the contrary, I had computed the slags that would result from the fusion of the Aspen ores alone, and also in admixture with such other ores as would naturally be suggested by the study, and taking into consideration the commercial conditions which must prevail at Aspen by virtue of its being a large mining center I had come to the conclusion, which as yet I see no reason to alter, that the ores of Aspen, as far as they conform to the analyses mentioned, offer undoubted assurance of economical and profitable treatment by the pyritic process. The question is mainly one of slags. From this point of view the ore is somewhat deficient in silica, wanting an addition of 8.44% to make up the charge to conform to what I have found the best practice. A little more sulphur or arsenic would be desirable to enable less fuel to be used. Barring these deficiencies, which doubtless can be made up by purchasing siliceous sulphides, I do not see how a more advantageous ore mixture could be obtained. Doubtless a good many lead smelters will smile at the term "advantageous" as applied to an ore containing nearly 25% of heavy spar; but, contrary to their experience, I think baryta is a very wholesome base to deal with, and not at all the bugbear it is generally considered. Besides, sulphates do not increase the matte formation in pyritic furnaces as they do in lead smelting; their acid is volatilized unchanged.

If Mr. Morse will put me in possession of the necessary data, including cost of furnace, labor, coke coal and other ordinary requirements at Aspen, I shall be glad to submit an estimate of the cost of matting 100 tons of such ores daily. It would amount, I presume, to somewhat less than \$3 per ton. How this would compare with the cost of treatment in the Russell tanks Mr. Morse best knows.

I wish to introduce a correction in my letter published in the Journal of March 18th. I quote the concluding sentences: "I hold the same opinion concerning the Aspen works, which run on similar ore, and Marsac workings. I do not know how they compare with other processes." These statements I did not make, nor intend to make, since

the working costs of the tub process at Aspen have not been published, or at least have not come to my knowledge. As to the work at the Marsac mill, I was careful to give full credit to the skill and ingenuity displayed there, and to credit the workers with having advanced their process to a point where it was doubtful if even the matting process could certainly surpass them, working on such siliceous ores as they do. I am inclined to think, however, that, with the higher extraction of the precious metals attainable, as well as the saving of the associated metals, added to the advisability of thus benefiting on the spot those higher grade ores of the Ontario and neighboring mines which are now sold to outside smelters, preponderating advantages may fairly be claimed for the matting process, even in Park City, which is the chosen home of the tubmen.

HERBERT LANG.

MINERAL, Idaho, April 8, 1893.

The Colorado and the Henry's.

EDITOR ENGINEERING AND MINING JOURNAL:

Sir: The uncertainty of the silver market has caused miners and prospectors of the West to turn their attention to the gold fields, and when, a few months ago, the report went out that gold was being washed out on the San Juan River, it wanted only a little boosting by enterprising newspapers to cause a stampede to the scene of the excitement. Finding the colors too fine and far between on the San Juan to be tempting, we returned to the Colorado River, where we spent ten days panning with our own pans and our own hands, and this is what we have seen. We began at the mouth of Creescent Creek, North Wash, or the Dirty Devil, as it is called, and at this point we found a bar of 320 acres, 5 yards deep, which we estimated to be worth 25c. per yard. At Dandy Crossing the "92" claim has 100 acres, worth probably 25c. per yard. The Dandy is a 100-acre claim, as rich as the above and 9 yards deep. The Sundown, with 160 acres, we guessed from the colors we got, was worth 40c. per yard, and the Dorothy was as good. Then there are the Raven, the Illinois, Little Tom Thumb, Cape Horn, Lucky Boy, Narrow Gauge, Unprospected, Monte Cristo and Gray Cliff, running from 20 to 60c. per yard. This list of properties, all located and recorded, takes us down the Colorado 25 miles from the starting point, and now we come to Tickaboo No. 1. It was here that Cass Hite found the old Spanish workings, as he had been told he would find them by Hoskannini the Navajo. A few miles further down the river we came to Good Hope, 80 acres, that is rich in gold. This bar is worth not less than 50c. per yard. Here we passed two days, panning from every conceivable part of the bar, getting for our trouble from 40 to 150 colors in each pan. A considerable amount of money has been spent here, and I am told that \$9,000 have been taken out.

Fifteen miles below Good Hope, as we glided down the beautiful stream, we saw two men on the shore working a Kent washer; they said "Boat ahoy!" and we pulled in. This is called California Bar, and it is here that the Salt Lake Company has since begun operations on a somewhat extensive scale. The two miners referred to were Messrs. Wills and Rouse. They had just finished a run of 7 yards of dirt, and we asked them to clean-up and show us what they had. This they did and got one-half ounce of beautiful yellow gold, and we gave them \$10 for it and brought it away. On a test they had run this little machine 12 hours and had taken out \$28.65. In five days they cleaned up \$36, but this did not represent five days of constant rocking, as these men were obliged to handle the dirt three times. There are a number of valuable claims still further down the river, and some of the lower bars will run as high as \$2 per yard. Of all the prospecting we did we found no place where we failed to get gold. It is only a question of getting water upon the bars; there is no question as to the value of the dirt.

It has been the theory of old prospectors that the gold in the Colorado comes from the Henry Mountains. I don't think so. The gold in the Henry's is red; the gold in the river is a beautiful yellow. Again, we find gold above the mouth of Tickaboo, Trachyte and the Dirty Devil.

We found fair placer prospects on the Green and in the Grand, far up into Colorado, which two streams flow together and make the Colorado River.

Unfortunately, there has been a great deal of local strife among the property owners on the Colorado River, else this district would have been developed more than it is. The Hites, who were the pioneers in this district, and who have done most of the work that has been done have had a hand in the strife which has prevented the opening up of this placer field. It is not my province to accuse the innocent or acquit the accused, but I would be ungrateful if I failed to say that the Hites are a most hospitable family. They gave us shelter, furnished a boat and two of them went with us 50 miles down the river, rowing down and towing back, when it was necessary to do so. Homer Hite, the Recorder for the district, and his assistant, opened their books and gave such information as was asked.

Old prospectors tell me that you can wash all the gold out of a bar, let the ground remain undisturbed for a half dozen years, wash the same dirt again and get gold. It appears to grow, they say, when the ground is seeded.

Beside the placer prospects in the Henry's, there are good leads; it is here in the seams of the porphyry, the general formation of the mountains being trachyte. No less than 100 disappointed San Juaners crossed the Colorado River to the Henry's, and already we begin to hear from them, and the reports so far are anything but discouraging.

DENVER, Colo., March 22, 1893

CY. WARMAN.

Imports of Iron and Manganese Ores into Great Britain.—The British imports of iron ore in 1892 were 3,780,503 tons, 599,960 tons greater than in 1891, but 691,287 tons less than in 1890. Between 1890 and 1891 there was a difference of 1,291,247 tons, the imports in the former year being 4,471,790 tons. There was a slight increase in the importation of manganese ores of 8,374 tons; the total in 1892 being 109,823 tons. Of this 51,844 tons came from Russia, 27,195 tons from Chile and 11,156 tons from Spain.

ESTIMATION OF ARSENIC AND PHOSPHORUS IN IRON ORES.*

It is by no means unusual for ores of iron and manganese to contain arsenic, and this element is very apt to interfere with the estimation of the phosphorus, giving a plus error with either the molybdate or the acetate method. The method proposed in this paper seems to possess considerable merit, and it is claimed that after the sample has been dissolved and carried to dryness the phosphorus in ores containing arsenic can be determined in about 1½ hours. Briefly described this method is as follows: After solution of the ore and evaporation to dryness the residue is taken up with as little hydrochloric acid as possible. The iron is reduced with hyposulphite solution (500 grms. to a liter), somewhat rapidly at first, but toward the end of the reaction very slowly, drop by drop, until a single drop fails to produce the violet color of ferric thiosulphate. After addition of the hyposulphite the total volume of the solution should not exceed 60 c. c. The solution is then boiled to remove sulphurous acid completely, and then 5 c. c. concentrated hydrochloric acid are added. A little powdered zinc sulphide is now added to the cold, strongly acid solution. Arsenic separates immediately as arsenic trisulphide, and collects at once by gentle agitation of the liquid. Enough zinc sulphide should be added to cause the liquid to smell strongly of hydrogen sulphide. If the arsenic is to be determined, care must be taken not to boil the liquid in freeing it from sulphurous acid beyond two or three minutes, else there may be a loss of arsenic consequent upon its volatilization as trichloride. In ores containing ferrous oxide care must also be taken to oxidize the arsenic before evaporating to dryness.

The precipitate caused by the zinc sulphide may contain copper as well as arsenic, but cannot contain lead, and these substances may be separated from the silica in the usual way, by treatment with ammonium sulphide for separation of the arsenic, and with nitric acid

THE KOKSHAROFF MEDALLION.

The engraving given herewith is from a photograph of a medal or medallion of Nikolai Koksharoff, which was obtained by Mr. George F. Kunz at the Kasli Iron Works in the Oural Mountains in Russia. These works are 130 versts (87 miles) from Ekaterinbourg, the nearest railroad station. The medallion itself is about 6 in. in diameter and is a remarkably fine piece of work, the casting being clear and sharp, and presenting almost the appearance of bronze. The finish was entirely put on by the Russian iron founders.

The obverse, shown in the engraving, bears the portrait of Mr. Koksharoff, which is evidently a striking one, and his name—"Nikolai Ivanovitch Koksharoff." On the reverse side, which is not shown, is the Russian inscription, translated as follows: "To the director of the Imperial Mineral Society from the Imperial Mineral Society—1837-1887—50 years' success. To N. I. Koksharoff; author of Materials for the Mineralogy of Russia." The central date is surrounded by a laurel wreath.

The iron of the Oural district has long been noted for the exceptionally fine quality of the castings made from it, and this medallion seems to be an excellent specimen of it.

Nikolai Ivanovitch Koksharoff, who has long been considered the most eminent of Russian mineralogists, was born in Western Siberia in 1818, and studied in the Institute of Mines at St. Petersburg. In 1839, after completing his course, he was sent to the Oural district as an assistant engineer. In 1841 he accompanied Sir Roderick Murchison in his travels through Russia, and by advice of that gentleman decided to devote himself to a scientific career. He spent several years studying in France and Germany, and on his return to Russia applied himself to studies in mineralogy and more especially to gonometric measurement. In his earlier years he lectured at the Institute of Mines



NIKOLAI IVANOVITCH KOKSHAROFF.

for dissolving the copper. The filtrate from the sulphides is boiled to expel hydrogen sulphide, diluted with cold water to 200 or 250 c. c., and an aliquot portion taken for the estimation of phosphorus. To it is added a solution of ferric chloride sufficient to combine with all the phosphorus present and give a slight excess. Calcium carbonate, free from phosphorus, is then added to precipitate the mixture of ferric hydrate and ferric phosphate, care being taken to avoid the use of any but a very small excess. Precipitated at a temperature of 65° to 70° C. in this way the ferric phosphate filters very rapidly. It is washed with warm—not hot—water, dissolved in dilute nitric acid and the phosphorus thrown with ammonium molybdate as usual.

The method gives excellent results, and is to be recommended to all who may have to determine phosphorus in presence of iron and arsenic. It might be used with advantage in certain fertilizer works where iron containing phosphate rocks are treated with arsenical sulphuric acid.

Occurrence of Cinnabar in Belgium.—X. Stainer, in "Annales de la Societe Geologique de Belge," Tome XVIII., p. 52, mentions a new occurrence of this mineral in Belgium. It is found in dolomite belonging to the carboniferous limestone, the dolomite being full of crinoidal stems. The cinnabar occurs with pyrite and calcite, and is found at the foot of the Navian cliffs on the right hand side of the Meuse north of Dave. The original position of the ore cannot be determined, but Stainer supposes it was held in quartz veins. A similar occurrence of cinnabar was noticed by Lipold in the "Oesterreicher Zeitschrift fuer Berg u. Huettenwesen" in 1855, and again in 1882 at St. Anna in the Loibel Valley. It is not likely that the Belgian cinnabar will be found in sufficient quantities to be worked, as the amount found was very small and important only as showing a curious environment.

on geology and physical geography, but later restricted himself entirely to mineralogy. His chief work is found in the 11 volumes of the "Contributions to Russian Mineralogy." A twelfth volume of this series has been completed and is now on the press. Besides this work he contributed many special papers to the "Mineralogische Mittheilungen" and the "Jahrbuch fuer Mineralogie." He was for over 50 years a prominent member of the Imperial Mineral Society, and for many years its presiding officer. In 1866 he was made a member of the St. Petersburg Academy of Sciences, and he was also a corresponding or honorary member of many of the learned societies of Europe. Mr. Koksharoff died January 2d, 1893, aged 74 years, after a long and useful life.

Russian Petroleum.—The total exports of petroleum products from Batoum in 1892 are reported by United States Consul Chambers at 261,815,005 gals., an increase of 18,771,475 gals., or 7.7% over 1891. Of the total last year 194,091,450 gals. were illuminating oil, the balance crude oil and residuum. The prevalence of cholera during the summer caused a heavy reduction in the output. Another result of the cholera was that no new fields were developed during the year. A new feature in the method of shipping refined oil to India and the far East was inaugurated by the clearing of the tank steamer "Murex" from Batoum in August with a cargo of refined oil in bulk for Singapore and Bangkok, via the Suez Canal. This trade is now supplied with oil in cans and cases, but the "Murex" is constructed according to rules laid down by the Suez Canal Commission for the express purpose of carrying bulk oil through the canal, her owners having two more steamers of like construction completed, and, it is said, three or four more in the course of construction. They have also erected tankage at Calcutta, Madras, Singapore, and Bangkok, and will, it is said, continue the erection of tankage at all the principal ports of India, Burmah, Straits Settlements, Java, Slam, China, and Japan.

* Abstracted from paper read before the Newcastle section of the Society of Chemical Industry by John and H. C. Pattinson

THE IRON ORE DEPOSITS OF A PORTION OF THE MENOMINEE RANGE, MICH.

By D Hulst.

After an extended description of the geology of a portion of this region, Mr. Hulst gave considerable information concerning the ore deposits.

Thus far in the development history of this portion of the range it appears that its productive portions are to a certain extent located at or near points where the geological formation has been faulted, eroded deeply or sharply folded. At Iron Mountain a great gorge has been eroded through the Huronian ridge, which once was continuous from mountain to mountain.

At the Pewabic mine a gorge double the depth of the Iron Mountain gorge exists in the Huronian strata and evidences exist of one, if not two, faults or sharp folds of the same strata at no great distance from the Pewabic ore body. At Quinnesec likewise the broken trend in the outcropping limestone is evidence of a fault or similar sharp fold. So too at Norway the apparently displaced limestone ridge and lack of continuity of the ore formation are indications of a fault or sharp fold involving the whole Huronian series. The Aragon mine lies near the line of this fault or fold and its disturbed ore body and enclosing slate rocks bear witness to the stress at this point.

These coincidences which I have related may be that of mere chance, but they are at least worth consideration in the search for ore along the range.

The ore bodies are found in beds of banded lean jaspery ore. The lean ore is the invariable associate of the richer ore. There may be large lenses of ore, as, for instance, the great lens of the Chapin mine, widening out to reach the enclosing slate walls on either side, but longitudinally the lens diminishes and lean ore fills up the width.

The rich merchantable ore often appears to be part and parcel of the general stratification of the lean ore encompassing it. Not infrequently one finds spots in the ore bodies where the ore apparently is in the transition state from jaspery lean ore, as though the ore body were charged with a solution which was gradually dissolving out the silica from the adjacent enclosing jaspery ore. Quite invariably there is a notable pitch to the ore bodies, and with rare exceptions this pitch is to the west at a variable angle from 30° to 50°. If, as is probable, the ore bodies were formed before the uplifting of the Huronian rocks, it be possible to account for the pitch, by stating that the axis or line of the uplift made the same angle with the axes of the ore bodies, as the axes of the ore bodies do now with the horizon. That is, the ore bodies which now pitch northwest had when lying horizontally a south northwest trend; while an ore body pitching northeasterly like the Pewabic had when lying horizontally a south northeast trend.

It was supposed well settled until within a few months ago that the only ore formation giving any promise of productive ore bodies must lie above the limestone geologically. A good deal of energetic exploring was done in the early days of the range on the slates and banded ore lying north of the Norway mine and underlying the limestone.

The Menominee Mining Company at an early date struggled ineffectually to reach the supposed ore belt underlying the deep drift near the mouth of Pine Creek on Sec. 2. Now that the Loretta mine has been found underlying the limestone and producing ore of a high grade our range has new possibilities. It might be remarked here that this mine is in close proximity to a gorge in the Huronian strata, making one more link in the chain of coincidences of which mention has been made.

Within a brief period a bed of merchantable magnetic ore has been found by diamond drill exploration to exist near Quinnesec. This deposit lies south of the formation of banded jaspery ore, apparently by itself, though it is in the line of a well known magnetic attraction which skirts along the base of the range for its entire length.

Without exception all the merchantable ore of the range is found lying in the more or less extensive beds of lean ore. The lenses are likely to be found in any portion of any of the beds from the bottom to the top of the beds geologically speaking. To some beds well defined hanging or footwalls may exist; to others there are no walls, the merchantable ore suddenly giving way to lean ore or vice versa according to no known rule. When there are no well defined walls found accompanying the ore body, such lenses of ore are quite sure to carry a minimum per cent. of phosphorus. The Millie, Pewabic, Cyclops, Aragon and S. E. Vulcan mines are all notable in this respect. All of the mines east of the Menominee River at the outset, excepting the Norway, the Stephenson and the Perkins adjoining, were producers of low phosphorus ores. Some of them still continue so. It would appear that the ore immediately underneath the drift covering has had more or less of its phosphorus leached out by percolating waters. That the phosphorus does leach out during a winter's exposure on a stockpile is a well settled conviction, with the chemists who have worked upon the blue Menominee ores.

It is a notable feature of this portion of the Menominee range that all of its mines, with the exception of the Norway, produce the well known soft blue hematite. They are, in fact, soft specular ores. With other ore ranges and also with the western portion of the Menominee range a mine producing ore of such color and texture is the exception. Here it is the rule, and yet there is an individuality with the ore of each mine. With a little practice one could almost unhesitatingly select and name the ore of each mine in a collection of typical samples.

A Ship Canal Project.—The Minnesota Canal Company has recently been incorporated at St. Paul with the object of connecting the Mississippi with Lake Superior at Duluth by a canal which will enable lake vessels to deliver their cargoes directly at St. Paul. The project does not look badly on the map, but the difficulties in the way are very serious. The lift and size of locks required and their number will alone be formidable obstacles, and others will be found in the cost of the works and the supply of water for the upper levels.

*Abstracted from a paper read at the first meeting of the Lake Superior Mining Institute.

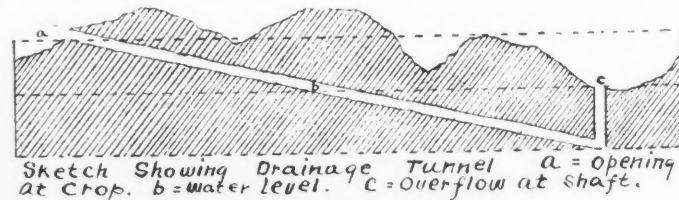
THE REYNOLDSVILLE PA. COAL FIELD AND A NOVEL DRAINAGE SYSTEM.

Written for the Engineering and Mining Journal by Frank M. Brown.

One of the most important coal producing districts in Pennsylvania is the Reynoldsville coal and coke region, located in the eastern part of Jefferson County. The seam now being worked is the Lower Freeport, with an average thickness of 5½ ft.; it lies in parallel troughs, which trend to the northeast and southwest. In appearance the coal is lustrous and compact, cokes well, is free from iron pyrites, and is an ordinarily good gas coal. The increase of the output is an evidence of the value of this coal for steam making, as it is used almost exclusively for this purpose. In 1886, the total amount produced was 1,023,186 net tons, and for 1891 it reached 3,160,614 tons, while the output for 1892 exceeds this. The principal shipments are to northern and north-eastern markets. The largest mine in the region is situated near Reynoldsville, and takes its name, Big Soldier Run, from the stream on which it is located.

The place selected for the opening of the slope is on the northwest side of the trough, or coal valley, not far from the anticlinal lying between the Reynoldsville sub-basin and Reynoldsville basin proper. By boring, the lowest point in the coal valley was found to be near Sykesville, a village two miles distant. Levels were taken and it was ascertained that the dip of the seam was 218 ft., and the surface at the same point was found to be 102 ft. below the bottom of the seam at the slope opening. This condition of affairs suggested, to the engineer in charge, a scheme for cheap drainage, which was carried out as follows: The seam was opened up at the crop, and a random line run from this point along the highway to the point near Sykesville. From data thus obtained an angle was calculated, giving the course of a straight line that would join the two points. The difficulty in running a perfectly straight line, for nearly two miles, through a hilly and wooded country, was here encountered, and three attempts were made before the line was completed. At the crop end a heading was started, on line 9 ft. wide, also three others, running parallel, two on the right

FIG. 1.



Sketch Showing Drainage Tunnel a = opening at Crop. b = water level. c = overflow at shaft.

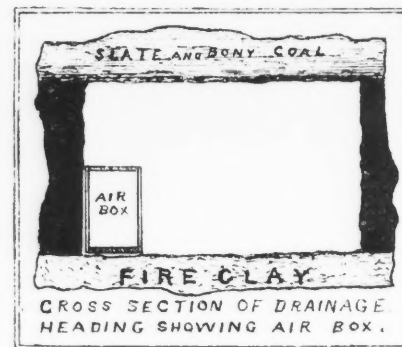


FIG. 2.

and one on the left, all to be used as roadways. Ground was then broken at the Sykesville end for a shaft, rectangular in form, 12×16 ft., so located that the straight line would pass diagonally through the two corners of the rectangle. Two large boilers and a hoisting engine were then put in place, and the work progressed. In sinking the shaft first loose earth had to be cribbed, and next hard sand rock was met requiring drilling and blasting; and then the water in great quantities. After procuring two double cylinder duplex pumps, each having a capacity of 420 gals. per minute, work was resumed, and the shaft went slowly down, until the coal seam was uncovered, and the bottom reached, at a depth of 116 ft.

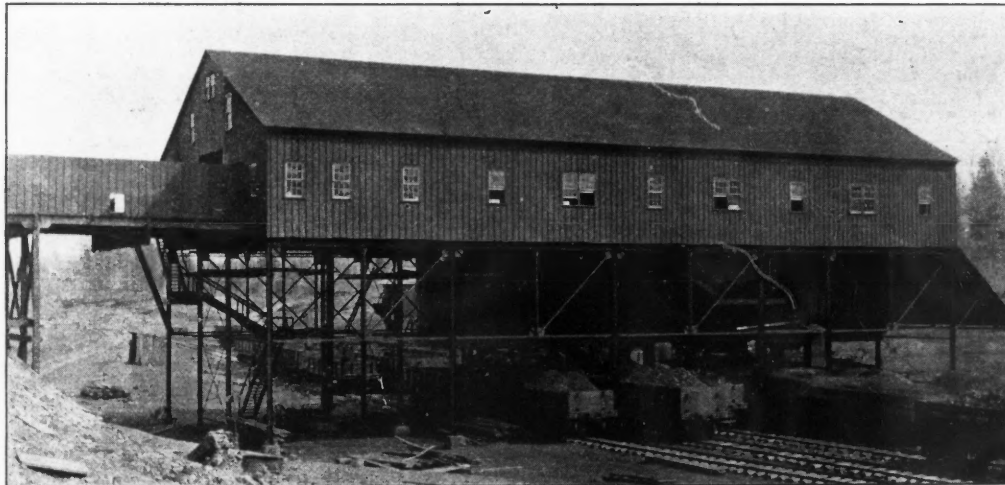
To carry the surface line to the bottom of the shaft, enough fine steel wire was obtained to make two plumb-lines, that would reach from the top to the bottom. It was absolutely necessary that this wire should be fine, and yet strong enough to hold a given weight and not stretch. The weights, weighing 12 lbs. each, were suspended, one at each corner of the shaft, and the wires carefully placed in line, on the surface, with the transit. The instrument was then taken to the bottom. The plumb-bobs, however, would not remain quiet, but kept up the motion of a long pendulum. Two pails of molasses were procured, and the weights were suspended in these, and at last ceased to vibrate. After numerous mishaps, from various causes, the heading line was established to meet the one being driven from the slope end. Before starting the main heading away, two cross-headings at right angles with the main were driven, and off from these several rooms were turned and mined out, to make water room. This, in the event of anything happening to the pumps, would allow the men time to escape before the main entry filled.

Having decided to drive the headings with machinery, two Norwalk air compressors were procured, one for each end; also several Harrison mining machines, or "Iron Men," as the miners call them. A single heading was driven from the shaft end, and the air carried to the face by a wooden box, 20 in. wide by 36 in. high; this box was grafted on

in 16 ft. sections, as the work advanced, and through the whole distance furnished a good supply of fresh air at the face of the workings. For 370 ft. the work progressed well, and no obstacles were encountered; a few feet more and a rock fault was struck; geologically speaking not a rock fault, for the strata remained intact. The coal seam had been washed or cut out, and sand deposited in its place, which ultimately became very hard rock, and 120 ft. of this rock were gone through before coal was again found. About 420 ft. further on more rock of the same description was found. In this no progress of account was made, till an Ingersoll drill was purchased, and then an average of 5 ft. a day was made. The natural rise of the seam was kept, and occasionally a hole was drilled down as well as up, but with no signs of coal. After going on in this manner for 300 ft., it was deemed advisable to ascertain what was ahead, and a point was located on the surface, 330 ft. ahead of the face, and a hole bored 230 ft. deep, which showed 7 ft. of coal. This was encouraging, and the work was pushed on. No coal was found until within 12 ft. of the hole, and then the full height of the seam, but 12 ft. further on the coal again disappeared. To the writer this was proof positive that prospecting by boring here and there a hole does not tell the entire story. In this case, had the hole been located 15 ft. either backward or forward, no coal would have been found; and again several holes a few hundred feet right and left of this heading line showed full thickness of the seam, while the work in the heading actually went through 1,000 ft. of solid rock. After tunneling 120 ft. more in the rock, coal was again found. Here the Ingersoll drill was exchanged for the mining machine, and from this end the work progressed at the rate of 30 ft. a day.

At the slope end, the progress was slow. Four headings were carried along, and from two of these, the outside ones, rooms were turned, and entries driven both right and left. The water was a constant source of trouble, and so heavy was the grade that a mule could pull

there have been improvements. The haulage system at Big Soldier Run is laid out on a large scale, and with the best machinery. The buildings are substantial, of brick and stone. The boiler house is 80 by 38 ft., and contains a battery of six boilers of 100 H. P. each. The stack is built of brick, 13 ft. square at the base and 11 ft. at the top, and is 103 ft. high. The flue is 5 ft. square, and holds its size from bottom to top. Adjoining the boiler house is the engine house, 100 by 30 ft. This building is only one-half completed yet. When done, it will contain four double engines, each pair working an endless rope. The rope coming from the mine takes several wraps around the large driving wheels, and returns to the mine, where it passes around a bull-wheel, to return again. The train of mine cars is attached to the rope with a grip, similar to those used on street car lines, and a trip of 60 loaded cars, of two tons each, can be hauled up this heavy grade in a few minutes. The rope does not run continually in the same direction, but has a reciprocal motion. The engines are reversible, and as soon as a trip is brought out, the engines are reversed and a trip of empty cars are taken in. The engines are controlled by two men, occupying positions in towers erected for the purpose, on top of the engine building. From this position they are enabled to see each trip as it emerges from the mine, 1,100 ft. distant. The rope delivers each trip to a large structure called the tippie building. Here it is dumped into chutes where it passes over screens, and is divided into lump, nut and slack; each kind being delivered into cars ready for shipment. There are six of these dump places, two of which have no screens. Coal loaded from the latter is known as "run of mine." This structure is shown in the accompanying engraving, from a photograph; it is built of iron and steel; its length over all being 140 ft., and its width 56 ft. The distance from the ground to the eaves is 45 ft. The approach is 90 ft. long by 36 ft. wide. The whole structure rests upon a substantial foundation, laid in cement. Underneath are seven tracks, extending up a slight grade for half a mile above the chutes, which constitute the



TIPPIE BUILDING, BIG SOLDIER RUN MINE, REYNOLDSVILLE, PA.

but one loaded car at a trip. For months not more than 2 ft. a day was averaged, and so the distance between the two ends was lessened, until one day a shot was heard by the shaft heading men from the slope. Careful measurements demonstrated the distance through to be 399 ft. At 200 ft., the mining machines could be plainly heard.

From both ends the miners were kept on line by means of sights. These were plumb-lines suspended from plugs, driven in holes drilled in the roof, and carefully placed in line by the engineers. It was found to be necessary to set these sights ahead every 200 or 300 ft., to keep them near the face. This was often difficult because of the smoke from the powder used in blasting, and inability to so light the plumb-lines as to be seen with the transit. A small error in this work would have thrown either end off from the line, but when the headings were driven together, so closely did they meet it would require a practiced eye to discover where they joined. The distance driven from the shaft end was 5,200 ft., and from the slope 3,900 ft. The time from the beginning to the completion of the work was nearly three years.

Levels were taken, and it was ascertained that an elevation equal to the depth of the shaft would pass up the heading 4,500 ft., and should the shaft be allowed to fill to the top, there would still be left above water level 4,600 ft. from the slope end. The heading was now cleared of pumps, pipes, rails, and everything valuable, and this scheme for drainage was accomplished. The shaft is now full and overflowing, and 2,500 acres are being drained without cost of pumping. As soon as all the coal above water level is mined, which will be many years hence, the water can be pumped out, and the balance of the territory mined. The diagram, Fig. 1, shows the general plan of this drainage system; Fig. 2 is a cross-section of the shaft.

The reason why this field was not mined from the shaft was that the company owning it already had a railroad constructed nearly to the slope end; and several large shafts, with machinery in each, would have to be constructed to hoist the desired output. Besides, if all the coal should be taken out at the shaft, then all the water from the entire field would have to be pumped; now 2,500 acres can be mined without pumping. The heading had to be straight, in order to put in a peculiar haulage system. The idea of cable traction is an old one. It was first employed in mines, and wire rope was first used for this purpose in Saxony, as far back as 1830, but in this, as in everything else,

yard for the storage of empty cars. For loading, the cars are dropped into place by gravity. Here, as soon as the mine is brought up to its full capacity, 350 cars, or about 8,000 tons, can be loaded each day.

The New French Tariff and Foreign Trade.—The tariff act passed in France, February 1st, 1892, by which the duties on many classes of merchandise were greatly increased has caused a most pronounced falling off in the foreign trade of that country, as is shown by the value of the imports and exports during the first two months of the present year and compared with those of 1892. The total value of imports this year was 637,764 francs, against 961,862 francs in 1892. Exports, however, showed little change, the values being 489,604 francs in 1893, and 496,782 francs in 1892.

Deep-Lying Phosphates in Florida.—The last report of the State Chemist of Florida, Mr. Norman Robinson, notes that indications derived from artesian wells and other deep borings have been confirmed by later investigation and justify the belief that there is a bed of pebble phosphate underlying a considerable part of the State. The depth at which this bed is found varies from 125 to 300 ft., and its thickness from 25 to 50 ft. When the easily worked surface deposits are exhausted, Mr. Robinson believes that these deep deposits will be mined and furnish an abundant supply.

Mineral and Metal Exports and Imports of Spain during 1892.—During the year the exports of ores of iron, lead, manganese, and pyrites showed a marked increase over the corresponding movement in 1891; while the exports of copper ore showed a considerable decrease, as did likewise the exports of pig iron and mercury. The imports of coke were 49,128 tons less, and of iron and steel 26,000 tons less than in 1891. The imports of coal, tin-plate and pig tin showed a slight increase. On the whole, it may be said that trade in the articles named has been steady, as, indeed, might be expected from the slowness of that country to adopt improvements. Leading articles of import in 1892 were: Coal, 1,688,537 tons; coke, 178,872 tons; iron and steel, 71,836 tons. The exports included, 4,773,827 tons iron ore; 512,015 tons copper ore; 454,451 tons pyrites; 153,859 tons lead; 1,643,731 kilogs. quicksilver.

THE LOWEST TEMPERATURE.*

While M. Moissan has devoted himself to obtaining high temperatures and has obtained heat rising to thousands of degrees, M. Raoul Pictet has been carrying on a series of experiments in the opposite direction. By steps carefully reasoned out he has succeeded in obtaining a temperature lower than any hitherto known, 273° Cent. below zero, or 491° Fahr. below the freezing point of water. M. Pictet obtained this temperature by using a series of cold wells which brought him gradually to the final result. In his first well he used a mixture of carbonic acid and sulphurous acid, and by their evaporation obtained a temperature of 110° C. below zero. In this first cold well he immersed a condenser in which the vapors of a still more volatile liquid—protoxide of nitrogen or ethylene—were condensed, and thus reached 150° below zero. In the third well he reached 210°, and in a fourth 273°, beyond which he has not yet gone. In his third and fourth wells nitrogen, carbonic oxide, marsh gas and atmospheric air under a pressure of 40 atmospheres were used. M. Pictet has communicated some of the results he obtained to the Societe des Sciences Naturelles at Geneva, but has not yet given full accounts. The instruments with which the lower temperatures were measured were hydrogen thermometers graduated by comparison with sulphuric ether instruments.

Among the other results obtained, M. Pictet has been able to reduce atmospheric air to a liquid state, in which it showed a blue color; he has obtained alcohol, ether, bromide of ethyl and chloroform in an absolutely pure state. The low temperatures given will, he believes, open some new views of chemical combination and enable him to obtain some hitherto unexpected results and possibly some changes in industrial processes. He is at present engaged in investigating the question of the temperature necessary to extinguish life entirely in certain classes of microbes.

It is interesting to note that these experiments have developed enormous pressures, and that M. Pictet's cold wells might be converted into dangerous projectiles. It may also be noted that while, at the temperature of 6,000° above zero, obtained by M. Moissan, the earth would be burned up or vaporized, the 273° below zero, which M. Pictet obtained, would be followed by absolute death, and it is doubtful whether even the more solid portions of the globe, the rocks and stones could retain their form. Certainly no form of organic life with which we are acquainted could continue to exist.

ABSTRACTS OF OFFICIAL REPORTS.

GENERAL ELECTRIC COMPANY.

The General Electric Company was incorporated April 15th, 1892, and began active business June 1st, 1892; so that the report covers a period of eight months ending January 31st, 1893. The company acquired in exchange for its stock practically all the capital stock of the Edison General Electric Company, of the Thomson-Houston Electric Company, and of the Thomson-Houston International Electric Company. These three corporations, referred to in this report as the underlying companies, still retain their independent corporate existence. The first two continue their manufacturing business as before, the General Electric Company purchasing and distributing the chief part of the apparatus manufactured by them. The various selling and many other departments of the Edison General and Thomson-Houston companies have been gradually merged into corresponding organizations of this company.

The total number of central station lighting companies using Edison and Thomson-Houston apparatus is 1,277, supplying about 2,500,000 incandescent and about 110,000 arc lamps.

The total number of railroads operating and under contract February 1st, 1893, was 435; total number of cars in actual operation, 8,386; number of miles of road in actual operation, 4,927. This is an increase of 221 roads, of 2,612 miles of track and of 5,596 cars during the year.

An interesting point shown in the report is that there has been a notable increase in the size of individual machines manufactured at the different factories, as well as a large increase in the total factory output. On February 1st, 1892, the largest power-generator manufactured was of 275 H. P. Machines of 2,000 H. P. each are now being manufactured, seven of which are already sold for early delivery. The largest lighting generators in use February 1st, 1892, were capable of supplying only 2,000 incandescent lights each. There are now being constructed generators of the direct-coupled type with a capacity of 12,000 incandescent lights each. Many local lighting stations are being equipped with steam engines directly coupled to such machines, giving a capacity of about 25,000 incandescent lights from each engine. Of the largest direct-coupled lighting generators which were manufactured a year ago, there were shipped during the year 1892 an aggregate of 7,000 H. P. Of such sizes now being constructed there are at present on order 8,000 H. P. Machines for power purposes, principally rail, aggregating 40,000 H. P., have been shipped during the past year. There are now being manufactured, on order, generators aggregating 37,000 H. P., or practically as much as the total shipments for the past year.

Satisfactory progress has been made in the development of apparatus for mining purposes, particularly of locomotives for haulage work in coal mines. Thirty of such locomotives, with a very large amount of other mining material, are now under construction at the works. For general purposes two locomotives of 1,600 H. P. each, ordered by one of the principal trunk lines, are now under construction and nearly ready for use. The equipment of the elevated electric railway at the World's Fair, six miles in length, and which is now nearly completed, is being supplied from the Schenectady factory, and it is hoped will be in operation at the opening of the Fair.

As to patents, the report says that the decision of the highest court sustaining the fundamental incandescent lamp patent, has vested in the company the right to the incandescent lamp business of the United States, a result of great value. The efforts made to develop an incan-

descent lamp which will not infringe this patent have been thus far without success. The decisions heretofore rendered in favor of the Thomson-Houston and Brush companies, covering the double carbon arc lamp, automatic current regulation and electric storage, are of very great value to the company. Suits against infringers are now in active progress on many important patents, other than those already sustained by the courts, covering essential features in electric railroad, lighting, and power apparatus. These suits will be pushed as vigorously as possible.

The financial statement shows the assets as follows: Stocks of underlying companies, \$18,262,060; real estate, \$298,727; stock of United Electric Security Company, \$1,234,370; stocks of manufacturing and other companies, \$1,580,216; stocks and bonds of local companies, \$9,173,252; cash, notes, and accounts receivable, \$16,101,863; inventories, \$2,076,503; work in progress, \$2,207,983; total, \$50,934,974. The liabilities are: Common stock, \$30,426,900; preferred, \$4,236,900; debenture bonds, 5%, \$10,000,000; notes, accounts, accrued interest, etc., \$5,246,219; surplus, \$1,024,955. In this account the stock of the Edison company stands at \$8,633,208; the Thomson-Houston company at \$8,416,852; the Thomson-Houston International company at \$1,212,000.

A feature of the report which is one result of the manner in which the electrical business has been carried on, is the item of \$9,173,252 stocks and bonds of local companies in the assets. Concerning these the report says that the stocks have been valued at a figure which can be easily obtained for them. The bonds are almost entirely those of local companies. They are nearly all first mortgage bonds, payable in gold, and stand in the balance sheet at about 70% of the face value. All of these bonds excepting \$439,000 at par value—\$251,088 book value—are regularly paying their interest. Some of the bonds carried have been sold since the close of the fiscal year at prices in excess of their book value, and the rest will be sold from time to time through the United Electric Securities Company and other channels, as heretofore.

The net profits of the business for the eight months over all expenses were \$3,356,593. From this are deducted interest, discount and interest on bonds, \$242,431; patents charged off, \$118,151; dividends paid and declared, \$1,971,056; a total of \$2,331,638; leaving a surplus of \$1,024,955 at the close of the year.

ALABAMA CLAYS.

The fireclays of Alabama may be discussed and classed under five heads: 1. Clays of the crystalline schists, or metamorphic formation. 2. Of the Cambrian and Lower Silurian. 3. Of the Subcarboniferous. 4. Of the Cretaceous Formation. 5. Of the Tertiary.

Under the first are the deposits of Coosa, Cleburne and Randolph counties, the clay, or kaolin, of Louisa, Randolph County, having the following composition: Silica, 37.29%; alumina, 31.92%; oxide of iron, trace; potash, lime and magnesia, 0.72%; water, 15.09%; undecomposed mineral, 14.28%. The pottery made of this clay took the first prize at the Art Institute Fair, at Philadelphia, in 1890, and brick made from it have successfully withstood the severest fire tests that could be applied at a large firebrick factory.

It is among the second class, the Cambrian and Silurian clays, that the bauxites and kaolins of Cherokee and Calhoun counties occur. An analysis of the kaolin from near Jacksonville, Calhoun County, is as follows: Silica, 44.60%; alumina, 38.92%; oxide of iron, 0.78%; lime, potash, etc., 1.03%; water, 13.88%; undecomposed mineral, 0.90%.

The third class, or Subcarboniferous clays, occur at the base of the formation in close proximity to the underlying black shale. These clays approximate closely to halloysite, and have been opened at Valley Head, De Kalb County. The Cretaceous clays, the fourth class, occur over a very wide extent of territory in the Tuscaloosa Formation (the Potomac of McGee, and the Raritan of Cook). Dr. Smith says of these clays that there is hardly a variety among the New Jersey clays that cannot be exactly matched in Alabama. The Tuscaloosa clays extend entirely across the State, occupying roughly all that portion of it lying south of a line drawn from Tuscaloosa southeast to Columbus, Ga. In admixture with other clays they are used in the manufacture of firebrick at Bessemer and at Bibbville. An analysis of a typical sample from Chalk Bluff, Marion County, is as follows: Silica, 47.20%; alumina, 37.76%; oxide of iron, 0.91%; lime, potash, etc., traces; water, 14.24%.

The clays of the Tertiary Formation occur in the Buhrstone Division of the Alabama Tertiary. A sample of the beds in Choctaw County had the following composition: Silica, 36.30%; alumina, 45.12%; oxide of iron, 1.60%; lime, 0.46%; water and volatile matter, 6.60%. There seems to be no question of the adaptability of the Alabama clays for the manufacture of all kinds of fireproof material, and some of them have already been used in the production of the finer grades of pottery with very satisfactory results. Their wide extent and diversified nature enable one to select, with ease, whatever particular sort may be required; and the growth of metallurgical interests in the State, requiring large supplies of firebrick, indicates a profitable source of revenue from this direction alone.

Manganese in Russia.—According to a Russian exchange the Trans-Caucasian Railway carried during 1892 a total of 8,500,000 lbs. of manganese ore, against 4,500,000 lbs. in 1891.

Trial of the "Detroit."—The new cruiser "Detroit," of the United States Navy, has proved herself a fast vessel for her size, and probably earned a large bonus for her builders, the Columbian Iron Works, of Baltimore, by the excess of speed over contract requirements. On the official trial in Long Island Sound she made an average speed of 18.3 knots an hour, which was increased to nearly 19 knots on a run of 36 miles. The "Detroit" is one of the smaller cruisers, having 2,000 tons displacement only, and a mean draught of 14½ ft. She has twin screws and triple-expansion engines.

*Abstract of paper read before the Alabama Industrial and Scientific Society by Dr. Eugene A. Smith, State Geologist of Alabama.

Translated from article by M. Max de Nansouty in *Le Génie Civil*.

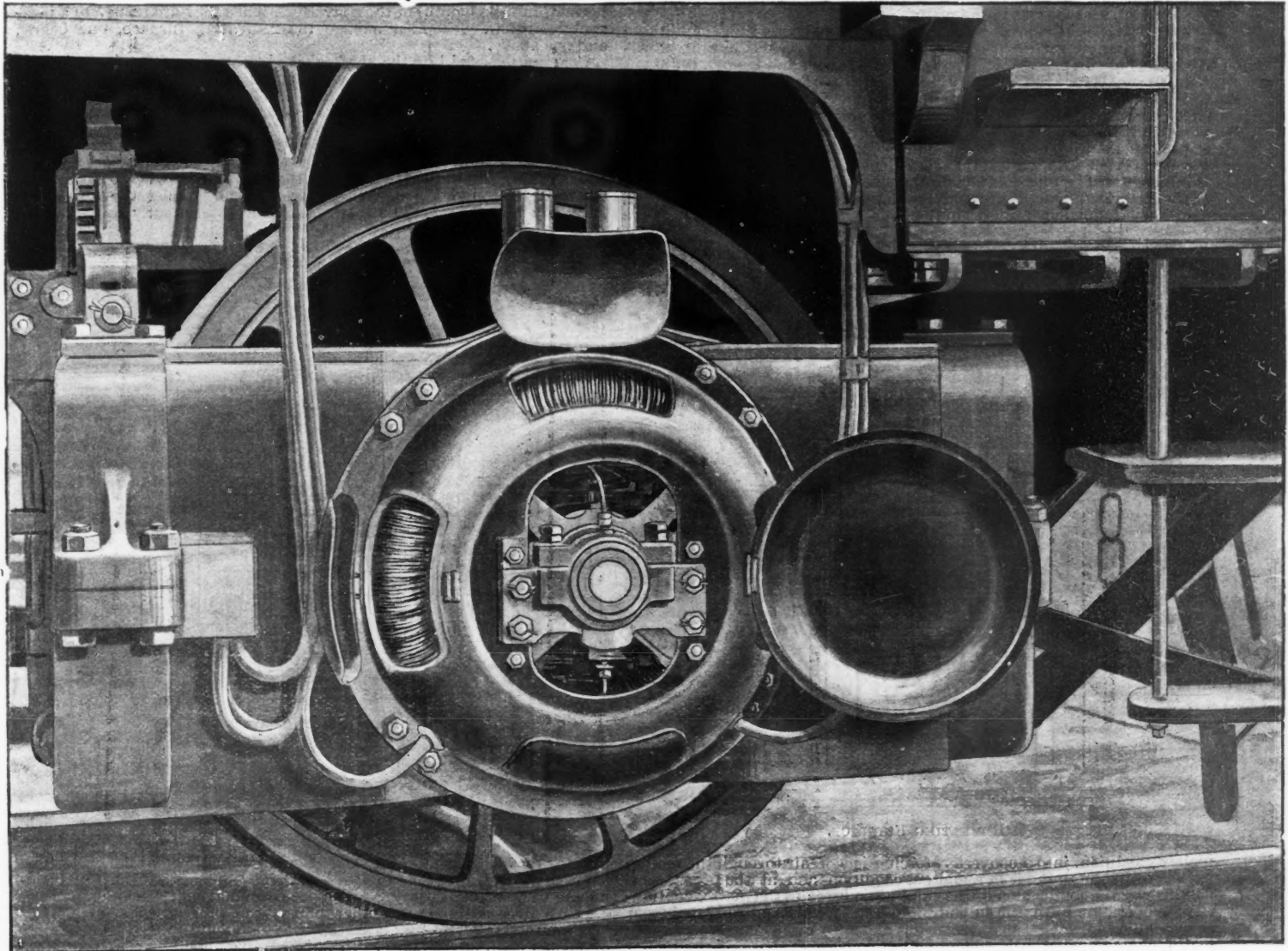
ELECTRIC LOCOMOTIVE FOR THE NORTHERN RAILROAD OF FRANCE.

The Northern Railroad of France some time ago decided to make experiments with an electric locomotive adapted especially to the working of its local and suburban trains. The problem presented was to provide a machine which would be able to work a train properly under different conditions of grades and curvature and the necessity of making frequent stops; which would be able to maintain a nearly uniform speed and to increase the commercial speed of trains without the necessity of using very high speeds on descending grades and at other favorable points. The type of locomotive adopted after careful study is an experimental one only and may be modified after trial; but it has been carefully worked out and presents some interesting points.

The locomotive is simple in construction. It is a car or carriage mounted on six wheels of equal size. Two of the axles carry motors, the third being only a bearing axle. The car serves as a platform to carry the storage batteries which supply power, leaving room for the engine driver, the reversing levers and other machinery. These storage

panying engraving, which is from "Le Genie Civile." Two reasons are given for this arrangement: first that the motor is much more accessible for inspection and repair; and second that the motor can be suspended from the frame of the engine by links connected with the outside sills, thereby relieving the axle of the dead weight of the motor, which in the usual plan of construction comes directly on the rails without the intervention of springs. A very serious objection to the electric motor has been, in fact, this dead weight, which is usually destructive to the rails. The motor has for protection against injury by dust or other causes a zinc box or case around it. In the engraving the cover of this case is shown open. The motors, which were built by the Breguet works, are four in number, two on each driving axle; they are of the four-pole type, which was adopted because with this type a high magnetic speed can be obtained with a comparatively low angular velocity.

So far this locomotive has worked with satisfaction to its designers; the tests, however, have hardly begun, and no report will be made until they have been continued long enough to satisfy the company



MOTOR FOR ELECTRICAL LOCOMOTIVE, NORTHERN RAILROAD OF FRANCE.

batteries are of the type made by the Societe du Travail Electrique des Metaux, and are made up of elements consisting of 11 plates 800 x 400 mm. in size and 6 mm. thick. There are 80 of these elements on the locomotive, and as each weighs 143 kg., the total is 11,440 kg. The weight, including all the boxes and connections, is 19 metric tons. The arrangement of these storage batteries, the suspension of the plates, their composition and other points have been carefully studied out. It is calculated that without renewal they will supply power to the locomotive for 6½ hours of constant running at a speed of 46 km. an hour, or for a run of 300 km. or about 184 miles. The connections are so arranged that at the option of the engineer combinations giving 40, 80 or 160 volts may be made, to increase the speed, to give the additional power needed on grades, or to start the engine. The action of the motors may be reversed instantly, and they may be used as powerful brakes to stop the train.

An accessory arrangement permits the motors to be used as generators when the engine is running on down grades, thus restoring to the accumulators part of the power which has been expended.

The arrangement of the motors is somewhat peculiar. The journal bearings on the axles are inside the wheels, and the motors are placed outside the wheels on the ends of the axles, which are made long enough for this purpose. The arrangement is shown in the accom-

panying engraving, which is from "Le Genie Civile." Two reasons are given for this arrangement: first that the motor is much more accessible for inspection and repair; and second that the motor can be suspended from the frame of the engine by links connected with the outside sills, thereby relieving the axle of the dead weight of the motor, which in the usual plan of construction comes directly on the rails without the intervention of springs. A very serious objection to the electric motor has been, in fact, this dead weight, which is usually destructive to the rails. The motor has for protection against injury by dust or other causes a zinc box or case around it. In the engraving the cover of this case is shown open. The motors, which were built by the Breguet works, are four in number, two on each driving axle; they are of the four-pole type, which was adopted because with this type a high magnetic speed can be obtained with a comparatively low angular velocity.

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Gold Mining in Corea.—A correspondent of the Shanghai "Mercury" gives some account of the working by Japanese of the Korean gold mines in the vicinity of Fusan. The mine is only 8 miles from the fine seaport of Massampo. In the mining district of Chagwan there exist gold-bearing quartz reefs and auriferous alluvial soil; the latter is being washed in the usual way, in primitive native fashion, and the quartz is worked in an unscientific and barbarous manner. After heavy rains many people may be observed washing for gold which has been carried down in the floods from the mountains, and this process has been repeated annually, from generation to generation. The mines were worked for about 10 months last year, under Japanese auspices. The Japanese had actually some houses built, and sank seven shafts; they employed about 100 natives, besides their Japanese staff, and 30 Japanese miners, but as they were without the necessary mining appliances, such as stamps and quartz crushing mills, the operatives had to throw up the working. The Japanese were working some rich galleries at a depth of 60 to 100 ft., but the necessity for mining and pumping gear made itself felt.

THE BESSEMERIZING OF COPPER MATTE AND PRODUCTION OF PIG COPPER.*

By Charles Wade Stickney, A. B., M. E., Mem. Am. Inst. Mining Engineers.

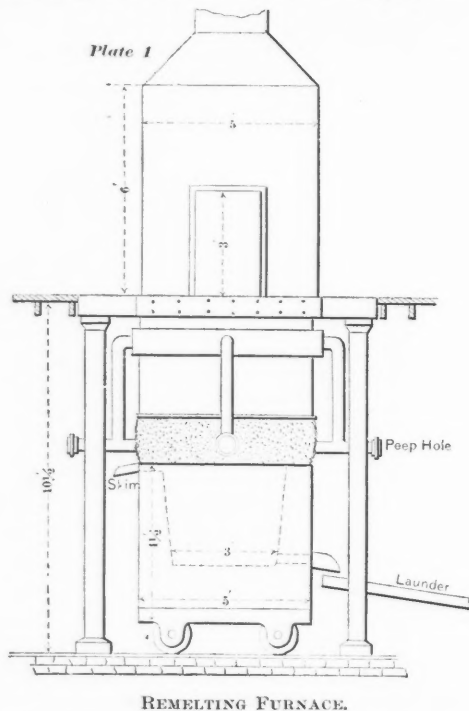
In 1883 Monsieur Pierre Manhes, of Lyons, France, filed patent applications in the United States Patent Office for a process (and certain modifications of it) for converting copper matte of low grade into white metal, and a further conversion of this product into pig copper. Upon two of these applications patents covering the fundamental points were granted in 1892. Shortly after the filing of the patent applications an experimental plant was erected and operated by pupils of Manhes, under license, at the Parrott Company's Copper Works, at Butte, Mont. The experiment was entirely successful, under the efficient direction of Mr. A. J. Schumacher, who was at that time, and for several years afterward, the superintendent and metallurgist of the works; and the process has developed into a very practical and profitable method of converting a matte containing 50% copper into a pig product containing about 99% copper and generally from one-third to one-half of 1% of gold and silver; in fact, all that was in the matte.

In carrying out the process, the appliances used were in general those of a Bessemer converting plant, from which the name of this process was derived; but this process, in metallurgical reactions and results, bears but a faint resemblance to the real Bessemer process of making steel. In addition to the original plant set up under Mr. Schumacher's superintendence, certain unessential improvements in minor details of machinery have lately been added by the management. The most practical of these improvements were added by Mr. James Breen, successor to Mr. Schumacher. A description of the variations introduced upon the original machinery will be found following the description of the general process.

The American patents granted to Monsieur Manhes, March 8th, 1892, make the following fundamental claims: "Charging the matte, in a

ported upon four hollow pillars of cast iron. The main body terminates below in a detachable well made of boiler iron, and lined deeply with a mixture of crushed quartz and fire clay, the exact composition of which is given hereafter. The well is placed on wheels for convenience in running it out on the iron floor, when it is necessary to reline it. Tuyeres enter the shaft just above the well, and they have peep holes, through which the workmen can observe the level of the molten matte. The junction between the cupola shaft and the well is made by a heavy wall of the lining material. This junction is often broken through by the fire, as the iron of the melting matte is very prone to eat it out. When this occurs, the cupola man in charge quickly patches it up from the outside, with lumps of lining composition which he keeps in readiness. At its rim the well is provided with a heavy cast-iron lip, by means of which the well is skimmed from time to time, as the level of the metallic bath rises above it. The lining is pounded hard in the well to a thickness of about 12 in., and somewhat deeper in the bottom. The cupola shaft is also lined with the same material as the well, but decreasing in thickness above, and running out entirely near the feed door. The whole furnace is so placed that the tap hole at the bottom of the well shall be about 2 ft. higher than the mouths of the converters, when they are turned to a horizontal position. Two men manage the re-melting furnace, one below, and one above.

Cold matte is fed into the shaft above by the upper cupola man, who judges from experience about how much coke and lime to mix with it. No charges are weighed out, but the coke used runs from 10 to 12% of the weight of the matte, an amount somewhat above that required for smelting copper ore in the blast furnace. The reason for this greater consumption of fuel is that the temperature of the matte, as it enters the converters, must be much higher than is required for fluidity only, otherwise the long run in the launder and the cold blast of air are apt to chill the charge around the converter tuyeres and prolong the operation. Economy of fuel results in a waste of time. It frequently happens, too,

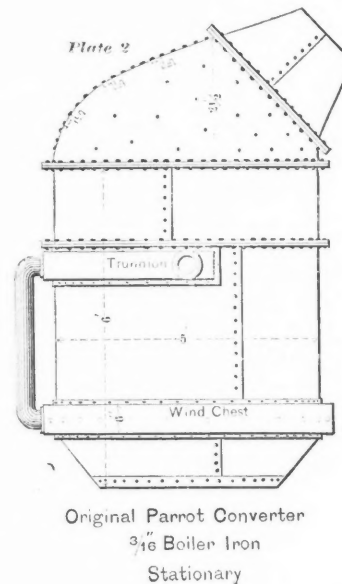


molten condition, into a converter, forcing jets of air through the molten matte and maintaining it in a molten condition and at the proper temperature by the combustion of the sulphur and iron in the matte, continuing the operation until the sulphur and iron have been separated from the metallic copper; "a converter for reducing pig copper from copper matte, having a wind belt encircling the converter above its bottom, a series of tuyeres extending through the lining of the converter and communicating at the outer ends with the wind belt, and removable stoppers located in the outer wall of the wind belt and in alignment with each of said tuyeres, whereby a drift bar may be inserted successively through said tuyeres to remove obstructions."

In the following pages the writer gives the technical and practical details of the process as at present practiced in this country, together with some suggestions of his own, which aim at making the process easier, and at the saving of expense in handling it.

The matte produced by the smelters of Butte, as it comes from the blast furnaces, is never of so low a grade in copper as to require two operations for the production of the pig, but the grade is crowded well up to the limit allowed by the two opposing factors—fusibility and economy of fuel. The higher grades are obtained only by a greater fuel consumption. An average run is, approximately, a mono-sulphide of iron mixed with a sub-sulphide of copper, and is of about the following composition: 51% copper, 22% iron, 26% sulphur. The copper often runs as low as 48% and as high as 55%. A small percentage of iron is often replaced by small quantities of zinc, lead, antimony and arsenic. These elements are partly volatilized in the converter and partly enter the slag.

When the matte has become cold enough to handle, it is broken up by sledges to about the size of a man's fist, and elevated in cars to a high track leading above the mouth of the re-melting furnace. This furnace (plate 1) consists of a simple cupola shaft, the main body of which is sup-



ported upon four hollow pillars of cast iron. The main body terminates below in a detachable well made of boiler iron, and lined deeply with a mixture of crushed quartz and fire clay, the exact composition of which is given hereafter. The well is placed on wheels for convenience in running it out on the iron floor, when it is necessary to reline it. Tuyeres enter the shaft just above the well, and they have peep holes, through which the workmen can observe the level of the molten matte. The junction between the cupola shaft and the well is made by a heavy wall of the lining material. This junction is often broken through by the fire, as the iron of the melting matte is very prone to eat it out. When this occurs, the cupola man in charge quickly patches it up from the outside, with lumps of lining composition which he keeps in readiness. At its rim the well is provided with a heavy cast-iron lip, by means of which the well is skimmed from time to time, as the level of the metallic bath rises above it. The lining is pounded hard in the well to a thickness of about 12 in., and somewhat deeper in the bottom. The cupola shaft is also lined with the same material as the well, but decreasing in thickness above, and running out entirely near the feed door. The whole furnace is so placed that the tap hole at the bottom of the well shall be about 2 ft. higher than the mouths of the converters, when they are turned to a horizontal position. Two men manage the re-melting furnace, one below, and one above.

The melted matte, passing below the tuyeres, settles in the well to a depth of about 30 in., and the lower cupola man, by regulating the blast, keeps it on a level with the lip before mentioned, from which he draws off, from time to time, a thin stream of slag. This slag contains 4 or 5% copper and is returned to the blast furnace, where it is mixed with other charges and plays the part of a flux while giving up its copper. The action of this furnace is regulated by the amount of heat produced by the blast, which is under control of the lower cupola man; the upper man merely keeps the shaft full of material in the proper proportions and gives more coke when the lower man wants more heat. One furnace of 5 ft. outside diameter will melt about 30 tons matte per day, and will supply molten matte for three converters.

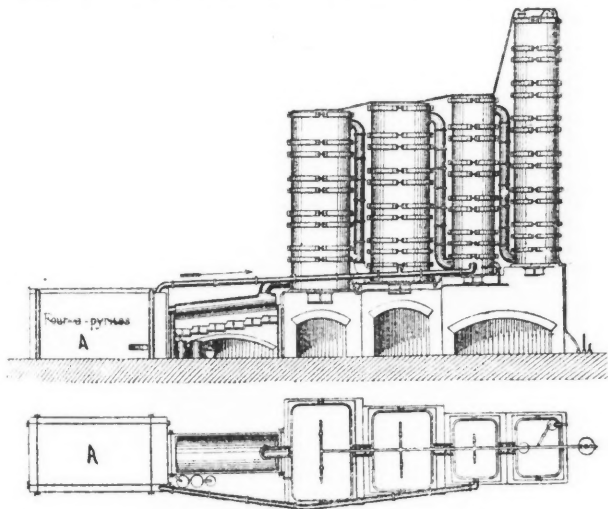
A launder of wrought iron of semi-circular section, 12 in. in diameter, lined with fire clay and quartz (converter lining) is used to run the matte from the tap hole of the well into the converters. It is supported from a swinging crane by chain tackle, which allows a quick adjustment in height to the converter mouths.

The converters are swung on trunnions, as shown in Plate 2, and an air blast enters through one trunnion. This passage communicates with a wind-chest which encircles the converter near the bottom. The converter is made of three-sixteenths wrought iron boiler plate, riveted. It is made in three sections. The upper one—the hood—is provided on the inside with numerous pieces of wrought iron, riveted on, and curved outward, and crooked at the outer ends; these pieces afford a hold for the lining, which is put on around them while plastic. The wind-chest has 3/4-in. holes drilled from the outside through its outer shell, and thence straight

* From the "Mineral Industry": Its Statistics, Technology and Trade for 1892." Copyrighted by the Scientific Publishing Company, New York.

on through the side of the converter. The outer hole is kept closed by a wooden plug which is easily removable, so that thus the inner tuyere hole can be kept clear from copper incrustation by thrusting an iron rod through the hole into the interior of the converter. The mouth of the converter is about one-quarter the outside diameter of the body, and when in position points up into an opening in a brick gallery, which communicates with a dust chamber and stack. A worm screw operated by power takes into a cog wheel of 20 in. diameter, which is attached to one trunnion of the converter and can be worked in either direction by either of two pulleys placed on each side of a loose pulley.

Suppose, to begin with, that the converter shows that its lining is eaten out dangerously near the iron shell. The first business is to cool it. For this purpose it is allowed to rest until the red heat has disappeared, and then water is very cautiously introduced through a rubber hose; after a time the whole interior is filled with water which overflows and runs over the exterior, and escapes through a trap and drain under the iron floor. It is necessary to have the floor all around the converters formed of iron plates, because of the occasional spitting of matte from the converters, and the slopping over of slag or copper, in pouring and wheeling. On iron the hot liquid quickly chills, and does not adhere to the plates, and for this reason can be quickly shoveled aside. When the converter is cool enough a man goes inside and removes all loose lining and copper nuggets by a pick, or by hammer and gad. The converter is then turned mouth down and emptied. Frequently more than one-half the old lining remains undisturbed, and the new lining is placed over it. The lining is composed of ground quartz (98 to 100% silica) with sufficient fire clay mixed with it to make it stick together. It is found that less than 15% of best fire clay does not satisfactorily keep the lining in its place. The grinding is done in a revolving quartz pan with stationary rollers, and the mixing is done by a machine similar to an old-fashioned clay mixer for making brick. The proportion of fire clay is not very accurately kept and the measurements are made by bulk and not by weight. The average amount of clay is 15% of the quartz by bulk. A somewhat less proportion is used on the bottoms where it can be rammed hard, and a rather larger proportion on the overhanging



BARBER'S SULPHURIC ACID APPARATUS.

roof of the converter, where more tenacity is required and where there is less contact with the matte. This lining is meant to wear away; in fact, the process depends upon the union of its silica with the oxide of iron. The linings last generally about eight hours. When three converters are running, one is cooling while the second is drying out and being heated up, and the third is in full blast, producing metal. In each shift of 12 hours, the lining of the three converters is performed by one lner and his helper. When the lining of one is completed, a ladle full of hot slag is poured in; an armful of wood is then thrown on it, and on top of this two or three bushels of coke. A gentle blast is turned on through the tuyere holes, and the lining dries out, and afterward gets red hot. The converter is now ready for charging.

(To be Continued.)

THE BARBIER SULPHURIC ACID APPARATUS.

A comparatively cheap and simple apparatus for the manufacture of sulphuric acid has been devised by M. Barbier, and is now in successful operation at his chemical works in Villafranca, Italy. It is described in a recent number of "Le Genie Civil," and is shown in elevation and in plan in the accompanying illustration. It consists of a furnace, A, for burning sulphur or pyrites, which discharges the sulphurous acid vapors produced into a series of towers or chambers of varying dimensions, which are divided into cells of a special form, and are placed over a series of receiving basins heated by a separate furnace. The last tower in the series discharges its nitrous sulphuric acid into the highest of the receiving basins, from which it passes into the lower ones. These give out nitrous vapors and steam which rise into the towers. The latter, therefore, receive sulphurous acid, nitric acid, steam and air, which meet and are mixed in the small chambers, producing a continued agitation which assists in producing the reactions necessary to the formation of sulphuric acid. These operations continue through the series of towers, the contact of the gases and the chemical reaction being repeated in each. The sulphuric acid formed is collected in the concentrating basins, from which it is recovered finally concentrated and freed from the nitrous vapors.

The apparatus shown has been in use about three months, and the

acid obtained is the same as that from the ordinary lead chambers. The yield is 1,650 kilog. of acid daily, or about 50 kilog. of acid per cubic meter of tower capacity, while the leaden chambers yield only about 3 kilog. per cubic meter. At the Villafranca works a new plant of this kind, with a capacity of 5,000 kilog. per day, is now being erected.

The importance of the cheap manufacture of sulphuric acid is so manifest that it need not be enlarged upon. In many industrial operations success depends largely upon a cheap supply of this acid, while at the same time it is usually charged high rates of transportation, being considered dangerous freight. A simpler plant than those now in use is an important improvement.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

Supreme Court of Idaho.

Mines and Mining—Application for Patent—Action to Contest—Complaint.

Cronin et al. vs. Bear Creek Gold Mining Co.—This was an appeal from District Court, of Elmore County, in action to determine adverse claim to mining ground. The court held:

1. A complaint in an action under Revised Statutes U. S., Sec. 2326, to contest an application for a patent for mining land must show that plaintiff has filed his adverse claim within the prescribed period of Section 2325, and brought his action within the time thereafter allowed by Section 2326.

2. It must also contain such a description of the property as will enable the court to determine to what extent, if at all, the claim of plaintiff is covered by that of defendant upon which the patent is applied for.

Judgment of court below affirmed.—Opinion, February 10th, 1893.

Supreme Court of Pennsylvania.

Coal Leases—Right to Reach Underlying Oil.

The Chartiers Block Company, plaintiff on appeal, vs. Mellon et al.—This was an appeal by plaintiff from Court of Common Pleas, of Allegheny County, on a decree denying injunction restraining defendants from drilling oil and gas wells through a coal bed plaintiff had purchased for removal and sale. The court holds:

1. The right to drill oil or gas wells through a stratum of coal belonging to another person in order to reach oil or gas in a lower stratum belonging to the owner of the surface is a right which at all times exists, although that right must be exercised in such a way and under such conditions as will do no violence or damage to the rights of the owners of the coal.

2. An injunction will be refused in the exercise of the discretion of the court when the granting of the same would work an injury greater than the wrong sought to be redressed.

Decree of court below dismissed and appeal dismissed.—Paxson, C. J.—Opinion, January 9th, 1893, Justices Williams, Green and McCollum concurring.

Diamond in Native Iron.—In a recent lecture, M. Daubree, the eminent French scientist, mentioned that M. Nordenskiold had found carbon in the condition of carbonado in a fragment of native iron from Norway. It was also stated that the Norwegian savant had discovered manganum, yttrium, cerum, gadolinium and other very rare metals in globules of bitumen found inclosed in certain Norwegian gneisses.

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, APRIL 18TH, 1893.

- 495,485. Pugging Mill. William H. Hall, Tiffin, O.
- 495,515. Ultramarine Furnace. George A. Prochazka and William Scharringhausen, Newark, N. J., Assignor to the Heller & Merz Company, same place.
- 495,516. Steam Engine. Sereno H. Rathburn, Stanberry, Mo.
- 495,524. Steam Boiler. Melvin L. Severy, Boston, Mass., Assignor to Francis Doane, Charles F. Crowell and Melvin L. Severy, trustees, same place.
- 495,550. Process of Concentrating Zinc Bearing Sulphide Ores. Gustave M. Gonyard, Denver, Colo.
- 495,574. Traveling Crane. John B. Anderson, Montpelier, Vt.
- 495,591. Hydraulic Strapping Press. Charles A. Knight, Glasgow, and Campbell P. Higging, Kilbowie, Scotland.
- 495,593. Process of Manufacturing Zinc Oxide. George T. Lewis, Philadelphia, Pa.
- 495,631. Machine for Bending Crank Shafts. Frederick Hart, Poughkeepsie, Assignor to D. H. Burrell & Co., Little Falls, N. Y.
- 495,637. Process of Extracting Zinc by Electrolysis. Johannes Pfeifer, Frankfurt-on-the-Main, Germany.
- 495,675. Blast Furnace. Herman Huber, Argentine, Kan.
- 495,681. Centrifugal Ore Separator. Orrin B. Peck, Chicago, Ill., Assignor by mesne assignments to the Patent Title Company, same place.
- 495,682. Water Tube Boiler. Stephen A. Pratt, Detroit, Mich.
- 495,686. Rolling Mill Appliance. Henry Rigby, Pittsburg, Pa.
- 495,686, 495,687. Clutch. Samuel Trethewey, Pittsburg, Pa., Assignor to the Trethewey Manufacturing Company, same place.
- 495,689. Oil Well Drilling Apparatus. Josiah Barrett, Allegheny, Pa.
- 495,696. Apparatus for the Manufacture of Tin Plate. Daniel Edwards, Morriston, England.
- 495,708. Pumping Wagon. John T. Richardson, Harrisburg, Assignor of one-half to Alexander H. Ege, Mechanicsburg, Pa.
- 495,715. Process of Lixivating Ores. Samuel R. Whitall, Salt Lake City, Utah.
- 495,742. Steam Engine. George De Laval, Warren, Mass., Assignor to the Geo. F. Blake Manufacturing Company, New York, N. Y.
- 495,760. Centrifugal Pump. Edward Selz, Melbourne, Victoria.
- 495,789. Current Wheel. William F. Buckmann, Detroit, Mich.
- 495,809. Slate Picker. Alonzo W. Houser, Edwardsdale, Pa.
- 495,816. Water Wheel and Elevator. John B. Lockwood, Helmville, Mass.
- 495,829. Steam Boiler. Lars A. Olsen, Oakland, Cal.
- 495,832. Placer Mining Apparatus. Marshall D. Platner, Elliston, Mont., Assignor of one-half to Adna D. Platner, same place.
- 495,852. Oil Well Drilling Apparatus. Dexter J. Thayer, Pittsburg, Pa.
- 495,895. Steam Boiler. Christopher Ahrens, Cincinnati, O., Assignor to the American Fire Engine Company, Seneca Falls, N. Y.
- 495,883. Ore Roasting and Calcining Furnace. Robson C. Greer, Lebanon, Pa.
- 495,930. Method of Annealing. Martin Coppinger, 2d Millford., Assignor to the Hopedale Machine Company, Hopedale, Mass.
- 495,947. Welding Apparatus. John A. Pross and Charles E. Lipe, Syracuse, N. Y.

PERSONALS.

Mr. E. H. Russell, of Park City, Utah, is now in Chicago arranging for an exhibit at the World's Fair of his lixiviation process.

Mr. F. E. Schurman is now in charge of the Trust Ruby Mine, at Mt. Sneffels, Ouray County, Colo., a gold and silver property.

Mr. John C. F. Randolph, the well-known mining engineer of New York, has returned to that city from a professional trip to Mexico.

Mr. John Jose has been appointed superintendent of the Atlantic coal mines, in Mineral County, W. Va., in place of T. L. Delbitt, who has resigned.

Mr. John S. Hart, general manager of the Santa Eulalia Mine, of Jesus Maria, Chihuahua, Mex., is now in Denver consulting with Senator Tabor, the main owner of the property.

Mr. Charles Allen and Capt. George Wanless, of the Rio Grande Smelting Works, of Socorro, New Mexico, are now in Jimenez, Chihuahua, Mex., in the interests of their company.

Mr. A. A. Robinson, for many years connected with the Acheson, Topcka & Santa Fe, has been offered the presidency of the Mexican Central Railroad Company, a position for which he is well fitted by experience.

Mr. George H. Robinson, who for many years has been general manager of the Montana Company (Limited), at Marysville, Mont., has entered into his new position as manager of the Mammoth Mining Company, Tintie, Utah.

Mr. Edward Coleman, for many years the superintendent of the Idaho gold mine, of Grass Valley, Cal., has resigned his position. Mr. Eugene Creller, who has been connected with the company for a long time, has been appointed to fill the vacancy.

Mr. R. T. Bayliss and Mr. F. P. Crowther, two of the London directors of the Montana Mining Co., are now at the mines in Montana. Mr. Bayliss has taken charge of the property in place of Mr. Robinson, resigned, and will continue there until a new manager is appointed.

Mr. James Henley, formerly of the Chrysolite and A. Y. mines of Leadville, but latterly assistant manager of the Montana Company (Limited), has accepted the general management of the Granite Mountain Mining Company's properties, vice Mr. Thomas Weir, resigned.

It is said that Mr. J. S. Jeans has tendered his resignation as secretary of the British Iron and Steel Institute. He has held the office for 16 years. He will retain the secretaryship of the British Iron Trade Association. His successor as secretary of the Iron and Steel Institute will be Mr. Bennett H. Brough, his present chief assistant.

In the reorganization of the New York "Times," Mr. Charles R. Miller is made president and Mr. George F. Spinney secretary and treasurer. Mr. Miller, who has been with the paper 18 years, and its chief editor 10 years, will continue to be the chief editor and director, while Mr. Spinney, late managing editor, becomes publisher and business manager. Both gentlemen have shown their ability and fitness for their positions, since the "Times" has been in many respects the best of the New York dailies, and has always maintained a very high character. We wish it and its proprietors abundant success.

OBITUARY.

Thomas F. Gibbs, said to be the oldest surveyor in Canada, died in Adolphustown, on the 18th inst., aged 81 years.

Charles Barelay Tappen, formerly a prominent architect and builder of this city, died April 20th, at the great age of 98 years. He was probably the oldest inhabitant of New York.

Major M. Palmer Low, who died April 18th, aged 80 years, was for many years a prominent man in the iron business in New York. He retired two years ago on account of his age, although he remained an active and vigorous man until a few weeks before his death.

Charles R. Peddle, who died in Terre Haute, Ind., April 19th, was one of the best known railroad men of the West. He had a good training on Eastern lines, and went West in 1851 as master mechanic of the Terre Haute & Indianapolis Railroad, one of the first lines in Indiana. He held the position for nearly 40 years, and was then transferred to the less laborious office of purchasing agent.

SOCIETIES.

American Society of Civil Engineers.—At the regular meeting in New York, April 19th, papers were read by Mr. D. Bontecou on "Cost of Cable Railroads," and by Mr. J. P. Frizell on "Old-Time Water Wheels of America."

Canadian Society of Civil Engineers.—At the regular meeting in Montreal April 20th, Prof.

Henry T. Bovey read a paper on "Tests of White Pine of Large Scantling." The discussion on Mr. J. S. Armstrong's paper on "Transition Curves" was continued.

National Mining Congress.—The Committee on Arrangements for the third Congress, which was to have met at Salt Lake City, Utah, on June 5, has decided to postpone the meeting to September 11th. W. S. McCormick is chairman and C. L. Rood, secretary of the committee.

National Academy of Sciences.—The annual meeting began in Washington, April 18th, about 100 members being present. At the opening session a memoir of the late Gen. M. C. Meigs was presented, and several other papers were read. On the second day the reading of papers continued and after adjournment the members were received by President Cleveland at the White House. Prof. Wolcott Gibbs, of Boston, was re-elected foreign secretary; Dr. Billings, treasurer; Messrs. Brush, Gould, Langley, Mendenhall, Newcomb and Remsen, members of the council.

Engineers' Club of Cleveland.—At the regular meeting, April 11th, the following calendar was arranged for the coming year: 1893, May 9th, architecture; June 13th, railroad engineering; July 11th, electrical engineering; August 8th, civil engineering and surveying; September 12th, mechanical engineering; October 10th, applied science; November 14th, marine and steam engineering; December 12th, hydraulic and sanitary engineering; 1894, January 9th, electrical engineering; February 13th, civil engineering and surveying; March 13th, annual meeting; April 10th, applied science.

Mr. C. F. Uebelacker then read a paper on "Electric Railroads," which was discussed by Messrs. John W. Langley, C. W. Foote, J. Leon Gobille, A. H. Porter and Ludwig Herman.

Florida Pebble Phosphate Miners' Association.—This association was formed at a meeting held in Lakeland, Fla., April 5th, at which the following companies were represented: Bone Valley; Tampa; Terracia; Land Pebble; Pharr; Lake Hancock; United States; National Peace River; Fort Meade; Virginia-Florida; Florida Consolidated; Moore & Tatam; Florida Mining & Transportation; Marjetta; Massachusetts, and Florida Phosphate Company, Ltd. The object is "the mutual information, benefit and protection of the interests represented." Each company in the association will have one representative and there will also be associate members. After the adoption of a constitution and by-laws the following officers were elected for the ensuing year: R. A. Ellis, president; John Beatey, vice-president; J. Northcott, secretary and treasurer. Executive committee, president, Ellis; chairmen, Messrs. Heyward, Beatey, Lay and Wall.

Montana Society of Civil Engineers.—At the regular meeting in Helena, April 8th, a communication from Max E. Schmidt, secretary of the General Committee of Engineering Societies of the Columbian Exposition, asking for a list of the important engineering works and industries in Montana, was read. The secretary was instructed to communicate with the managers of mines and smelting works in Montana and prepare the list as requested. Mr. A. E. Cumming read an interesting paper on the "West Gallatin Irrigating Canal," giving the history of its construction and a full description of the work. Mr. Cumming said that his experience had led him to believe that about 1 1/4 miner's inches of water per acre were required for proper service for irrigation in Montana. In the discussion which followed the reading of Mr. Cumming's paper, President Haven said he had recently measured the amount of evaporation from a reservoir in Teton county, having a surface area of 40 acres and an average depth of 12 ft. No water had been drawn from the reservoir for one year and none supplied except by rainfall. There was a little seepage and the total evaporation for the year amounted to 10 in.

WORLD'S FAIR NOTES.

The exhibit of Allegany County, Md., will include 24 large views showing the interior and exterior workings of a coal mine, the views being taken in mines of the George's Creek district. There will also be a block of coal 14 ft. 8 in. by 4 ft. by 3 ft. 6 in., weighing about 10 tons.

The Calumet and Hecla Mining Company will make a most interesting exhibit at the Fair in the shape of a miniature section of the mine and stamp mill. The section, which was built at the Hecla carpenter shop, is complete in all details, and represents a shafthouse, rockhouse, a drift, stoping, tramcar, a skip, rock crushers, shoots, etc. It stands 9 ft. 2 in. from the bottom of the base to the top of the shafthouse. Underneath the rockhouse is a railroad track with a complete rockcar, about 6 in. long by 4 in. wide, complete in its construction as any rockcar used; it shows the method of dumping, has springs, brakes, etc. The whole outfit is furnished with a complete set of machinery built of brass, and when set up at the Fair will be attached to an electric motor and will be constantly in operation.

INDUSTRIAL NOTES.

Longdale Furnace, at Longdale, Va., has gone into blast after a month's stop for repairs.

The Youngstown Bridge Company, Youngstown, O., has taken a contract to build large car sheds for the New Orleans City Railroad.

The Shenango Valley Steel Company, Newcastle, Pa., has bought the Red Jacket furnace from the Crawford Iron and Steel Company, for \$250,000.

The Neponset Steel Casting Company, of Boston, Mass., is now operating a small open hearth furnace. The company expects to erect an additional furnace soon. It produces steel castings only.

The blast furnace of the North Carolina Steel and Iron Company, at Greensboro, N. C., recently completed, has never been operated owing to lack of capital. The stack is 70 x 14 ft., and is well equipped.

The Lidgerwood Manufacturing Company, of New York, has ready for distribution a new catalogue showing a great variety of hoisting engines and conveying devices for mines, quarries and other purposes.

The Berlin Iron Bridge Company, East Berlin, Conn., has the contract for the power station of the Atlantic Improvement Company, Long Island City, N. Y., the buildings including engine and boiler house and dynamo room.

The blast furnace of the Pulaski Iron Company, at Pulaski City, Va., blew out March 21st, to reline after a run of 2 1/2 years, in which time the furnace made 95,100 tons. The company will resume operations about the middle of May.

The Transvaal Silver Mines, Ltd., have ordered from the Lullrig Coal and Ore Dressing Appliances, Ltd., London, a complete ore dressing plant on the Lullrig system to treat 100 tons of silver lead ores per day of 10 hours. The plant will be shipped to Port Elizabeth early in May.

The Bessemer mill of the Bethlehem Iron Company, started up April 14th, after an idleness of more than two weeks. The converters were blown in and the blooming train started running. More than 1,000 men are at work. During the mill's idleness the machinery received a thorough overhauling and many repairs were made.

Plans for the electrical transmission of power from the Folsom Dam, on the American River, to Sacramento, Cal., have been submitted by the General Electric Company, the Westinghouse Electric Company and the Siemens-Halske Company, of Berlin. These plans have been submitted to Mr. W. F. C. Hasson, as consulting engineer, and he will soon submit a report.

The annual meeting of the stockholders of the Jos. Dixon Crucible Company was held at the offices of the company in Jersey City, April 17th, and the following directors were elected: E. F. C. Young, John A. Walker, Joseph D. Bedle, Daniel T. Hoag, Richard Butler, William Murray and Jerome D. Gillette. The board re-elected officers as follows: E. F. C. Young, president; John A. Walker, vice-president and treasurer; George E. Long, secretary.

The Robert Poole & Son Company, of Baltimore, has issued the 12th edition of its catalogue of gearing, which makes a book of 200 pages. The list includes a very large number of gears of every description, rope and chain pulleys, belt pulleys and wheels. Machinery of transmission is a leading branch of business with this company, and no more extensive list of the kind can be found. The catalogue has also some pages of tables and other matter useful to millwrights and manufacturers.

The Ingersoll-Sergeant Rock Drill Company on May 1st removes its offices in New York to the handsome new Havemeyer Building, on Cortlandt, Church and Dey streets. The old office, at No. 10 Park Place, will be retained as a shipping department and storeroom. At the new offices the company has fitted up convenient rooms for the use of its friends who may visit New York, and will always be ready to receive there engineers, contractors and others interested in mining, tunneling and similar work. The new offices are very conveniently located and handsomely fitted up.

Secretary Herbert, of the Navy, has concluded an agreement with the Carnegie Steel Company, to apply the Harvey process to armor plates now being made by that firm. In all this company will treat about 1,400 tons of plates, most of which are intended for the side and 17-in. barbette armor of the Oregon. Under the contract Secretary Herbert can have a greater amount of armor plates Harveyized. The new contract provides that the ballistic tests for acceptance and for premiums shall be the same as those provided for in the department's circular, under the requirements of which the recent contracts with the Bethlehem and Carnegie companies were let. This provision means that the Harveyized plates shall withstand two shots fired with velocities established by prescribed formula for plates respectively 10 and 15% greater in thickness than the one to be tested. In testing a 10-in. nickel steel plate with an 8-in. gun, for example, the velocity of the first shot would be 1,400 ft.-seconds, and that of the second shot

1,637. Under the same conditions velocities of 1,491 and 1,786, respectively, would be employed in testing Harveyized plates. Furthermore, a Harvey plate must not have a crack extending from the angle of impact to an edge, from one edge to another, or through its entire thickness.

MACHINERY AND SUPPLIES WANTED.

If any one wanting machinery or supplies of any kind will notify the Engineering and Mining Journal of what he needs, he will be put in communication with the best manufacturers of the same.

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.

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.

GENERAL MINING NEWS.

District No. 5, of the United Mine Workers of North America, composed of the railroad coal mines of western Pennsylvania, eastern Ohio and a portion of West Virginia, will make a demand for an advance of 5c. per ton for mining. A convention of the district will be held on April 27th, and if the demand is not conceded a strike will probably be ordered on May 1st. About 7,000 men are affected.

ALABAMA.

Madison County.

Southern Mining and Development Company.—This company has been incorporated with office at Limestone, the nominal capital stock being \$10,000,000. The object is to prospect, develop and work mines and to deal in mines and mineral leases and rights. The incorporators are: A. C. Harte, Catawba, Pa.; James F. Dalrymple, W. L. Ament, Charles C. Johnson and William H. Hendricks, Seneca Falls, N. Y.; George H. Oplyke, Jersey City, N. J.

ARIZONA.

Yavapai County.

(From our Special Correspondent.)

Leek Mine.—A strike made on the mine some weeks ago is said to more than equal the famous Silver King, the ore running more than 1,000 oz. to the ton, the width of the ore body being 3½ ft. at a depth of 127 ft.

ARKANSAS.

(From an Occasional Correspondent.)

General Mining Law.—The legislature at its last session passed a general mining act, the first that has become law in the State. Its provisions resemble in some features the Missouri law, and the office inspector of mines is created.

The act establishing the Geological Survey was repealed. An appropriation of \$5,000 was made for the Bureau of Mines, Manufactures and Agriculture.

The State mineral exhibit at Chicago will include a block of zinc ore weighing nearly seven tons.

Drew County.

An extensive deposit of yellow ochre was recently discovered near Monticello.

Pulaski County.

Little Rock Mining and Milling Company.—This company, which is working the old Kellogg mines, made an important find recently in the new shaft, which it is putting down, and reports a quantity of high-grade silver-lead ore in sight.

CALIFORNIA.

(From our Special Correspondent.)

The mining assessments falling delinquent during April amount to \$20,000. The capitalists interested in erecting a smelter at some point on the bay contiguous to San Francisco, have not yet decided upon a site.

Amador County.

Wildman.—At this mine work is steadily progressing in opening up the 1,000-level, good headway being made in the drift running south, says the Sutter Creek "Record." Occasional bunches of promising quartz are being encountered in the tunnel, but as yet no cross-cutting is being attempted. Nothing is being done on the 1,100-level and there will not be until certain improvements on the pumping machinery now in progress are finished. The quartz to keep the mill going all comes from the 800 and 900 levels.

Butte Company.

(From our Special Correspondent.)

Spring Valley Hydraulic Mining Company.—This company was incorporated under the laws of New York State, and in 1881 it executed a mortgage to three trustees, W. Alvord and P. F. Low, of San Francisco, and W. B. Laidlaw, of New York, to secure the payment of 200 bonds of \$1,000 each. In 1886 there were 155 of these bonds outstanding, and also an indebtedness to the Bank of California. As the stock was unassessable under the laws of New York, the property was conveyed

to a California corporation named the Spring Valley Gold Mining Company, but the corporation failed and the Bank of California and others obtained judgments to a large amount. The trustees brought a foreclosure suit in Butte County, making both old and new corporations dependents. There are no less than ten points upon which differences exist, and now all the propositions have been submitted to Judge Prewett, of Placer County. Many points involved are of great interest to mining corporations, and for that reason a decision is anxiously awaited.

Mono County.

Bulwer Consolidated Mining Company.—At the annual meeting of this company, held last week in San Francisco, 85,304 shares were represented and the following officers elected: H. Zedig, president; Charles H. Fish, vice-president, and E. B. Holmes, W. R. Sherwood, J. E. Jacobus, W. S. Wood and H. L. Shippey, directors. L. Osborn was re-elected secretary and John W. Kelly superintendent. The secretary's financial statement shows an indebtedness of about \$929,70, which is offset by bullion to arrive. The latest official weekly letter from the mine says: "The extraction of ore has been steadily carried on. The stopes are yielding a good quality of ore. For the past week we have been crushing Summit ore, as it was impossible for us to haul Bulwer ore, the snow was so deep. We commenced to haul Bulwer ore on the 8th inst. We crushed 122 tons of ore. Average battery sample, \$21.83 per ton; tailings, \$7.61.

Mono Mining Company.—The suspension of operations at this company's mine is only temporary. Superintendent Kelly has gone to San Francisco; on his return work will be resumed.

Nevada County.

(From our Special Correspondent.)

The Idaho Mining Company, Grass Valley.—For some years past the report that the mine was exhausted found current belief, but at the last moment, when it was thought that the mine would have to be abandoned, some new find re-aroused enthusiasm. Now, however, it appears as if the end of the grand old mine had come. The ledge has pitched into the Maryland ground, and work has been suspended in the Idaho. It is reported that all the machinery, buildings and mine itself belonging to the above corporation have been offered to the Maryland company. P. N. O'Connor, who is a stockholder in the Idaho company, and controls the destinies of the Maryland, is opposed to any such sum being paid as is asked, and if the transfer is made it will be on a much lower basis.

San Bernardino County.

Silver King Mining Company, Limited.—The manager at the mines reports as follows: In January mill with 25 stamps worked 20 days, crushed 1,600 tons, producing 11,000 oz. fine silver, expenses \$13,000. In February mill with 23 stamps worked 21 days, crushed 1,700 tons, producing 28,000 oz. fine silver, expenses \$13,500. In March the mill with 28 stamps worked 25 days, crushed 2,100 tons, producing 37,000 oz. fine silver, expenses \$15,500; now in full work with 30 stamps.

San Diego County.

The mining industry of this section, says the Perris "Era," is experiencing quite a boom at present. One of the latest mines opened and being worked is the Lucky Boy, in the Manifee district, owned by S. E. Walker. A contract for sinking a shaft has been let to Heber & Bennett, and at the depth of 70 ft. drifts will be opened on the ledge, which runs northeast and southwest. They are now down 22 ft., and the prospects are encouraging.

COLORADO.

Cripple Creek District.—The chief topic in Cripple Creek is the railroads. All the big properties are waiting for them before heavy shipments begin. President Johnson, of the Florence & Cripple Creek line, has returned from New York and has announced the placing of \$1,000,000 in bonds, and a final survey is now in progress. A large stamp mill will be built in Florence by the time the railroad is completed. The Victor mine has about 600 ft. of drifts on the vein, and has produced \$80,000 in the development work. A well-defined vein from 2 to 6 ft. has been traced, with pay streak from 3 to 24 in. Its deepest shaft is 200 ft., opening on a 2-ft. vein. The company has paid a dividend while developing the property. The holders of the lease on the Burns lode have transferred it to the Calumet Mining Company in exchange for 600,000 shares of stock. The Burns lode is rich in gold, being on the Pharmacist vein. It has been shipping weekly about 25 tons of smelting ore to Denver.

Calaveras County.

La Grange Hydraulic Mining Company.—Capital, \$5,000,000, divided into 5,000,000 shares. Denver is the central office. The directors are: Baron Ernest De La Grange, Chaumont Quiry, Baronne E. De La Grange, L. L. Bailey, William Gilder and Fred Beaudry.

Gilpin County.

Black Hawk.—The following is the shipment of the smelting ore and tailings made by rail to Denver and Argo from Black Hawk, for the first quarter in 1893: January, 4,127,100 lbs.; February, 4,296,000; March, 5,430,000; total, 13,853,100 lbs. There was an increase of 20 cars in March over February. The shipments for March

were consigned to Denver and Argo, not a car of ore or tailings having been sent to Kansas City or Pueblo.

Saratoga.—At this property, in Russell district, the cage shaft has reached the 700-ft. level, which have been run about 200 ft. east and west from the shaft showing a nice vein of ore which assays well, but does not seem to extend up in the back-stope. It is now the intention of the management to sink a winze on the vein so as to keep the shaft dry, and sink another 50 or 100 ft., in order to get under the good body of ore now exposed in the 700-ft. level. The mine, according to the Central City "Register-Call," now has an output of about 300 tons of ore per month, but it is low grade.

Lake County.

(From our Special Correspondent.)

A visit to the Maid and Henrietta workings shows that this property still leads as one of the big producers of the camp. The bottom of the main shaft is now down over 900 ft. in the Cambrian quartzite, and from developments being carried on in the lower levels, it is expected that some very important geological facts will be brought to light in the near future. Where the work is now being carried forward in the Cambrian quartzite a vertical crevice is disclosed going down the side of the shaft, and the vein matter is heavily mineralized, containing a large percentage of copper. As there is pay mineral in sight this crevice will be followed downward, and it is the opinion that it extends entirely down to the granite. The work of sinking the Harker shaft, proposed a short time ago, has been started and the shaft will be carried down through the parting quartzite. Beneath this parting quartzite is the white limestone, and it is here that it is expected to catch a good carbonate body.

The steady work going on at the Small shaft of the Hibschle property has resulted in the opening up of several bodies of excellent ore. In one of the drifts a good body of carbonate has just been opened up, in which is found considerable chlorite ore. From present indications it would appear that the main ore bodies lie in place above the iron and porphyritic material, and that by upraising these will be caught.

The Penrose people have completed the work of cutting their station, and the new pumping plant is now being put in place. This will enable them to resume sinking and will somewhat relieve the enormous water pressure on the Sixth street shaft.

The iron ore body in the west workings of the Walcott Company, recently described in these pages, has given place to a good body of carbonates that assay well in silver and lead, and also disclose traces of gold. This ore chute is proving to be a most excellent one, and more improvement will be noted with further development work.

At the Bohn property there is a deal of excellent work being carried forward. Four drifts are being run from the bottom level and one of these is now in over 100 ft. The water flow has diminished and it is found necessary to keep only four boilers going. A new double cage is being put in place, and every preparation made to facilitate the handling of the mineral.

In the Grey Eagle workings very satisfactory results are being met with, and recently several new bodies were opened up in the Poahontas ground. Ore shipments are steady with a promised increase.

Yosemite Hydraulic Mining Company.—This company, operating on the South Boulder, partly in Boulder County and partly in Gilpin County, has purchased a large electric plant for the placers, which will be used to light the workings the coming season. The placers will be worked day and night with three shifts of miners. The company has considerable ground opened up, which was stripped last season.

Mineral County.

The first quarter of 1893 shows shipments from Creede camp as follows: Amethyst, 774 cars; New York, 769; Last Chance, 280; Bachelor, 11; scattering, 10. The estimated value of this is over \$2,000,000.

San Miguel County.

Shipments of ore and concentrates from Telluride for the week ending April 7th aggregated 297 tons; total shipments since January 1st, 5,539 tons.

Smuggler-Union Mining Company.—In the Smuggler-Union tunnel there was opened last week, a large body of ore, but as yet of undetermined value, says the Telluride "Republican." The ore body, which is from 24 to 30 ins. wide, was opened on the Seventy-six ground, nearly 2,000 ft. from the mouth of the tunnel. It runs over 50% in lead.

GEORGIA.

Lumpkin County.

Turkey Hill.—The Dahlonega "Signal" reports the sale of this gold mine at a good price to Frank B. Pratt, who has been working it for some months past. New machinery is to be put in and the property developed.

IDAHO.

Boise County.

Last Chance.—On the 300-ft. level a drift has been run 500 ft. on the vein, and for that distance the ore is rich, says a correspondent of the Anaconda "Standard." Adjoining this, and on the same

level, \$20,000 has been taken out of a piece of ground 60 ft. long by 70 ft. deep. The new ground opened up prospects equally well. Ten men are now at work in the mine. The mill will start crushing soon. The difficulty in regard to the title has now been settled and the mine will be worked constantly.

Owyhee County.

Black Jack.—The large ore house at this mine is filled to its utmost capacity, and 400 tons more are stored on the dumping platform at the mill. This ore has all been taken from the drifts and raises. This ore, which is considered second-class, is estimated to run about \$140 per ton. A load of the higher grade, which is sacked, went out to the railroad, completing another car for shipment, and runs about \$800 per ton. The drift on the ledge is now in the third shoot, and the character of the ore is fully equal to that in those that were passed through.

Shoshone County.

The town of Wardner, which is dependent upon the Bunker Hill and Sullivan, Last Chance, Steamwinder, Tyler, Sierra Nevada and other mines, was almost totally destroyed by fire Thursday morning. The loss is stated to be nearly \$700,000, less than one-third of which is covered by insurance.

INDIANA.

Natural Gas.

Indiana Natural and Illuminating Gas Company.—A press dispatch reports that this company has been formed at Indianapolis. Its capital stock is \$1,000,000 and it is incorporated by C. F. Dieckman, E. J. Jerszmanowski, E. C. Benedict, A. W. Brady, Samuel Thorne and A. B. Proal, of New York, and John R. Pearson, of Indianapolis. The incorporation is the consummation of a deal for a consolidation of the artificial and natural gas companies of Indiana, which was begun some months ago. The present incorporation includes the plants at Indianapolis, Crawfordsville and Lebanon, and it is expected that other cities will be brought in.

MICHIGAN.

Copper.

Atlantic Mining Company.—The March output of mineral by this company was 229 tons, against 215 tons in February and 235 tons in March, 1892. This makes 681 tons for the year to date, compared with 612 tons last season, an increase of 69 tons.

Centennial Mining Company.—The crosscut is in 430 ft., and, at the present rate of driving, the amygdaloid cut in No. 4 shaft Calumet, should be reached within a month.

Franklin Mining Company.—The mine yielded 184 tons of mineral in March, against 187 tons in February and 200 tons in March, 1892. From January 1st the return shows 551 tons, compared with 609 tons last year, a decrease of 58 tons.

Osceola Mining Company.—The March output was 200 tons.

Huron Mining Company.—The March outputs of mineral was 53 tons.

Tamarack Mining Company.—The March output reached 810 tons.

Tamarack, Junior Mining Co.—According to Capt. John Daniel, the No. 2 shaft of Tamarack, Jr., which has been showing some 6 to 18 in. of copper-bearing ground in the drift toward the No. 1 shaft, has widened out, so that all the rock from a drift 5 ft. wide is being saved for the stamp mill. The vein is about 12 ft. wide against an average of 18 ft. in the Calumet & Hecla mine. The drifts from No. 1 shaft show copper ground from 8 to 12 ft. wide, and 80 to 90 % of all that is taken from this shaft goes to the stamp mill. The quality of the rock is improving, and now carries about 3 % of mineral. In No. 1 shaft of Tamarack, Jr., the company is stopping only upon the third and fourth levels. On the fifth and sixth levels, drifts are being opened from winzes. The No. 1 shaft is paying its way, but nothing has yet been stamped from the No. 2 shaft, although the rock from the present driftings is being saved for the stamp mill.

Iron—Marquette Range.

Buffalo Iron Company.—The shaft started near the Queen shoot to tap the deposit from last fall has reached the intended depth; there has been connection made with the Prince of Wales deposit, and a drift to connect with the Queen is already well along.

Champion Iron Company.—This company has ordered two ore crushers. These crushers will have 24-in. openings, and their capacity is estimated to be 25 tons per hour. The Champion will crush the ore it has in stock, amounting to many thousands of tons. After this is done the work can probably be conducted with but little added cost.

MISSOURI.

Jasper County.

(From our Special Correspondent.)

Joplin, April 17th.

The lead and zinc mining district of southwest Missouri and southeast Kansas has been favored with good weather during the past two weeks, and there has been a large output of ore, with the sales fully up to the average. The top price paid for zinc ore was \$22 per ton and the average \$21. The lead ore market has had an upward tendency and closed Saturday at \$23.25 per thousand. Following are the sales from the different camps for

the week ending April 10: Joplin mines, 1,824,670 lbs. zinc ore and 241,680 lead, value \$22,657; Webb City mines, 535,500 lbs. zinc ore and 28,990 lead, value \$6,272; Cartersville mines, 2,228,540 lbs. zinc ore and 54,330 lead, value \$24,622; Zincite mines, 461,040 lbs. zinc ore, value \$4,431; Oronogo mines, 147,680 lbs. of lead, value \$3,250; Carthage mines, 32,000 lbs. zinc ore and 31,200 lead, value \$1,066; Wentworth mines, 120,000 lbs. zinc ore, value \$1,200; Mosley mines, 263,250 lbs. zinc ore and 4,130 lead, value \$2,521; Granby mines, 124,000 lbs. zinc ore and 23,000 lbs. lead, value \$1,746; Galena Kerns mines, 1,289,720 lbs. zinc ore and 121,340 lead, value \$15,253; Aurora Lawrence Company mines, 1,083 lbs. zinc ore and 170,000 lead, value \$11,772; lead and zinc belt's total value \$94,790.

For the week ending April 17th sales were: Joplin mines, 1,598,770 lbs. zinc ore and 224,980 lead, value \$22,196; Webb City mines, 663,000 lbs. zinc ore and 16,360 lead, value \$6,213; Cartersville mines, 2,180,790 lbs. zinc ore and 60,170 lead, value \$23,031; Zincite mines, 108,440 lbs. zinc ore and 2,190 lead, value \$1,271; Oronogo mines, 40,680 lbs. zinc ore and 17,690 lead, value \$716; Carthage mines, 122,050 lbs. zinc ore and 31,200 lead, value \$1,261; Galena Kerns mines, 1,449,980 lbs. zinc ore and 404,400 lead, value \$23,650; district's total value \$78,338.

Zinc and Lead Belt.

A recent trip through the mining belt from Joplin, in Jasper County, to Springfield and the Pierson Creek mines, in Greene County, seven miles east of Springfield, show what is being done in the way of new development back from the lines of the railways. After passing out of the Joplin district we find the agricultural district of Diamond Grove, with here and there a prospect hole or shaft showing silicate and sometimes lead and zinc. The old Conway mines, three miles east of Wentworth, were discovered a great many years ago by silicate croppings, but no systematic plan of development or machinery was used to within the past year, when a new company has taken hold and are making good development. Next is the new and prosperous camp of Wentworth, located on the line of the St. Louis & San Francisco railroad just at the east line of Newton County, so that the mines are in Newton and Lawrence counties. Here the Peirce Mining Company is producing 30 to 40 tons of ore per week. The Gobbler mine, with over 400 ft. of underground workings, confined solely to exploration work, shows a wonderful deposit of zinc blend ore lying in a stratified form. This company intends to put up an ore dressing plant with a capacity of not less than 100 tons per 10 hours. The Mollie Gibson mine has emerged from a prospect to a producing mine with an output of 20 to 25 tons of ore per week. The Purdy and Jones mines, the Pittsburg Land and Mining Company, both developed, show good deposits of ore and will soon be in the list of producers. There is a great amount of prospecting being done by other parties.

At Aurora, 25 miles further east, shafts, pits and prospecting is being done, but nothing of any importance. A large and steady production from the mines of this district averages up about \$12,000 per week. New developments are being made to the south and northeast, proving that the ore deposit covers a large area around Aurora.

At Springfield, Greene County, 30 miles from Aurora, and directly on top of the Ozark Mountains, the exhibit of the mining bureau, has specimens of the various minerals, building stone and clay from southwest Missouri and Arkansas.

The lead and zinc mines of Pierson Creek, seven miles east of Springfield, are very old mines, but have always been operated in a very crude and primitive manner up to the present time, but new men and new capital have lately come in. The old Gumbo mines are now in the hands of the Nathalie Mining Company and are under the management of Mr. R. P. Boyar, one of the principal owners. This company now has in operation an ore dressing plant and is producing 20 to 25 tons of zinc ore and 5,000 lbs. of lead per week. About 300 ft. north of this plant is the Kodac Mining Company, which is putting up a \$12,000 ore dressing and concentrating plant. East of this are the Suffolk Mining Company, the Annias Mining Company, the Leddo Mining Company and the Kickapoo Mining Company, all of which are developing and putting in machinery. The deposits of lead and zinc ore are found at depths of 30 to 40 ft. underlying a limestone cap. As a rule the zinc ore is found disseminated through stratas of a Gumbo mine and is a free pebble ore. The lead ore is found free and disseminated through the limestone. Dr. Winslow, the State Geologist, visited the mines recently and made an examination in the interest of the geological survey.

MONTANA.

Deer Lodge County.

Magnet.—The incline shaft is down 340 ft. and prospects are good, says the "Phillipsburg Mail." At the first station, 214 ft. from the surface, there have been two levels run. The right level has been extended 32 ft. and carries a fair body of ore the whole length of the level. The left or south level has been run in 40 ft. and is showing well. The north level was run about 25 ft. on an angle with the right hand level in hard country rock, and turned west to strike the vein in about 8 ft. The

vein is looking well at the bottom of the shaft. It is the intention of the management to start cutting out another station at the 300-ft. level. There are now 1,000 tons of second class ore on the dump, and it is reported that the company will soon put up a mill. At the annual meeting the old directors were re-elected.

Puritan Mining Company.—The future of this mine is in considerable doubt. When the pay ore pinched out on the 200 level the shaft was sunk to the 300. Here ore was found again, but in small quantities, eventually cut out by a horse. Further development now will be done, however.

Jefferson County.

Elkhorn Mining Company.—The official report states that during the month of March the mill worked 30 days and crushed 1,026 tons. Bullion produced in the mill, \$32,610; 274 tons of smelting ore sold, \$16,130; total product, \$48,740; total expenses, \$26,230; estimated profit for the month, \$22,510, or at \$4.85 to £ sterling, £4,691.

Meagher County.

Gilt Edge Mining Company.—This is a new company with capital stock of \$500,000. The trustees are: H. H. Chandler, T. E. Collins, A. E. Dickerman, H. S. Sherard and J. K. Clark.

Shelield.—It is reported that some good ore has been struck on this claim. The shaft is down 35 ft.

Missoula County.

Nine Mile Mine.—Not less than \$25,000 worth of gold bullion has been taken from this mine during the last three months, says the "Daily Inter-Mountain." There is a large quantity of ore on the dump, and the 10-stamp mill is running full time. It is said that the owners will put in 10 more stamps.

Silver Bow County.

Alice Gold and Silver Mining Company.—A new Knowles pump has been placed in the Boston mine; the stations have been cut and cross-cutting for the north and south veins will be commenced. It is expected that the south vein will be encountered in four or five days, but the north one will probably not be cut for a couple of weeks. The Blue Wing mine has been shut down for a few days. One shipment of 30 tons of gold ore has already been made.

Butte & Boston Mining Company.—The March output was 1,634,000 lbs. of refined copper, 64,000 oz. silver and \$21,000 in silver bullion.

Ella Mining Company.—This company has been organized with a capital stock of \$500,000, divided into assessable shares of \$1 each. Of the 500,000 shares 225,000 will be sold. The incorporators are R. M. Cobban, Theodore Schweitzer, J. W. Cotter, C. P. Drennan, E. Ring. The company proposes to carry on a general mining and milling business at Butte. The Ella claim is at present showing up well, a body of good ore having recently been struck in its workings.

Gambetta.—This mine has been sold to Boston capitalists. Ore has been struck in the bottom of the shaft which is being sunk at the rate of 12 ft. a week.

Gambetta.—This property has been sold to Boston capitalists, says the Butte "Inter-Mountain." Gen. John A. Leggett, the former owner, said the price was over \$100,000, and that he had received the first payment. Last week it was announced that a body of ore had been encountered in the bottom of the shaft and had been penetrated 19 ft. This week's report is that the shaft has been put down 12 ft. further and is still in the ore body, which is widening with depth.

Montana Mining Company, Limited.—The official report states that the total output for March was \$23,882 (the price of silver being taken at \$37½c. per oz.), and the working expenses \$42,101. In addition to 6,007 tons of ore crushed, 2,500 tons of tailings from the dams were treated, yielding \$8,300, at a cost of \$5,950, which figures are included in the above return. The heavy expenses incurred during the month were in some measure owing to the late caves in the nine-hour workings, and the working expenses this month will be reduced.

Pacific Lode.—James A. Talbot, a special administrator of the estate of A. J. Davis, has brought suit against James A. Murray et al. alleging that the estate of A. J. Davis is the owner of the Pacific lode claim, which embraces and contains a vein and ledge of quartz between two well defined walls, the top or apex of which is within the side lines of the said Pacific and continues therein along the entire length of said lode claim; that the said vein having its apex within the Pacific side lines in its downward course departs from the vertical side lines of the Pacific into and under the Carrie lode claim; that defendant on or about Dec. 1, 1891, by underground working within the vertical lines of the Carrie lode, entered upon the Pacific vein and extracted and are now extracting therefrom large quantities of ore of the value of \$20,000. Plaintiff therefore demands \$20,000 damages for ore extracted and restitution of said vein and premises, and that an injunction restraining defendants from working the premises pending the determination of the suit be granted. A temporary restraining order was issued.

Parrot Silver and Copper Company.—It is stated that this company will remove its smelting plant from Butte, and that the Hecla Consolidated Mining

Company may unite in the construction of a large plant on the Big Hole River.

NEVADA.

(From our Special Correspondent.)

The mining assessments falling delinquent during the months of April make a total of \$246 800.

Elko County.

Belle Isle Mining Company.—The latest official weekly letter says: "The south drift, 250 ft. level, has been advanced 14 ft. The stopes above this level are producing the usual amount of ore."

Navajo Mining Company.—The latest official weekly letter says: "Work has been confined to the stopes above the 350 ft. level and 150 ft. level. The stopes are yielding as usual."

Eureka County.

The Eureka & Palisade railroad received during the month of March 777 tons of ore from the mines of Eureka district for shipment to Salt Lake City, as follows: From the Eureka Consolidated mine, 300 tons; Diamond mine, 280 tons; Richmond mine, 119 tons; Bullwhacker mine, 60 tons, and Jackson mine, 18 tons. The Diamond shipments were unusually light, owing to the very bad condition of the roads.

(From our Special Correspondent.)

During the month of March 777 tons of ore were shipped over the Eureka & Palisade Railroad in transit to Salt Lake City. The Eureka Consolidated mine shipped 300 tons; Richmond, 119 tons; Diamond, 280 tons; Bullwhacker, 60 tons, and Jackson, 18 tons.

Eureka District has been dull and cheerless during the winter, and very little has transpired worth noting. Continual snowstorms have blocked the roads, and now that a spring temperature is setting in they are in a too soft and muddy condition to admit of hauling. Ore shipments were unusually light during last month, and it does not appear probable at this writing that April will mark much improvement. I learn that the summer output of the Diamond mine will record an increase over any previous season, but the quantity of ore to be shipped can not be estimated upon any reliable information obtained up to this date.

The tributers at the Hamburg mine will have about 200 tons of ore ready for shipment about the 1st of May. The coming summer will probably wind up the cleaning of by-products at the Richmond and Eureka Consolidated reduction works, but nothing has been learned in regard to future operations. It is reported that the Alexandria and El Dorado mines have been leased for a year, and will be worked the one in connection with the other. During the month of April the Eureka & Palisade Railroad Company received 777 tons of ore from the mines of the district for shipment to Salt Lake City, Utah, as follows: From the Eureka Consolidated mine, 300 tons; Diamond mine, 280 tons; Richmond mine, 119 tons; Bullwhacker mine, 60 tons, and Jackson mine, 18 tons.

Storey County—Comstock Lode.

Belcher Mining Company.—The latest official weekly letter says: "We have hoisted during the week 40 tons of fair grade ore. The proceeds of this mine during March not only paid all the expenses for that month but left a small surplus."

Consolidated California & Virginia Mining Company.—The latest official weekly letter says: "The ore product for the week amounted to 645 tons. The average car sample assay was \$32.50 per ton. The shipments of ore to the Morgan mill amounted to 376 tons. The mill, which had closed down for several days to permit of a clean-up, resumed work on the 7th inst. and worked 90 tons, the battery sample average of which was \$31.65 per ton. The mill has since been in steady operation and regular shipments of ore are being made from the mines. During the week bullion valued at \$33,376 was sent to the Carson Mint. This included the closing shipment on March account. Following is the official report of the operations in the mine during the past week: 1,500 level—Have continued to extract ore and old fillings in working upward in the old south stopes, from the 10th to the 15th floors above the sill floor of this level; 1,600 level—Extracting a few tons of ore from the old stopes east of the main south drift; 1,650 level—We continue to extract some ore from the old stopes, eight floors up in the up-raise No. 6 carried up from the main northwest drift. Also from the old stopes in working north from the crosscut run west from the northwest drift. In working in the north and south sides—partly in old timbers—of the drift run east (at a point 20 ft. down) from the winze which was sunk from the west crosscut from the main northwest drift, have extracted some ore of fair quality."

Crown Point Mining Company.—The latest official weekly letter says: "We have started a west crosscut from the top of the raise which was started from the main west crosscut on the 400-ft. level 250 ft. west of the shaft. This crosscut is now out a total distance of 29 ft., and is passing through the old stope. The fillings are of fair grade in places, and are saved when practicable. Have started another crosscut from the southwest drift from the shaft on the 400-ft. level, 300 ft. in or 150 ft. south of the previous ore. It is out 28 ft. The face is in porphyry with seams of quartz through it. We continue to explore the ore

stocks on the 160-ft. level and are saving a little ore from there daily.

Justice Mining Company.—The latest official weekly letter says: "The south drift from the north stope on the 822 level has been advanced 6 ft.; total length, 149 ft. The face is in low-grade quartz. The raise 120 ft. from the north stope on this level is up 60 ft. The face shows about 3 ft. of ore in width, the car samples of which average about \$20 per ton. We are taking out about 5 tons of ore per day, the samples from which run about \$20 per ton."

Kentuck Mining Company.—The latest official weekly letter says: "From the stopes above the 160 level we continue to extract from two to three tons of ore per day of the average value of \$33 per ton, as per car samples. The south drift from the Jacket east crosscut on 1,100 level is in 209 ft. and has reached the Kentuck line. The ore in the face of the drift assays from \$5 to \$40 in gold. Shipped to the Nevada Bank treasurer, bullion valued at \$2,750."

Ophir Mining Company.—The latest official weekly letter says: "The winze below the 1,565 level was sunk 14 ft.; total depth 40 ft. The bottom is in porphyry and clay, showing streaks of quartz which carry a very low assay value. On the 1,585 level west crosscut No. 2 is in 110 ft., continuing in a hard porphyry formation carrying clay separations and showing fine lines of quartz."

Potosi Mining Company.—The latest official weekly letter says: "Extracted and sent to the mill the past week 445 tons and 750 lbs. of ore from the 550,930 and 1,150 levels. Milled during the week, 445 tons. On hand at mill, 141 tons and 500 lbs. Average battery assays, \$21.41; average car sample assays, \$22.64. Shipped to the United States Mint at Carson, 1,158 lbs. of erude bullion."

Savage Mining Company.—The latest official weekly letter says: "On the 1,300 level the up-raise in the ledge is advanced 65 ft.; the top is in quartz and porphyry. In the east crosscut started from the north stope 30 ft. below this level, they have prospected north and south 15 ft. on the quartz mentioned in the last weekly report; quartz gives low assays. On the 1,800 level the north drift from the south boundary is advanced 57 ft.; face in quartz and porphyry."

(From our Special Correspondent.)

The following is the weekly tabulated statement of the ore hoisted from Comstock mine, with the car and battery assays, bullion shipments, etc.:

Mines.	Tons Hoist'd	Car Assay	Tons Milled	Av. Bat'ry Assay.	Bullion for Week.	Bullion Shipped
Belcher...	40	.....	.....	.....	.....	.....
C. C. & Va.	645	32.50	90	31.65	.....	\$33,376.52
Justice...	35	20.	.....	.....	.....	.....
Kentuck...	21	33	.....	.....	.....	\$2,756.85
Potosi.....	445	22.64	445	21.41	.....	\$1,158 lbs.

¹The company has a cash balance on hand of \$59,702 with March expenses paid. ²Receipts for March are about \$31,000.

Consolidated California & Virginia Mining Company.—An examination into the record of the ore worked during the month of March shows some interesting features of mine and mill management. Repeatedly the ENGINEERING AND MINING JOURNAL has drawn attention to the fact that the bullion returns made from the Bonanza was so low in percentage value—averaging as they did about 60% of the battery value of the ore—that only the grossest ignorance could account for such unsatisfactory manipulation of the ore, or—the grossest and most palpable fraud.

A step in the right direction has been taken when a decided improvement has been shown in the March account, and, without criticising the action or the motives that prompted the management of the mine to inaugurate this new departure, stockholders may be thankful for such small mercies. It appears that there were sent to the mill 3,625 tons of ore, the average car sample of which was \$30.46 and the average battery sample \$27.43—a difference in the assay of \$3.03 or 10%. From 2,463 tons there was bullion returned as follows: Gross bullion, \$59,092, or an average of \$23.98 per ton. Thus, 78.72% of the car sample value and 87.42% of the battery sample value of the ore were saved. With such a radical change in the showing made one can't help wishing that a change of heart had taken place a year or two ago, when stockholders would have been very considerably in pocket.

Potosi Silver Mining Co.—Attention was drawn last week to the returns made by the mill in working ore from this mine. These returns show that in the month of March there were shipped to the Nevada mill 2,258 ³³⁵ tons of ore. The average car sample was \$27.67 per ton, and the average battery assay \$24.77 per ton. A difference in the assay value is here shown of \$2.90 or a trifle over 10%. The bullion return from 1,888 tons was, in gross bullion, \$41,300.98 or 79% of the car sample and 88.03% of the battery sample.

The Virginia City "Chronicle" of the 13th inst. contained the following: "A contract has been let by the Comstock Milling Company (Maekay, Flood and the Joneses) to A. J. McCone for rebuilding the Eureka mill on the Carson River. The new structure is to be a pan mill, and operations will commence in a short time. Further details will be given further on. The new shaft of the engine at the Chollar works has been put in place, and operations in the

mine will be resumed to-night. The Nevada mill will start up as soon as sufficient ore is raised to run on—probably to-morrow. A test run of 500 tons of ore from the Kentuck mine is to be made at the Occidental mill in a few days."

White Pine County.

Osceola Gravel Mining Company.—Mining operations here are now fully under way. Work was resumed on the 4th inst., and in running the water out of the reservoir for the purpose of cleaning up the debris left last fall a \$700 gold nugget was found.

NEW JERSEY.

Iron.

Hurdtown Mine.—It is reported that this mine, near Lake Hopateong, will be closed, its operation being no longer profitable. It has been worked about 50 years, and the main shaft is down 500 ft. For some time past the ore has been shipped to the Glendon Iron Company.

NEW MEXICO.

Grant County.

Pacific Gold Mining Company.—This company's mill and mine have been closed down, owing to the inability of the Silver City Water Company to supply it with water for some time to come. The probabilities are that operations will not be resumed until the company takes some steps for the reduction of its ores at the mine, says the Silver City "Enterprise." The mill at Silver City will be moved to the mine, and water procured from one of the many sources of supply near Pinos Altos. During the past year \$36,000 has been paid by the company for hauling when two-thirds of that amount would have paid for moving the mill and piping water to the mine.

OHIO.

The joint conference of miners and mine operators of Ohio held in Columbus on the 15th inst. to fix the price of coal mining for the year beginning May 1st next, adjourned without having reached an agreement. The operators insist on the rate now paid being continued, and they also insist on settling the wage question by districts, while the miners are equally determined they will act as a unit in the matter. A strike on May 1st is feared, no further meeting of the miners and operators being arranged for.

OREGON.

Coos County.

(From our Special Correspondent.)

Oregon Coal and Navigation Company, Marshfield.—The mines belonging to this corporation have been in the market for the past two years. They formed part of the estate of the late Nicholas Luning, and after trying, without avail, to dispose of them in Europe, purchasers have been found close at home. The San Francisco firm of Goodall, Perkins & Co. have purchased from the Luning estate the mines and mining lands on Coos Bay, the three-mile railroad to the bunkers at Marshfield, the immense bunkers where steamers go alongside to load, the wharf and warehouses at Marshfield, the hoisting plant and tramway in San Francisco from the Vallejo Dock to the main bunkers on the state lot, and the ground lease, and the two steamers "Arago" and "Areata." The terms of the sale have been kept private, but it is said that the purchasers got a bargain and did not pay more than \$65,000. The company has of late been working the mines on half time, and latterly one steamer was laid up, the developed parts of the mines having been very nearly exhausted. The new owners will open new veins, when there appears no reason why the prosperity that attended the company some years ago should not return. The "Arago" is an iron steamer of 620.6 tons net, and was built expressly for this trade, carrying 1,200 tons of coal. The "Areata" is much smaller, registering only 415.56 tons net.

PENNSYLVANIA.

Anthracite Coal.

Charters were granted April 19th, to the West, Ridge Coal Company, of Scranton, capital \$100,000, and the Laurel Run Coal Company, of Wilke-Barre capital \$500.

It is reported in Ashland that L. A. Riley & Co., operators of the Logan & Centralia colliery, at Centralia, are negotiating with the Locust Mountain Coal and Iron Company for the lease of the Germantown coal basin, between Ashland and Centralia. The basin was worked many years ago by the Heilner Coal Company. If Riley & Co. succeed in getting it, the coal, in all probability, will be prepared for the market at the Logan colliery.

The contract for one of the largest coal strip-pings ever opened in the Hazleton section has been awarded to Cuyler Brothers by A. S. Van Winkle & Co., and work will be begun at once. The vein which is to be stripped is near Milnesville. It is known as the mammoth vein, and is said to be the richest mined in the region.

Crystal Ridge.—Fire started on the 17th inst. in the pump house at the bottom of the first lift of Crystal Ridge colliery at Hazleton, operated by A. Pardee & Co. Five gangway men were in the mine, but it is thought they reached a place of safety. The flames spread quickly, and in a short time had climbed the 300-ft. slope.

Humboldt Colliery.—Orders were received April 11th at Hazleton to get that mine into shape for an indefinite suspension. The order comes from the

main office of the operators, Linderman & Skeer. About 200 men will be affected. The shutdown is due to the worked-out condition of the mine.

Philadelphia & Reading Coal and Iron Company.—The annual meeting of the Finance Company, of Pennsylvania, was held in Philadelphia September 18th, and resulted in the indorsement of the policy of President George H. Earle and the Board of Directors. The annual report of the president showed the aggregate profits of the year to be \$244,330.00, and after the payment of various indebtedness the total net profit for the year to be \$71,725.89. The report says that a five-year contract has been entered into with the Reading Coal and Iron Company to manage the sales of the company's coal, and that the contract had been rectified by the receivers of the Reading company.

(From our Special Correspondent.)

Alden Coal Company.—This company is about to sink an air shaft at its Alden colliery. The size of the shaft is to be 12 ft. x 34 ft. 8 in. It is to be sunk from the surface to the Cooper vein, a depth of about 600 ft.

Lehigh & Wilkes-Barre Coal Company.—This company's large breaker at the South Wilkes-Barre colliery prepared recently 101 mine-cars of coal each car containing about 2 tons of clean coal), in one hour, with only one side of the breaker in operation. At this rate, this breaker would, when working both sides, have a daily capacity of over 4,000 tons. As this colliery is unusually gaseous, it has been deemed advisable to largely increase the ventilation, and for this purpose a third shaft is now under way at this colliery. This shaft will be sunk to the Hillman vein, a depth of about 525 ft., and will be 12 x 37 ft. in the clear. As soon as it is completed, and a 35 ft. Guibal fan has been erected and connected to this shaft, about twice the present number of men will be employed at this colliery, and both sides of the breaker will be put in operation. The new breaker in course of erection at this company's Maxwell colliery at Ashley, will be of about the same capacity as the South Wilkes-Barre breaker, and it is expected to be completed by September 1st next.

West End Coal Company.—This company has decided upon the plans for the new breaker at Mochanqua, to take the place of the one that was recently destroyed by fire. The contract for building this breaker has been awarded to J. B. Tyrrel, and it is expected that the work will be completed by August 1st, next.

SOUTH DAKOTA.

Lawrence County.

Comet.—Satisfactory progress is being made in the development of this mine. Several seams of ore have lately been cut in the drifts being run at a bottom of a 50-ft. shaft.

Deadwood-Terra Mining Company.—The underground workings of this mine took fire early in the morning of April 14th. The fire started in the southwest slope of the 300 ft. level. The men were soon compelled to abandon the mine and began at once to bulkhead and seal the drifts on the east side. Notwithstanding the bulkheads the men in the top levels of the Highland soon felt the effects of gas and were forced to abandon their work. The day shift of the Homestake and Highland went on at the usual time, but they too were finally forced to suspend working. A number of men have been overcome by the gas, but so far no life has been lost. At present no work is going on in the Highland or Homestake, but a little is being done in the upper levels of the Terra.

Omaha Gold and Silver Mining and Smelting Company, incorporated at Deadwood, April 5th; capital stock, \$165,000, divided into 165,000 shares. The incorporators are: Arthur B. Smith and F. C. Matthews, of Omaha, Neb., and Frank S. Bryant, of Deadwood, S. Dak. The property of the company consists of 26 claims. Offices are at Deadwood and Omaha.

Pennington County.

Welcome Chlorination Works.—These works, at Rapid City, have started in full operation.

TENNESSEE.

Tennessee Coal, Iron and Railroad Company.—Trouble has broken out again in relation to the convicts employed by this company. A press dispatch of April 20th says: About 11 o'clock last night the branch prison at this place was attacked by armed men estimated at 40 to 100. The prison officials had information of the intended attack and the guards were all on duty. Firing was soon begun, but the miners were repulsed with one of their men killed, one wounded, and another thought to be wounded, but name unknown. Assistant Deputy-Warden Shriver was wounded in the head, dangerously. Walden, a guard, was fatally wounded. Sheriff N. Sanders was at the prison during the attack. This morning all is as quiet as Sunday. No work is being done in any of the mines. The prisoners were not taken out of the stockade today.

Coal.

Bon Air Coal Company.—This company has found two veins of coal from 4 ft. to 5 ft. thick in its workings near Crossville, Tenn.

Indian Mountain Coal Company.—This company was organized April 10th, at Newcomb, Tenn., the incorporators being nearly all from Elk Rapids,

Mich. The officers are: President, Frank Merrett; vice-president, W. A. Farrell; secretary and treasurer, W. H. Dellameter; general manager, A. W. Schenck.

TEXAS.

Llano County.

Olive Iron Mine.—The first drift from the shaft is now in about 100 ft. A large quantity of ore has been taken out. Work is to be pushed as soon as the branch track to the mine is finished.

UTAH.

Beaver County.

Horn Silver Mining Company.—The financial statement of this company, for the quarter ending March 31st, has been issued. The receipts were: Sales of ore, \$98,886.47; interest, \$3,955.76. Smelter at Franklyn (house rent, etc.), \$61. The disbursements for the same period were: Mining, \$35,649.38; general expenses, \$2,850.08; New York office, \$4,137.49; dividend No. 29, \$50,000; balance cash on hand, \$379,587.54.

Salt Lake County.

Bingham District.—The prospects of this camp are becoming bright, according to the Salt Lake "Tribune." Yosemite No. 2, the Spanish, the Sampson and Garland and Beerman mines are making regular shipments. At the Greatwestern a good body of ore is said to have been struck. At the Old Jordan and Galena Mining Company's mine 70 leasers are at work. At Amazon and Alamo extensive prospecting is being done and the showing is said to be good. A recent shipment from the Leona gave very satisfactory results.

Petro.—Another strike in this mine at Bingham has been reported. The ore was struck in the tunnel, or up-raise that was being run from Cottonwood gulch to tap the mine. The tunnel was in a distance of over 700 ft. when the ledge was encountered. The vein is a strong one, and is supposed to be the same as they had in their upper workings, as the ore is about the same. The ore assays between 50 and 60% lead and about 12 oz. silver to the ton, besides carrying a small amount of gold.

Wasatch Asphaltum Company.—The stockholders held their annual meeting April 12th, and re-elected the old board of directors, as follows: G. F. Culmer, president; W. H. Jennings, vice-president; H. L. A. Culmer, secretary and treasurer; W. H. Culmer and St. V. le Sieur, directors. The mines of this company in Spanish Fork Canyon were noted in the "Mineral Industry" for 1892, where an account of the occurrence and production of asphaltum in Utah will be found.

VIRGINIA.

Coal.

Kelly Moon.—This property, near Big Stone Gap, Va., was sold April 6th at public sale and bought by John C. Haskell for \$75,000. The property includes 1,460 acres of land, about 50 acres only being known to contain coal. The coal is the Imboden seam, and is good coking coal.

WASHINGTON.

Stevens County.

Northport Smelter.—At a meeting in Northport, April 12th, between the local owners of the Le Roi mine and the representatives of the Pyritic Smelting Company, of San Francisco, it was practically decided that a smelter would be built this summer either at Northport or near the Le Roi mining property, to reduce the ores of that and other neighboring mines. Treasurer W. A. Rust and President Pugh, of the smelter company, are in the city.

WEST VIRGINIA.

Coal.

West Virginia Central & Pittsburg Railroad.—At a special meeting in Piedmont, W. Va., April 12th, resolutions were adopted authorizing the conclusion of traffic contracts with the Pennsylvania, the Cumberland Valley and the Western Maryland railroads.

WYOMING.

Colorado Fuel and Iron Company.—A press dispatch from Cheyenne says that Messrs. Hills and Eakins, of the Colorado Fuel and Iron Company, are to go with W. C. Hart, the Fort Collins geologist, into the Hartville iron district. It is said that good iron ore can be quarried at 50c. a ton. The deposits are 130 miles from Cheyenne, 13 miles from a Union Pacific branch and on the line of two Burlington surveys.

FOREIGN MINING NEWS.

MEXICO.

Guanajuato.

(From an Occasional Correspondent.)

Bolañitos.—At this mine, which is the property of a private gentleman, Don Jesus Andrade, there is at present being erected a large plant at the mouth of the shaft, which has been designed to treat the milling ores at a cost not to exceed \$5 Mexican per ton. Taking it for granted that a saving of at least 80% will be made, \$39 ore can be worked to a profit of not less than \$9 per ton.

This is one of a number of instances where mine owners in this country have endeavored to meet the depreciation in the value of silver by decreased cost of production, but the item of \$12 for mining expenses is a very heavy charge on \$30 ore, and it is quite likely that at no distant date the present system of tributing will be replaced by some more economical system of mining, when ore of much lower grade will yield handsome profits when found in anything like large quantities. The reduction works referred to above will include modern improved Chile mills and will have a capacity of about 100 tons per day.

(Special Correspondence of Richard E. Chism.)

Chihuahua.

It is stated that a new mining district has been discovered near the Rio Grande and almost on the border of the State of Texas. The new discovery is of rich galena ore, and it is stated that some Mexican capitalists are about to develop the new field.

Oaxaca.—While I was writing the above a friend reports a similar discovery in the state of Oaxaca. The mineral deposits are of rich galena, and the immediate neighborhood of the mines is said to afford some extensive beds of coal, quite available for smelting purposes. The whole combination is stated to be not far from surveyed line of a projected railroad. It sounds almost too good to be true.

Coahuila.

Fronteriza Mining and Milling Company.—This company owns property in the Sierra del Carmen, some 160 miles northwest of Barroteran, a station of the Mexican International R. R. The mine is worked through a 300 ft. shaft, the ores, being chlorides and sulphides are carrying from 10 to 500 oz. of silver per ton.

Mr. C. E. Lyman is the president and Mr. O. T. Noble the secretary of the company, which has received, within a few years some \$200,000 worth of silver from its property.

Durango.

Gurney Mining and Milling Company, Topia.—Manager Gilbert Gurney is recovering from the murderous attack made on him by bandits some time ago. At one time it was feared that one of his legs would have to be amputated. A surgeon, however, has saved the leg. He has been removed from Topia to Culiacan, Sinaloa, and as soon as he is able to travel will take a trip to England.

Promotorio.—These mines, owned by Mr. Maximiliano Damm, are shipping on an average from three to four cars of rich ores per day.

Jalisco.

La Luz de Borda Mine.—From London we hear that the reorganization of the unfortunate enterprise of the La Luz mines has been decided upon.

This is the enterprise of which I wrote, predicting its failure, some time in the year 1889. Its affairs were put into liquidation in 1890 and have been reorganized, and in all kinds of trouble ever since. A good deal of money seems to have been spent and nothing done, although liberal promises have been showered upon the unfortunate stockholders from this end of the line all through the unhappy history of the company.

The impression seems to be, in this country, that the mines themselves are good, but they are situated in a peculiarly rough and inaccessible region and have fallen into bad hands—that is, into possession of speculators, and not of miners. The end will probably be similar to that of many other properties floated in England—the stockholders will be milked dry and the mines will fall into the Mexican owners. These will profit by the expenditures and experience of our English friends and probably make a good deal of money. The ores carry some gold, and if the reports of the experts and managers are to be believed the mines have a good deal of ore in sight.

Michoacan.

The National Mining Company.—This company, which owns a mine of that name in Talpujahuá, has met with so much success in the development of the property that a plant of Chilean mills and pans has been ordered from Fraser & Chalmers, and will probably be at work before you receive this. The National Mine belongs to a company consisting mainly of railway employes, who have quietly been investing their savings during some years for the purpose of finishing a tunnel to strike the veins on this property below the old works. This work was practically completed more than a year ago, and the mine is now beginning to pay well. Mr. W. J. Nolan is the superintendent.

Morelos.

Huautla.—This camp is one that deserves more attention than it has yet received from American capitalists who really want to mine. It is as yet practically unexplored, yet, from the indications I have seen there are numerous fissure veins which seem as if they would repay development. It is also stated that there are numbers of gold-bearing quartz veins in this locality.

Santa Ana.—I hear that the Santa Ana mine, situated in Huautla, has undergone a partial change of ownership. A half interest, formerly owned by Don Enrique Sota Cortina, has been purchased by Messrs. M. P. Bots and W. H. Armstrong. Mr.

boss is the well known inventor of the continuous milling process for gold and silver ores, and Mr. Armstrong is a mining man of long experience on the Pacific coast. The third and one of the two original owners is Mr. B. C. Watson, who took hold of the mine when it was a mere wreck of the old Spanish times, and has worked it up within a few years to a rather large producer. The workings extend along a well defined fissure vein, which is continuous for some miles and which has other mines upon it, all giving evidence of having yielded large amounts of rich ore. The old Spanish (and more modern) workings of the Santa Ana mine are only some 75 ft. deep, although rather extensive horizontally. Mr. Watson sunk an incline, following the vein to a depth of some 300 or 400 ft., and in opening this shaft and with one or two short side drifts, took out enough silver to pay all expenses and a liberal profit besides.

No extraordinary expenses were indulged in for buildings or machinery (the hoisting is done with a horse whim), and with a moderate but judicious investment of capital Mr. Watson has acquired quite a fortune and still owns one-half the mine, which will probably pay better than ever in the hands of the new combination.

Tlachichilpa.—This mine is situated some four miles west of the Santa Ana (which is nearly in the town of Huautla) and has produced some millions for its owners, who are the Noriega brothers of the City of Mexico. A plant of Chilean mills and other machinery is now being erected to treat the ores on a larger scale. A wagon road has been finished lately at a cost of some \$40,000 to permit the transportation of heavy machinery.

Vera Cruz.—Coal.

Considerable attention has been attracted lately to the reported discoveries of coal in the Huasteca, or tropical district lying on the eastern or gulf side of the mountains which line the coast of the Gulf of Mexico.

The existence of coal in these localities has been known for a long time, and now, it appears, the matter has been taken up in earnest by a syndicate of English capitalists who have sent experts into the region. It is asserted that these gentlemen have pronounced the thickness and extent of the deposits to be very great and the coal of the best quality. Assays have been made, it is said, in London, in Glasgow and in this city with an average result of 88 per cent. of fixed carbon.

It is supposed that work on a large scale will soon be commenced on this property, but the intervention of a "London syndicate" is not, to my mind, the highest guarantee of the success of the enterprise.

COLORADO ORE MARKET.

Denver.

April 10.

(From our Special Correspondent.)

For the two weeks ending April 8th the receipts of ore in this market offered for competitive bid by the three public sampling works amounted to a total of 674 tons, an increase of 229 tons over the preceding two weeks; this increase is due largely to the increased shipments of gold ores carrying very little silver, the bulk of which came from Cripple Creek, and as a rule received very liberal treatment at the hands of the bidders, the smelting charge in many cases being below the minimum, and \$19.50 per oz. being allowed for the gold; heavy lead ores also commanded a premium, the general average in that direction still continuing with nearly all the smelters, and if it was not that a large lead tonnage is being received by one of the Colorado smelters from Mexico some of them would have to blow out their furnaces, as it is a matter of fact that the present supply is not equal to the demand.

Of straight silicious silver ores there is at present an abundance; consequently the margins for treatment are more favorable for the smelters than the other two mentioned products. Of straight silicious gold and silver ores there were sold 330 tons, which stood a treatment charge of from \$5.50 to \$22 per ton, this wide difference being due to the heavy gold securing a very low treatment. On account of the profit in it, over \$19.50 per oz. (the price allowed) the other extreme being represented by high grade silver purchases carrying a large excess in silica—a fair average treatment however for a 50% silicious ore, carrying some gold and not too high in silver, was about \$13 per ton.

Of silicious lead ores there were 151 tons sold, running from 5% to 15% lead, which brought from 25c. to 35c. per unit, and stood a treatment charge of from \$9 to \$15 per ton, the price being regulated in many cases by the excess of zinc.

Of heavy lead ores and concentrates, carrying from 25% up to 54%, there were sold 102 tons; the heavy lead sold at from 50c. to 53c. per unit with no treatment charge, and the medium percentages from 20% to 40% brought from 45c. to 50c. and stood a treatment charge of from \$5 to \$8 per ton.

Of copper ores and concentrates carrying from 3% to 5% there were sold 53 tons, which brought 80c. per unit for copper, and stood a treatment charge of from \$13 to \$15 per ton.

Of heavy iron ores and concentrates (sulphides) there was sold 53 tons, which stood a treatment charge of from \$3.50 to \$10 per ton, the treatment charge being governed by the excess of iron.

MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Aspen, Colo.; Baltimore, Pittsburg, Deadwood, S. Dak.; St. Louis, Helena, Mont.; London and Paris, see page 384.]

NEW YORK, Friday Evening, April 21.

The volume of business done during the past week in the mining stock market was very small, amounting to but 15,960 shares, of which 9,825 shares were of stocks which have never declared dividends.

The only feature of the week was the advance in the prices of some of the Comstocks. Ophir advanced from \$2.40 to \$2.80, with total sales of 450 shares. Consolidated California & Virginia was quiet, only 200 shares being sold at \$2.45 to \$2.50. Belcher shows sales of 400 at \$1.20 to \$1.30. There was a solitary sale of 100 shares of Crown Point at 95c. Of Gould & Curry, 300 shares were sold at 70 to 75c.

There was a single sale of 100 shares of Savage at 46c, and another of an equal number of shares of Yellow Jacket at \$1.05. Comstock Tunnel stock continued in fair demand; during the week 2,300 shares were sold at 9 to 10c. Other sales were as follows: 200 shares of Sierra Nevada at \$1.40 to \$1.50; 800 shares of Alta at 20 to 25c.; 500 shares of Best & Belcher at \$1.50 to \$1.75; 200 shares of Chollar at 75c.; 425 shares of Mexican at \$1.45 to 1.85, and 200 shares of Union Consolidated at \$1.15.

For the California stocks, Brunswick Consolidated was the only one dealt in during the week. Of this stock 300 shares were sold at 7c. The superintendent of the company writes as follows from Grass Valley, under date of the 12th inst.: Owing to the quantity of water in the mine, caused by the recent heavy rains, we have been unable to work full time in the bottom level, and only made 5 ft. in the 700 west drift. The raise in the 600 level is up 10 ft., with a ledge from 2 1/2 to 3 ft. thick, showing well in sulphurets and a little gold.

The Colorado stocks were in fair demand this week. Chrysolite was traded in to the extent of 1,200 shares at 22c. Leadville Consolidated was stationary at 17c., with total sales of 1,500 shares. Of Little Chief 1,000 shares were sold at 19c.

The only Black Hills stock dealt in during the week was Homestake, of which 425 shares were sold; the stock declined from \$14.75 to \$13.

Ontario continued in some demand. During the past week 150 shares were sold at \$17.50 to \$18. The quarterly financial statement of the Horn Silver Mining Company is published in our Mining News column. Attention is called to the excellent showing made by this company, which reports a balance cash on hand on March 31st of \$286,950.59. This is \$10,260 more than the balance as per last quarterly report.

Of El Cristo 600 shares were sold at 35 to 40c. and of Monte Cristo 1,100 shares at \$3.15.

Phoenix of Arizona was actively traded in at 12 to 18c. Total sales of the week amounted to 3,400 shares. The reorganization committee has issued the following: Stockholders who desire to obtain the benefit of the plan of reorganization must deposit the certificates for their stock duly indorsed, with the State Trust Company, 36 Wall street, New York City, on or before May 1, 1893, and pay an assessment of 20c. per share. They will receive from said trust company negotiable reorganization certificates of deposit. The holders of practically all the mortgage debt, judgments and claims against the company have become parties to the plan and holders of over 400,000 shares of stock have already approved thereof. The plan may be inspected at the office of the State Trust Company. The main features of the plan were published in the "Engineering and Mining Journal" of the 8th inst.

Boston.

April 20.

(From our Special Correspondent.)

There has been less activity in copper stocks the past week, and prices have been irregular with a general tendency toward a lower level. The rise in Boston & Montana noted at the close of last week was not sustained, the price receding again to \$24 1/4, with later recovery to \$25 1/4. There was less pressure to sell the stock, and its friends are confident that with an improved ingot copper market it will sell higher.

The dealings in Butte & Boston were very light, and the stock improved from \$9 to \$9 1/4, with latest sale at \$9 1/2.

Calumet & Hecla early in the week was firm at \$315. The announcement of a \$5 dividend, payable May 13th, seemed to have a bad effect, causing it to sell off to \$300 to-day, on an order of about 100 shares. The weakness of ingot copper is perhaps the real reason for the decline.

Osceola sold ex-dividend this week, and dropped from \$32 1/2 to \$31 1/4, with recovery to the former figures.

Tamaracks declined from \$160 to \$156 1/4, recovering to \$153. The decline was in sympathy with the rest of the market. Quincy sold in small lots at \$125 and \$123, closing at the latter figure.

There was some quiet buying of Centennial on favorable prospects, which caused the stock to advance from \$8 3/4 to \$9 1/4, the advance being well held.

On the other hand, Kearsarge was pressed for sale and declined from \$9 to \$7 1/4, recovering to \$8 1/4. Franklin holds fairly steady at \$12 1/2 to \$12 3/4, with but little doing in it. At the annual meeting this week the old board of officers were re-elected.

Tamarack, Jr., declined to \$19, with later sales at \$20. Wolverine sold at \$2 1/4, same as last week.

San Francisco.

April 14.

(From our Special Correspondent.)

The stock market has remained steady throughout the week. The amount of stock that has changed hands has not been sufficient to pay the brokers, but, notwithstanding, prices have been maintained, particularly at the same figures ruling a week ago. The North End Comstocks have been, if anything, a shade weaker, but the remainder of the list has shown no disposition to move.

The mining assessments falling delinquent this month, making a total of \$266,800, are for the most part being gathered in by Comstock companies, and consequently, with such heavy rates to collect, prices are not likely to boom. Further assessments, too, are in order, and it is not likely that there will be any substantial activity in the market during the next month.

Reports are current, however, of interesting work being done in the Mexican, where a small strike was made over a week ago, the drift afterward being closed, and which the superintendent forgot to make mention of in his weekly report. In Belcher, Kentuck and all Jacket mines, also, the prospects are good, but nothing has occurred to date to warrant investment in these shares.

The Consolidated California & Virginia stock sold a week ago for \$2.35, and has remained steady to date, when the same ruling rate prevailed. Mexican ruled at \$1.30; Ophir, at \$2.15; Sierra Nevada, at \$1.25, and Union Con., at 75 cents.

In the middle group of stocks Best & Belcher ruled to-day at \$1.40; Chollar at 60c.; Gould & Curry at 60c.; Hall & Norcross at 95c.; Potosi at \$1.55, and Savage at 55c. Sales have been light, interest being mainly centered at Potosi.

The Gold Hill and South End Comstocks sold more freely yesterday and to-day, one or two of the more prominent stocks showing a one point advance. Belchers old for \$1.10; Bullion for 30c.; Caledonia for 10c.; Confidence for \$1.10; Crown Point for 95c.; Justice for 15c.; Kentuck for 40c.; Occidental for 5c.; Overman for 30c., and Yellow Jacket for 95c.

Outside stocks have remained stagnant, only quotations having been obtained as follows: Bodie Consolidated, Bulwer Consolidated and Mono being held for 30c. Belle Isle, Commonwealth, Navajo, North Belle Isle and North Commonwealth were held for 10c.; and Grand Prize and Nevada were 5c. bid. Of the Quijotoas, Crocker and Peerless were held for 5c.; 20 c. bid for Peer, and Silver King held for 25 c.

This afternoon the volume of trade aggregated in cash only about \$1,700, from this showing the state of the market may be inferred.

SAN FRANCISCO, April 21st (By telegraph).—The opening quotations to-day are as follows: Best & Belcher, \$1.60; Bodie, 25c.; Belle Isle, 10c.; Bulwer, 25c.; Chollar, 75c.; Consolidated California & Virginia, \$2.55; Eureka Consolidated, \$1.50; Gould & Curry, 65c.; Hale & Norcross, \$1.05; Mexican, \$1.50; Mono, 25c.; North Belle Isle, 10c.; Navajo, 10c.; Ophir, \$2.60; Savage, \$1.20; Sierra Nevada, \$1.35; Union Consolidated, \$1.15; Yellow Jacket, 90c.

MEETINGS.

Church Gold Mining Company, at the office of the company, room 4, Nevada Block, No. 309 Montgomery street, San Francisco, Cal., May 1st, at 1 P. M.

Delaware & Hudson Canal Company, at the office of the company, No. 21 Cortlandt street, New York City, May 9th at 12 o'clock noon.

Justice Mining Company, at the office of the company, room 3, Nevada Block, No. 309 Montgomery street, San Francisco, Cal., May 1st, at 10 A. M.

Valenzuela Consolidated Mining Company, at the office of the company, room 40, Merchants' Exchange Building, San Francisco, Cal., April 25th, at 1 P. M.

DIVIDENDS.

Champion Mining Company paid dividend No. 30 of ten cents per share, 3,400, April 15th, at the office of the company, No. 320 Sansome street, San Francisco, Cal.

Colorado Fuel & Iron Company, dividend of one and one-quarter (1 1/4%) per cent. on the common stock payable May 15th, at the office of the company. Transfer books close April 24th and reopen May 16th.

Daly Mining Company, dividend No. 74, of 25 cents per share, \$37,500, payable April 29th at the office of Lounsbury & Co., Mills Building, No. 15 Broad street, New York City. Transfer books close April 25th and reopen May 2d.

Homestake Mining Company, dividend No. 177, of ten cents per share, \$12,500, payable April 25th, at the office of Messrs. Lounsbury & Co., Mills Building, No. 15 Broad street, New York City, or at the office of the company in San Francisco, Cal. Transfer books close April 20th.

METAL MARKET.

NEW YORK, Friday Evening, April 21, 1893.

Prices of Silver per Ounce Troy.

April.	St. Ex.	London Pence.	N. Y. Cts.	Value of sil. in \$1.	April.	St. Ex.	London Pence.	N. Y. Cts.	Value of sil. in \$1.
15	4'88 1/4	38	82 3/4	.629	19	4'88 3/4	38	82 3/4	.629
17	4'88 1/4	38	82 3/4	.629	20	4'89 1/4	37 1/2	82 3/4	.628
18	4'88 1/4	38	82 3/4	.629	21	4'89 1/4	37 1/2	82 3/4	.628

Government Silver Purchases.

The Government has purchased during the week the following quantities of fine silver at the accompanying prices per fine ounce:

April 17th, 500,000 oz., at 83'4c. to 83'5c.
April 19th, 425,000 oz., at 83'5c.

Gold and Silver Exports and Imports at New York Week Ending April 15th, 1893, and for Years from January 1st, 1893, 1892.

	Gold,		Silver,		Excess of Exports.
	Exports.	Imports.	Exports.	Imports.	
Week.....	\$1,880,209	\$91,085	\$127,560	\$19,215	\$5,197,467
1893.....	41,856,372	5,752,594	9,394,346	886,916	41,591,998
1892.....	13,072,109	5,811,131	7,149,887	421,980	14,251,056

Of the gold, \$4,750,000 went to Europe, principally to Austria. The silver went to London. The gold imported came from France and South America.

The exports and imports during the five days ending April 21st, so far as ascertained, have been as follows: Exports, gold, \$1,781,000; silver, \$298,800. Imports, gold, \$16,263; silver, \$11,819.

The gold demanded at the Treasury, but not yet exported, amounted to \$4,800,000, of which \$250,000 is going to Canada.

In payment for this gold, the amount of Treasury notes offered was unusually small, being about 25%, and, contrary to the usual custom of late, a large amount of gold certificates were paid in. In consequence of this, the reduction of gold in the Treasury will be proportionally less.

NOTES OF THE WEEK.

The past week has been replete with incidents and rumors of startling interest to the financial world. On Saturday last, late in the day, it was announced that Secretary Carlisle had decided to indefinitely postpone the further issuance of gold certificates against deposits of either gold coin or bullion. The reason, and at the same time the authority, given for this decision was given in Section 12, Act of July 12th, 1882: "The Secretary of the Treasury shall suspend the issue of gold certificates whenever the amount of gold coin and gold bullion in the Treasury reserved for the redemption of United States notes fall below \$100,000,000." At the time this decision was made public there was, so far as can be ascertained, about \$40,000 in free gold in the Treasury.

The effects of this decision are manifold. In the first place, gold cannot, as hitherto, be locked up in the Treasury by those anxious to hoard gold; as the law stands, gold can be demanded from the Treasury upon the presentation of legal tender notes and Treasury notes, and then returned to the Treasury and gold certificates obtained, all of which tended to embarrass the work of the Treasury Department. Again, it will cause a slight inflow of gold to the Treasury, as the gold bullion presented to the different assay offices will now be paid for either in gold coin or in legal tender notes. As it is not likely that gold coin will be taken to any great extent, the free gold in the Treasury will slightly increase, perhaps to the extent of \$1,500,000 monthly.

It is well to inquire here what useful purpose gold certificates have served. They have caused about \$110,000,000 in gold to be locked up in the Treasury, of which, under the existing statute, no use can be made; they have afforded speculators a chance to hoard gold without cost of storage, and without inconvenience, to themselves, and, it may be added, without benefit to the country at large. To be sure, the certificates have been used by National Banks as part of their lawful reserve, but there appears no special reason why the Government should afford free storage to National Banks. At present there is about \$210,000,000 in gold coin and bullion in the United States Treasury, and if it were not that \$110,000,000 of this must be considered as a special deposit, subject to call upon the presentation of gold certificates, the present financial difficulties of the Government would not exist.

Following this decision of the Treasury Department came further discussion of the possible issue of bonds, as to the power of the Secretary in the matter, as well as to the wisdom of doing it at the present time.

The various Acts bearing upon the subject are as follows:

The Act of January 14th, 1875, providing for the resumption of special payments empowered the Secretary of the Treasury to prepare and provide for the redemption . . . to issue, sell, and dispose of, at not less than par in coin, either of the description of bonds described in the Act of July 14th, 1870.

The Act of July 12th, 1882, empowered the Secretary to issue \$200,000,000 coupon bonds redeemable after 10 years, and bearing interest at 5%; \$300,000,000 payable after 15 years, bearing interest at the rate of 4½%, and a sum not greater than \$1,000,000,000, payable at the Treasury of the United States after 30 years, and bearing interest at the rate of 4½%.

Following the Act of 1875 came the Act of May 31st, 1878, which was initiated and passed in both houses of Congress by the inflationist element. This Act provided that "It shall not be lawful for the Secretary to cancel or retire any more of the United States tender notes. And when any of said notes may be redeemed or be received into the Treasury . . . they shall not be retired, cancelled or de-

stroyed, but they shall be reissued and kept in circulation."

The question here arises what is the intent of this law. Are the notes mentioned to be irredeemable or does the provision of the Act of 1875 continue in force? It has been the established policy of the Treasury Department to interpret the law of 1875 as being continuously in force, and each Secretary of the Treasury has continued to redeem the legal tenders in gold whenever presented.

The Act of July 12th, 1882, passed to enable banking associations to extend their corporate existence, provides in Section 12 that "The Secretary of the Treasury shall suspend . . . whenever the amount of gold coin and gold bullion reserved for the redemption of the United States note falls below \$100,000,000."

As our readers well know there are many arguments *pro* and *con* concerning the meaning of the word "reserved" in this clause. It seems probable that Secretary Carlisle has decided that he has no power under the Act of 1875 to issue bonds while the amount of gold, specifically reserved for the redemption of legal tenders according to the Act of 1882 remains intact. If this view be correct it is probable that as Mr. Carlisle has already declared that the Administration will do all in its power to maintain its obligations on a gold basis that bonds will be issued so soon as the existing gold in the Treasury is seriously threatened.

Early in the week dispatches from Washington were received, stating that the Secretary of the Treasury would refuse to redeem in gold coin the Treasury notes issued under the Act of July 14th, 1890, whenever the free gold in the Treasury is exhausted. This rumor naturally created considerable alarm, for it seemed to be tantamount to putting the gold and legal tenders at a premium. A statement made public by Secretary Carlisle, on the 18th, has hardly tended to reassure the public as to the policy of the Department. It says that: "In the exercise of the discretionary power conferred upon the Secretary of the Treasury under the Act of July 14th, 1890, he has been paying gold coin for the coin Treasury notes issued for the purchase of silver bullion, and he will continue to do so as long as he had gold lawfully available for that purpose." This would seem to indicate that Secretary Carlisle thinks that \$100,000,000 reserve was meant for the redemption of the old legal tenders alone, which is the same as saying that the Treasury notes issued in payment of silver bullion are not United States notes. Here again the question and future policy depends upon a definition. The Act of 1882 does not specifically mention legal tender notes. It says United States notes, and it seems to us the veriest quibble to adopt such a policy upon such a distinction. There is no doubt, however, of the power of the Secretary to redeem Treasury notes in silver; the Act of 1890 specifically providing, that the Secretary of the Treasury shall under such regulations as he may prescribe redeem such notes in gold or silver coin at his discretion. If this policy be adopted its results are not difficult to see. Gold and legal tenders will be at a premium as regards the silver notes. It will not mean, however, that the United States would be on a silver basis, for the notes mentioned are legal tenders for all amounts, are receivable by the Government for taxes, and by the Custom House in payment for duties. In other words, although not redeemable in gold coin they will have a gold quality and be on a parity with gold coin so far as the Government is concerned. It would, however, prevent the Government from receiving some gold through the Custom House as at present, for it is plain that these notes would be used exclusively in payment of duties and taxes.

The effect upon the stock market of the Secretary's decision in regard to gold certificates and the rumors current with regard to the payment of Treasury notes in silver has acted disastrously upon the general stock market. Prices have fallen quite generally, and gold has been exported in larger quantity than usual, owing to the general lack of confidence. The prevailing conditions are such that the public mind is easily disturbed, and it would seem probable that, unless some relief is soon afforded, a crisis may result.

LATEST, 5 P. M.—Notwithstanding the rumors current during the week to the effect that the Secretary of the Treasury would redeem Treasury notes only in silver after the exhaustion of the free gold, \$1,300,000 in gold were paid out for these notes to-day (Friday), part of the \$100,000,000 being used for this purpose, and according to information received from Washington, which has not, however, been officially confirmed, President Cleveland has ordered that all notes, whatsoever the kind, shall be redeemable in gold, while there is any left in the Treasury.

This news is important if true, but from various sources we learn that about \$6,000,000 in gold was offered to the Treasury to-day, and that the National banks have concluded to supply the Treasury with all gold it may need. If this be so the payment of the Treasury notes in gold is without significance. At the time of going to press the Cabinet is in session, and it is probable that this and the question of the issue of bonds will be definitely decided.

Copper.—The market is still on the decline and it is very difficult to make sales. A not inconsiderable amount of business was done at about 11½c., but this price has been cut although several of the larger

producers refuse to sell at it. To-day we have to quote, nominally, 11½@11¾c. Electrolytic copper has been selling at 10½@11c., according to brand and quantity, while casting copper has now to be quoted at 10½@11½, with Arizona pig copper still held comparatively high, viz., at 9½@10 by first hands, although some from second hands could be had below this. The consumptive demand for copper is quite good, but manufacturers are not in immediate need of supplies and therefore can wait in the hope of getting it still cheaper.

Large orders have recently been received for refined copper for export and the prices realized therefor are said to have been rather good.

In Europe, where the statistics have decreased 2,400 tons, the market has been rather steady for G. M. B's, for which the closing quotations are £44 15s. for spot, and £45 5s. for three months' prompt. Refined and manufactured we quote as follows: English Tough, £47 10s.@£47 15s.; Best Selected, £48 15s.@£49; Strong Sheets, £55 10s.@£56; India Sheets, £51 15s.@£52; Yellow Metal, 45½d.

A large business, both in electrolytic and lake copper, has been done at prices which have not been reported. There are also buyers of large quantities of furnace material, none of which is to be had here for export.

The following figures give the production, in tons of 2,240 lbs., of copper in the United States and also by the chief foreign mines, and the exports of fine copper from the United States for the month of March and for the three months since the beginning of the year.

	March, '93	Jan. 1, '93
Reporting mines in United States.....	9,965	26,165
Pyrites and outside sources, U. S.....	1,321	3,552
Reporting foreign mines.....	6,495	19,394
Total, long tons.....	17,782	49,211
Exports from U. S. (fine copper).....	2,331	7,320

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

To Liverpool—	Copper Matte.	Lbs.	\$28.00
S. S. Bovic.....	5,558 bags	618,578	17,000
S. S. Germanic.....	2,141 bags	242,293	6,000
S. S. Nasmyth.....	1,010 bags	131,132	6,000

Tin has been rather depressed and prices have given way somewhat. Now the supply is quite abundant, with large additional shipments en route; besides, the somewhat easier values in London have affected us, but at the time of writing the market is somewhat firmer at \$20.85 for April, \$20.90 for May, \$21 for June and \$21.15 for July. From the East we are informed that during the next few months shipments will probably be light, and this is borne out by the fact that during the first half of this month only about 700 tons left the Straits.

The London market has been dull, and a little lower. Spot metal is quoted, at the close, at £94 5s., with second half of June and July obtainable at £91 10s., and £89 respectively.

Lead.—The higher range of prices checked business and only sales of retail quantities have been made. The moment sellers came into the market the price quickly declined to 4½@16 and several lots were sold at even less. Nowhere are there any stocks worth mentioning and a larger demand cannot but create a firmer market again. The efforts made by some dealers to sell foreign lead for domestic consumption came to naught, because of the prices they had to ask being too high.

In Europe the market remains rather dull, prices being somewhat lower at £9 13s. 9d. for Spanish and £9 17s. 6d. for English brands.

Chicago Lead Market.—The Post, Boynton, Strong Company telegraph us as follows: The market has been quiet but very strong at 4c. asked and 3.95c. bid, with small sales only. Consumers are apathetic and only buy as their immediate wants require.

St. Louis Lead Market.—The John Wahl Commission Company telegraph us as follows: Unfavorable seaboard advices have demoralized the market here very perceptibly, and sales have been made as low as 3'87½. Market is very unsettled and nervous.

Spelter is considerably firmer, and now hardly any can be obtained for forward deliveries. All the smelters are holding back with sales, fearing that a strike in the mines of Lower Missouri and Kansas is now inevitable and that, naturally, they would in consequence have to close down for an indefinite period. The stocks of spelter on hand are insignificant, and as producers have some orders on their books they do not care to offer anything beyond what they have actually ready for shipment. Sales were made at 4'35@4'40, but to-day nothing is to be had below 4½. Prices for this metal have certainly, for a long time, been too low; in fact, so low that nearly all the smelters worked at a loss.

London is dull and ordinaries are quoted at £17 12s. 6d., and specials at £17 15s.

Antimony is lifeless, Cookson's at 10¾; L. X., at 10¾, and Hallett's 10@10¾.

Nickel is freely offered, foreign at 51@54c. and domestic at 44@46c.

Quicksilver.—There is nothing new to report of this market, which continues quiet. Quotations are as follows: New York, \$39.50; London, £6 15s.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 21, 1893.

Pig Iron Production.

Fuel used.	Week ending		From Jan., '92.	From Jan., '93.
	April 21, 1892.	April 21, 1893.		
Anthracite.	94 38,970	73 34,310	54,550	501,370
Coke.	164 138,990	146 134,595	2,034,850	1,994,365
Charcoal.	55 11,820	36 8,623	144,349	130,661
Totals.	313 189,780	255 177,528	2,813,749	2,626,996

Northern brands: No. 1, \$14.50@15.25; No. 2, \$13.75@14.50; Gray Forge, \$12.50@13.00. Southern: No. 1, \$14.25@14.50; No. 2 F, \$13@13.50; No. 1 soft F, \$13.25@14; Gray Forge, \$12@12.50. Tidewater, Scotch irons: Coltness, \$21.50@22; Edlinton, \$19.50@20.

It is said that No. 2 F, Southern iron has been offered direct to consumers f. o. b. Birmingham for \$9, and reports as to cutting of rates are again prevalent. To what extent this is being done it is impossible to say, but there is reason to believe that concessions, more or less liberal, according to circumstances, have been made. Some dealers are hopeful of better prices, others take things as they are and do the best they can, while others look for reductions at the hands of those who are obliged to sell. A few Northern furnaces are doing a fair business on standard brands and orders continue to come in, but for the most part orders are for car load lots only. There seems to be no good reason for anticipating a change in the market, up or down, for some time to come, and transactions will be confined, on the whole, to current demands.

Billets and Rods.—Steel billets, tidewater, \$25.25@25.50; foreign, \$20@20.50; wire rods, \$33.50@34; foreign, \$40@40.50; Swedish, \$52@53.

Manufactured Iron and Steel.—Angles, 1 1/2@2c.; axles, scrap, 1 1/2@2 1/2c.; delivered; steel, 1 1/2@2c.; bars, common, 1 1/2@1 1/2c.; refined, 1 1/2@1 1/2c. on dock; beams, up to 15 in., 2@2 1/2c.; 20 in., 2 1/2@2 1/2c.; car truck channels, 2@2 1/2c.; channels, 2 1/2@2 1/2c. on dock; hoops, steel, 1 1/2@1 1/2c.; delivered; links and pins, 1 1/2@2 1/2c.; plates, bridge, 2@2 1/2c.; fire-box, 2 1/2@2 1/2c.; flange, 2 1/2@2 1/2c.; marine, 2 1/2@2 1/2c.; sheared, 1 1/2@2 1/2c.; shell, 2 1/2@2 1/2c.; tank, 1 1/2@2c.; universal mill, 1 1/2@1 1/2c.; tees, 2 1/2@2 1/2c., all on dock.

Merchant Steel.—Quotations are: Tool steel, \$6.50@8.75 and upward; tire steel, \$2@2.10; toe calk, \$2.30@2.40; Bessemer machinery, \$2.10@2.20; Bessemer bars, \$1.70@1.75; open hearth machinery, \$2.30@2.40; open hearth carriage spring, \$2.10@2.20; crucible spring, \$3.75@4.

Old Material.—Rails, iron, \$16.50@17; steel, \$13@13.50; No. 1 scrap, \$15.75@16; car wheels \$12.50@13 f. o. b. Jersey City.

Rail Fastenings.—Fish and angle plates, 1 1/2@1 1/2c. at mill; spikes, 1 1/2@1 1/2c.; bolts and square nuts, 2 1/2@2 1/2c.; hexagonal nuts, 2 1/2@2 1/2c. delivered.

Spiegelisen and Ferromanganese.—10 to 12% Spiegel, \$22@22.50, 2 1/2% \$25@25.50. Ferro, 80% \$57@57.50.

The Cambria Iron Company, Johnstown, Pa., will begin the manufacture of ferromanganese from Canadian ore.

Steel Rails.—\$20 mill or tidewater. Girder rails, \$31@33. Steel rails fit to relay can be had for \$20.

Buffalo. April 20.

(Special Report from Rogers, Brown & Co.)

Special contracts of considerable size are pending, with a continuation of quite a run of small orders. Prices show no improvement. We quote for cash f. o. b. cars Buffalo: No. 1 X foundry strong coke iron, Lake Superior ore, \$14.50; No. 2 X foundry strong coke iron, Lake Superior ore, \$13.75; Ohio strong softener No. 1, \$11.50; No. 2, \$11; Jackson County Silvery No. 1, \$17@17.30; No. 2, \$16.30@16.80; Lake Superior charcoal, \$16.75; Tennessee charcoal, \$18; Southern soft No. 1, \$14; Alabama car wheel, \$19; Hanging Rock charcoal, \$20.50.

Chicago. April 20.

(From our Special Correspondent.)

As May-day draws near the disquiet among the labor element becomes more ominous. Of the skilled mechanics more closely allied to the iron and steel trade are the boiler-makers, the molders and the architectural and ornamental ironworkers. Many of the latter are still on strike, but there is every reason to believe that an early adjustment of their grievances will soon be reached. The boiler-makers want a shorter work day and the same rate of pay, and the molders will, the next week, present their demands to the foundrymen.

A large buyer of Southern iron in this market, doing a heavy business with railroads, is reported as being in the market for big block of iron, 11,000 tons. The feeling of confidence in the pig iron market is not quite so strong as regards Northern iron, but so far prices are unaffected. Finished iron and steel, while in fair demand in a general way, are in several branches neither strong nor active.

Pig Iron.—The volume of business the past week has been fair for local iron, with orders running largely to small quantities. A few good sized contracts were placed, but they were exceptional.

Foundries are running full, but there is a feeling of uncertainty in regard to the molders, which is having a bad effect on the market. Some inquiry is noted for Lake Superior charcoal iron but it is not urgent; actual demand is very quiet and except in rare instances and for small lots, carloads \$17 is an outside figure. Southern coke iron is slow, orders light and general demand quiet.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$16.50@16.75; Lake Superior coke, No. 1, \$13.75@14.00; No. 2, \$13.25@13.50; No. 3, \$12.75@13; Lake Superior Bessemer, \$14.75; Lake Superior Scotch, \$14.50@15; American Scotch, \$16.00@16.50; Southern coke, foundry, No. 1, \$14.25; No. 2, \$13.00; No. 3, \$12.50; Southern coke soft, No. 1, \$13.00; No. 2, \$12.75; Ohio silveries, No. 1, \$16.50; No. 2, \$16.00; Ohio strong softeners, No. 1, \$16.75; No. 2, \$16.25; Tennessee charcoal, No. 1, \$17; No. 2, \$16.50; Southern standard car wheel, \$19.50@20.

Steel Billets and Rods.—The local steel mills continue to sell steel billets from stock at \$25, but are not soliciting business. Rods are nominal at \$32.50.

Structural Iron and Steel.—A fair volume of inquiry is noted, and a number of orders covering a good tonnage was placed last week for architectural shapes as well as for bridge work. Quotations, car lots, f. o. b. Chicago, are as follows: Angles, \$1.85@1.90; tees, \$2.15@2.25; universal plates, \$1.90@1.95; sheared plates, \$1.90@1.95; beams and channels, \$1.95@2.25.

Plates.—Demand for mill quantities or from warehouse is equally light and prices are fully as weak as at any time this year. Steel sheets, 10 to 14, \$2.25@2.35; iron sheets, 10 to 14, \$2.20@2.30; tank steel, \$1.90@2; shell iron or steel, \$2.50@2.75; firebox steel, \$4.25@5.25; flange steel, \$2.75@3; boiler rivets, \$4@4.15; boiler tubes, all sizes, 60%.

Merchant Steel.—Miscellaneous consumers and dealers are buying more freely and some of the agricultural implement makers are figuring on the coming season's contracts. Tool steel is fairly active. Quotations are: Tool steel, \$6.50@8.75 and upward; tire steel, \$2@2.10; toe calk, \$2.30@2.40; Bessemer machinery, \$2.10@2.20; Bessemer bars, \$1.70@1.75; open hearth machinery, \$2.30@2.40; open hearth carriage spring, \$2.10@2.20; crucible spring, \$3.75@4.

Galvanized Sheet Iron.—Demand is quite good; mill deliveries have greatly improved and warehouse trade is well maintained. Discounts are very firm at 70 and 10% off on Juniata and 70 and 15% off on charcoal, and jobbing quantities at 70 and 5% off on the former and 70 and 10% off on the latter.

Black Sheet Iron.—Demand has eased up considerably; orders are irregular and prices from mill less strong at 28% for No. 27 Chicago delivery. Jobbing quotation is 3 1/2% for iron and 3 1/2@3 1/2% for steel of the same gauge.

Bar Iron.—Inquiry from the implement trade is better, but generally the demand is not so brisk as it has been, and prices are certainly less firm. Several jobbing orders were placed at less than 1 1/2%, but as they ordinarily carry good extras that is usually expected. Regular mill quotations are 1 1/2@1 1/2c. Chicago, with concessions according to specification. Jobbing price is 1 1/2@1 1/2c. for iron or steel bars.

Steel Rails.—There is the usual amount of small orders coming forward, but large contracts are apparently withheld for reasons best known to railroad managers. Prices unchanged at \$30@31.50. Quotations on iron and steel splice bars are 1 1/2@1 1/2c.; track bolts, square nuts, 2 1/2c.; hexagon, 2 1/2c.; spikes, 2 1/2@2 1/2c. according to style.

Nails.—Wire nails are in moderate demand from mill at \$1.07 Chicago and \$1.75 from stock in less than carloads. Steel cut are somewhat irregular in price from mill at \$1.30@1.35, and \$1.50 base from jobbers.

Scrap.—Demand has improved; sales are more frequent in small lots, but prices remain weak as ever: Railroad, \$15; No. 1 forge, \$14; No. 1 mill, \$9.50; fish plates, \$15.50; axles, \$19.50; horseshoes, \$15; pipes and flues, \$7; cast borings, \$5.50; wrought turnings, \$8; axle turnings, \$9.50; machinery castings, \$10; stove plates, \$6.50; mixed steel, \$10; coil steel, \$15; leaf steel, \$15.50; tires, \$14.50.

Old Material.—Offerings of iron rails are now freely made at \$18.25, but without takers. A lot of 500 tons was secured by a mill in this vicinity at equal to \$17.50 Chicago. Steel rails are dull at \$11@14. Car wheels are in better demand in small lots at \$14.50@14.75.

Louisville. April 17.

(Special Report by Hall, Bros. & Co.)

Outside of a few medium sized inquiries and orders the run of trade has been small. Mills complain of light business and the general jobbing trade is not very active. Prices remain nominally unchanged, though reduced prices have been accepted by some companies, which has a tendency to soften the market somewhat. Generally \$9@9.25 Birmingham basis is considered about the ruling figure for No. 2 foundry.

Hot Blast Foundry Irons.—Southern coke No. 1, \$13@13.25; Southern coke No. 2, \$12@12.25; Southern coke No. 3, \$11.25@11.50; Southern charcoal No. 1, \$15.50@16; Southern charcoal No. 2, \$15@15.50.

Forge Irons.—Neutral coke, \$10.75@11; mottled, \$10.50@10.75.

Car Wheel and Malleable Irons.—Southern (standard brands), \$17.50@18.50; Southern (other brands), \$16.50@17; Lake Superior, \$18@18.50.

Pittsburg. April 20.

(From our Special Correspondent.)

Raw Iron and Steel.—Trade during the week was not very active. Consumers seem to have a fair supply of the raw material on hand and are disposed to wait and take the chances of the market, but there are others who are not so well situated. The situation cannot become worse; a large volume of business is being done at such low prices that there is little or no margin of profit; any change, therefore, is expected to be in the direction of improvement.

As regards the pig iron department there are indications that the consumption has overtaken the production. Not only is there no pressure to sell, but there is decidedly less competition by Southern furnaces that have generally sold under the market. Information from the East reports the market for pig iron decidedly better as regards foundry and mill irons, but quite the reverse in Bessemer and in steel of all descriptions.

Steel monopolizes the active attention of the trade, and, in fact, comprises so large a proportion of the turn-over that weakness in that direction at once creates an impression that weakness is general throughout the entire market. This, however, is not always the case, and may, perhaps, be less so in the future; in any case the immediate movement is in the opposite direction.

Pig Iron.—The statistical position proves to be so favorable that holders feel very much encouraged. The increase in production since January 1st has been nearly 2,500 tons per week, while the decrease in stocks has been at the rate of 6,000 tons per week, showing an actual gain in consumption of over 8,500 tons per week.

Steel Rails.—This market is very quiet, with very little business being transacted. The usual quotations of \$29 for standard sections f. o. b. cars at mill continue. At the present prices for steel billets buyers refuse to close contracts.

Coke Smelted Lake and No. Tons. Cash.

Live Ore.	Tons.	Cash.
3,500 B., April, May...	13.85	
3,000 B., April, May...	15.91	
2,500 B., May, June...	13.70	
2,000 B., next 3 months	13.75	
2,000 B., May, June...	13.80	
1,500 G. F., May, June	12.25	
1,000 G. F., April, May	12.25	
1,000 G. F., April, May	12.25	
750 G. F., April, May	12.25	
500 B.	13.00	
500 B.	13.80	
500 G. F.	12.25	
500 No. 1 F.	14.00	
500 No. 2 F.	13.00	
250 M.	11.60	
200 B.	13.85	
150 No. 1 S.	16.00	
150 No. 2 S.	15.00	

Charcoal.	Tons.	Cash.
300 C. B.	28.00	
100 C. B., extra....	30.00	
50 C. B.	26.50	
50 W. B.	25.50	
50 No. 2 F.	18.80	

Blooms, Billets and Slabs.

3,000 B., May, June, at mill....	\$22.91
2,100 B. and S., May, June, at mill....	22.90
1,800 R. B., June, at mill....	22.85
1,200 B., April, May, June, at mill....	22.80
1,000 B., May, June, at mill....	22.75
500 S., April, May, at mill....	22.70

Philadelphia. April 20.

(From our Special Correspondent.)

Pig Iron.—Increased demand has hardened prices on the finer brands to the extent of 25c. per ton for early delivery. Even on poorer grades there is more firmness and considerable activity. Buyers now recognize the possibility of a general advance of 25c. in May, but makers and brokers may spoil any chance of a permanent improvement by crowding after business. No. 1 pig is \$15; \$15.25 for best. No. 2, \$14.50. Forge, \$13@13.25. The conservative view is that while prices will probably be firm from this out there will be no general advance beyond that now indicated.

Steel Billets.—Eastern, \$25; Western, \$24.50. Only small orders this week, but considerable inquiry, which points to large orders in May at a trifle below present quotations.

Muck Bars.—Selling price, \$22.50 mill.

Merchant Iron.—The temporary rush of orders has subsided without leaving the trade in any better condition. Large orders are in sight, and as low as \$1.50 it is said to-day is named at some country mills.

Nails.—The volume of business both at factory and store is large, but prices do not improve.

Skelp.—Mill owners think there is a large amount of business soon to be placed. Small orders are being placed at \$1.52 1/2@1.55.

Sheet Iron.—All the mills are will supplied with

business for iron and steel sheets. Cut prices do not respond to the improved demand.

Wrought Iron Pipe.—No improvement has resulted from the recent modification in the price list.

Plate and Tank.—Small orders are the rule and large orders the exception. The exception this week is the order for between 15,000 and 16,000 tons of plates, angles and general elevated road and bridge building material, for the new Harlem bridge and approaches of the New York Central road. J. A. Bailey & Co. have a portion of the specifications on hand.

Structural Material.—New business is coming in. The order above referred to will give some of the structurals mills considerable work. Universal plates and angles, 1"80; beams, tees and channels, 2c.

Steel Rails.—The activity in light rails for electric roads is about all that there is to speak of at present. This feature will become very interesting as there is a rage for electric roads.

Old Rails.—Dull at \$18 for iron and \$15 for steel.

Scrap.—Railroad in large lots, \$15.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 21.

Statement of shipments of anthracite coal (approximated) for week ending April 15th, 1893, compared with the corresponding period last year:

	April 15, 1893.	April 16, 1892.	Difference.
	Tons.	Tons.	
Wyoming region.....	404,953	378,850	Inc. 26,103
Lehigh region.....	149,639	102,080	Inc. 47,559
Schuylkill region.....	216,214	178,035	Inc. 38,179
Total.....	800,806	658,965	Inc. 141,841
Total for year to date, 11,614,906		10,585,838	Inc. 1,029,068

Statement of shipments of anthracite coal for month of March, 1893, compared with corresponding period last year, compiled from the returns furnished by the mine operators.

Regions.	March, 1893.	March, 1892.	Difference.
	Tons.	Tons.	
Wyoming region.....	2,080,069.03	1,620,615.11	Inc. 459,453.12
Lehigh region.....	592,017.94	433,016.05	Inc. 159,001.89
Schuylkill region.....	1,089,658.01	1,016,894.18	Inc. 72,763.83
Total.....	3,761,744.98	3,070,524.15	Inc. 691,217.13
Wyoming region.....	5,727,079.15	4,763,733.04	Inc. 963,346.11
Lehigh region.....	1,455,299.06	1,318,596.05	Inc. 136,703.01
Schuylkill region.....	2,733,101.05	3,011,765.17	Dec. 278,664.12
Total.....	9,915,480.06	9,094,035.06	Inc. 821,445.00

The stock of coal on hand at tidewater shipping points March 31st, 1893, was 781,187 tons; on February 28th, 1893, 601,854 tons; increase, 179,333 tons.

PRODUCTION OF BITUMINOUS COAL for week ending April 15th and year from January 1st:

Shipped East and North:	1893.		1892.
	Week.	Year.	Year.
Phila. & Erie R. R.....	456	36,594	27,170
Cumberland, Md.....	84,107	1,076,906	1,007,202
Barclay, Pa.....	1,016	21,112	59,396
Broad Top, Pa.....	10,712	255,847	175,558
Clearfield, Pa.....	94,392	1,230,912	1,076,731
Allegheny, Pa.....	39,354	381,657	339,022
Beach Creek, Pa.....	28,742	562,201	666,022
Peachontas Flat Top.....	66,619	808,194	720,757
Kanawha, W. Va.....	52,756	935,397	731,298
Total.....	369,154	5,288,850	4,803,176

Shipped West:	1893.		1892.
	Week.	Year.	Year.
Pittsburg, Pa.....	26,671	383,753	384,284
Westmoreland, Pa.....	36,043	619,743	538,693
Monongahela, Pa.....	7,725	200,506	140,488
Totals.....	70,439	1,214,302	1,053,465

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending April 15th, 1893, and year from January 1st. In tons of 2,000 lbs.: Week, 104,482 tons; year 1,659,521 tons; to corresponding date in 1892, 1,710,565 tons.

The approximate shipments for the week ending April 15th, compared with the corresponding period of last year, are as follows:

	April 15, 1893.	April 16, 1892.
Lehigh.....	149,639	102,080
Schuylkill.....	216,214	178,035
Wyoming.....	404,953	378,856
Total.....	800,806	658,965
Year, to date.....	11,614,906	10,585,838

The Wyoming region, representing the Delaware, Lackawanna & Western, the Jersey Central, the Delaware & Hudson, and in part the Pennsylvania, increased its output by 459,453 tons, while the Schuylkill, representing the Reading, has decreased its output since January by 1,278,604 tons. It may be found upon close examination that the Lackawanna has increased its shipments as compared with the corresponding period of last year by nearly 300,000 tons, the Delaware & Hudson by 100,000 tons, while the Reading is, perhaps, close on 170,000 tons behind its record for last year. The Reading will have to do better than this if it is to maintain its 40% share of the coal traffic.

Anthracite.

The market is quiet, in spite of the assertions that circular rates are being cut to the extent of 30 cents per ton. It may be that sales have been made at

this figure, but it is not believed that the transactions have been large or that this feature of the season is important.

Speculation as to the policy of the Reading under the presidency of Mr. Harris still continues, and, like most things based on a dearth of facts, grows ever more lively. It seems to us that what Mr. Harris will avoid because he must do so is the pursuit of the McLeod policy of attempting to force every other coal operator to fall into the Reading line. Doubtless the Reading will secure, because it must do so, its full share of the coal trade. It deserves its share and should have it.

This is not the reason for the severe criticism of Mr. McLeod that has been the principal feature in the market for the last several months. No reasonable man objects to the Reading having all the coal traffic it can get honestly and without bulldozing methods, but when it begins to say to this road or to that operator, "Do thus and so or it will be worse for you," the spirit of independence is aroused, and enemies spring up on every hand. It was the domineering, rule or ruin feature of the McLeod policy that finally brought it to grief, and which Mr. Harris will do well to avoid as he would the cholera. To persist in the furtherance of plans which have brought upon a great corporation the greatest misfortune in its history is to ignore the lessons of the past year and forget the injunctions of prudence.

The shipments during March from the several regions were as follows, the figures for March, 1892, being added for comparison:

	1893.	1892.
Lehigh.....	592,017	433,016
Schuylkill.....	1,089,658	1,016,891
Wyoming.....	2,089,069	1,620,615
Total.....	3,761,744	3,070,525

The increase for March, 1893, as compared with March, 1892, is 691,291 tons, of which the Lehigh contributes 150,001 tons, or 23%, the Schuylkill, 72,764 tons, or 10.5%, and the Wyoming, 459,454 tons, or 66.5%. The shipments for the first three months of 1893 and 1892 are as follows:

	1893.	1892.
Lehigh.....	1,455,299	1,318,596
Schuylkill.....	2,733,101	3,011,765
Wyoming.....	5,727,079	4,763,733
Total.....	9,915,479	9,094,034

The increase for 1893 is 821,445 tons, the Lehigh contributing 136,703 tons, or 16.7%, the Schuylkill losing 278,664 tons and the Wyoming gaining 963,346 tons.

The stock at tidewater March 31st was 781,187 tons, a gain of 179,333 tons over February stocks. Unless production is restricted the shipments for the year 1893 will exceed 46,000,000 tons, and in view of the increase during the first three months of this year of over 800,000 tons the question of maintaining prices is likely to be a very pressing one.

It cannot be doubted that an earnest effort will be made to retain the combine prices, and, if possible, to advance them. There is every probability that the first course will be adopted, but we do not look for higher prices than ruled last year.

Prices are as follows:

	Philadelphia.			
	Broken.	Egg.	Stove.	Chestnut.
Hard white ash.....	\$3.75	\$3.75	\$3.90	\$5.90
Free white ash.....	3.65	3.65	3.90	3.90
Shamokin.....	3.90	3.90	4.10	3.90
Schuylkill R. A.....	4.00	4.00	4.25	4.00
Lykens Valley.....	4.50	5.25	5.50	4.75

	New York.			
	Broken.	Egg.	Stove.	Chestnut.
Hard white ash.....	\$4.00	\$4.00	\$4.15	\$4.15
Free white ash.....	3.90	3.90	4.15	4.15
Shamokin.....	4.15	4.35	4.15	4.15
Schuylkill.....	4.25	4.50	4.30	4.30
Lykens Valley.....	4.75	5.50	5.75	5.00

Pea, \$2.75; No. 1 Buckwheat, \$2@ \$2.10; No. 2 Buckwheat, \$1.25@ \$1.50.

F. o. b. prices are quoted as under:

	Schuylkill.	Shamokin.	Red Ash.	Lykens Valley.
Lump and Steamboat.....	\$2.20	\$....	\$....	\$....
Broken.....	2.25	2.45	2.95	2.95
Egg.....	2.45	2.45	3.05	3.30
Stove.....	2.60	2.85	3.15	3.55
Chestnut.....	2.50	2.55	2.55	2.90
Pea.....	1.25	1.25	1.25	1.60
Buckwheat.....	0.75	0.75	0.75	1.30

Bituminous.

The car service is somewhat better than it was a month ago, but some of the larger companies are refusing to take contracts. Trouble is brewing in the Clearfield District over the question of freight rates, and it is reported that one of the companies will close down if a more satisfactory arrangement cannot be made. The open rate to Philadelphia is \$1.40, and to Perth Amboy or South Amboy \$2. Just what the rebates are is a variant of wide orbit, and "the most favored nation" clause is not operative over the entire field. It is rapidly coming to this, that quotations of freight rates are to be taken with many grains of allowance. There is an open rate which can be had on application and which is enforced against those who are not able to secure better terms. Then there is a private rate which also may be had on application if the proper person applies to the right man. It is practically a rate, although it masquerades as a rebate.

But a rebate is a powerful weapon in the hands of a railroad company. Taken in connection with a scarcity of cars, it can be used to bring the most

obdurate coal operator to sue for peace. It is to-day the most important means possessed by transportation companies for controlling the mining industry in their territories, and has been and is now used at their pleasure.

Steam coal is in good demand, and prices are satisfactory. There has been no change of importance since our last report, and we quote as follows:

Prices in New York Harbor are from \$3.10 to \$3.15, and at lower tidewater ports \$2.50 to \$2.60.

Charter rates are: New York to Rhode Island, 65 to 75 cents; to Boston, 75 to 90 cents. Philadelphia to Sound ports, \$1.10 to \$1.15; to Boston, \$1.15; to Portsmouth, \$1.25. Baltimore to Sound ports, \$1.10 to \$1.15; to Boston, \$1.20 to \$1.25.

Boston. April 21.

(From our Special Correspondent.)

The trade is still holding off, expecting to get coal at lower prices. Few of them have much stock on hand, and for this reason they will have to come into the market soon. The dealers say that the companies are now cutting prices, and ere long they will be reduced. Last year this policy was pursued, but unsuccessfully, and whether they are nearer right this year or not time will alone tell. The old list of circular prices are still quoted here.

There is not much doing in soft coal contracts. Agents strongly maintain their price at \$2.50, while some buyers refuse to accept this. The railroads are holding off, as they are being asked fully 25c. per ton more than last year. Spot coal is active and strong. George's Creek being worth from \$4.05@ \$4.10 on cars here, and Clearfield \$3.75.

Freight rates are very strong and fully as high as last reported. From New York, 70c.; from Philadelphia, \$1.20; from Baltimore, \$1.25; from Newport News and Norfolk, \$1.10. In a retail way trade is fair. Prices are unchanged. Quotations are: Stove, \$6.50; nut, \$6.50; egg, \$6.00; furnace, \$6.00; Franklin, \$7.75; Lehigh, \$6.50; Lehigh furnace, \$6.25; soft coal, \$4.25@ \$5.

The receipts of coal at the port of Boston for the week ending April 15, were 45,343 tons of anthracite and 32,015 tons of bituminous, against 63,561 tons of anthracite and 12,729 tons of bituminous for the corresponding week last year. Since January the receipts have been 407,754 tons of anthracite and 307,040 tons bituminous, against 513,721 tons anthracite, and 170,236 tons of bituminous for the corresponding time last year.

Buffalo. April 19.

(From our Special Correspondent.)

Anthracite coal is quiet and a change in the schedule of prices is expected May 1st.

Bituminous coal is active for propellers, tugs and manufacturers, but quotations are nominally unchanged. The supply is adequate for consumption requirements.

Navigation at this port has commenced; vessels have arrived and departed since Sunday last. The Straits of Mackinaw are open and the large Chicago fleet is on its way here. The ice in Lake Superior is still very firm, and arrivals at and departures from Duluth may be delayed several days yet. Navigation through Sault Ste. Marie cannot be effected for some time, the ice being still heavy.

For furnishing bituminous coal to the Hamburg Canal pumping station in this city, Mr. Chas. T. Hork was the only bidder, his prices varying from \$1.95 to \$2.40 per net ton and delivered, according to size and quality.

The General Electric Light and Gas Company of New York offers to supply our gas consumers at the rate of 80c. for illuminating gas per 1,000 cu. ft. and 30c. for fuel gas.

Some excitement exists in coal circles regarding the changes in the firm of Bell, Lewis & Yates, the latter party ceasing to be one of the firm.

The jurors on the Rochester Coal Exchange case could not agree on a verdict. It is reported that the Exchange will disband.

The shipments of coal from Buffalo thus far this season as reported at the Custom House foot up 32,450 net tons.

Great excitement here yesterday in consequence of Mayor Bishop suspending Mr. James Hanrahan, a member of the Board of Councilmen and president of the Common Council, for malfeasance in office. The complaint made by citizens is that Mr. Hanrahan has been supplying the Poor Department of the city with coal in violation of the charter which precludes any person holding a salaried office to sell any article to the city. The details are too voluminous for publication. The sale is admitted, but the contract is made out in the name of the son of the councilman, who turned it over to his father, and became a clerk in the Street Department of the Board of Public Works.

Chicago. April 20.

(From our Special Correspondent.)

The first fleet of the season started for the Straits of Mackinac, thence to Buffalo, Saturday, April 15th, all being steamers loaded with grain. Among them were a number of anthracite coal carrying vessels, which may be expected back before May 15th with full cargoes. The docks are well cleaned up and ready for a full supply of fuel of all kinds. Some of the shippers expect coal before end of week, as the sailings from Buffalo were just as prompt as from here, when the news that the Straits were open was telegraphed.

Trade, wholesale and retail, is seemingly at a standstill; sales are light, and will be until after

the opening prices are fixed. Some shippers think that the Western circular will open at \$5.50.

Bituminous coal continues in heavy supply, but the crowded condition of a week ago has eased up to a very great extent and there is less desire on the part of shippers to force their production on a flat market, especially with talk of strikes in Ohio, Indiana and Illinois. At Springfield the men have demanded an advance, and the operators of the central Illinois district and leading men of the union are endeavoring to come to some satisfactory conclusion. A majority of the operators and mine owners of the Indiana block coal field have organized and incorporated a company which will act as a sort of clearing-house. Each mining company will market and sell its own coal at a price to be fixed by the new incorporation, the record of sales to be subject to its inspection and supervision, which will insure uniformity of the circular price. The output which will be controlled by the new consolidation will be 1,000,000 tons a year.

Coke is quiet, as most of the foundries are well stocked for the present. There is a very full supply of coke of all kinds. Barring a strike in the molding trade, dealers look for increased demand by May 1st.

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

Circular prices are at the following rates: Lehigh lump, \$6.50; large egg, \$5.85; small egg, range and chestnut, \$6.10. Retail prices per ton are: Large egg, \$7.25; small egg, range and chestnut, \$7.25.

Prices of bituminous per ton of 2,000 lbs., f. o. b. Chicago, are: Pittsburg, \$3.35; Hocking Valley, \$2.90; Youghiogheny, \$3.25; Illinois block, \$2.50; Brazil block, \$2.50.

Pittsburg.

April 19.

Coal.—Up to the present time the miners are still at work along the Monongahela Valley. How long this will continue is another matter; many of them are dissatisfied with the situation. The coal mined amounts to about 500,000 bushels per week; as fast as loaded it is towed to this city and forwarded to the Western and Southern markets. The number of miners at work varies from 4,500 to 5,000 men. At the Columbus meeting the miners refused to accept the operators' proposition to make a scale of prices for the different districts, and are determined that the advance of 5 cents per ton must be granted, while the operators claim they cannot pay more than the scale paid last year. As there were no signs of an amicable settlement, the meeting adjourned.

Connellsville Coke.—Trade has been very uncertain. Just when it looks promising and shipments

in the increase, with good prospects of a continuance, the car supply drops away down and operators are compelled to stock coke that should be en route to the furnaces. The production of the region for the past week, notwithstanding the short car supply, was materially larger than the previous week. In the running order of the region, 33 plants, with 5,350 active ovens, ran 6 days; 38 plants, with 7,755 ovens, ran 5 days; and 2 plants, with 403 ovens, ran 4 days.

The March shipment shows the following: To Pittsburg and river tipples, 10,023 cars; to points west of Pittsburg, 16,193 cars; points east of Connellsville, 7,978 cars; total, 34,194. The shipments for the week aggregated 124,814 tons, a decrease of 11,761 tons; a decrease from the week previous distributed as follows: To Pittsburg, 1,690 cars; points west of Pittsburg, 3,341 cars; points east of Pittsburg, 1,538 cars; total, 6,569 cars. Western shipments decreased 254 cars; Pittsburg shipments decreased 94 cars, making a total decrease for the week of 603 cars. Prices f. o. b. at ovens per ton, \$1.70; foundry, \$2.30; crushed, \$2.60.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, April 21.

Heavy Chemicals.—A quiet week has passed in this market. Generally speaking, there has been no change in the position of any of the heavy chemicals since our last report. The demand for caustic soda continues rather small, and prices remain the same. Carbonated soda ash and alkali have been devoid of special features. Bleaching powder continues somewhat firm and in fair demand. Prices show no change and we quote this week: Caustic soda, 60%, 2.95@3.10c.; 70%, 2.70@2.80c.; 74%, 2.72½@2.82½c.; 76%, 2.80@2.90c. Carbonated soda ash, 48%, 1.40@1.60c.; 58%, 1.35@1.40c. Alkali, 48%, 1.35@1.40c.; 58%, 1.30@1.40c., according to package. Sal soda, English, on the spot, 1c.; American, 90@95c.; bleaching powder, 2.25@2.50c.

Acids.—Dealers report a good demand for the various acids, and a good business has been done during the past week. In some quarters stocks have been light. Sulphuric acid has been in good request and several contracts are reported. Our quotations are as follows: Acid, per 100 lbs. in New York and vicinity, in lots of 50 carboys or more: Acetic, \$1.87½@2, according to quality; muriatic, 18°, 90c.@\$1.10; 20°, \$1@1.25; 22°, \$1.25@1.50; nitric, 40°, \$1.42; 42°, \$4.50@4.75; sulphuric, 90c.@\$1.10; mixed acids, according to mixture, oxalic, \$6.30@6.50. Blue vitriol is quoted all the way from \$3.25 to \$3.75; glycerine for nitro-

glycerine, 11½@12½c., according to quality and quantity.

Brimstone.—There is nothing new to report of this market, which continues very quiet. There are no stocks on the spot. Quotations are as follows: Best unmixed seconds, to arrive, \$20; shipments, \$19.50. Thirds are 75c. less.

Fertilizing Chemicals.—The fertilizer market shows no change from last week, and the comments in our last report are as pertinent now as they were then. The demand has been light; buyers are still waiting for prices to decline further. During the past week there has been some inquiry for ammoniates from small consumers, but not a very great business was done. Our quotations this week are as follows: Dried blood, \$2.85@2.90 per unit for high grade, and \$2.80@2.85 for low grade; azotine, \$2.90; sulphate of ammonia, on the spot, \$3.20@3.22½ for gas liquor. No bone liquor is offering. Acidulated fish scrap, no stocks on hand; dried scrap is quoted at \$30 f. o. b. fish factory. Tankage, high grade, \$27@30; low grade, \$26@28. Bone tankage, \$24@25; bone meal, \$24@25.50.

The potash salts generally show no change. The price of double manure salts as fixed by the syndicate is as follows: New York and Boston, \$1.12; Philadelphia, \$1.14½; Charleston and Savannah, \$1.17 cwt., basis 48@50%, in 50 ton lots on foreign weights and analyses. Sulphate of potash, 90%-96%, basis, 90%; New York and Boston, \$2.07; Philadelphia, \$2.09½; Charleston and Savannah, \$2.127, sulphate of potash, 96-99%, basis 90%, is 4% higher.

Phosphates.—Quotations for high grade land rock, f. o. b. Charleston, are \$4.50@4.75. Freight is \$1.25. Shipments of crude and ground phosphate rock from Charleston, S. C., according to the well-known broker of that city, Mr. Paul C. Trenholm, for the month of March were as follows: 1891, 17,714 tons; 1892, 15,434 tons and 15,793 tons in 1893. The total shipments of fertilizers amounted to 79,014 tons in March, 1893, as against 53,745 tons in March, 1892.

Muriate of Potash.—The prices fixed by the syndicate for 1893 are as follows: New York or Boston, \$1.78; Philadelphia, \$1.80½; Southern ports, \$1.83.

Kainit.—Quotations for shipments previous to September are as follows: New York, Philadelphia and Boston, \$3.75 for foreign invoice weight and test, and \$9 for actual weight; Charleston, Savannah and Wilmington, \$9.50 for invoice weight and test, and \$9.75 for actual weight. Shipments after September 1st, 25c. higher.

Nitrate of Soda.—There is a fair demand for nitrate. The market continues strong and quotations show no decline. Goods on the spot are held at \$2.35. Shipments and arrivals are according to position.

CURRENT PRICES.

These quotations are for wholesale lots in New York unless otherwise specified. Acid—Acetic, chem. pure, 17c. 10 Commercial, in bbls. and cys., 01¼@.42 Carbonic, liquefied, 18c. 25 Chromic, chem. pure, 1.00 for batteries, 1.40 Hydrobromic, dilute, U. S. P., 2c. 30 Hydrocyanic, U. S. P., 4c. 50 Hydrofluoric, 2c. 30 Alcohol—95%, gal., \$2.30@2.40 Absolute, \$3.80 Ammoniated, \$2.80 Alum—Lump, ½ cwt., \$1.75@1.85 Ground, ½ cwt., \$1.85@1.90 Powdered, ½ lb., .04½@.05 Lump, ½ ton, Liverpool, \$1.25 Aluminum Chloride—Pure, 18c. 65 Amalgamating solution, ½ lb., \$1.90@2.50 Ammonia—Sal., in bbl. lots, .07½@.08 Carbonate, ½ lb., English and German, .07½@.08 Muriate, white, in bbls., 08¼ Aqua Ammonia—(in cys.) 18c. 03@.04 20°, 04@.05 26°, 04¼@.05 Antimony—Oxymur, ½ lb., .04@.06 Regulus, ½ lb., .10@.11 Argols—Red, powdered, ½ lb., .15 Arsenic—White, powdered, ½ lb., 03¼@.03½ Red, ½ lb., .065@.07 Yellow, ½ lb., .08@.09 White at Plymouth, ½ ton, \$12 26 Asbestos—Canadian, ½ ton, \$50@50.00 Italian, ½ ton, c. l. f. Liverpool, \$18@20.00 Ashes—Pot., 1st sorts, ½ lb., .475@.5 Pearl, 05¼@.06¼ Asphaltum—Prime Cuban, ½ lb., .04@.05 Hard Cuban, ½ ton, \$28.00@30.00 Trinidad, refined, ½ ton, \$30.00@35.00 Egyptian and Syrian, ½ lb., .05@.07½ Californian, at mine, ½ ton \$12.00@15.00 at San Francisco, ½ ton \$15.00@20.00 Barium—Carbonate, pure, ½ lb., .45 Carbonate, commercial, ½ lb., .05@.10 Chlorate, crystal, ½ lb., .75 Chloride, commercial, ½ lb., .05@.10 pure, ½ lb., .16 Iodide, ½ oz., .40 Nitrate, ½ lb., .06¼@.07 Sulph., Am. prime white, ½ ton \$17.50@19 Sulph., foreign, floated, ½ ton, \$21@22 Sulph., of color, ½ ton, \$11.50@11.80 Carb., lump, f. o. b. Liverpool, ½ ton, \$6 No. 1, Casks, Runcorn, " " \$4 10 No. 2, bags, Runcorn, " " \$3 15 Bauxite—½ ton, \$10.00 Bichromate of Potash—Scotch, ½ lb., .11@.12 American, ½ lb., .11@.12 Bichromate of Soda—½ lb., .09¼@.10 Borax—Refined, ½ lb., in car lots, 08@.09 San Francisco, .08@.08¼ Concentrated, in car lots, .07¼@.08 Refined, Liverpool ½ ton, \$2

Bromine—½ lb., .25@.35 Cadmium Nitrate—½ lb., \$2.00 Cadmium Iodide—½ lb., \$5.50 Chalk—½ ton, \$1.50@2.25 Precipitated, ½ lb., .04@.06 China Clay—English, ½ ton, \$13@18.00 Domestic, ½ ton, \$9@11 Chlorine Water—½ lb., .10 Chrome Yellow—½ lb., .10@.25 Chrome Iron Ore—½ ton, San Francisco, \$10.00 Commercial—Pure, ½ lb., .35@.40 Commercial, ½ lb., .02½ Cobalt—Oxide, ½ lb., \$1.60@1.70 Copper—Sulph. English Wks. ton \$20@22 Vitriol (blue), ordinary, ½ lb., 03¼@.03½ extra, .04½ Nitrate, ½ lb., .40 Copperas—Comm n, 100 lbs., .85@.95 Best, 100 lbs., \$1.35@1.50 Liverpool, ½ ton, in casks, \$2@2.10s. Corundum—Powdered, ½ lb., .04½@.09 Flour, ½ lb., .03 Cryolite—Pow., ½ lb., bbl. lots, .07@.08 Emery—Grain, ½ lb. (½ kg.), .04½@.05 Flour, ½ lb., .02½@.04 Epsom Salt—½ lb., .01@.01¼ Feldspar—Ground, ½ ton, \$6.00@10.00 Crude, \$2.00@3.00 Fluorspar—Powderd, No. 1, ½ ton, \$20@30 Lump, at mine, \$5@8 French Chalk—½ ton, \$16@20 Fuller's Earth—Lump, ½ ton, \$16@20 Glycerine—In bbls., ½ lb., .01@.01¼ Glass—Ground, ½ lb., .09@.10 Gold—Chloride, pure, crystals, ½ oz., \$12.00 pure, 15 gr., c. v., ½ doz., \$5.40 liquid, 15 gr., g. 40 a. v., ½ doz., \$5.50 Chloride and sodium, ½ oz., \$6.00 15 gr., c. v., ½ doz., \$2.75 Oxide, ½ oz., \$27.25 Gypsum—Calcined, ½ bbl., \$1.25@1.50 Land Plaster, ½ bbl., .30@.33 Iodine—Resublimed, ½ oz., .30@.33 Iridium—Oxide ½ lb., \$90 Iron—Nitrate, 40°, ½ lb., .01@.01¼ 47°, ½ lb., .02@.02¼ Kaolin—See China Clay. Kieserite—½ ton, \$9@10 Lead—Red, American, ½ lb., .06¼@.07½ White, American, in oil, ½ lb., .08¼@.07½ White, English, ½ lb., in oil, .08¼@.08½ Acetate, or sugar of, white, .06@.06¼ Granulated, .09@.12 Nitrate, .09@.12 Lime Acetate—Am. Brown, .90@.95 Gray, \$1.75@1.87½ Litharge—Powdered, ½ lb., .05¼@.07½ English flake, ½ lb., .06@.09¼ Magnesite—Crude, ½ ton of 1,015 lbs., \$14.75 Calcined, ½ ton of 2,240 lbs., \$22.00 Brick, ½ ton of 2,240 lbs., \$47.50 Manganese—Ore, per unit, .23@.28 Oxide, ground, ½ lb., .02¼@.06 Mercury Chloride—(Corrosive Sublimate) ½ lb., .63@.64 Powdered, ½ lb., .60

Metallic Dust—½ bbl., \$1.25@1.50 Metallic Paint—Brown ½ ton, \$20@22 Red, ½ ton, \$20@22 Mineral Wool—Ordinary slag, .01½ Ordinary rock, .02½ Ground, ½ ton, .02½ Mica—In sheets according to size. 1st quality, ½ lb., .25@.60 Naphtha—Black, \$10.00 Nitre Cake—½ ton, \$10.00 Ochre—Rochelle, ½ lb., .01¼@.01½ Washed Nat Oxid. Lump, ½ lb., .00¼@.00¾ Washed Nat Oxid. Powder, ½ lb., .07@.07½ Golden, ½ lb., .03@.05 Domestic, ½ lb., \$12@20 Oils, Mineral—Cylinder, light filtered, ½ gal., \$14@.16 Dark filtered, ½ gal., \$10@.13 Extra cold test, ½ gal., \$2@.24 Dark steam refined, ½ gal., .67½@.17 Phosphorus—½ lb., .5@.55 Precip., red, ½ lb., .80@.85 white, ½ lb., .85@.90 Platonic Chloride—Dry, ½ oz., \$7 Plumbago—Ceylon, ½ lb., .04@.05 American, ½ lb., .05@.07 Potassium—Cyanide, ½ lb., C. P., 7c 67%, ½ lb., .40 fused, .38@.42 Bromide, domestic, ½ lb., .28@.32 Chlorate, English, ½ lb., .18@.18¼ Chlorate, powdered, English, ½ lb., .18¼@.19 Carbonate, ½ lb., by casks, 82%, .04½@.05 Caustic, ½ lb., pure sicc., .05¼@.06 Iodide, ½ lb., \$2.58@2.80 Nitrate, refined, ½ lb., .06@.08 Bichromate, ½ lb., .10@.11½ Yellow Prussiate, ½ lb., .21¼@.22½ Red Prussiate, ½ lb., .9@.45 Pumice Stone—Select lumps, 103¼@.15 Original cks., ½ lb., .01¼@.02 Powdered, pure, ½ lb., .01¼@.01¾ Pyrites—Non-cupreous, p. units, \$12@.15 Quartz—Ground, ½ ton, \$6.00@10.00 Kotten Stone, Powdered, ½ lb., 03¼@.03½ Lump, ½ lb., .06@.07 Original cks., ½ lb., .04½@.05¼ Rubbing stone, ½ lb., .03¼@.04 Sal Ammoniac—lump, in bbls., ½ lb., \$0.90 Salt—Liverpool, ground, sack, .700 Domestic, fine, ½ ton, \$7@7.5 Common, fine, ½ ton, \$4.50@4.80 Turk's Island, ½ bush, .26@.28 Salt Cake—Crude, ½ ton, \$10.00@15.00 Salt Peter—Crude, ½ lb., .03¼@.04 Soapstone—Ground, ½ ton, \$8@8 Block and slab according to size. Sodium—Prussiate, ½ lb., .22@.24 Phosphate, ½ lb., .04@.05 Stanate, ½ lb., .06@.12 Tungstate, ½ lb., .30@.35 Hyposulphite, ½ cwt., in cask, \$1.70@1.80 Strontium—Nitrate, ½ lb., .18¼@.0.19 Sulphur—Roll, ½ lb., .61¼@.0.64 Flour, ½ lb., .01¼@.02 Sylvinit, 27@35%, S. O. P., per unit, 4.37@4

Talc—Ground French, ½ lb., .01¼@.01½ American No. 1, ½ lb., .01¼@.01½ American No. 2, ½ lb., .006 Terra Aiba—French, ½ lb., .65@.80 English, ½ lb., .6@.80 American, No. 1, ½ lb., .60@.80 American, No. 2, ½ lb., .40@.45 Tin—Crystals, in kegs or bbls., 14@.15 feathered or flossed, .2 Muriate, single, .07@.12 Double or strong, 54° B., .10@.15 Oxymur, or nitro, .19 Vermilion—Imp. English, ½ lb., .80 Am. quicksilver, bulk, .57 @.59 Am. quicksilver, bags, .35 @.40 Chinese, .90 @.96 Trieste, .90 @.96 American, .11¼@.12 Zinc White—Am. Dry, ½ lb., .04¼@.05 Antwerp, Red Seal, ½ lb., .06¼@.07 Paris, Red Seal, ½ lb., .07½@.08 Muriate solution, .06 Sulphate crystals, in bbls., ½ lb., 03¼@.03¾

THE RARER METALS.

Aluminum—½ lb., .80@.85 Arsenic—(Metallic), per lb., .40 Barium—(Metallic), per gram, \$1.00 Bismuth—(Metallic), per lb., \$2.00 Cadmium—(Metallic), per lb., \$1@1.5 Calcium—(Metallic), per gram, \$10.00 Cerium—(Metallic), per gram, \$7.50 Chromium—(Metallic), per lb., \$20.00 Cobalt—(Metallic), per gram, \$1.00 Didymium—(Metallic), per gram, \$9.00 Erbium—(Metallic), per gram, \$7.50 Gallium—(Metallic), per gram, \$140.00 Glucinum—(Metallic), per gram, \$12.00 Indium—(Metallic), per gram, \$9.00 Iridium—(Fused), per oz., \$12.00 Lanthanum—(Metallic), per gr., \$10.00 Lithium—(Metallic), per gram, \$10.00 Magnesium—(Powdered), per lb., \$4.00 Manganese—(Metallic), per lb., \$11.00 Chem. pure, per oz., \$10.10 Molybdenum—(Metallic), per gm, \$0 Niobium—(Metallic), per gram, \$5.00 Niobium—(Metallic), per oz., \$65.00 Palladium—(Metallic), per oz., \$20.00 Platinum—(Plate), per oz., \$37.5 Potassium—(Metallic), per lb., \$7.50 Rhodium—(Metallic), per gram, \$5.00 Ruthenium—(Metallic), per gm., \$5.50 Itubidium—(Metallic), per gram, \$2.0 Selenium—(Metallic), per oz., \$1.80 Sodium—(Metallic), per lb., \$5@7.5 Strontium—(Metallic), per gm., \$0 Tantalum—(Metallic), per gram, \$9.00 Tellurium—(Metallic), per lb., \$5.00 Thallium—(Metallic), per gram, \$2.00 Titanium—(Metallic), per gram, \$17.00 Thorium—(Metallic), per lb., \$0 Tungsten—(Metallic), per lb., \$0 Uranium—(Oxide), per lb., \$5.00 Metallic, per gm., \$2.0 Vanadium—(Metallic), per gm., \$22.0 Yttrium—(Metallic), per gram, \$9.0 Zirconium—(Metallic), per oz., \$65.

NEW YORK MINING STOCK QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns for Name and Location of Company, dates from April 15 to April 21, and Sales. It lists various mining companies and their stock prices.

Ex-dividend. *Dealt at 1/4 New York Stock Ex. †Unlisted securities. ‡Assessments paid. §Assessments unpaid. ¶Dividend shares sold, 6,135. Non-dividend shares sold, 9,825. Total shares sold, 15,960.

BOSTON MINING STOCK QUOTATIONS.

Table with columns for Name of Company, dates from April 11 to April 20, and Sales. It lists various mining companies and their stock prices.

Dividend shares sold, 10,534. Non-dividend shares sold, 1,807. Total shares sold, 12,341.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Large table with columns for Name and Location of Company, Capital Stock, Shares, Assessments, Dividends, and Date and amount of last. It provides detailed financial data for various mining companies.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns: Name and Location of Company, Capital Stock, Shares, Assessments, Dividends, Date and amount of last, Total paid, Date and amount of last, Name and Location of Company, Capital Stock, Shares, Assessments, Dividends, Date and amount of last, Total paid, Date and amount of last.

G., Gold. S., Silver. L., Lead. C., Copper. B., Borax. * Non-assessable. † This company, as 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 \$1,320,000 in dividends, and the Cons. Virginia \$42,390,000. ** 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 & Ely 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 assessment.

COAL AND COAL RAILROAD STOCKS.

Table with columns for stock names, dates (April 15-21), and sales. Includes entries like Am. Coal, Balt. & Ohio, Buff., R. P., etc.

Total shares sold, 24,795.

INDUSTRIAL AND TRUST STOCKS.

Table with columns for stock names, dates (April 15-21), and sales. Includes entries like Adams Express, Am. Cotton Oil, Am. Dist. Tel., etc.

Total sales, 523,558.

CALIFORNIA.

San Francisco.

Table of closing quotations for San Francisco stocks, including Alpha, Alta, Belcher, etc.

COLORADO.

Aspen.

Table of prices and sales for Aspen stocks, including Argentum Junata, Aspen Contact, etc.

Colorado Springs, April 15.

Table of prices and sales for Colorado Springs stocks, including Anaconda Gold, Calumet, etc.

Denver.

Table of prices and sales for Denver stocks, including Anaconda, Amity, Bangkok-Cora Belle, etc.

Rico.

Table of prices and sales for Rico stocks, including Atlantic Cable Cons. M. Co., etc.

MARYLAND.

Baltimore.

Table of Baltimore stocks, including Balt. & N.C., Corrad Hill, etc.

Duluth.

Table of Duluth stocks, including Biwabik M. Iron Co., Clark Iron Co., etc.

UNLISTED STOCKS.

Table of unlisted stocks, including Adams Iron Co., Allegheny Iron Co., etc.

MISSOURI.

St. Louis.

Table of St. Louis closing quotations, including Adams, American & Nettie, etc.

MONTANA.

Helena.

Table of Helena prices for the week ending March 25th, including Bald Butte, Benton Group, etc.

PENNSYLVANIA.

Pittsburg.

Table of Pittsburg stocks, including Bridgewater Gas Co., Chartiers Val. Gas, etc.

Table of stocks including Excelsior B. & S., Locust Mt. C. & I., Penn. Salt, etc.

SOUTH DAKOTA.

Deadwood.

Table of Deadwood stocks, including Deadwood Terra, Double Standard, etc.

Pipe Line Certificates.

Table of pipe line certificates, including Week Ending March 31, April 1, etc.

Total sales in barrels, 17,000.

FOREIGN QUOTATIONS.

London.

Table of London foreign quotations, including Alaska Treadwell, Amador, etc.

Paris.

Table of Paris foreign quotations, including Belmez, Spain, Golden River, etc.

ASSESSMENTS.

Table of assessments, including Baltimore, Belle Isle, Bullion, etc.