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THE economical treatment of the low-grade argentiferous sulphide ores, carrying a high percentage of zinc blende, has been for many years a most puzzling metallurgical question. It has become, of late years, a matter of greater and greater importance in Colorado and other western States, but particularly the former, where vast bodies of ore of this class have been opened. In Leadville, alone, the amount of this ore which has been exposed, is estimated at millions of tons. At last it seems that a step has been made in the solution of the problem. The American Zinc-lead Company last year commenced the erection of works at Cañon City, Colo., for the reduction of ore of this character by the process devised by Mr. F. L. BARTLETT, which was described in the ENGINEERING AND MINING JOURNAL, XLIX., p. 169. A section of these works has now been in operation about four months and we are informed that results have been better than was anticipated. About 100 tons of the low-grade zincky tailings from the dressing works at Leadville have been treated daily with an outcome of about eight tons of zinc-lead oxide. The latter product is shipped to Chicago and is said to be meeting with such favor that the company has more orders for it than it can fill. The capacity of the works at Cañon City is to be increased to 300 tons per day as soon as possible. An important feature in connection with the practical operation of the Bartlett process has been that the loss in silver is not so great as was anticipated. With ores assaying 10 oz. silver per ton, the loss has not exceeded 15 per cent. It is thought, consequently, that ores of higher grade in silver may be accepted for treatment than was originally intended.

THE lead-smelting industry in the West has been undergoing a noteworthy change during the past few years, due to the change in the character of the ores mined and sent for reduction. This has been mainly on account of the exhaustion of the rich lead-carbonate ore bodies of Leadville, which formed the basis for the establishment of the smelting industry, now expanded to such vast proportions. Up to three or four years ago the supply of lead-carbonate ore was ample and the smelters of Leadville, Denver, and Pueblo depended upon it for the necessary silver-gathering element in their furnaces. The number of roasting furnaces at Denver and Pueblo smelting works was small and there were fewer at Leadville. Since that time, however, the lead-carbonate ore reserves of Leadville and Monarch have been rapidly exhausted. The amount of lead-sulphide ore sent into the market has been constantly increasing, however, and it is now upon ore of this class that lead smelters depend almost entirely for the supply of lead for their furnace charges.

The increasing number of dressing works in operation at the mines of Colorado and adjacent States has also had considerable influence upon the lead-smelting industry. Many mines which formerly sent much silicious ore to the smelters are now working up their low-grade ore and shipping clean, non-silicious concentrates instead. That this change is having important results is evident from the reports which we occasionally hear of scarcity of silicious ores in the Denver and Pueblo markets. The pyritous concentrates are, moreover, furnishing more and more of the iron flux required, and the demand for the argentiferous oxidized iron ore of Leadville is steadily decreasing. The furnace work which is being done at the various smelting works of Colorado at the present time is extraordinary for its closeness. The low lead charges that are being run and the extraordinary clean slags withal would amaze the metallurgist of five years ago who had not kept up with the progress in the industry. The art of lead-smelting as performed in Colorado at the present time has attained a degree of perfection which has been reached nowhere else in the world.

RAILWAY ZONE SYSTEMS.

A subject of considerable discussion abroad among those interested in the economics of railway management is the zone system of railway tariffs, which was introduced originally in Hungary in 1889 by M. BAROSS, Hungarian Minister of Railways. At first it was applied to passenger traffic only, but its success in that department was so immediate and so great, that within a short time it was extended so as to include freight traffic also. The innovation was instituted upon the Hungarian State railways; the competition of these, however, compelled private lines to reduce their fares, so that now the system obtains practically throughout Hungary. In similar manner the Austrian lines which came into competition with those of Hungary were compelled to meet the new system of tariffs, the result being that it has been extended over all of the Austrian State lines so far as the passenger traffic is concerned. Austria Hungary is the only nation in which the system has been adopted up to the present time. It has excited considerable attention of late, however, in Russia and England, and there has been more or less talk in favor of its trial there; in fact, it has already been inaugurated upon a short line in Ireland.

The zone system consists in dividing railway region into zones of approximately equal distances within which a passenger goes to any part at a fixed price. It is, indeed, simply the method in general use in this country upon the horse, electric and cable tramway lines, and the elevated railways in New York, applied upon a larger scale. In Hungary, the territory, with Buda-Pesth as a center, is divided into 14 zones, most of which are about 10 miles broad. The first, twelfth and thirteenth, however, include an area about 15 miles wide, while the fourteenth comprises all the territory between 140 miles from the capital and 457 miles, the end of the railway system. The fare to any station in the first zone, by parliamentary or omnibus trains, corresponding to our local trains, is about 25 cents first class, 20 cents second class and 12½ cents third class. By quick or express trains the fares are: first class, 30 cents; second class, 25 cents; third class, 15 cents. Passengers traveling from one station to the next, or next but one, do not pay full rate for the zone. These fares rise up to the twelfth zone by proportionate amounts. In the thirteenth zone the fares (from Buda-Pesth) by the parliamentary trains are: First class, \$3.40; second class, \$2.55, third class, \$1.70; and by quick trains, \$4.10 first class, \$3.15 second class, and \$2.05 third class. The maximum fares for any journey above 140 miles are \$3.90 first class by slow trains and \$4.65 by quick trains. A passenger can thus journey from Buda-Pesth to the Roumanian frontier, a distance of 450 miles, for \$2.90 first class, or one-half that amount second class, which is probably the lowest railway rate in the world. It is calculated that the average reduction of fares under the zone system amounts to about 40 per cent. from the regular tariff formerly in use. Return and annual tickets and the like are, however, abolished under the new system.

The introduction of this system into Hungary was brought about by the inadequate patronage received by the State railways under the old

regime, there being a deficit of \$900,000, in round numbers, under fixed charges in the year preceding the adoption of the zone or regional tariffs. M. BAROSS, having carefully studied the matter arrived at the conclusion that the passenger traffic of the roads was not what it should be. As the country was comparatively sparsely settled and poor there was no other way to awaken and stimulate the desire for travel among its inhabitants than by cheapening the passenger fares. This was done, with the results to which we have already called attention.

The statistics of the Hungarian State railways for the years prior to and after the adoption of the zone system shows more clearly the degree of success which it attained. From August 2d, 1888, to July 31st, 1889, the total number of passengers carried was 5,186,227; from August 1st, 1889, to July 31st, 1890, 13,060,751, showing the enormous increase of 7,874,524. The number of pieces of baggage carried increased from 465,759 to 603,060. The receipts from passengers in the year 1888-89 amounted to \$4,265,704; in 1889-90, \$5,165,047, an increase of \$899,343. The total receipts from passengers and luggage in 1888-89, amounted to \$4,438,199; in 1889-90 to \$5,436,546, an increase of \$998,347.

The Austrian zone system is worked in somewhat different manner from the Hungarian, though based upon the same principles. The differences are unimportant, however, relating merely to the standard rate of fare and the size of the zones, which the Austrian Government found necessary to limit in extent and increase in number. With a few exceptions the zone tariff is applicable to all State and private lines worked by the Government. It is based on the face of one kreutzer (about $\frac{1}{2}$ cent) per kilometer, for third class passage; two kreutzers, second class; and three kreutzers third class. In the case of express trains these rates are increased 50 per cent. The number of zones into which the railway region is divided is 28. The first 50 kilometers is divided into five zones of 10 kilometers each; the next 30 kilometers is divided into two zones; while the eighth zone is 20 kilometers in extent. The distance from 100 to 200 kilometers is divided into four zones, after which the width of each zone is 50 kilometers so that the 28th zone is 950 to 1,000 kilometers from the central point. The system was inaugurated in Austria June 16th, 1890, and no figures of the results of its first year's operations are yet at hand. It was well received from the first and the number of passengers at once increased very perceptibly, even exceedingly so at times. In the month of August, 1890, six weeks after the introduction of the system the number of passengers carried was 1,700,605 greater than in the same month of the preceding year, the increase amounting to about 54 per cent. The adoption of this system in Austria implied a reduction of fares of 50 per cent., 33 per cent. and 36 per cent. for third, second, and first class fares, respectively, on ordinary trains, and 40 per cent., 35 per cent., and 20 per cent. on fast trains.

Conditions in this country, with its vast railway systems are, of course, enormously different from those prevailing in Austria and Hungary, yet the results obtained there are so important as to merit the attention of railway managers in the United States. It is by no means unlikely that a modification of the system might be adopted with equally successful results in various regions in the vicinity of each of our larger cities. Wherever the plan has been inaugurated upon urban and suburban tramways, with an accompanying reduction in fares, a large increase of traffic and in the earnings of the company has occurred.

COMMON SENSE IN FORESTRY.

We have had repeated occasion to recognize the happy combination of practical wisdom with scientific training, exhibited by MR. B. E. FERNOW, the head of the Forestry Division of the U. S. Department of Agriculture. It is evident enough from the publications of that Division, that Congress has granted to this important work very niggardly and inadequate appropriations, and we fancy that MR. FERNOW is to some extent hampered besides by the views and fancies of politicians. It is under such circumstances, however, that the man of tact, patience and skill exhibits these qualities by perceiving and achieving what is practicable. This characteristic may be observed in MR. FERNOW's course in two particulars especially. In the first place, though an educated European forester, he has never advocated the introduction in this country of a government system of forest administration, for which our people are not prepared. And, in the second place, when restricted or thwarted in plans for the wider usefulness of his bureau, he has quietly gone on, doing the best he could, and appealing to the people through a series of plain and suggestive publications which have done and will do more to reform popular ideas of forestry, and win popular support to a national forest policy, than any amount of crude legislation would do.

An excellent example is Bulletin No. 5 of the Forestry Division, entitled "What is Forestry?" This little pamphlet might serve as a textbook for the enlightenment of sentimental reformers. After a suitable introduction, emphasizing the significance of the forest to civilization, it treats the subject under two main heads, forest management or forestry in a wooded country, and forest planting or forestry in a treeless country.

Under the first head, the objects of management are declared to be: first, to make the forest yield a regularly recurring harvest of useful material; secondly, to maintain the favorable influences of the forest on climatic conditions, water distribution, etc. For the second purpose, any kind of forest would serve; and it is in this aspect that people generally look at the subject, who denounce the cutting-down of the timber, and fancy that good forestry consists in letting the woods alone. The notion that scientific forest management consists almost wholly in the skillful use of the axe, by which the forest is maintained, while the useful timber is harvested and its perpetual reproduction is assured, has yet to be generally recognized among us.

Nor is it good forest management to cut the trees of a certain size or degree of maturity, without regard to the conditions of reproduction and growth thereby affected, or in blind expectation that Nature will restore as much wood, of as good quality, as man has removed. In many cases (as, for instance, to adopt Mr. FERNOW's illustration, in the spruce forests of the Adirondacks, this wholesale removal of mature trees delivers the forest over to inferior species.

I cannot refrain from quoting in full the following admirable passage:

"Admirers of European forest management, as well as the know-nothings who consider it inapplicable to our conditions, very often confound the administrative features with the technical management. To cut a given equal amount of wood yearly, as is done more or less strictly in most European government forests, is a purely administrative measure, just as a mine owner may propose to take from his property annually an equal amount of coal. To cut over a certain area and take out a certain number of trees because it is a seed year, and we want to take advantage of it for reproduction, and, in order to secure that satisfactorily, remove a certain amount of the shade—that is a technical measure, just as the proper proportioning of coal and ore and flux to make iron. The administrative measures in vogue in European forest management we may, perhaps, not think desirable or suitable to our country and conditions; but the technical measures, as far as they are based upon natural laws and proved by experience proper for the object in view, will have to be adopted with the necessary modifications, if we wish to attain proper forest management.

Before, however, we may apply the finer methods of forestry management as practiced abroad, it will be well enough to begin with common sense management, which consists in avoiding unnecessary waste, in protecting against fire, in keeping out cattle where young growth is to be fostered, and in not preventing by malpractice the natural reforestation."

It is in this practical spirit that the whole of the little treatise is conceived. One is almost chagrined to perceive how useful its simple explanations are likely to be, for the fact argues a deplorable ignorance among our people. It is as if a primer in words of one syllable were found to fill a long felt national want! Yet that such rudimentary instruction is needed, who can deny? Take the simplest and most obvious of the elements of "common sense management," the protection of forests against fire: what has Congress ever done in the way of efficient legislation on that subject? A few timber-thieves are more or less earnestly prosecuted every year, and the great timber-devourer goes on unchecked.

This leads me to call attention to a paper by Mr. FERNOW on the Practicability of an American Forest Administration, read before the American Economic Association, and just published. It is, on the whole, chiefly an enumeration of the difficulties in the way of such a reform, among which are emphasized:

1. The lack (so long as virgin forests are still available) of sufficient pecuniary interest to secure private forest-management, though this might already be profitably introduced in certain localities.
2. The impracticability of forcing private owners to manage their forests in such a way as to secure the advantage of the community at less immediate profit to themselves.
3. The present "incongruous, shortsighted and unjust regulations" as to the timber-lands of the government, whereby depredations and fire are "especially invited, and the resident population is forced to resort to theft and fraud in order to supply their present wants, at the same time endangering their present needs and interests."

4. The opposition, honest and dishonest, aroused by any plan of remedy for this abuse.

Mr. FERNOW supports the principle of the bill introduced into the Fiftieth Congress, which provided for the temporary withdrawal from private entry of the public timber-lands, the reservation after examination of the areas which ought to be kept in forest, the issue of licenses under which supplies of wood may be obtained, according to the needs of the resident population, and the protection of the forests by a sufficient force of guards and rangers. After answering various objections to this principle, he practically confesses that he sees little prospect of its adoption in the face of "personal considerations and considerations of expediency, which cannot be discussed by the uninitiated." And he concludes as follows:

"It takes a giant, or rather two giants combined, strengthened by the courage of conviction that this is an urgent matter to be acted upon, to carry through the flood of legislative streams any measure involving radical changes in the existing land policy. It is the tremendous momentum of bad habits, unfair usage and personal politics that must be overcome, to make a rational forest policy possible."

This is sadly true; but Mr. FERNOW is wise in not abandoning on that account the quiet and effective agitation of the subject by which he has already effected more, perhaps, than he realizes. His work may have borne, as yet, little fruit in comparison with his desire. But it has been creditable to him and useful to the country; and I trust it will go on with increased range and power.

R. W. R.

BOOKS RECEIVED.

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

Die elektrische Kraftübertragung und ihre Anwendung in der Praxis. Von Eduard Japing, nach dem Tode des Verfassers neu bearbeitet von J. Zacharias. Illustrated, 232 pages. Third edition. Published by A. Hartleben, Wien, Pest and Leipzig, 1891. Price 3 marks.

Poor's Manual of Railroads. 1891. Illustrated, 1,439 pages. Published by H. V. & H. W. Poor, New York, 1891. Price \$6.

Preliminary Survey and Estimates: By Theodore Graham Gribble, Civil Engineer. Illustrated; 420 pages. Published by Longmans, Green & Co., London and New York, 1891. Price \$2.25.

NEW PUBLICATIONS.

STRENGTH AND PROPERTIES OF MATERIALS WITH DESCRIPTION OF THE SYSTEM OF TESTING. By Wm. G. Kirkaldy. 342 pages, with numerous illustrations, plates, tables, etc. Sampson, Low, Marston, Searle & Rivington, London, publishers.

The full title of this volume is "Illustrations of David Kirkaldy's System of Mechanical Testing, as originated and carried out by him during a quarter of a century, comprising a large selection of tabulated results, showing the strength and other properties of materials used in construction, with explanatory text and historical sketch."

David Kirkaldy's engineering career began at the engine works of Robert Napier, in Glasgow, in 1843. There he obtained his first experience in making researches and experiments on engines and on the performance of steamships. From 1858 to 1861 he carried on an extensive research for Messrs. Napier & Son on properties of wrought iron and steel, the results of which were published in book form in 1862, and gained him a gold medal from the Institution of Engineers in Scotland. At this time "homogeneous metal" and puddled steel were beginning to be substituted for iron in boilers, and as the qualities of these new metals were then almost unknown, the research was of great importance. This work led to Mr. Kirkaldy's entering into testing and experimenting as his life work. He designed a special testing machine of a million pounds capacity, and had it built at his own cost, although it took, as he says, his last shilling. He had it set up in London and put in operation in 1866, and for more than 25 years he has been using this machine, testing all kinds of materials of construction, and carrying on researches for the leading manufacturers of Europe. His testing and experimental works in Southwark, London, have long been famous to engineers the world over, and many an American engineer has made them a visit, invariably receiving the most hospitable treatment from the eminent proprietor.

One of the most remarkable features of the works is the museum of fractured specimens, many thousands in number, of all sizes, from the smallest test specimen up to a full-sized bridge member. The book, just published, contains illustrations of this museum, which occupies the two upper floors of the building, and a description and enumeration of its principal contents.

A view of the testing-room is shown, with the large machine, but the book contains no description of it, which is to be regretted. The machine is a horizontal one, with a hydraulic press at one end for exerting the power, and a combination of knife-edge levers at the other for weighing it.

The system of testing used by Kirkaldy is described in great detail. It does not differ much from that generally practiced in this country, but exceptional care seems to be taken in securing uniformity of shape and size of specimens, and in accurately finishing them, so that results of different tests may be properly compared with each other. One peculiarity of Kirkaldy's system is that he insists on his directions being followed by his clients as to the number of tests to be made of each kind of material, to enable him to make a report of the quality of a given lot, instead of testing whatever is sent, and reporting on the actual test only, as is usually the custom. The following extract shows his firmness in this matter. "With articles such as bricks, for instance, a certain minimum number has been decided upon, and such is exacted whenever tests are required; frequently a single picked brick, the best the brickmaker can select is sent for testing, but it will be readily understood that the experimenter is entitled, and it is his duty, to refuse to issue a report upon such. Very beneficial effects have resulted from firmness of this kind. . . . The extent to which some persons will go in the direction of getting off with as little testing as possible is well illustrated by a case with which the author had to do. One small article was sent with the view of obtaining a report to do duty for *forty thousand*; a distinct refusal to test it was made, as to have acquiesced would be to become a party to a sham. The refusal gave great offense. Before any one condemns such a refusal it is wise to consider whether a tester is worth anything who does not make a firm stand against humbug of whatever kind. Certainly it has been found here that to permit any laxity, or to neglect keeping a lookout upon the purposes for which reports are wanted, would soon lead to the experimenter being used as a tool to serve the ends of individuals. To sink to such a level would be to become guilty of breach of trust, and that of a very important and public nature."

A chapter on testing clauses and specifications follows, which is a very unsatisfactory one. It is full of complaints against the customary method of making rigid specifications and being lax in their enforcement, and condemns the practice of specifying both a minimum and maximum limit for tensile strength, but it does not give us any light on what specifications should be adopted for different materials. Kirkaldy apparently considers this matter of testing specifications as one of private ownership, for the use of which he should be compensated. He says "a great amount of time has been spent in collecting and condensing information for engineers to use when specifying, and surely it ought not to be too much to expect that the testing for such specifications should be carried out by Kirkaldy after his best attention has been given to them." He also speaks of having drawn up testing clauses for a specification *gratis* under a promise that the testing was to be carried out by him. This probably explains why he has omitted actual specifications from the book, but it reads strangely to American engi-

neers, who consider specifications as public property for discussion in the engineering societies and for printing in pamphlet form for sale at an insignificant price.

One of the sub-headings of this chapter is the word "Trickery," and under it Kirkaldy reveals what he stigmatizes as a "contemptible dodge," "downright fraud," "disgraceful case," and the like, in the practice of some contractors who play "dodges" on the inspectors or testing men in inducing them to pass material without proper tests. Many instances of trickery, he says, could be enumerated, as the contents of the museum afford lamentably numerous examples. We hesitate to believe that English manufacturers are such a set of tricksters as this would indicate. He objects also to professors of engineering taking up mechanical testing, and asks: "Can a professor be properly aware of the manifold tricks tried to escape testing or to annul the results, and if he be aware of such, can he keep a close watch upon everything that goes on in the laboratory, students being there to receive instruction?"

The greater portion of the work is devoted to tables giving results of tests made by Kirkaldy. He gives mean, lowest and highest results of many groups, the whole number of tests thus abstracted, as shown in a table of contents, amounting to 11,786. These tables contain much valuable information for engineers and students of the strength of materials, and are especially remarkable in showing the great variations in strength of metals and other materials usually supposed to be of uniform quality. It is a defect in the tables, as far as they are of value to a student, that they do not contain any chemical analyses of the materials by which their qualities may be compared, nor does Kirkaldy give any generalizations or conclusions which can lead the manufacturer to improve the quality of his material or the engineer to draw proper and reasonable specifications concerning it. Instead of generalizations from these tests, however, there are reprinted from Kirkaldy's book, published in 1862, his sixty-six conclusions concerning quality, tests, etc., of iron and steel, with the astonishing statement that not one of these conclusions requires to be retracted or modified. One of these conclusions is that steel is reduced in strength by being hardened in water. This certainly needs to be modified since one of the methods now in use for increasing the strength of steel axles is to partially harden them in water. A remarkable increase in strength is invariably produced in soft steel, containing 10% to 15% carbon, by heating it to a red heat and plunging it in water. We would advise Mr. Kirkaldy to try this experiment and then see if one of his sixty-six conclusions does not need to be modified. Several of his conclusions relate to his method of comparing the qualities of metals by the breaking strain per square inch of fractured area. Several years ago this method was in vogue, but it is now entirely abandoned by most experimenters in this country, at least, and it is not used in the specifications of Lloyds or the Board of Trade in England.

The tables are followed by numerous full-page lithographed strain diagrams, all made by plotting the figures of elongation observed in the tests and illustrations of fractures. An immense amount of labor must have been spent in plotting and drawing these diagrams, but their value is questionable. It is so difficult to draw comparisons from numerous isolated strain diagrams that probably few readers of the book will ever do more than casually glance at them.

An appendix of 40 pages is devoted to a historical sketch, and this is by far the most unfortunate and ill-judged part of the book. It is chiefly devoted to a reprint of articles written in the course of old controversies, in which Mr. Kirkaldy attacks his enemies, some of the most prominent English engineers, for their ill-treatment of him. One of these is a letter he published in *Engineering* in 1871, in which he says: "For more than four years I have been subjected to a great deal of annoyance, persecution and pecuniary loss from the ignoble and underhanded proceedings of the Steel Committee, *alias* a Committee of Civil Engineers, *alias* —," then giving their names. In 1880 he similarly attacked the Committee on Riveted Joints of the Institution of Civil Engineers, naming the individual members and charging them with willful injustice. In the preface to the book it is stated in justification of this appendix that the work was taken up, after long consideration, as one of *defense*. It is strange that Mr. Kirkaldy needs now to be defended against injustice done him as long ago as 1871 and 1880, especially as his defence was then made public in the English technical press. No doubt he was ill treated at that time, but the world-wide reputation he has made as an honest experimenter, and as the originator of the correct system of testing and experimenting on materials might have led him at this late date, if not entirely to condone the ill deeds of his enemies, to at least have treated their very human weaknesses in a little more charitable spirit.

The book as a whole is a very disappointing one. We expected a better book from Mr. Kirkaldy—one of higher professional merit—but it contains much information of value to the engineer, and is therefore well worth having.

Electric Transmission of Power at Oyonnax, France.—A large transmission of power plant has been in successful operation at Oyonnax in the east of France, since March, 1890, says the *Electrician*. Power is obtained from a 1,750 H. P. fall, five miles from the town, where two 105, kilowatt, 2,000-volt Thury machines are coupled direct to two horizontal turbines. The current is transmitted on the three-wire system to two 120-H. P., 1,800-volt motors, driving direct on to two 125-volt, 600-ampere dynamos, which supply current to the town on the three-wire system. The commercial efficiency of this arrangement is said to be 76.2%.

The Lartigue Single-rail Railway.—It is reported, says the *Engineering News*, that a single-rail railway, on the Lartigue system, is to be built from Feurs to Parrisieres, France. The line will be about 10½ miles long. This system consists of a series of A frames resting on the ground and carrying the rail upon the top, while guide rails along the sides serve to steady the train. The engine and cars straddle the track, the latter having longitudinal seats, the passengers sitting with their backs to the track. A railway on this system, 10 miles long, has been in operation for some time in Ireland. It is said that the French government has sent a commission to Ireland to inspect this line, with a view to adapting the system for lines in the French colonies, and that the engineer of a railway in India has also recently inspected it with a view to adopting the system for feeders to the railway.

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 Free Coinage Discussion.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mr. Carnegie's article on "The A B C of Money" you quote as an interesting and valuable article. It is valuable to show the false basis upon which the gold bug stands. The whole article is based upon the assumption that gold cannot change in value, yet he claims to know the A B C of money! It ought not to be necessary to call attention to the fact that wheat is usually taken as the standard by which to measure the fluctuation in the value of gold.

The value or purchasing power of the money metal depends upon its abundance or scarcity as compared with other kinds of property, and in estimating the amount of money to determine whether it is more or less abundant, you can only take into account that metal which is the standard, paper and token money must be excluded. You certainly cannot object to the logic of our position, which is that the value of silver and paper money depends upon their being exchangeable for gold—that is, the real money of the world, the thing that measures the value of all other property, is gold. A few years ago the value of property was measured by the amount of gold and silver because both were money metals. If to-day the value of all property is measured by the amount of gold alone, then gold must have become relatively more abundant or have increased in value.

The whole silver question amounts to this only. Is gold reasonably steady in value, and is there enough of it to do the business of the world? If you can say yes to these questions and prove that you tell the truth, you demonstrate that silver money is not needed. These are the questions that gold bugs will not discuss. Mr. Carnegie is wrong when he says that money plays no part in 92% of business transactions because checks are used. He knows perfectly well that a check is a fraud if the money is not in the bank to the full amount of the face of the check. Checks do not take the place of money, they merely remove the necessity of carrying the money about and the trouble of counting. The money is deposited in a central place. Not 8% of the money, but 100%. Mr. Carnegie's A B C are: A, that business is not done with money itself, but with checks; B, that gold is less liable to fluctuate than wheat, and C, that gold is the one steady unchangeable basis article. The population of the commercial world, the amount of money necessary per capita and the amount of gold in the world available for money are the A B C that have escaped his attention.

H. W. REED.

OURAY, Colo., August, 1891.

Meetings of Engineering Societies.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Since my last letter on this subject was published in the JOURNAL in which I commented on the small attendance at the Cleveland meeting of the American Institute of Mining Engineers, as contrasted with the Providence meeting of the American Society of Mechanical Engineers, the London *Engineering* of June 12th has come to hand, and in one of its editorials I find some words so pertinent to the question at issue, that I beg you will quote them.

The editorial says: "The effect of good management is most strikingly seen in the case of our own institution of civil engineers. By the exertions of the secretary, Mr. J. Forrest, the meetings of this body have become a pattern to be watched by all kindred societies. Whether a paper be of high merit or not, the discussion is almost always thorough and exhaustive. This end is attained by inviting every one who is known to be skilled in the subject under review to attend the reading of the papers, and by furnishing such persons with an abstract of the information that is to be laid before the meeting. With the prospect of adequate and authoritative criticism it is worth while to spend very considerable pains in compiling a paper, while those who come to speak have the opportunity of arming themselves with facts and arguments in support of the views they desire to put forward. Discussions often run over several evenings, and when they close, the best opinions of the engineering world have been heard, and the printed proceedings rendered worthy of being read in all the remote portions of the earth to which they penetrate. The secret of success lies in getting an audience worthy of the occasion, and in putting forward in advance a fairly comprehensive statement of the paper to be read."

I have myself received on this side of the Atlantic from Mr. Forrest an advance copy of a paper in which he supposed I would be interested, and which was at a later date to be read at a meeting of the institution, with a request that I would send by mail my views or criticisms upon it, to be read in the discussion at the meeting, and this, although I was not a member of the institution. I give this to show how Mr. Forrest "goes gunning" for discussions.

The editorial well says the meetings of the Institution of Civil Engineers have become a pattern to be watched by all kindred societies.

NEW YORK, August, 1891.

A MEMBER OF THE INSTITUTE.

[Our correspondent does well to call the attention of the officers of the American engineering societies to the causes of success in the great English institution, and we know that the Secretary of our American Institute of Mining Engineers has long and also successfully "gone gunning" for discussions in just the same manner as Mr. Forrest is doing. No doubt the practice of sending out papers, or abstracts of papers, to members interested in the subject previous to the meeting is the best way of securing a valuable discussion, and this is more important than haste in bringing out the paper. Our societies evidently recognize this fact, for their practice is conforming more and more to it.

Believing that the interests of all our societies are promoted by public discussions of suggestions for their improvement, our columns are always open for these, and we well know that the officers of our societies, all zealous for the promotion of the interests entrusted to them, are quick to profit by every good suggestion made. Such criticisms are not intended as reflections on any individual officer, but are simply suggestions of

members, made with the view of promoting the common good, and their publication draws out the views of others, while private communications would not.—Ed. E. & M. J.]

The Santa Fe Copper Company.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: We notice a semi-official statement in the Boston papers (by the by, no official reports on production and costs are ever published) to the effect that the new Luhrig concentrator at the Santa Fé mines, with a capacity of 10 tons, works like a charm, that it yields 18% concentrates out of 2% rock, and that arrangements will be made for a larger concentrator of 100 tons capacity.

Such a result could just as well be obtained by a concentrator built by Americans, and it is certainly not necessary to go to Europe for such work. The concentrating works of the Anaconda, the Parrot and of the Lake Superior works and many others were all planned and built here and work admirably.

The question which most interests the poor stockholders and the mortgageholders of the Santa Fé Copper Company, is, whether there is any money in concentrating and smelting 2% rock. It should not be overlooked that 2% rock on the Lake Superior contains the 2% in the form of native copper, while the 2% in the Santa Fé are in the form of copper-pyrites requiring further and more expensive treatment, the calcining, the smelting into a 60% matte and finally the refining into pure copper, after an expensive shipment of such matte to the Eastern refining works.

We give herewith a very low estimate of the cost of producing copper from the 2% rock made by experts familiar with the facts on the premises, assuming that the 100-ton concentrator to be built will really concentrate 100 tons in 24 hours:

100 tons 2% mined from White mine, \$2.....	\$200.00
Haulage and concentrating expenses, \$1.....	100.00
Yield, 10 tons of 18% concentr., allowing only 10% for losses.....	\$300.00
or \$30 per ton of 18% wet assay.	
Calcining 10 tons concentrates, \$3 per ton.....	30.00
Smelting 10 tons calcined ore, \$4.50 per ton.....	45.00
Freight to railroad station.....	9.62
" " New York, \$14.....	38.50
Refining, East, 1 1/2c. per lb.....	56.70
Total.....	\$479.82

Product, 3,600 pounds copper, less 10%, or 360 pounds, net 3,240 pounds of copper, in 2 1/2 tons of matte of 60%, or 14 1/2 cents per pound of copper.

This is a loss of almost 3 cents per pound at the present price of 12 cents for this quality of copper.

We have not calculated on loss of interest, or commission to the sales agents, on wear and tear of machinery and the usual stoppages, because some small amount of gold is contained in the matte. The costs of concentrating and smelting include also the costs for the secondary supply of water and the running of the machinery for the waterworks.

Should this 2% rock be taken from the old dumps, where the mining expenses have figured in former statements, our estimate of \$479.82 would be reduced by \$200 to \$279.82 and increased by the handling and extra hauling from the dumps to the bins and works, at 75 cents per ton, or \$75, to \$354.82. Cost of refined copper would be reduced to about 11 cents per lb., leaving but a slight profit at the present price—or none at all, if the wear and tear of the concentrator and other machinery and furnaces are considered.

My advice would be to let the treatment of 2% rock severely alone and to confine operations to the taking out of ore as it comes, which will certainly contain at least 5% copper, probably 6%, on the average and in this way the management may be able to make a profit with which to pay, first, the fixed annual charges for the mortgage bonds and taxes, about \$60,000, and, perhaps, later on, to reduce the floating debt, including two years' amortisation of bonds and unpaid interests, amounting now to about \$130,000.

X. Y. Z.

NEW YORK, August, 1891.

"A New Theory of the Disease Due to Compressed Air."

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mr. Saunders has been good enough, as he states at my request, to criticise my theory of the effects of compressed air (ENGINEERING AND MINING JOURNAL, August 1st), and I am only sorry that he has not quoted some theory of his own, whereby he could combat my suggestions. I have myself read Dr. Smith's book, from which he quotes so largely, which is a most able and useful work on the subject. After doing so, however, I was still bold enough to publish my theory, and am not yet convinced that it is mechanical and not chemical action that is at the bottom of caisson fever.

Though I have not suffered to the same extent, I am glad to say, as Mr. Saunders has, I have seen many cases both of the paralyzed form and of those with acute pain, at the Forth Bridge and at the Hudson Tunnel, and as stated in my article published in the ENGINEERING AND MINING JOURNAL July 18th, cannot reconcile my observations with the mechanical theory. The blood vessels may be likened to a system of soft rubber tubes filled with a fluid at a practically uniform pressure, leaving the height of the man out of account, the difference due to which the valves of the vessels probably take care of. Any external pressure, therefore, on this hydraulic system would increase that of the whole, if the air did not pass into the blood, and there would be no tendency in any case for it to flow from one part of the system to another.

Dr. Jaminet, Paul Bert, Professors Rameaux and Francois all agree that air finds its way into the blood vessels, and the explanation that "the bleeding of the nose is caused by the escaping air fracturing the blood vessels" goes to show that my critic is also of this opinion. If this is so, no air pressure in the body, or compressible parts of it, would force the blood from one part of the system to another, for the pressure is the same within and without the blood vessels. I have noticed in the case of the blood vessels on the backs of my own hands, while under air pressure, that they are just as full of blood as when in the atmosphere, and the slightest pressure from without will stop the flow as it would on the earth's surface.

The example cited of the winding of a string round the finger is a contradiction of the already acknowledged fact that the pressure is within

the blood system, and the pain produced by its removal comes on immediately, and not some time after, as in the case of the removal of the air pressure.

I am also of opinion that a finger so incased would suffer if the string remained upon it for a year, as the air has done upon our mules. If the blood is forced to the spinal column with an increase in the air pressure, how is it that the congestion does not take place while under the extra pressure, and not half, three-quarters, or even several hours after that pressure is relieved—when the congested parts, according to the argument, should be free to give up their blood to the relieved vessels of the body?

Paralysis, or caisson disease, has resulted from the too rapid ascent by aeronauts to high altitudes, and we must therefore conclude, following the quoted arguments, that the blood vessels of the interior of the body are carrying more than their share even now! If the blood vessels in any part of the body were not supplied with blood for any length of time, surely the tissues supplied by them could not remain healthy. I have experience, however, of mules having improved while under air pressure, for more than 12 months, without coming out, which are now in our stables fit for work.

How can pressure alone account for the fact that when we are short-handed, or making slow progress from any cause, and the locks are not making an interchange of air, there is more sickness? or that in the sinking of cylinders it is always when the bottom of the caisson is sealed with concrete that the greatest risk occurs, though the same men are employed all the time? Mr. J. Anderson told the writer of a case in his experience where eight men went into a caisson chamber after it had stood for a day with the bottom sealed; they were all right as long as inside,

PROMINENT MEN IN THE MINING INDUSTRY.

Ferdinand Suydam Van Zandt.

Mr. Ferdinand Suydam Van Zandt, president of the Bluebird Mining Company, Limited, of Butte, Mont., and one of the most prominent men in the silver-mining industry of the West, was born in New York in 1856, being descended from an old Knickerbocker family which came to this country from Holland in 1697. His boyhood days were passed in his native place, where he lived until he was twenty years old, when he removed to the West. At a very early age he had expressed a desire to enter the army, and it had been the intention of his parents to prepare him for West Point. When he was but eleven years old, however, his father died, and the family experiencing some serious financial reverses at the same time, it became necessary for Mr. Van Zandt to abandon his original purpose and seek active employment.

In 1878, when the Leadville excitement began to sweep over the country, Mr. Van Zandt's imagination was aroused by the wonderful stories coming from the Carbonate Camp, and like many other young men resolved to go thither to seek his fortune. Arriving at the scene of the new bonanzas, he at once became actively engaged in mining operations. Leadville was a rough place at that time, and many of those who had come from the cities of the East, finding that, notwithstanding the wealth which was being uncovered every day, fortunes were not, literally, to be picked up on the streets, returned discouraged to their homes. Mr. Van Zandt, however, although still a boy, stuck persistently to his new undertaking and there was no one in the new camp who worked with greater steadiness or industry. Things did not always come easily for him, and like others he experienced hard times



FERDINAND SUYDAM VAN ZANDT.

but on coming out seven died of caisson disease. They were all men who had been employed on the same work.

Does not all this point to the cause being blood poisoning, exaggerated in this case by the impurity of the air inside?

NEW YORK, Aug. 4, 1891.

ERNEST W. MOIR, Assoc. M. I. C. E.

Rhenish-Westphalian Coal Mines.—The output of the Rhenish-Westphalian collieries now averages from 102,000 to 104,000 tons a day, says Geo. G. André in the *Colliery Guardian*. The quantity would be considerably larger than this were the mines fully manned. But, as a consequence of the last strike, many of the hands were dismissed. These were the more restless and discontented, and they will not be re-engaged. Their places are being gradually filled with peat hands. The statistics of coal production in western Germany show an output of 66½ tons per quarter of a year per man, against 76·7 tons in 1889. As wages have increased considerably, and other expenses have been thrown upon the producers in the last two years, it will be seen that the cost of getting coal has largely increased. This is a sufficient answer to those who are asking why prices may not be expected to descend to the level of three years ago.

The Proposed Trans-Pacific Telegraph Cable.—Rear-Admiral Belknap's survey of parts of the Pacific, preparatory to the laying of the proposed trans-Pacific telegraph cable, indicates that extraordinary difficulties will be encountered. His soundings show the existence of a trough or basin of extraordinary depth and extent along the east coast of Japan and the Kurile Islands, and under the Kuro Siwo, or Japan or Black Stream. The basin exceeds any similar depression yet found in any other regions of the great oceans. In a run of 30 miles after leaving the coast of Japan the waters deepened more than 1,800 fathoms, and upon the next cast of the lead the wire broke after 4,643 fathoms had been run out without bottom having been reached. Thermometers specially constructed for deep-sea sounding were wrecked by the unprecedented pressures. The depth of the deepest cast—5½ miles, the deepest water yet found—is sufficient to hold two mountains as high as Japan's great Fusi-yama, one on top of the other, and then the summit of the highest would be nearly two-thirds of a mile under water.

but he gradually overcame his difficulties and made good progress in the race of life. Having filled various subordinate positions he finally became assistant manager of the Terrible Mining Company, operating the Adelaide mine, on the northwestern slope of Iron Hill, and subsequently was its manager. While occupying the latter position he contested in behalf of the company one of the most celebrated mining law suits ever fought in the courts of the United States. The issues involved in this suit which was brought by the Terrible against the Argentine Mining Company were large and important, and Mr. Van Zandt received high praise from the directors of his company for his conduct of the case.

Leaving Colorado in 1881, Mr. Van Zandt visited England upon mining business and upon returning to the United States directed his attention to prospecting in Arizona, New Mexico, Nevada, and other Western States, at times managing mining properties for Eastern and English companies. His own enterprises met with varying fortunes, but upon the whole were fairly successful. In 1884, Mr. Van Zandt went to Butte, Mont., and after familiarizing himself thoroughly with the conditions and occurrence of the ore deposits of that district, purchased the Bluebird mine, then a mere prospect. He at once commenced the development of this property, and it was in this work, particularly, that he displayed his great ability as a business man and miner. As the great vein was opened it was found to surpass the wildest expectations; but with his customary caution and conservatism, Mr. Van Zandt spent nearly two years in its exploration before erecting a mill for the reduction of the ore. In the meanwhile he had transferred the property to the Bluebird Mining Company, Limited, of London, a close corporation in which he retained a large interest. After a great amount of money had been spent in opening the property, the results being successful in every respect, it was determined to erect a 90-stamp dry-crushing silver mill. These works, which are among the largest and most complete in the West, were completed in the latter part of 1886, when the mine commenced to make the enormous output which it has since maintained with the exception of the period during the past year when operations were suspended on account of litigation.

Mr. Van Zandt is an enthusiastic miner, and is now engaged in mining operations upon a more extensive scale than ever. A number of men are constantly employed by him in examining mining properties in this

and foreign countries, and many undertakings owe their success in a great measure to his never-tiring enterprise. He has also embarked in many outside undertakings, such as cattle-raising, land, and smelting works; but, with all his many interests, he exercises a constant and close supervision over the affairs of the Bluebird company, and to him have been due many of the improvements which have made the process of silver-milling, practiced at its works, so successful. Mr. Van Zandt is now considered one of the wealthiest men in the West. His success has been the more wonderful from the fact that it was won while he was still so young a man. It is due, of course, in part to rare good luck, but more to the remarkable foresight and quickness of perception, which enabled him to grasp the opportunities when they offered.

ABRASIVE PROCESSES IN THE MECHANIC ARTS.—II.*

By John Richards San Francisco.

(Concluded from Page 96.)

THE POOLE SYSTEM OF GRINDING CALENDER ROLLS.

In the former section of this article I attempted to explain what the term "cutting" includes, as well as the nature of abrasive cutting so far as it is familiar or can be understood; I shall therefore in the present case not occupy any time in explanation of the general subject, but will proceed to describe, as well as possible, one of the strangest processes that can be referred to—one without precedent, so far as mechanical literature will show, and one that has for 20 years remained confined to one purpose. I allude to the invention of J. Morton Poole, of Wilmington, Del., for grinding calender rolls. A description of this process is by no means easy, but this I will now attempt.

In the first place, I will say, in respect to what are called calender rolls, that for certain purposes—papermaking for example—these rolls require an exactness scarcely attainable by the ordinary processes. They are sometimes seven or even eleven high, and are from 5 to 7 ft. long. Their accuracy in straightness and parallelism should be within one five-thousandth part of an inch in their length or diameter.

Tissue paper, a common article of manufacture, will pile 2,000 to 3,000 to an inch, and this must be uniformly gripped by the rolls as it passes through, and I am inclined to think that variations of one five-thousandth part of an inch would affect, if not destroy, the web, because its thickness is no measure of a roll's variation. The paper will "draw" if it is gripped loosely at any part of the width of the web, that is, one portion will "overrun" another portion, if the grip is not uniform across the web. Even common printing paper, Molesworth's pocketbook for example, has 500 leaves to an inch.

A line of light is observable to one five-thousandth part of an inch, some claim one ten-thousandth, and yet a pile of calender rolls 11 high can be so ground by the Poole process as not to show a line of light between them. You will wonder what becomes of flexure from gravity in such a case, but even that is provided for with the greatest exactness; but this I will not attempt to explain, as it involves apparatus whose description would extend the present paper beyond the limit intended.

DIAGRAMS.

Referring to Fig. 1, let *A* be the roll to be ground, *C* and *D* grinding wheels mounted on a carriage or platform *E*, which weighs a ton or more. *F* and *G* are angular ways, on which the carriage *E* moves parallel to the roll *A*, which is mounted on its own journals at each end in strong stationary bearings, combined with the ways *F* and *G*.

Next suppose *H* to be a second sliding carriage, moving on the ways *I* and *J*, and the lower carriage *E*, suspended to the top one by the rods *L L*; also suppose the standards *M* and *N* to be adjustable on the carriage *E* to and from the roll *A*, and you will be ready to consider the method of operating.

In the first operation we will consider the lower carriage *E*. The rolls being turned in what is called a "chill lathe," they are put into the grinding machine, and the wheels *C* and *D* are advanced to touch on each side and traversed from end to end of the roll. These wheels are driven at a high velocity and are flooded with soda-water. The roll *A* is also revolved at a slower speed, perhaps 100 revolutions per minute.

The wheels *C* and *D*, being fixed in respect to the platform *E*, become in effect a caliper apparatus, producing precise parallelism in the roll *A* as the carriage *E* is traversed along on the ways *F* and *G*. It is like passing the roll through a hole. There is no opportunity whatever for irregularity in its diameter, but it will be seen that its straightness will depend on the alignment of the grinding ways *F* and *G*.

Now, it may be thought that this is complete, and that carefully planed ways will produce true alignment; but this is not so. The work produced by a good planing machine is true enough for most purposes, but falls far short of the requirements here. If an absolutely true straight-edge is placed on the ways *F* and *G* there would not only be a line of light, but deviations through which one could pass not only one but several thicknesses of tissue paper. This process does not produce truth of alignment, and we now come to that. The roll *A* being ground to exact diameter from end to end, the main carriage *E* is lifted from its ways and is suspended by the rods or links *L* to the carriage *H*. These links are on knife edges of hardened steel; and so nicely poised is the great mass of the carriage *E* that the slightest pressure will swing it. The adjustment of the wheels *C* and *D* is now made with little mallets of pine wood not weighing more than an ounce, poised on spring handles; so the adjusting screws are struck slight blows, the same as a hammer acts on a pianoforte wire. This is necessary, because to touch the screws by hand would disturb the carriage *E*.

Now imagine the carriage *E* suspended as described and traversing along on the ways *I* and *J* at the top, the roll *A* revolving at 100 revolutions per minute, and the problem of the Poole system is before you.

What will occur? is the question. The slightest amount of crookedness of the roll *A* would swing the carriage *E* from right to left at each revolution of the roll, but this is impossible because the mass, weighing a ton or more, cannot be moved 100 times a minute from right to left; at the same time its method of suspension is such that a breath almost will move

it if "time" is allowed. The truth of the ways *I* and *J* now becomes a matter of indifference, because movement to the right or left of the carriage *E* to compensate for truth in these ways calls for a force so minute as to be undiscernible.

The result is that the traverse alignment of the carriage is controlled by what may be called the axis of rotation in the roll itself—a kind of theoretical line, so perfect that the result is absolute straightness within a ten-thousandth part of an inch in 6 ft., or even a less limit if there were means to prove it. It is a curious problem that has to work itself out in one's conception, and I imagine involves in some way the elements of what we call gyroscopic action, which I need not say has no explanation open to average conception.

As the mechanical engineers will no doubt wonder how motion can be imparted to the grinding wheels *C* and *D* without disturbing the carriage *E* when it is swinging free, I have prepared a second diagram, Fig. 2, which explains Mr. Poole's method for this.

The grinding wheels are driven by a true endless band *O*, passing continuously around the pulleys of both grinding wheels, as shown. *O* is the main driving pulley and *P* an idle one, made of such diameters that all four strands of the band are vertical. This exerts no disturbing force on the carriage so long as the band runs true.

This principle or mode of operating has not, so far as known, ever been applied before Mr. Poole's invention, and it seems to have no function beyond the present process. So intricate is it that Mr. Morton Poole, the inventor, when he presented his drawings and description in Europe, was at first laughed at and called a "crank." He, however, as he used to say, got it hammered into a Scotchman's head at Leith, near Edinburgh, where a great many rolls have since been made by this process. On the continent he met with better understanding of his mysterious process—in Germany at least, where there is a large establishment employing such machines.

MR. J. MORTON POOLE.

I had the honor to know J. Morton Poole intimately, and, from my knowledge of the man and his habits of thought, have not the least doubt of his inventing this process by inductive and deductive reasoning. He was a type of a class of constructing engineers, very few in number, invested, as I have sometimes thought, with a strange power of discerning the mysteries of forces and the means of their direction by a kind of intuition. I am the more impressed with this idea from the fact that when he was 70 years old he enabled my son and myself to overcome what seemed insuperable impediments in the manufacture of standard gauging implements. In 10 minutes' time he taught us more than a year of expensive experiment had brought to light.

When the present method of grinding straight and parallel occurred to him he went to various papermakers and proposed that, if they would furnish him in advance with the capital he required to construct his plant of machinery, he would grind and prepare their calender rolls for a term of years at a given price, much less than was then paid, and would also agree to tests which others, grinding by the "lap" process, would not dare to undertake. His proposal was acceded to, and he proceeded to carry out the scheme by which he not only ground the rolls with greater truth than had hitherto been attained, but at a cost to him which I imagine was less than one-half of what it had been by the "lap" method. He died about six years ago, after adding much to what may be called the science of manipulation process.

ROLLING ABRASION.

I now come to what is the most novel and least known among abrasive processes—that of "rolling abrasion"; that is, the disintegration of hard material by means of globular particles rolling under pressure.

This is a new process, in so far as entering into industrial use, and was the discovery of Messrs. B. C. and R. A. Tilghman, of Philadelphia, the inventors of the sand blast, which will be explained in a future place in this paper. The sand-blast experiments, after they had progressed some years, led to what may be called general experiments in cutting and abrading obdurate material, such as hard steel, glass, granite, and so on.

The Tilghman brothers had at Philadelphia an extensive laboratory, equipped with all kinds of apparatus for physical experiments, and in some attempts at cutting or abrading hard materials it was soon discovered that the ordinary agents, such as sand, corundum, glass, and so on, had but little effect on tempered steel, glass, granite, flint, and the like. They also discovered that while the scratching or cutting of such material was slow and expensive it could be easily pulverized by means of pressure applied on a small point such as a sphere presents when in contact with a plane.

It will be a little difficult to conceive of a process for abrasion that is analogous to, or is indeed a counterpart of, what are called ball bearings, that run almost without friction, consequently without abrasion, but there is a degree of pressure that must be exceeded before abrasion begins, and ball bearings will operate up to that limit. Beyond that they constitute the most effective means known of abrading the surfaces on which the balls roll, especially if the latter are hard and inelastic. But this matter aside, the discovery of the principle, to so call it, of rolling abrasion, left the Tilghman Brothers very near where they started, because there were no means of making or procuring hard globular particles for abrasive cutting. They next set about the problem of producing a suitable substance, selecting cast iron, which when chilled is as hard or harder than tempered steel. It was found that when cast iron in a melted state was divided fine enough to form a sand, or even in the form of what we call "shot," it burnt up instantly if exposed to the oxygen of the air; so the first experiments were made in a sealed room from which oxygen was excluded. This was a very difficult and expensive matter, because the room had to contain apparatus which was wholly inaccessible when in operation.

After years of expensive experiment, the Tilghman Brothers succeeded in producing the chilled cast-iron globules, or shot, at a price which enabled the use of the material in sawing stone, grinding plate glass and analogous operations.

With this material, brownstone, marble or any of the softer kinds of stone, using the same machinery, will saw four times as fast as with sand by the common process. Granite, which, previous to this invention, could scarcely be sawed at all at a cost commercially practicable, is now sawn by the aid of the globules ten times as fast as with sand. Not only

* Extract from a paper read before the Technical Society of the Pacific Coast, February 6th, 1891.

this, the wear of saw blades is only one-fifth as much. More than 250 firms are now using this material for sawing stone, and it has stood the test of nine years in practical use.

The stains due to corrosion, which at first seemed an impediment to the process for sawing white stone, are easily avoided by the use of lime in the water.

I am not privileged to describe the processes of manufacturing the iron sand or globules, further than to say that the metal is disintegrated or torn to pieces by the action of high pressure steam. The fineness of this chilled iron sand or shot is designated by the same numbers as emery. After the very long and expensive experiments, the Tilghman Brothers succeeded in reducing the cost of the shot to a commercial point where it could enter profitably into industrial processes, and now has reached a surprising cheapness. The price of No. 30 to No. 40, delivered free, in 100-lb. bags, to railway or steamer, is 4c. per lb.; No. 40 to 60 is 3½c. per lb. The coarser grades, which are more difficult to produce, are sold at 5½c. per lb., and it is safe to suppose the manufacture is not likely to be introduced on this coast for a long time to come at least. There is but little wear in use. The consumption per month is only about 40 lbs. to each saw. The shot is washed out of the sludge and is used over and over again.

The fine particles, which, for the smallest numbers look like dust, are, nevertheless, well-shaped globules, the same as in the coarser sizes. This may be seen when they are magnified. Their efficiency depends on their rolling, consequently on how nearly spherical they are, and this shows the clear line that may be set up between abrasion by crystalline or irregularly formed particles, like sand or emery, and the spherical or rolling particles. The two are quite distinct in nature, and require very different methods. Any silicious substance would be at once crushed by

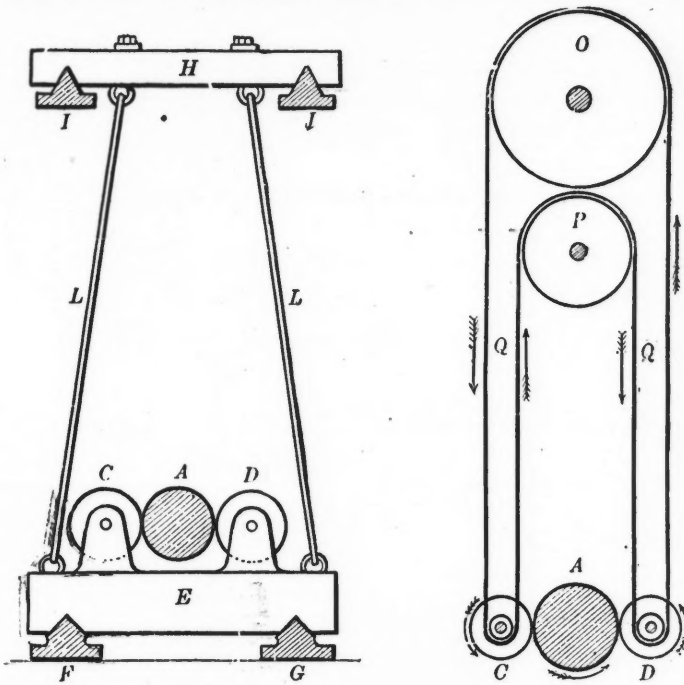


FIG. 1.

FIG. 2.

the circumstances under which these globules are used, for example, under the edges of thin loaded saws in sawing granite.

As before mentioned, until the discovery of this means for cutting granite, that material could only be sawn for special purposes, and sawing may be said to have been impracticable for any commercial purpose. The effect on various other industries has also been very marked, plate glass manufacture for one.

Resuming the subject of the iron sand or shot, if one of these spheres, large or small, is rolled under pressure on a surface of glass or any other hard, friable material, it will leave a line of abrasion behind. On glass it will produce a white streak similar to, but not so deep as, a common score made by a diamond. The hardness of the material compared to other substances I am not able to state in definite terms, but, as a practical illustration, these spheres can be imbedded by pressure into untempered steel. The only thing we can compare with it is the diamond, and I am not sure that the black carbons of commerce, if reduced to the same spherical form, would stand more pressure, although their endurance of wear might be greater.

THE SAND BLAST.

The sand blast was a distinct discovery in the processes of useful art and of exceeding novelty, which, like many more, had its origin in natural suggestions.

I will explain that it is an attritious wearing away by grains of sand forcibly against friable material. It is illustrative of the old saying that "continuous dripping wears a stone," but is infinitely more effective than that. The blows given during a minute's time may be estimated by millions, and the wear is so rapid that I have seen the jet cut through a mill saw file in a few minutes' time.

Gen. B. C. Tilghman, and his brother, R. A. Tilghman, when in company at a seaside watering place, about 20 years ago, observed an old bronze cannon, the touch-hole of which was enlarged and cut out by some action, quite common in such cases. Those among us who can remember the old flint-lock guns can call to mind how common it was for the touch-holes to become "cut out" and require bushing. The cannon in question was an example of such cutting, and Messrs.

Tilghman, after assuming a supposed number of times the gun had been fired, and aggregating the moments of time occupied in firing, or of tending, on the gun, saw that the flow of gases alone, during this inconsiderable period, could have no appreciable effect on the metal, and they straightway set about investigating analogous action in other cases.

Another and more direct example of the abrasive action of granular material impinging on hard surfaces appeared in the depolishing of the glass in the cottages along the seashore where drift sand was carried in the air, serving in some cases to render the glass useless so far as its transparency was concerned.

After noting the circumstances referred to, Messrs. Tilghman returned to Philadelphia, and at their laboratory began blowing jets of sand by means of a fan against glass, and by the results attained were induced to construct machinery for depolishing large panes or sheets of glass for commercial uses.

An early use of the sand blast was in cutting or figuring marble for decorative uses, first polishing the surfaces in the usual manner and then sinking with the sand blast various figures or letters by means of stencils. One of the first applications of the sand blast was in cutting the names on thousands of marble head-stones for the National Soldiers' Cemetery at Arlington Heights, Virginia, opposite Washington.

For cutting on marble, high-pressure steam was employed; for ornamenting and depolishing glass, air currents were found best. These were produced by fans, and one impediment was, that the sand which was then carried through the fans soon cut holes in the casing or shells. After a time the machinery was modified so that nothing but the dust or fine sand in suspension passed through the fans, but at the present time air is not employed at all, the work being done by steam.

The objection to steam as a vehicle for the sand was the moisture and heat, but a simple discovery of Mr. Mathewson, the manager of the Tilghman Sand Blast Company, at Sheffield, England, did away with both heat and moisture, and otherwise much simplified the working and cost of sand-blast plants. This simple invention consists in introducing a weak counter-current of air to meet the steam and sand just before they reach the object acted upon. This stops the steam, but the greater weight of the sand permits that to go on and complete its work without appreciable retardation. The sand, being hot and exposed to the counter-current of cool air, falls down dry as soon as it strikes the object being cut, and is immediately ready for use again. The evolution of this process or sand blast required nearly one patent term of 17 years, but this later discovery has given the inventors a new term in which to gain some fair returns for their long labors and losses in developing the sand blast.

It is a strange matter that notwithstanding our boasted progress, the sand blast, so far as I know, has made but little progress in this country. The company in Sheffield before mentioned uses at least 200 H. P. of steam in its operations, and the application elsewhere in Europe is extensive, but in the United States, for some reason, people have not availed themselves of it as they might have done for various purposes.

The main operation carried on at Sheffield is that of recutting files—not recutting old files, although some of that is done too, but recutting new files, to improve them; and here comes in another important discovery in this process. At some place in New England where a sand blast machine was employed, an attempt was made to clean a dirty file by holding it in the jet. The file was of course cleaned at once, but the effect was something more. The file, although a worn one, had all the characteristics of a new one, which, as all mechanics know, is a very noticeable change. Other files were treated in the same manner with a similar result, and the discoverer proceeded to patent the process in this country, assigning the invention to Messrs. Tilghman for European countries.

Then began another round of experiments to determine the precise nature of the effect produced. The experiments extended to giving a certain number of uniform strokes with files and weighing the metal cut away. New files and old ones were treated, until the precise nature of the effect was learned.

Every one knows how files are cut with chisels that raise up shavings or teeth. These are of curved form and with a thin edge that soon crumbles or breaks, unless the cutting is skilfully done and the steel of good quality. When treated by the sand blast the files are held at an angle, so the sand impinges on the back of the teeth, cutting away the thin edge, but not affecting the face, so the teeth become strong cutters, without the thin curled edge left by the chisels in cutting. The operation is very rapid, requiring but a few seconds, and the value of the files is much increased, so much so that a great many of the files made in Sheffield and on the Continent are treated in this manner. Sand, in the common sense, is not used in this process, but a mixture of sandy clay and water, thin enough to be circulated by pumps. This mixture of clay-water, it may be called, is drawn in by induction nozzles and discharged through a thin slit made in chilled cast-iron tips that wear away very rapidly.

In conclusion, I am compelled to admit that the subject of abrasive processes, although treated as compendiously as possible, is by no means complete in the two papers presented. Little or nothing has been said of exact processes, which form an important branch of the subject, and one I may have the pleasure of presenting at some future time.

The Electro-Magnet in Eye Surgery.—The London *Electrician* describes and illustrates an electro-magnet for use in eye surgery, brought out by Tatham Thompson, of Cardiff, being a modified form of Snell's instrument. It is about 2½ in. long and weighs 5 oz. It has been successfully used to ascertain whether the foreign body is of steel or of a non-magnetizable metal; to move the fragment from an inaccessible part of the eye to one favorable for its extraction, and to remove it from the surface or even the retina of the eye without cutting or lacerating the delicate tissues. In the most serious case recorded, a blacksmith in a South Wales colliery was recently, while stamping a new pick, struck in the eye by a fragment of steel. The patient, whose other eye was affected through sympathetic irritation, was put under the influence of ether, the orifice of the wound slightly enlarged to enable the pole of the electro-magnet to be introduced, and the latter inserted in the direction which the fragment presumably had taken. On the withdrawal of the magnet the second time, the piece of steel came readily through the wound attached to it.

TWO ROPE HAULAGE SYSTEMS.*—II.

By E. Van A. Norris, Wilkesbarre, Pa.

(Concluded from page 166)

Encouraged by the success of the first rope haul, a second one was designed to carry the dirt cars from the Susquehanna Coal Company's No. 6

except that in the large gear wheel a spring hub (Fig. 13) was inserted, the main wheel being loose on the shaft and provided with lugs which projected into a chambered hub keyed to the driving shaft, three heavy springs, each closing with 2,000 lbs., being interposed between the lugs and the hub, allowing a motion of four ft. on the circumference of the 6-ft. diameter rope-driving wheel to take up the shock of starting. The rope take-

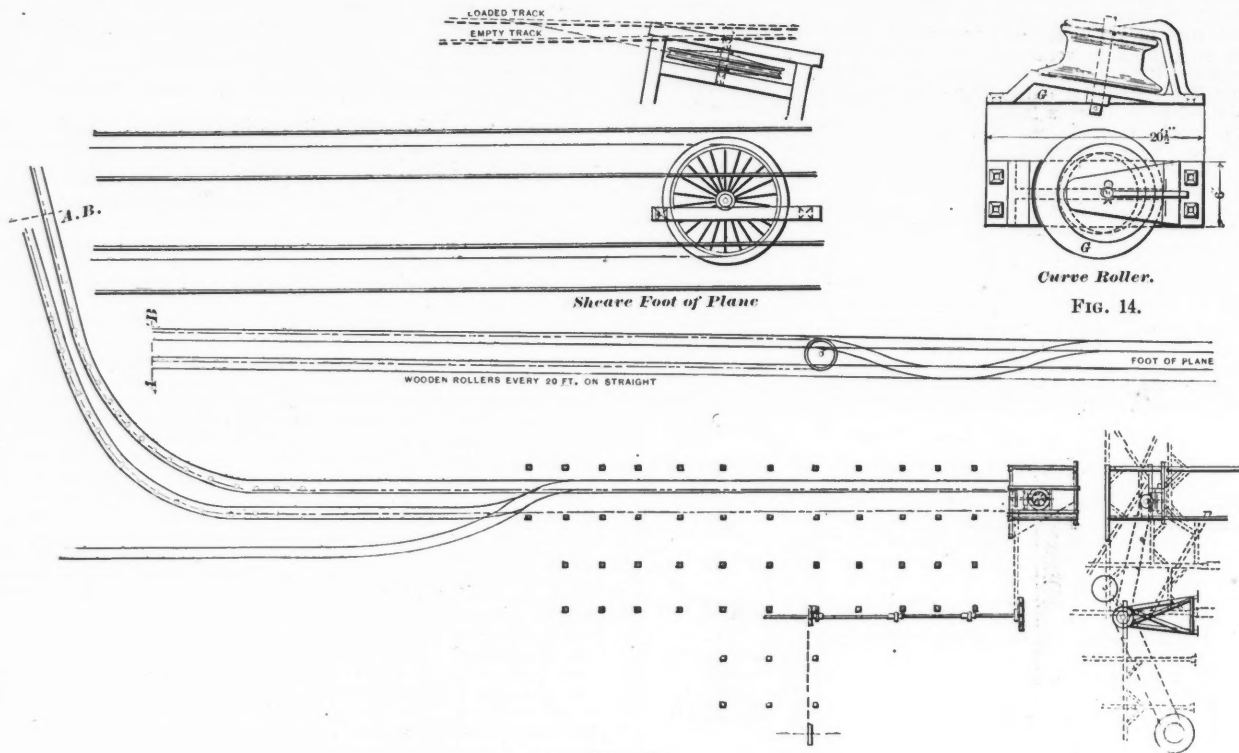


FIG. 11.

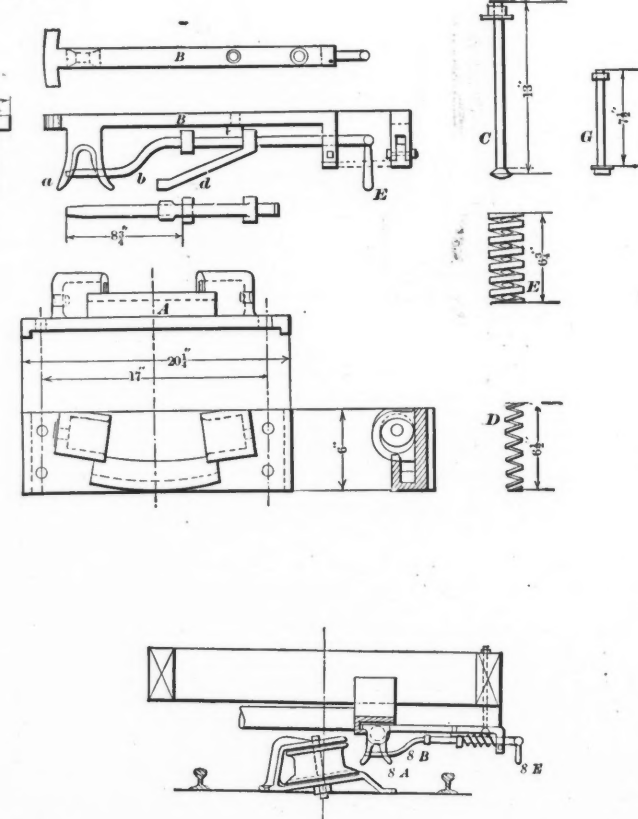
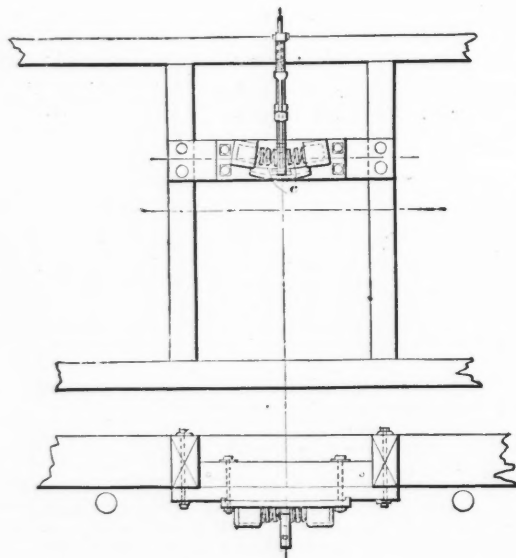


FIG. 16.

breaker to the dirt plane, a distance of 600 ft., and to return the empty cars to the breaker. About 500 three-ton cars of dirt are made daily by this breaker, which are hoisted on a long plane out of the valley, and dumped on the other side of the mountain, where space is less valuable. In this case (Fig. 11) there was but one interfering switch, which, being merely for supplying coal to the breaker boilers, was but little used; therefore it was practicable to stretch the rope on the surface. The driving arrangements were similar to those in the No. 5 breaker haul,

up was similar to that at No. 5 breaker, except that the square shaft was shorter and the end unsupported, allowing a take-up of 12 ft. of rope (Fig. 12). The end-sheave, which was of necessity 8 ft. in diameter, the distance between centers of tracks, was put in a pit under the tracks and tilted in both directions to bring the two ropes out at equal distances from it, on the empty and loaded tracks, 3 ft. vertically apart. The rope was carried around the curve on the curve pulleys (Fig. 14), set about 4 ft. centers on the curve; these work very well, though they already show considerable wear. The throat of the driving sheave in this instance was made of the shape shown

*Read at the Providence meeting (1891) of the American Society of Mechanical Engineers.

(Fig. 15), the groove being filled with hemp; when the machine was started, however, it was found that the driving sheave did not sufficiently grip the rope, a tension of 8,000 lbs. on the rope being just sufficient to move the cars, but not to start them on grade. To take the sheave down and send it to the shops to have a V-groove turned in it would have consumed several days, so a tool was made to the shape of the groove required and bolted to the timber of the carriage, the machine, rope and all, run very slowly and the groove turned out in two hours to the shape shown by the dotted lines, when it was found to drive perfectly, though, of course, it is none too easy on the rope; the tension was, however, reduced to 3,000 lbs. without interfering with the driving. The cars, twelve in all, were attached to the rope by a grip (Fig. 16) catching clamp cones (Fig. 17)* similar to those used on the No. 5 breaker haul; these are constructed of six brass segments cast on a piece of the rope, so that their inside surfaces are an exact reproduction of its exterior, and clamped to it by steel cones screwed on the threaded exterior of the segments; these are readily put on and removed, so far have shown no tendency to slip, and give perfect satisfaction in every way. The moving rope is thrown into the socket (a, Fig. 16) by a wooden lever slipped under the car, and the finger (b) allowed to spring into place, holding it there until the cone comes along, and striking the socket, carries the car

APPARATUS FOR CONCENTRATION OF SULPHURIC ACID.

W. C. Heraeus, in *Chemiker Zeitung*, XV., 36, observes that there exists a generally adopted belief in the superiority of the purest platinum as the material for constructing vessels for concentrating sulphuric acid. To put this view to the test, he alloyed pure platinum (containing only 0.01% iridium) with 5% and 10% of iridium, and rolled the alloy into sheets, which were then placed, together with a sheet of the pure platinum, for 40 days in a concentration apparatus in which a 98% acid was manufactured. Taking the loss in weight of the pure platinum in this experiment as 100, the 5% iridium alloy lost 73 and the 10% alloy only 58, thus showing an important advantage in favor of platinum-iridium alloys as a material for constructing concentration apparatus. In further experiments on the resisting power of gold in a similar capacity, still more favorable results were obtained. Taking the loss in weight of pure platinum again as 100, commercial platinum (containing 0.5% iridium) lost 90, the 10% iridium alloy lost 58, and pure gold only 13—that is, one-seventh the loss sustained by the material usually employed for concentration purposes. A gold solder must therefore be greatly superior to a platinum solder in the construction of apparatus, and, in view of these facts, the author has patented a process for covering the surface of platinum vessels

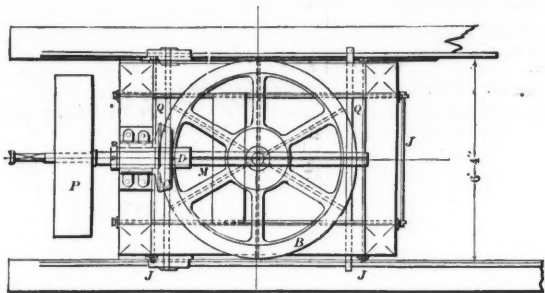


FIG. 12.

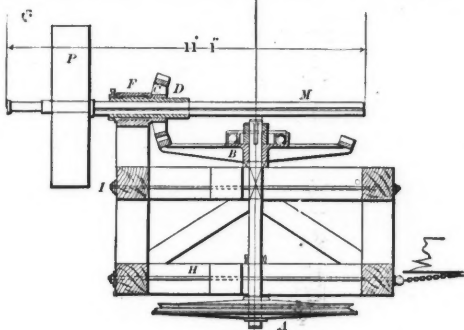


FIG. 13.

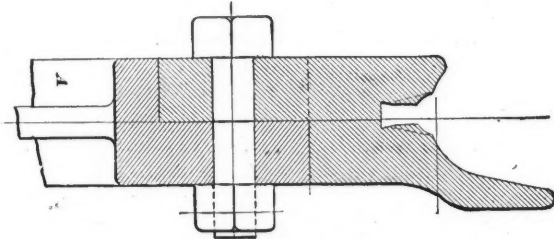


FIG. 15.

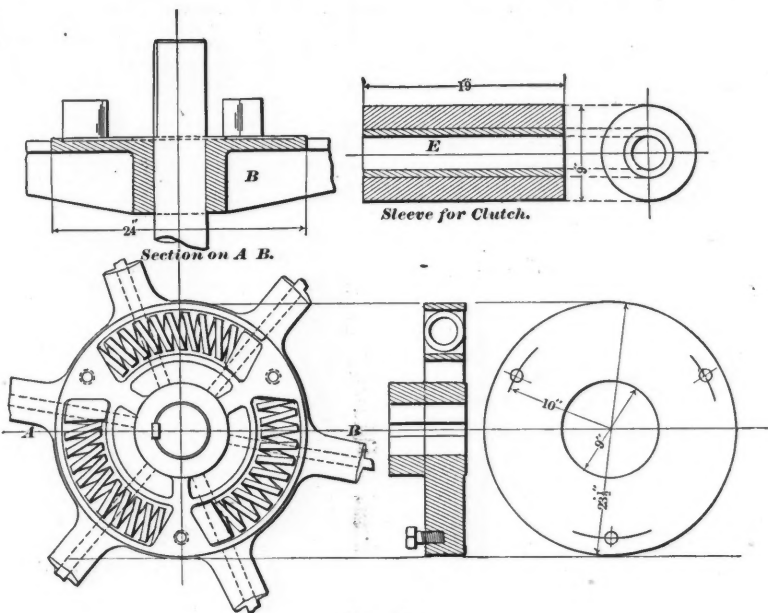


FIG. 17.

forward with it, the blow being cushioned by the springs (c), each compressing with 600 lbs., against which the grip arm works, as well as by the spring hub in the driving sheave. The latter works admirably, the rope coming almost to a full stop and then gently starting the car.

The rope is dropped by the sliding out of the finger b, which is effected by an uncoupler beside the tracks. It was originally intended to place this inside the track, and to shove the pin out with the arm d by having that slide against a curved piece of wood, but it was found that d had a tendency to bend, and, besides, was in the way between the rails. It was consequently removed and the uncoupler applied direct to the handle E. This was not at first successful, as the finger could only be moved 2 1/2 ins., and the car had a clearance of over an inch, including end motion of axle and clearance of wheels on track. Finally, the solid uncoupler was successfully replaced by a 3 x 3/8 steel spring, which was strong enough to drop the rope, but not enough to bend the handle of the grip.

From the drawing it will be noticed that the loaded cars can be picked up anywhere under the breaker, while the empties are unhooked outside and run in by gravity, the empty rope passing under the track. The loaded rope passes one switch rail, which is effected by grading the track so that the natural position of the rope is below the bottom of the rail at this point, the rope being raised in the grip through the open self-acting latch shown, this latch only closing when the empty cars are running in. A friction clutch operated by ropes extending the entire length of the haul is provided for starting and stopping, as in the No. 5 breaker haulage plant. The cars, both empty and loaded, are run in trips of two cars each, the grips on the last car only being used. The cars are very heavy and hard running, teams of two mules each having all they can do to pull two loaded cars up the grade to the plane.

* Patented by the chief engineer, J. H. Bowden, October 16th, 1888.

with a compact adhesive layer of gold on those parts in contact with acid during concentration. As only 144 grms. of gold at 2,800 marks per kilo. go into solution, against 1,000 grms. of commercially pure platinum at 1,800 marks per kilo. under the same conditions, the coating of concentration apparatus internally with gold offers considerable pecuniary advantages.

The Use of Statistics.—One long engaged in statistical work, says Carroll D. Wright in the *Popular Science Monthly* for August, feels more and more keenly, as the results of original investigation, not only the limitations of statistics, but the fact that perfectly honest and truthful statistical tables may not only be vicious in themselves, but may also lead to the most worthless conclusions, the tables themselves not indicating, and it not being possible to fully indicate by them, the exact truth they contain. The method, I believe, is the surest for ascertaining conditions, and the truest on which to base conclusions; but the method must be supplemented by full and frank analysis. A statistical table, independent of such analysis, is to me what a red flag is to a bull. It immediately excites antagonism and invites attack. The value of any statistical presentation must depend upon the basis upon which it is made, the integrity of the collection of the various elements of it and the analysis which accompanies it. No one has any right to quote statistical tables without using and understanding the analysis of them. It is because of the flippant and careless use of statistics by writers and speakers that it receives their condemnation. No one thinks, however, of condemning anaesthetics because the burglar chloroforms his victim; or the elementary rules of arithmetic, the means by which all honest accounts are kept, simply because dishonest accounts are made possible by the same means.

THE SLIDE RULE SPECIALLY ADAPTED TO THE SOLUTION OF PUMP CALCULATIONS.

Written for the Engineering and Mining Journal by Wm. Cox, C. F.

That the slide rule is an instrument which greatly facilitates all kinds of calculations, none who are in the habit of using it will deny; but even its most ardent admirers will readily admit that its advantages are more manifest in some cases than in others. For the rapid solution of all ratios and proportions nothing can be more convenient than the slide rule, be cause, as its construction is based upon the remarkable properties which belong to a series of numbers in arithmetical progression, corresponding with another series in geometrical progression, we may place the slide as we will, and every number on the slide and its coinciding number on the rule will bear the same ratio to each other. In any proportion, therefore, having three terms given, the fourth is instantly found by mere inspection.

Slide rules, although all based upon the principles referred to, vary somewhat in their details of construction. The most recent and certainly the best is the Mannheim, perfected by a French artillery officer of this name, in which the two upper scales are alike, and also the two lower ones, these latter being graduated from 1 to 10, while the two upper scales are graduated from 1 to 100; every number on the upper scales is consequently the square of its coinciding number on the lower scales. A small brass runner enables coinciding points on the different scales to be easily found, and also permits of continuous calculations being effected without the necessity of reading off the intermediate results. For all ordinary examples of multiplication, division, and proportion the two lower scales (called C and D) are used, as owing to their running the whole length of the rule the results are more clearly defined; and for all calculations involving squares, square roots, etc., the two upper scales, A and B, are used in conjunction with C and D.

We have said that one of the most remarkable properties of the slide rule is the facility with which numbers corresponding with any given ratio are found. If we therefore place the slide so that 2 shall be opposite or over 4 on the rule, then every other pair of coinciding numbers will possess the same ratio of 2 to 4, thus:

Slide, Scale C	2	3	15	62	87	113, etc.
Rule, Scale D	4	6	30	124	174	226, etc.

We have therefore the following simple rule for obtaining the fourth term of a proportion:

Set the first term on scale C of the slide over the second term on scale D of the rule; and under the third term on scale C of the slide will be found the fourth term on scale D of the rule.

DEMONSTRATION.

The following demonstration of the rule is more easily taken hold of by the eye:

Scale C. Slide.	Set 1st term	Under 3d term
Scale D. Rule.	Over 2d term	Find 4th term.

It will be at once evident that not only the fourth, but, in fact, any term of a proportion may be at once ascertained if the three others are given. One demonstration in such cases suffices for working out four different rules or formulæ, which are but modifications of each other.

We purpose in the present article giving similar demonstrations for the various formulæ relating to piston pumps, all of which are worked out with such facility by means of the slide rule. If these are strictly followed, the results obtained cannot be otherwise than correct. Some will require the use of the four scales, A, B, C, and D, as they involve both squares and square roots, but their solution is equally simple. In these demonstrations the letter R refers to the brass runner, and the letters A, B, C, and D to the different scales of the rule and slide, upon which the operations are to be performed.

1. To find the horse power required to raise 1,500 U. S. galls. per min. to a height of 60 ft.

Formula: $H. P. = \frac{G \times h}{3960}$

Demonstration:

A		
B		
C	Set G. P. 3960	Under 60 ft. height
D	To 1500 galls.	Find 22.7 horse power.

If the gallons are imperial gallons, then the gauge point is 3300 instead of 3960.

No percentage is added to overcome friction, etc. The following are the gauge points to be used instead of 3960 and 3300 for various percentages of allowance:

Per cent.	10	20	30	40	50	60	70	80
G. P. U. S. galls.	3600	3300	3050	2830	2640	2470	2330	2200
" Imp. "	3000	2750	2540	2360	2200	2060	1940	1835

2. To find the horse power required to raise 840 cu. ft. per min. to a height of 48 ft.

Formula: $H. P. = \frac{C \text{ ft.} \times h}{528}$

A		
B		
C	Set G. P. 528	Under 48 ft. height.
D	To 840 cu. ft.	Find 76.3 horse power.

The following gauge points must be used instead of 528 for various percentages of allowance:

Per cent.	10	20	30	40	50	60	70	80
Gauge point	480	440	406	377	352	330	311	294

The same demonstrations give equally the height to which a given horse power will raise a given quantity of water; or to ascertain the quantity of water which a given horse power will raise to a given height.

3. Required the number of U. S. galls. delivered per min. by a 10-in. pump with a 14-in. stroke, and 84 strokes per min.

Formula: $G = \frac{D^2 \times S \times N}{294}$

A				Find 400 galls.
B	Set G. P. 294	R. to 14-in. stroke	1 to R.	Over 84 strokes per min.
C				
D	To 10 in. diam.			

For imp. galls. the G. P. is 353.

4. Required the number of U. S. galls. delivered per min. by a 15-in. pump, with a piston speed of 126 ft. per min.

Formula: $G = \frac{D^2 \times P. s.}{24.5}$

A			Find 1157 galls.
B	Set G. P. 24.5		Over 126 ft. piston speed.
C			
D	To 15 in. diam.		

or

A				
B				
C	Set 1	R. to 15 in. diam.	G. P. 24.5 to R.	Under 126 ft.
D	To 15 in. diam.			Find 1157 galls.

For imp. galls. the G. P. is 29.4.

5. Required the number of cu. ft. delivered per min. by an 8-in. pump with an 11-in. stroke and 150 strokes per minute.

Formula: $C \text{ ft.} = \frac{D^2 \times S \times N}{2200}$

A			Find 48 cu. ft.
B	Set G. P. 2200	R. to 11-in. stroke	1 to R. Above 150 strokes.
C			
D	To 8-in. diam.		

6. Required the number of cu. ft. delivered per min. by a 9-in. pump with a piston speed of 160 ft. per min.

Formula: $C \text{ ft.} = \frac{D^2 \times P. s.}{183.3}$

A			Find 70 cu. ft.
B	Set G. P. 183.3		Above 160 ft. piston speed.
C			
D	To 9 in. diam.		

7. Required the diameter of a pump to deliver 400 U. S. galls. per min., with a 14-in. stroke and 84 strokes per min.

Formula: $\text{Diam.} = \sqrt{\frac{G \times 294}{S \times N}}$

A	To G. P. 294.			
B	Set 14 in. stroke	R. to 400 galls.	84 strokes to R.	Below 1.
C				
D				Find 10 in. diam.

For imp. galls. the G. P. is 353.

8. Required the diameter of a pump to deliver 1,157 U. S. galls. per min. with a piston speed of 126 ft. per min.

Formula: $\text{Diam.} = \sqrt{\frac{G \times 24.5}{P. \text{ speed}}}$

A	To G. P. 24.5.			
B	Set P. speed 126 ft.		Below 1,157 galls.	
C				
D				Find 15 in. diam.

The G. P. for imp. galls. is 29.4.

9. Required the diameter of a pump to deliver 48 cu. ft. per min. with an 11-in. stroke and 150 strokes per min.

Formula: $\text{Diam.} = \sqrt{\frac{C \text{ ft.} \times 2200}{S \times N}}$

A	To G. P. 2200			
B	Set 11-in. stroke	R. to 48 Cft.	150 strokes to R.	Below 1.
C				
D				Find 8-in. diam.

10. Required the diameter of a pump to deliver 70 cu. ft. per min. with a piston speed of 160 ft. per min.

Formula: $\text{Diam.} = \sqrt{\frac{C \text{ ft.} \times 183.3}{P. \text{ speed}}}$

A	To G. P. 183.3.			
B	Set 160 ft. P. s.		Below 70 cu. ft.	
C				
D				Find 9-in. diam.

All these demonstrations are arranged for the Mannheim slide rule, which is generally considered to be the best.

Sun Spot Phenomena.—A luminous outburst in the sun was observed by M. Trouvelot at 10:16 A. M., Paris mean time, on June 17th last, and has now been fully described by him to the French Académie des Sciences. First, a luminous spot appeared on the disk of the sun near its western limb. It was of a golden yellow tinge, and shortly afterward a companion spot appeared a little above it. The spectroscope showed the first spot to consist of a central eruption, from which volcanic bombs were thrown to heights above the chromosphere, where they seemed to rest as dazzling balls. A few minutes later these were replaced by brilliant jets or filaments. On the next day, June 18th, at 9:30 A. M., the eruption was seen to be diminishing, and it finally ceased at 2:45 P. M.

THE NAPHTHA INDUSTRY OF BAKU.

It appears from the *Messenger Official*, which bases its information upon data received from the naphtha producers, that the industry in this product is greatly developing at Baku. In 1890 the quantity of naphtha extracted at the isthmus of Apcheron reached the figure of 239,000,000 pounds (pound = 36 lb. avoirdupois), including waste, and the quantity of mineral oil employed as combustible. In 1889 the product at the same place was only 205,500,000 pounds; in 1888, 192,600,000 pounds; in 1887, 165,000,000 pounds; in 1886, 150,000,000 pounds; and in 1885, 116,000,000 pounds only. In five years the average of the increase in the production of naphtha has therefore been, in this peninsula, 24,600,000 pounds.

In 1890, it may be remarked, the production of naphtha at Apcheron has exceeded for the first time the production of the same mineral oil in Pennsylvania, which was only 230,000,000 pounds. With the exception of 6,348,700 pounds of naphtha exported from Baku by the Caspian Sea or by the Transcaucasian railway, the remainder of this product has been refined on the spot at Baku. In 1890 there were sent from that port 169,551,300 pounds of different naphtha products, including 67,306,500 pounds of lighting oils, 4,600,900 pounds of lubricating oils, 522,200 pounds of benzine, gasoline, tar, etc., and 97,121,700 pounds of naphtha residues.

THE WILSON ELECTRIC ALUMINUM SMELTING DYNAMO.

In the accompanying engravings is shown a dynamo of remarkable size recently designed by Mr. Thomas L. Wilson, of Brooklyn, N. Y., and built by the Brady Manufacturing Company and William Taylor & Sons, of Brooklyn, for use in the reduction of alumina at the works of the Wilson Aluminum Company, now in course of erection at Leaksville, N. C., where there is a large water power available. This machine weighs 25,442 lbs. It has a 24-in. Gramme armature, weighing 6,163 lbs., mount-

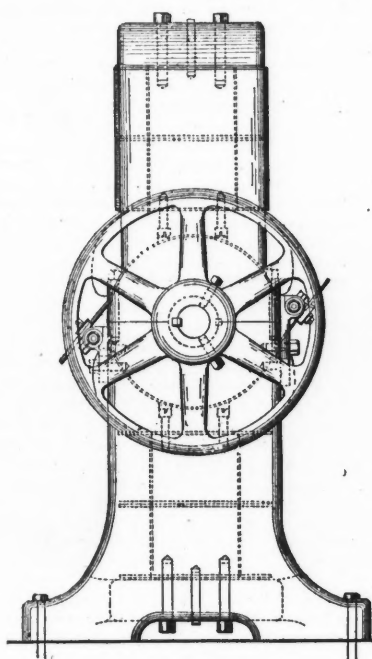


FIG. 1.

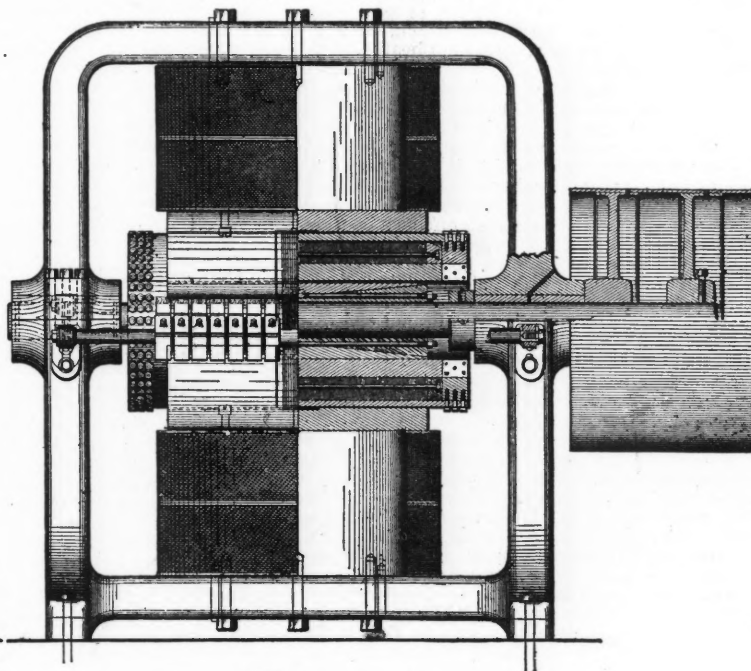


FIG. 2.

WILSON'S ELECTRIC ALUMINUM SMELTING DYNAMO.

ed upon a 5-in. hammered steel shaft. The shaft bearings are of composition brass, 15 ins. long. There are over 11,000 lbs. of cast iron in the frame of the machine, and 7,000 lbs. of forged iron in the pole pieces, etc.; and altogether it contains 7,456 lbs. of copper in the fields and armature. The capacity of the dynamo is 750,000 watts at 530 revolutions per minute, and it is designed to run at 50 volts.

One of the special features of this machine is the arrangement of the brushes, which, as will be noted, are placed directly against the outer surface of the armature bars; the commutator as such is thus done away with. The armature bars, which are 1 1/4 sq. ins in section, are thoroughly insulated with asbestos and with mica where the brushes bear, and are practically indestructible. One armature of this type, after four years of constant operation, is said to show not more than 1/8 in. reduction of size. As will be seen by reference to Fig. 2 no spiders are used, and the shaft is gripped by an expansive hub, the friction being automatically taken up by means of a constant spring pressure. Tests of the machine have shown it to run remarkably cool and to possess a high efficiency.

A Curious Property of Sulphur.—In *Bull. Soc. Chim.* V, 368, M. Charles Lepierre states that in demonstrating that sulphur, melted at about 115° C., can be cooled in paper, he happened to use a lithographed card of which the edges were turned up. Upon taking away the card he discovered that the lithographed characters were clearly and distinctly impressed upon the cooled surface of the sulphur, and remained after hard friction and washing. By repeated experiments he has been able to get very fine results, removing the paper each time by a mere washing and rubbing process. He finds that sulphur will receive impressions from and reproduce faithfully characters or designs in ordinary graphite crayon, colored crayons, writing-ink, typographical inks, china ink, lithographic inks (colored or uncolored), and others. He remarks, too, that it will reproduce with remarkable exactitude geographical maps.

ASPHALTUM AND OZOKERITE IN THE UNITED STATES.*

By E. W. Parker.

Gilsonite, elaterite, uintahite, wurtzilite, albertite, grahamite, asphaltum, maltha, and brea are names given to various semi-solid bitumens which differ considerably from one another in their chemical composition, in their action with acids or other agents, and upon the application of heat but are considered under the head of asphaltum in this report.

No statement of the production of asphaltum is given in the Tenth Census reports. From 1882 to 1885, inclusive, the product was estimated at 3,000 short tons per year, having an average value of \$10,500. In 1886 the production increased slightly, being 3,500 short tons, value \$14,000. In 1887 a still further increase was noted; the product was 4,000 short tons, value \$16,000. The production each year was limited to California. The figures for 1888, as published in the "Mineral Resources of the United States," show a remarkable increase, due to the production in California of 50,000 tons of bituminous rock (a sandstone formation impregnated with asphaltum), which then came into the market as a competitor with other kinds of material for street paving. In addition to this, 450 tons of gilsonite, valued at \$22,500, were produced in the Territory of Utah. The value of the total product was estimated at \$331,500, but in this aggregate the value of bituminous rock was taken at the price free on board cars. The value at the mines was about \$165,000.

The following table shows the product of asphaltum and bituminous rock for the United States for the calendar year 1889:—

States.	Product (short tons).	Value.
California (bituminous rock).....	47,968	\$1,688,500
Kentucky (bituminous rock).....	112	252
Utah (bituminous rock).....	3,163	15,000
Utah (gilsonite).....	492	29,400
Total.....	51,735	\$171,537

The total number of men employed in the industry in 1889 was 136, to whom was paid \$63,503; other expenses of mining asphaltum during the year were: Salaries, \$3,000; paid to contractors, \$8,340; supplies, \$13,884; miscellaneous, \$9,610; total, \$98,337. The total amount of capital invested was \$2,651,500, of which \$2,429,300 was in land; \$37,100 in buildings, machinery, etc.; \$139,600 in tools, implements, etc., and \$45,500 in cash.

Sources of Asphaltum.—Although for a number of years asphaltum in different forms has been known to exist in California in large quantities, it was not until 1888 that its production assumed any important proportions as an industry. In 1888 a large deposit of bituminous rock containing an unusually large percentage of asphaltum was discovered in Ventura County, and a company of San Francisco capitalists was organized for the purpose of developing and operating it. The owners styled this mineral "asphaltum," but, as it contains but 24% of bitumen, the other constituents being silica (about 64%), oxide of iron, and calcium carbonate, it should be classed among the bituminous rock products, and is so treated in this report. Its high percentage of bitumen, however, increases its value, and the price ranges from \$8 to \$10 per ton, while the bituminous rock of San Luis Obispo and Santa Cruz is valued at about \$2 50 per ton at the mines. Deposits of a nature similar to the Ventura product are also being operated in Santa Barbara County.

There are several deposits of bituminous rock in San Luis Obispo and Santa Cruz Counties, in which the peculiar features of asphaltum formations are strikingly illustrated, clearly showing that they belong to no particular era or age; that they are found at various altitudes, and with no uniform character in appearance, hardness, or chemical composition. Deposits of solid asphaltum and springs of viscid, oily material commonly called "brea" occur in places not a thousand feet apart, and yet in strata of unquestionably different periods of formation. A number of companies are now engaged in its production.

* From Census Bulletin No. 75.

Until the remarkable impetus given to the asphaltum industry in California and Utah in 1888, the island of Trinidad and the deposits of Seyssel, in France, and Val-de-Travers, in Switzerland, furnished the bulk of the world's supply. Cuba produces asphaltum of excellent quality, some of which has been imported into the United States. Venezuela has furnished a small portion of the supply in the past, and a few tons of bituminous limestone are imported annually from Germany and the island of Sicily. In the State of Tabasco, Mexico, large deposits of asphaltum are reported, but, although at a convenient place for shipment over the Mexican National Railway, only a few small lots have been shipped.

Preparation for Street Pavements.—The principal use of asphaltum, as is well known, is for street pavements. The bituminous limestone of France and Switzerland is prepared for this purpose by being first ground to a fine powder, then passed through iron cylinders, into which air heated to a temperature of 500° F. is introduced. It is thoroughly stirred as it passes through the cylinder, and when it reaches the opposite end is removed in a plastic condition and spread upon a concrete foundation, compacted by rammers, and when cool the street is ready for use.

The Trinidad asphaltum, upon being unloaded at its point of destination, is placed in large tanks and heated over a slow fire for a few days, care being taken not to heat the mass sufficiently to cause distillation. By this process all foreign substances are eliminated; vegetable impurities rise to the top and are skimmed off, while the earthy constituents settle to the bottom, and the asphaltum is then in a condition for manufacture. For street paving the refined asphaltum is treated with the residuum of petroleum, and mixed with fine, sharp sand in the proportion of 14% per cent. by weight or 25% in bulk of asphaltum. The mixing is thorough, and is made at a temperature of about 300° F. While still hot and plastic it is spread upon the foundation already prepared and rolled by heavy steam rollers. The advantage claimed for the Trinidad asphaltum over the French and Swiss limestone material lies chiefly in the granular nature of the sand used in preparing it, which prevents the slipping of horses.

Gilsonite is prepared for this purpose by being first pulverized and mixed with petroleum oil. The mixture is then heated, care being taken to keep the temperature below 500° F., as above that temperature gilsonite will decompose. This composite is mixed while heated with broken stone or gravel, and is then ready for the street. It has been ascertained that a mixture of about 80% gravel makes the most durable pavement.

For the manufacture of street paving from the bituminous rock of Ventura and Santa Barbara Counties, Cal., it is only necessary to mix it when heated with the sand of the locality where it is used. Sand is mixed with the asphaltum in the proportion of from three to eight times by bulk of sand to one of asphaltum. This method effects a considerable saving in transportation expenses. There is no appreciable loss of time in placing it on the street, as it requires only an hour after laying to "set" and be ready for traffic. Once properly mixed and laid it seems practically indestructible, as shown by a section of this pavement which had been in use for 18 months on one of the streets of San Francisco.

The bituminous rock of San Luis Obispo and Santa Cruz Counties, California, is a sandstone thoroughly impregnated with bitumen. It is used almost entirely for street paving, and for that purpose is probably more easily and cheaply prepared than any of the asphaltum products. The only treatment necessary is to steam it, so as to thoroughly mix its ingredients and soften it for spreading to a uniform thickness and a smooth, even surface. Bituminous rock has supplied a limited local demand for ten or fifteen years, but it is only during the past two years that it has assumed any commercial importance as an industry. It is reported that pavements made of this material 15 years ago and used under heavy travel have recently been removed and found to have lost very little either in weight or thickness; also that it stands equally well the high temperatures of the interior cities and the cold, damp atmosphere of the coast. It is estimated that there are now 50 miles of bituminous rock street pavement in the State of California.

Although the production of bituminous rock in California and of gilsonite in Utah have assumed proportions of commercial importance, with indications of much greater activity in the near future, the island of Trinidad continues to be the main source of supply for the United States. In the Eastern cities Trinidad asphaltum is used for street paving, to the almost entire exclusion of other kinds. This is due entirely to its advantage in cost of transportation. The railroad freight rates from the Pacific Coast practically shut out the bituminous rock of California from competition in the Eastern States, and a similar condition may be said to affect the sale of Trinidad asphaltum in the cities of Europe, since the bituminous limestones of Val-de-Travers and Seyssel, having the advantage in freights, control the markets. The cost of preparing the different varieties of asphaltum for street pavement is nearly the same, and, as all appear to be about equally durable, the exclusive use of any one of them is due merely to the advantage in freights.

Comparative Prices.—The ruling prices for the different varieties of asphaltum during the year 1889 were as follows: Trinidad, crude, at New York \$13 per ton; Trinidad, refined, at New York, \$30; hard Cuban, at New York, \$28; gilsonite, at the mines, \$60; bituminous rock, California, at the mines, \$2.50 to \$10; bituminous rock, Kentucky, at the mines, \$2.40; prime Cuban, at New York, 4-5 to 5-5 c. per pound.

Other Uses.—Although the greatest use for asphaltum is in the manufacture of street paving, large quantities are consumed in making floors for warehouses, cellars, wineries, breweries, etc. It is used for lining dams, levees, and reservoirs, and as a coating for piling, wharf timbers, ground ends of telegraph poles, etc. It is also used as a cement for sea walls and other marine architecture, and to protect iron work subjected to action of salt water from corrosion. It is to a considerable extent used as a roofing material, and, being practically a non-conductor of electricity, serves a useful purpose as an insulator for electrical wires. Varnish is manufactured from refined asphaltum or gilsonite by simply heating with spirits of turpentine.

New Discoveries.—Asphaltum deposits have been found in some of the northwestern counties of Alabama, and some progress has been made in the way of developing the properties, but none of the mineral had been mined up to the close of the year 1889. Other deposits are reported in Grayson and Hardin Counties, Kentucky, on which partial developments

have been made, but the owners are waiting a more lucrative demand. In Burnet County, Texas, asphaltum is known to exist, but little authentic information is obtainable regarding its extent and character.

Imports.—The amount of asphaltum imported into the United States in 1889 was 61,952 tons. The imports of Trinidad asphaltum by all companies in 1889 amounted to 53,881 long tons and in 1890 to 54,692 tons. About 800 tons of asphaltum were imported from Cuba in 1881 and 1882, but there have been no importations of any consequence since 1882. During 1885 and 1886 about 500 tons were obtained from Venezuela, but no amount of any importance has been imported into this country from there since that time. From Neufchatel, Switzerland, and Seyssel, France, the imports of bituminous limestone, sometimes called "asphalte," are about 200 tons annually, and about 150 tons of a similar material are imported each year from Hannover and Brunswick, Germany. All of this material was used in laying sidewalks and for interior work. During 1887, 1888, 1889, and 1890 about 6,000 tons of bituminous limestone were imported from Sicily and used for street paving.

Asphaltum Pavements.—The number of square yards of Trinidad asphaltum laid in the United States in the past decade is as follows: 1880, 106,838; 1881, 116,629; 1882, 196,184; 1883, 387,510; 1884, 424,524; 1885, 403,882; 1886, 623,188; 1887, 799,335; 1888, 757,101; 1889, 1,130,863; 1890, 1,857,000; total, 6,803,054, which is equivalent to 446 miles of roadway 26 ft. wide. Trinidad asphaltum is being used for street paving in 49 cities in the United States and Canada.

From the best information obtainable the proportions of Trinidad asphaltum used for different purposes are about as follows: For laying sheet asphalt pavements 72%, for manufacturing asphalt blocks and tiles for pavements 24%, total for paving 96%; for roofing, 3%; for all other purposes, 1%; total, 100%. The amount of asphalt blocks manufactured and laid as pavements has varied from 5,000 to 100,000 sq. yds. per annum, and the total from 1880 to 1890, inclusive, is estimated at 500,000 sq. yds.

About 55,000 sq. yds. of bituminous limestone pavement were laid in Washington, D. C., during 1876 and 1877, and about 3,000 sq. yds. in New York in 1883 or 1884. Nearly all of this was subsequently taken up and replaced by Trinidad asphaltum. In 1887 about 10,000 sq. yds. were laid in Rochester, N. Y.; in 1888 about 20,000 sq. yds. in St. Augustine, Fla., and in 1890 40,000 sq. yds. in New York City. Capt. F. V. Greene, of New York, estimates that the total amount of bituminous limestone pavement now in use in the United States does not exceed 75,000 sq. yds.

The asphalt pavements in Europe are all made from the bituminous limestones obtained from the localities mentioned previously in this report. The pavements are found in Berlin, London, Paris, and a few other cities, probably not exceeding ten in all. The total area covered is, approximately, as follows, and it is about one-fourth of that covered by Trinidad asphalt pavements in the United States: Berlin, 681,486 sq. yds.; London, 360,000 sq. yds.; Paris, 357,360 sq. yds.; other cities, 300,000 sq. yds.; total, 1,698,846 sq. yds.

The Commercial Value of the Investigator.—The German manufacturer, says F. W. Clarke in the *Popular Science Monthly* for August, does not employ a chemist who has only learned by rote the wisdom gained by others; he does not ask to be told that which he already knows; he seeks rather to push forward into new fields; to excel his competitors more by intelligence than by brute force; and to gain a growing supremacy in preference to a mere victory for the moment. This practical policy, the outgrowth of intellectual culture, has made Germany a dangerous rival of all other countries in those departments of industry which rest upon scientific foundations. Applied science cannot exist until there is the science to apply; and, where the latter is most favored, the industrial development is sure to be most perfect. This lesson is one which the United States must learn more thoroughly than heretofore, if it hopes to hold its own in the front rank of manufacturing nations. In a few of our universities the truth is already realized; but in too many American schools the so-called "practical" view prevails. Under the latter, teaching becomes routine; and the student, while learning elaborately that which is known, is not taught how to discover. He has little or no training in the art of solving unsolved problems; and that art is the mainspring of modern industrial growth. A teacher of science ought also to be an investigator, were it only for the inspiration that his example might give to the pupils in his charge. To impart knowledge is a good thing, but to reveal the sources of knowledge is better; and in that revelation is found the educational value of research regarded as a part of the teacher's essential duty.

New Process for Oxidizing Chrome Ores and Manufacturing Chromates.—J. Massignon and E. Vatel, in *Bulletin de la Société Chimique de Paris*, Series 3, Vol. V., No. 6, state that the yearly consumption of salts of chromium in France alone averages 2,000,000 kilos. yearly, representing a value of 2,000,000 francs. There do not exist any chromeworks in France. The authors criticize the present method of manufacture, and examine the proposals made for its improvements, none of which they find satisfactory. They proceed as follows: The ore, very finely ground, is mixed with calcium chloride and lime, or calcium carbonate, in such proportions that all the base derived from the caustic or carbonated lime introduced into the mixture may be a little in excess of what is required to convert all the chromium sesquioxide of the ore into calcium chromate, when this sesquioxide passes into the state of chromic acid. The calcium chloride is employed in the proportion of one equivalent to three of total lime. This mixture is obtained by working together the ground ore, and a paste is formed either with lime and calcium carbonate or calcium carbonate alone, slacked or stirred up in a strong solution of calcium chloride. If made with ground chalk it does not harden in the air; but if we use together lime and chalk the mixture sets like cement, and may be molded into blocks or plates which become partially dry in the air. The air-dried blocks are placed in a furnace, where they are moderately heated to complete the desiccation, and then baked at a temperature sufficient to causticize the calcium carbonate. If the blocks are then left exposed to the air, at the common temperature, in about a month the oxidation is complete. The advantages of this process are economy of fuel and of labor; the waste of alkali is suppressed, and a larger proportion of the chromium oxide in the ore is utilized.

SAMPLING ORES WITHOUT USE OF MACHINERY.*

By William Glenn, Baltimore, Md.

The taking of proper samples of crude ores seems to be less thoroughly understood, or less carefully practiced, than its importance requires, the work of sampling being often looked upon as within the realm of boys and of pensioners only. At least, though the manual labor be left to subordinates, the principles on which it is conducted and the safeguards with which it is surrounded are not unworthy of the study of experts; and experts should be ready to teach these principles and enforce them in practice. For exact sampling is the indispensable step toward learning the value of any boxful, carload, or shipload of ore.

The following is a simple account of the method of sampling by hand, such as I have always pursued. There is nothing new about it, and, so far as I know, it is the immemorial old method, as old at least as Cornish copper mining.

There are two principal processes to be considered: First, how to take the gross sample of the lot of ore; second, how to proceed with that sample. Really, there is no iron-bound rule governing the first step; each may have a way of his own; yet most samplers proceed in much the same way. But once having the rough sample, there is no question as to what shall be done with it. It is to be worked down after the orthodox fashion. It must be broken and mixed and quartered until only a few ounces remain. The sampler bottles this residue; the chemist does the rest.

Assume that we have a rough sample, weighing a ton, of any ore with its gangue. Assume that by some manner of magic we can at once reduce the whole of it to dust. Evidently, if we could mix it long enough and well enough upon a clean, tight floor, it would finally become homogeneous. In that case we could fill a half-dozen small bottles from any part of the pile, and they would be fair samples. But the work would have to be admirably done; so well done that a single gramme taken from the pile would properly represent the entire ton of sample. Really, this would entail a great deal of labor. And if the rough sample weighed 15 tons or more, as it would if taken from a shipload, the bare labor of mixing that quantity of dust until homogeneous is wearying even to think of. We cannot proceed upon the proposition that a final sample may be obtained in any such way. Yet upon a rock similar to this many are wrecked.

To take, for illustration, a definite case, let us assume that we have to sample a 10-ton pile of 10% copper ore, prepared for market. It will consist of masses generally the size of one's fist, smaller pieces, and even of dust. We shall require for the work a clean, tight floor or pavement, an iron mortar and pestle, a shovel, a small hammer, a piece of iron for an anvil, and, lastly, a broom. Besides these, we shall find convenient a wheelbarrow or a barrel or box of some kind.

For convenience and force I will put my description into the form of homely directions, such as I might give to my workman.

Begin by shoveling the pile roughly into the form of a flattened cone or a flattened pyramid; say we choose the pyramid. Now make a trench straight through the pile, cutting it into two nearly equal parts. And again by a trench, at right angles to the first, divide these halves into four nearly equal quarters. A part of the ore taken from these trenches will form the sample required. Proceed as follows:

Having the wheelbarrow ready, begin at the middle of any side of the made-up pile and cut the first trench. Cast the first shovelful to the right, the second to the left, the third into the wheelbarrow. Repeat this order of shoveling until the barrow is full; then empty it upon the well-swept floor intended to receive the sample. Continue in the same way until the trench has passed through the pile, when there will result two rather long and narrow piles. Begin the second trench, extending it across the middle of the two piles, casting the first shovelful right, the second left, the third into the barrow. Proceed in the same way as with the first trench. When done, you will have shoveled about 6,000 lbs. of ore. As every third shovelful was thrown into the barrow, there will result about 2,000 lbs. of sample upon the floor. That this is a fair sample of the original pile is based upon the assumption that each third shovelful thrown into the barrow was like the first and second ones cast into the piles. The hypothesis is reasonable and freely to be trusted.

Having the sample, proceed with it after the regulation method, as follows:

Spread it thinly on the floor; now examine it. If there be any lumps which look larger than the general run, place the anvil upon the pile, and between that and the hammer break those lumps. The next step is to thoroughly well mix the sample. Begin at one edge of it and shovel the ore over upon itself. Move around to the opposite side of the pile, and from that side shovel the ore again upon itself and back into its original place upon the floor. Having it well mixed, form it into a flattened cone and sweep all the dust upon and around the pile. You have now to halve and quarter the sample as follows:

Commence at any point and shovel a road through the center of the pile, casting the shovelfuls alternately right and left as you proceed. This movement will result in cutting the pile into two elongated nearly equal ones. Beginning at the middle of one of them, shovel a road through it in the same way as was done before. And in precisely the same way cut the other pile in two; sweep upon each pile the dust belonging to it. These movements will result in four piles.

If the sample were well mixed, as directed in these notes, then will each of the quarters, A, B, C, D, have the same composition as have all the others. But if, upon inspecting them, you judge one or another to be poorer or richer than the other, you will then have sufficient evidence that the work has been badly performed. In that condition of affairs mix well together all the piles, and once more halve and quarter them. Having made all the quarters of the same composition, it follows that any two of them may safely be accepted as representing the original 2,000 lbs. of rough sample. This opens a road leading in the right direction, since it enables us finally to get rid of half the sample. We may cast out two of the quarters and retain the other two for the sample. It is a matter of indifference which two are retained, say A and B. Remove from the floor C and D, together with the dust belonging to them.

We have again to break the larger stones, until there remain none

larger than walnuts. Place the anvil between the piles, within easy reach of them. Take a stone from A, break it; take one from B, break that. Continue in this way, taking stones alternately from each pile, until all are reduced to the size stated. By proceeding in this way, the sample is more or less mixed while being broken. Complete the mixing as before, by shoveling all of the sample forth and back over the floor. Form it once more into a flattened cone, and sweep the dust upon and around it. Divide the cone into two halves, and those into four quarters, precisely as you did before. You have now to reject two of these quarters. The unwritten law of the sampler says that it must be those holding the positions A and B, because those were retained in the last quartering. Remove A and B from the floor, retaining C and D for the sample. These would now weigh about 500 lbs.

Proceeding as before, break down the lumps of ore until none are left larger than, say, 1-in. cubes. Again mix well the sample, make it into a pile, sweep up the dust, halve and quarter the pile. Reject two quarters (C and D of course), retain two, precisely as in former quarterings.

Once more break the lumps, this time down to half-inch cubes. Mix well the sample, make it into a pile, sweep up the dust, halve and quarter; reject two quarters. The two quarters retained would weigh about 125 lbs. Break it down until comparable to fine gravel and coarse sand. Mix and quarter once more.

The two quarters this time retained would weigh about 60 lbs. With the mortar and pestle break this to something approaching coarse sand. Again mix and quarter. The quarters this time retained are to be ground yet finer, mixed, and quartered.

If you have no mortar and pestle, the hammer and anvil may be substituted throughout. After getting the material into the form of coarse sand, it is best to mix and quarter it upon a sheet of paper, even an old newspaper.

At this point the sample would weigh about 15 lbs.; its larger grains would be in size like coarse sand. It would be safe now, without further breaking, to mix and quarter it twice, or until its weight did not exceed 4 lbs. Run this through the mortar and then mix and quarter it twice, or down to 1 lb. weight. Grind this to something approaching powder, and, for the last time, mix and quarter it. Have ready six wide-mouth 1-oz. bottles. Place them in a line, side by side, upon a sheet of paper. From the other paper pour the ground sample in a small stream, forth and back across the mouths of the bottles, until they are all full up to their shoulders. Cork, seal, and label them; and the sampling is done, and properly done.

If there should lurk in your mind a suspicion that this half-pound residue of dust may not, after all, properly represent the rough sample with which you began, go back over the work, and try to decide precisely where in the quarterings the sample retained ceased to be a sample. If you can decide upon that point exactly then you will know just where you failed to do your work properly. The error will be with you, and not in the method.

It does not, in the slightest, matter of what solid a sample may consist, or how much or how little it may be, it should be worked down in the manner just detailed. Whether a sample consist of 20 tons or of 1 oz., it matters not, except as to breaking and grinding.

A word may be added as to larger and rougher ore piles than have as yet been mentioned. It is not unusual for one to have a pile of 100 tons or 200 tons, which one would like to sample. Such piles are apt to consist of lumps larger than a man's head, together with masses of all smaller sizes. Where a pile is formed by dumping ore uniformly upon its top, the likelihood is that the pile is homogeneous. In such a case it is safe to make short cuts into it at several points around its base, and to consider as sample the ore so gotten. It is safer to make one cut through the pile, retaining as sample each third shovelful, as in the case of the copper ore we have just considered. In forming ore piles of the weights given, it is a good custom to put upon a separate platform each tenth or twentieth barrow-load coming from the mine; the small pile will prove a fairly good sample of the large one. But no matter how it may be gotten, the rough sample is to be broken and mixed and proceeded with after the regulation method.

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, AUGUST 11TH, 1891.
- 457,341. Crane for Loading Logs. Christ Christenson Stillwater, Minn.
457,342. Anti corrosive and Anti-fouling Compound. Max E. Dejonge, Stapleton, N. Y.
457,348. Rock Drill. George M. Githens, Brooklyn, N. Y.
457,352. Method of Making Puddlers' Balls. Henry A. Jones, Brooklyn, N. Y.
457,371. Furnace Wall. John Ross, Chester. Assignor of one-half to Crawford Coates, Jr., Philadelphia, Pa.
457,384. Windmill. Elhanan L. Stoner, Centerville, Mo.
457,391. Primer for Fuses. Leander S. Woodbury, Detroit, Assignor to F. E. Woodbury, Iron Mountain, Mich.
457,417. Process for Making Anti-friction Compositions. Jonathan Harris and George Wass, Painesville, Ohio.
457,441. Hydraulic Traveling Crane. Earnest W. Naylor, Cleveland, Ohio.
457,457. Electric Oil-well Heater. Charles W. Robison and Samuel D. Robison, Allegheny, Assignors of two-thirds to Robert B. Robison and John G. Luccock, John A. Gartlan, Pittsburg, and Thomas D. Williams, Bellevue, Pa.
457,482. Machine for Covering Wires, Cables, etc., and for Making Tubing and Cord. Vernon Royle and John Royle, Jr., Paterson, N. J.
457,484. Apparatus for the Manufacture of Gas. John H. W. Stringfellow, London, England.
457,506. Steam Mining Drill. Albert Ball, Claremont, N. H., Assignor to the Sullivan Machine Company, same place.
457,507. Rolling Mill. John H. Bickley and John H. Bickley, Jr., Dover, N. J.
457,514. Injector. William B. Mack, Boston, Mass.
457,515. Injector. William B. Mack, Boston, Mass.
457,541. Apparatus for Grinding and Amalgamating Ores. Frederick Stahl and John S. Rew, St. Arnaud, Victoria.
457,552. Well-drilling Machine. Charles E. Wyman, Martinsburg, Ind.
457,589. Rotary Furnace for Burning Cement, Lime, etc. Jose F. de Navarro, New York, N. Y.
457,640. Steam-generator. Edwin A. Doty, Lockport, N. Y.
457,669. Miners' Squib. John R. Powell, Plymouth, Pa.
457,685. Guide for Rolling Mills. James W. Watson, Chester, Pa.
457,709. Disintegrator. George W. Elliott, Sheffield, England.
457,729. Steam and Vacuum Pump. Ernst Korting, Hanover, Germany.
457,730. Automatic Stop Device for Hoisting Mechanism. Henry Lechtenberg, Quincy, Ill.
457,762. Electric Air Pump. Allen A. Dittmar and Hugo Falkenhausen, New York, N. Y., Assignors of one-third to Albert L. Reinmann, same place.

* Abstract of paper presented at the Cleveland meeting of the American Institute of Mining Engineers, June, 1891.

PERSONALS.

Col. T. L. Livermore, general manager of the Calumet & Hecla Mining Company, has arrived at Boston, Mass., from his European trip.

Mr. Rawlinson F. Bayliss, of the Montana Company, Ltd., of Marysville, Mont., passed through this city on his way to England. Mr. Bayliss will return to this country next spring.

Mr. John W. Mackay is at the Virginia City, Nevada, personally directing the work in the Consolidated California & Virginia, and other northern mines, while Superintendent Lyman takes a vacation.

Mr. Alliene Case, for several years general manager of the Portland Mining Company, owners of the Sunset Park Peak mines, has resigned his position with that company to accept the superintendency of the Last Chance mine at Wardner, Idaho.

Mr. T. S. Austin has resigned the superintendency of the Rio Grande Smelting Works, of Socorro, New Mex., and Mr. Geo. B. Lee has succeeded Mr. Austin as superintendent of the Rio Grande Smelting Works.

Mr. A. Chadbourne, senior member of the firm of Richardson & Chadbourne, brokers, London, England, and Messrs. T. A. Bennett and Henry Bratnaber, of the Financial Trust and Mining Syndicate, which bought the Elk Horn mine of Montana, and the De Lamar property, have been at De Lamar, Idaho.

Mr. William M. Courtis, of the firm of Courtis & Smith, mining and metallurgical engineers, of Detroit, Mich., has gone to Minnesota on professional business. Mr. Frank C. Smith, of the same firm, has gone to Sparta, Ore., to take charge of the development work of the Eastern Oregon Gold Mining Company's mines.

Electrotechnische Gesellschaft zu Frankfurt am Main requests the ENGINEERING AND MINING JOURNAL to call attention to the international congress of electrical engineers to be held at the city above named on the occasion of the international electro-technical exposition which was recently inaugurated there. The programme includes visits to the exposition, social festivities and discussion of papers on technical questions, among which the following may be mentioned: Compressed Air and Electricity (Baumgardt, Dresden); Production and Use of Ozone (Fröhlich, Berlin); Electro-Chemistry and Metallurgy (Hoepfner, Giessen), and Magnetic Properties of Various Iron-Alloys (Holborn, Charlottenburg). Du Bois, Berlin; Terraris, Turin; Quincke, Heidelberg, etc., will also contribute papers. Application for participation in the seven sessions, which will be held from Sept. 7 to 13, inclusive, should be sent as early as possible.

OBITUARY.

Daniel S. Sullivan, an old-timer on the Comstock, died in Virginia City on the 1st inst.

John Duvall, a prominent civil engineer, aged seventy-three, committed suicide at Annapolis, Md., on the 8th inst. He was a graduate of St. John's College, and well-known throughout Maryland.

John E. Dixon, for some time a San Francisco stock broker, and President of the Grand Prize and Diana mining companies of Nevada, was found dead on the Cliff House beach, San Francisco, recently. Mr. Dixon was about 58 years old. He came to California in the early days, and after encountering varying fortunes, accumulated a moderate fortune in mining pursuits. The Tuscarora group of mines received most of his attention, but the depression which affected them after the collapse of the bonanza stocks made him again a poor man. He lived alone at his hotel in San Francisco, but was a companionable and generous man. The facts that his pockets were rifled and valuable jewelry was removed, lend color to the theory that Mr. Dixon was murdered by some enemy, for he, in common with all men possessing strong individuality, had enemies.

SOCIETIES.

The National Electric Light Association will hold its fourteenth convention at Montreal, Canada, September 8th, 9th and 10th.

INDUSTRIAL NOTES.

The East Jersey Water Company, which has a contract for supplying the city of Newark, N. J., with water, it is reported, will use pipe built from riveted steel sheets. The plates from which the pipes are made will be riveted together alongside of the trench in which it is laid.

The Phosphor-bronze Smelting Company, of Philadelphia, Pa., has issued a revised price list No. 8, containing in condensed form complete schedule of prices, with explicit directions for ordering, and particularly conspicuous from the act that all unnecessary wording and descriptions

have been omitted; it comprises in its twenty pages a full line and price of the various productions of this corporation.

The sixtieth national exhibition of the American Institute will open on September 30th, and close on November 28th. The exhibition hall on Third avenue will be ready for the reception of machinery on September 14th. The other exhibits will be received on and after September 21st. Blanks and general information may be had from Mr. Charles Wager Hull, the general superintendent, at the office of the Institute, No. 113 West Thirty-eighth street. The entries for this season promise an exhibition which is important to the manufacturers and inventors who appreciate the advantages of the fair to the American industry.

The Bethlehem Iron Company, of South Bethlehem, Pa., has been awarded the contract for the 100 high-power guns. The aggregate amount of money involved in the contract is \$3,580,373.35. According to the proposals of the company the funds are to be furnished as follows: Eight-inch type gun in 730 days, the other guns in such regular periods that the twenty-fifth shall be delivered in 2,433 days after notification of the acceptance of the type gun; the 10-inch type gun in 882 days, the others in regular periods so that the fiftieth shall be ready in 3,407 days after the acceptance of the type; 12-inch type gun in 1,095 days, the others in such regular periods that the twenty-fifth shall be completed in 3,194 days.

The Duluth Manufacturing Company has filed articles of incorporation in Elizabeth, N. J. The company will engage in the manufacture and sale of railway cars and supplies for railroads in the states of New York, New Jersey and Minnesota. Duluth will be the chief business place, with branches in Summit, N. J., and New York City. The capital is placed at \$1,250,000, of which \$200,000 will be preferred stock paying 8% dividend, exclusive of the general stock, and redeemable in 10 years. Shares are \$100 each. The incorporators and present stockholders are Col. Archer N. Martin and Haley Fiske, of Summit; Gen. Stewart L. Woodford, of Brooklyn; Lucian G. Matthews, of Peewee, Ky.; Omar H. Simonds, of Duluth, and Charles W. McLellan, of New York.

The National Forge and Iron Company, manufacturers of bar iron, car axles and forging, and makers of railroad and car construction works, having a general office in Chicago, Ill., and works at East Chicago, Ind., made a voluntary assignment on the 8th inst. This company and its predecessors have been doing business a great many years, and it has a capital stock of \$300,000. Gilbert B. Shaw, President of the American Trust and Savings Bank, was appointed assignee and gave bond in \$700,000. The assets of the company are said to be from \$350,000 to \$400,000; liabilities about the same. The failure is due to depression in value of iron and other metals and to the failure of the Union Rolling Stock Company, which owed over \$50,000 to the National Forge and Iron Company.

The Oliver Coke and Furnace Company, recently incorporated, proposes to build 300 ovens near Uniontown, Pa., shortly. The output will be used by the Oliver Iron and Steel Company in its furnaces at Pittsburg, Pa. If more is manufactured than can be consumed by the Oliver Iron and Steel Company it will be placed on the market. The company is composed of David B. Oliver, Henry Roberts, James B. Oliver, Stephen W. Tener, and Charles D. Fraser, of Pittsburg. David B. Oliver holds 780 shares and the other incorporators five shares each. The capital stock is \$400,000. The office of the company will be in Pittsburg. The Oliver Iron and Steel Company, it is reported, has purchased a tract of land in Unity township, near Derry, Pa., from H. W. Oliver, Jr., for \$200,000.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column.

Any manufacturer or dealer wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office. No charge will be made for these services.

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

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

GOODS WANTED AT HOME.

2,347. A steam shovel capable of extracting stumps, to work in a mixed loam and clay soil in

a thickly timbered section where an over-burden of some 6 ft. of earth must be removed. Pennsylvania.

2,348. A large quantity of boiler and tank plate; also bar iron. Pennsylvania.

2,349. A light logging outfit for 3 miles of road. Locomotive, 6 logging cars and 3 miles of 16 or 20 lb. T steel rails with fastenings and spikes. Virginia.

2,350. Phosphate mining machinery. Massachusetts.

2,351. Machinery for a saw-mill. North Carolina.

2,352. Elevator for a large hotel. West Virginia.

2,353. Laundry machinery. West Virginia.

2,354. Lighting plant for hotel to cost from \$75,000 to \$100,000. West Virginia.

2,355. An engine lathe. North Carolina.

2,356. Machinery for manufacturing all kinds of chair stock, stair balusters, fancy spiral turned table legs, etc. North Carolina.

AMERICAN GOODS WANTED ABROAD.

2,357. Entire equipment for six miles of 3-ft. gauge railroad and two miles of city street railway, including rails, engines, force pumps, dump and transportation cars. Mexico.

GENERAL MINING NEWS.

ARIZONA.

The board of supervisors of Maricopa County, Arizona, has provided for a survey of the southwestern part of that county with a view of establishing the boundary lines between Yavapai, Maricopa and Yuma counties. The principal object of the survey seems to be to determine the location of Yuma copper mines, which Maricopa officials claim are situated in the last named county.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—This company is running three furnaces steadily on ore supplied from its own mines.

COPPER KING COMPANY.—This company, under the management of Hon. David Gough, has about completed its tramway from the mines to the smelter plant at Oro. Machinery has been received for concentrators, and will soon be erected.

DETROIT COPPER COMPANY.—This company, operating at Morence, has struck a body of very rich new ore.

YUMA COUNTY.

For many years, says a correspondent, this county has produced a large amount of placer gold. The Gila City district in early days was the best camp, and Las Flores, on the north side of the Gila River, was embraced in the same district, the gold being heavy, clean and coarse. Many efforts have been made to find the mother lode, but without success. Recently a strike was made which is thought to be the long-sought-for mother vein. Samples taken from it at various places on the vein show the rock to run very near the same right along. The average of the ledge is said to be about \$20.

CALIFORNIA.

AMADOR COUNTY.

(From our Special Correspondent.)

SAN FRANCISCO, Aug. 8.

BUNKER HILL GOLD MINING COMPANY.—Most of the work during the past year has been on the 700 level. A new shaft was started to open the May Flower claim, and has been sunk over 300 ft. on an incline of 67 degrees. The company expects to sink 1,000 ft. The new hoist erected is operated by power developed by an 8-ft. Knight wheel at the mill under 275 ft. pressure and transmitted 800 ft. to the hoist by cable. Levels will be run every 100 ft., and by this means new ore bodies will be developed that were encountered in previous workings in the old shaft. There are three shafts on the vein. The vein has an average width ranging from three to twenty-five feet; the hanging wall is greenstone or diorite, and the foot wall slate. The formation penetrated in sinking the shafts was black slate. The ore is quartz and black slate mixed, is free milling, and contains 2% of sulphurets which are saved by concentration over Frue vanners and reduced at the chlorination works of the company. The ore, of which on an average about 90 tons are crushed per day, goes through a Hendy crusher. The mill can be run by either water or steam power, and is provided with a 17-in. cylinder engine. Steam is seldom used, a 6-ft. Knight well under a pressure of 270 ft. supplying necessary power. The mill has forty stamps, and two Frue concentrators to each five stamps.

The method of working at the chlorination works is in some respects different to that followed in other parts of the State. The furnace is charged in the same way as the ordinary reverberatory furnaces for roasting sulphurets, and 1% of salt is introduced with the charge. During the latter part of the roasting in the finishing oven, different portions of the sulphuret are in succession exposed to the highest action of the heat and oxidizing flame. The capacity of the furnace is two tons every 24 hours. The barrel used for chlorinating

the sulphurets after the charge has been introduced, is made to revolve 13 times per minute for six hours, when the mass is turned into a leaching tank of the usual construction. The leachings are treated as in the Plattner process.

BODIE COUNTY.

STANDARD CONSOLIDATED MINING COMPANY.—The production of bullion for July amounted to \$23,327.24. The company has about 60 men on its pay-roll, and is doing much work in the mine, which is said to be looking well.

CALAVERAS COUNTY.

OSBORN.—This mine, at Smith's Flat, is reported to have been sold for \$30,000.

MONO COUNTY.

(From our Special Correspondent.)

STANDARD CONSOLIDATED MINING COMPANY.—The mine produced during July \$23,327.24. Last week 321 tons of ore were crushed at the mill, the average battery assay being \$16.66 per ton.

NEVADA COUNTY.

EAGLE BIRD.—This quartz mine of Washington township has been sold by Oliver Newhouse & Co. to San Francisco parties. Mr. H. C. Callaghan has been appointed superintendent by the new owners. During the last four and a half years the mine is said to have produced \$500,000 in gold.

HARTERY MINING COMPANY.—At a recent meeting of this company it was decided to bond the Roach claim and work it in conjunction with the ground adjoining the Hartery, located by the company some time ago. The plant will be removed and a new shaft put down. The ledge will be cut at a depth of about 200 ft.

HERMOSA.—Recent developments show free gold in the ore. It is said to be of a superior quality, and the ledge is from fifteen inches to two feet in thickness. It is proposed to sink the shaft 100 ft. deeper before crosscutting. The depth is now about 300 ft.

SISKIYOU COUNTY.

The river miners on the Klamath are reported as rushing along the work of hoisting pay gravel, carrying on operations day and night. Only a few have yet reached the bedrock, but all will be down in a short time.

TUOLUMNE COUNTY.

(From our Special Correspondent.)

GRANT MARBLE QUARRY.—This old property, which supplied marble for many of the most prominent buildings in San Francisco, after lying idle for about ten years, is to be re-opened. Yesterday an arrangement was made by which English capitalists will erect new machinery and work the quarry to its full capacity. The terms of the agreement have not transpired.

COLORADO.

The following mineral surveys have been approved by the United States Surveyor General of Colorado during the week ending August 8th, 1891: Sur. No. 6,913; land dist., Durango; name of claim, Cleveland and Nibs lodes; 6,833, Garfield, Island Belle lode; 6,931, Leadville, White Quail, Marquis and Blanche lodes; 6,976, Leadville, Emma lode; 6,830, Del Norte, Midas and Columbia lodes; 6,953, Central City, Storm Placer; 6,950, Montrose, South Fork and Major Placers; 6,982, Central City, Clyde lode; 6,951, Central City, Maud and Gertrude lodes; 6,956, Montrose, Ennett lode; 6,991, Montrose, Gold Finch lode; 6,974, Garfield, Mirage Placer.

BOULDER COUNTY.

Recent reports state that a rich silver strike has been made in the Pomeroy Mountain, near Caribou. This mountain is on the main range, about a mile northeast of Caribou. Many prospectors are going to the scene of the strike.

(From our Special Correspondent.)

BOULDER, Colo., Aug. 8.

Notwithstanding the high smelting charges that, thanks to the restrictions placed upon the importation of fluxing ores from Mexico, miners of dry ores are compelled to pay, the mining industry is in a fairly healthy condition in Boulder County. Few of the large mines, or of those belonging to large companies are being operated, but quite a large amount of ore is coming in. Apparently most of the ore comes from mines owned and operated by private parties. The ore tonnage is rather below the average, but the production, measured in dollars and cents, is fully up to that of our best years. On left hand, at the foot of Gold Hill, Mr. Gale is remodeling his mill, and Mr. Cragg is building a new one. Farther up the stream, toward Ward, Colonel Brainerd has some twenty-five men at work developing his mines and experimenting with concentrating machinery. Colonel Brainerd, although he has some magnificent bodies, neither stopes nor sells any ore that comes out in the course of development. All that is necessarily taken out is piled on the dump, awaiting future treatment or sale. Just above Colonel Brainerd's camp, Mr. W. W. Hulings has secured several very promising claims, which, added to what he already owned, make his holdings in Ward district very large. His Columbia mine is doing very well. The large ore body which was uncovered some time ago in the lower workings still continues in good shape. Mr. John S. Reid, the superintendent, has taken a lease and bond on the Hudson,

Humboldt, Grand View and Mountain Evans, and has begun the erection of hoisting machinery on the Humboldt. These mines have always had a good reputation, but, for various reasons, have been idle a good many years.

COLDSRING AND RED CLOUD.—These properties at Gold Hill have been sold, and work in them will be resumed. As these mines were famous producers of telluride ores in the early days, their reopening will be watched with considerable interest.

INGRAM.—This mine has got into the courts, and is lying idle in consequence.

MODOC.—This property is still idle, but will, it is thought, start up shortly.

MINOT.—This mine is still in trouble. Liens have been filed against the property, and the outlook seems somewhat gloomy. I am told that Mr. Biddee has promised to pay the debts, which are mostly due poor men. If he does, he will greatly improve his reputation in this vicinity.

SLIDE AND SPUR.—These properties, at Gold Hill, are still idle, and the owners still fighting.

UTICA.—Farther east, on the Columbia vein, the Utica is doing very well; probably better than any other mine in the district. The ore is of good grade and the ore bodies large. The owners of the Utica have 3,000 ft. on the Columbia vein, beside a number of outlying claims that are known to be valuable.

VICTORIA.—This mine, worked under lease, is sending down ore that will run \$3.00 per ton, and bids fair to beat its own good record.

EAGLE COUNTY.

GILMAN MINING COMPANY.—This company has bonded the Wilkesharre and various other claims in the vicinity of its property. In the Little Chief, operated by this company, several heavy ore bodies have been discovered. A 800-ft. gravity train to the railroad is being constructed. In order to utilize the low-grade ores, it is proposed to erect a concentration mill.

FREMONT COUNTY.

COLORADO COAL AND IRON COMPANY.—This company, which began to drill for oil and erect a refinery at Florence nearly a year ago, after putting down five holes, getting one well, and being engaged upon the sixth hole, with a refinery almost completed, has ordered a shut down. The plant represents a money and labor expenditure of about \$50,000, and, considering the start that has been made and amount of money spent, it is not thought likely that the suspension is permanent, nor that it will last long. No reason is assigned by the company for this step.

GILPIN COUNTY.

ROSSITER MINING COMPANY.—This company, which is working the East Centennial lode in Russell district, has sunk the main shaft 105 ft., and is now taking out some good mineral.

SARA B. MINING AND MILLING COMPANY.—The directors of this company held a meeting recently and elected the following officers: L. L. Haynes, president; A. B. King, vice-president and treasurer; J. P. Olympius, secretary and general manager. The Sara is a gold property of exceptional promise. Mr. Olympius, the manager, reports that he is now working day and night shifts.

GUNNISON COUNTY.

GOLD CUP MINING COMPANY.—A company has been formed in St. Louis with a capital of \$2,000,000 for the purpose of working on an extensive scale the Gold Cup group of mines. An extensive plant of machinery is to be erected.

MAY MAZZEPA CONSOLIDATED MINING AND MILLING COMPANY.—Considerable work is being done at incline shaft No. 4, where some high-grade chloride ore is taken out. Dividend shaft is down 180 ft., and the bottom is soft, iron streaked, with a promise of ore in a short time. The ore now shipped is from stopes from 200-ft. level No. 4. The management has decided to do more work below the 200-ft. level until connection is made by Dividend shaft at the 550 level, where the ore can be taken out to better advantage than through the main incline.

MIDLAND MINING AND MILLING COMPANY.—This company has purchased the Noah and Golden Ark mines, in the Beaver District, near Gunnison, and will commence shortly to develop them. They are large-bodied low-grade properties, and a 30-ton Huntington stamp will be put in to concentrate and work it. The general manager of the company, Mr. C. O. Shields, of Denver, is now in the East to purchase the machinery. The company is composed principally of Denver people. C. L. Burlingham is president; E. H. Helmick, vice-president; T. S. Faris, treasurer, and C. T. Sims, of Gunnison, secretary.

LAKE COUNTY.

ALPS CONSOLIDATION.—A lease was given on the 6th instant on the Alps Consolidation. This is important, it is stated, as it will reopen a district that has lain idle for a number of years. The consolidation consists of the Alps, Nos. 1 and 2, Helvetia and the Columbus.

LAS ANIMAS COUNTY.

UNITED COAL COMPANY.—Messrs. Wallace & Porter have leased for 20 years to this company, at Trinidad, part of section 5, township 32, range 64, at \$2,500 per year.

PARK COUNTY.

ORPHAN BOY.—Two important strikes were recently made on this property. The work of exploration is going on to ascertain the depth of the ore body. In the first strike the ore is said to assay at 79% in lead, and in the second 27% copper.

PUEBLO COUNTY.

The proposed oil refinery at Pueblo is assuming definite proportions, says the Denver *Republican*. Five experienced boiler makers and iron workers have arrived from Titusville, Pa. These men will fit up two 35,000-gallon tanks which arrived on the 5th inst. and will be placed in the refinery. The tanks are to be fitted up within 45 days from the time of giving the order, and some forty or more men are now engaged on them. The contract for the building will be let shortly and the whole work pushed to completion as rapidly as possible.

PUEBLO SMELTING AND REFINING COMPANY, Y.—According to reports the net sales and production of this company for the six months ending July 10th were:

	Product.	Sales.
Silver, ounces.....	1,293,874	1,405,324
Copper, pounds.....	844,036	92,514
Lead, pounds.....	8,962,480	337,774
Lead pipe, pounds.....	773,475	36,732
Total.....		\$1,872,346

FLORIDA.

WHITTAKER PHOSPHATE COMPANY.—The newly erected plant of this mining as well as fertilizer manufacturing company has been started.

IDAHO.

For the survey of public lands during the year ending July 1st, 1892, the State has apportioned \$35,000, which is \$15,000 more than last year and \$15,000 less than asked.

The assay office at Boise shipped to the Philadelphia mint, on the 1st inst., gold to the value of \$22,000. Considering the large amount received, it seems rather small. It only represents the gold the government has bought and paid for. The receipts on the 3d were \$5,000. It came from Warren's Rocky Bar, Huntington and a point from which much gold has not heretofore been received Caribou, in the eastern part of the State.

IDAHO BEDROCK FLUME COMPANY.—Mr. George W. Taylor, superintendent of this company, has set the sawmill to work cutting up 200,000 ft. of logs into such lumber as will be first needed. All arrangements for building the flume have been completed. Mr. Taylor, who placer mined in the beds of More and Elk creeks nearly 30 years ago, has spent several years in getting a company formed. The company owns 24 claims of 20 acres each in the beds of More and Elk creeks. These creeks were hastily worked between 1862-5.

ALTURAS COUNTY.

It is reported that prospectors have discovered good placer ground on Willow Creek. The creek furnishes abundance of water for sluicing. Many claims have already been located.

IDAHO COUNTY.

Copper ore, running high in both gold and silver, has been discovered on a tributary of Little Salmon River. Many prospectors are going into that section, but the great drawback is the lack of even safe trails for pack animals. A bill was before the last legislature providing for a state wagon road that would give access to this and other mineral districts, but was defeated in the senate. At Warrens three five-stamp mills are running, and the outlook is very encouraging. A Portland company is making arrangements for the erection of a ten stamp mill to treat silver ores.

SHOSHONE COUNTY.

BUNKER HILL & SULLIVAN MINING COMPANY.—This company will soon commence to build a new concentrator equal to that now in operation, with the exception that Gates crushers will be substituted for rolls, which will increase the concentrating capacity of the works to 800 tons per day. The company is meeting with low-grade ores, and the addition to the mill is made to treat these. Reports from Wallace dated the 7th inst. state there are prospects of a serious labor trouble in the Coeur d'Alene country. Nearly 300 miners in Wardner are now out on strike. At the Bunker Hill & Sullivan Mining Company the Miners' Union demanded that the men be permitted to board any place they desired and not compelled to stop at the company's boarding house, and that the men employed about the mine be paid at a rate not less than \$3.50 per day. A demand is made also that shovelers and others on the surface may get the same wages as miners who now get \$3.50 per day. The company has positively refused to accept the wages proposed, and the mines are closed.

GETTYSBURG.—The company having a bond on this property had until the 10th instant to put up the final forfeit of several thousand dollars. If it fails to pay the forfeit, another syndicate, it is stated, is ready to take a bond on the property at \$30,000, 10 per cent. cash.

LACKAWANNA VS MAMMOTH COMPANIES.—Judge Beatty, of the United States District Court of Idaho, has recently handed down an important decision in the case of the Lackawanna vs. Mammoth companies, in which mining properties in the Coeur d'Alene district, said to be valued at

several million dollars, were involved. The suit which the Mammoth brought against the Lackawanna when the latter applied for a patent to its claim, the Mammoth won, and the lease was carried to the Supreme Court, which remanded it for a new trial. At the second trial Lackawanna won and then the Mammoth company raised the point that the Idaho court was not competent jurisdiction and asked that the case be heard in the United States District Court of Idaho. Judge Beatty decides that the court had jurisdiction and the lease will now be appealed to the Supreme Court of Idaho.

MAMMOTH MINING COMPANY.—The owners of this mine at Warner have made application to the district court to have a survey made of the underground workings of the Bunker Hill and Sullivan Mining Company, alleging that the latter, through its own tunnels, is taking ore from the Mammoth.

KANSAS.

Official reports show that during the week ending the 8th inst., the output of ore from the mining district of Galena and Empire City was: Rough ore, pounds milled, 2,581,880; rough ore, pounds sold, 1,418,870; zinc ore, pounds sold, 800,000; lead ore, pounds sold, 93,940; sales aggregated a total value of \$11,149.

KENTUCKY.

BELL COUNTY.

Trouble is feared in the coal mines of Middleborough. The whites object to the employment of colored laborers in the mines, and the latter have frequently been "run off" by the white miners. Application was made on the 10th inst. by the owners of the mines to the sheriff asking for protection to the colored men retained at the mines.

MICHIGAN.

(From our Traveling Correspondent.)

ISHPEMING, Aug. 16.

At the present time there is a railroad-construction movement in northern Wisconsin and the Upper Peninsula of Michigan.

The Keweenaw, Green Bay & Western Railroad Company has during the summer built a line from Keweenaw, a town located on the Wisconsin shore of Lake Michigan, 35 miles west, to Green Bay. The road-bed will be completed September 1st. This line, it is said, is to be a link in the chain designed to tap the great Southwest. This system is made up of the Delaware, Lackawanna & Western; Flint, Pere & Marquette; Keweenaw, Green Bay & Western; Green Bay, Winona & St. Paul, and about 140 miles (recently constructed) of the Winona & Southwestern, a line reaching into Iowa. The new line will obviate the necessity of navigating around the Green Bay peninsula in order to make connections with the Green Bay, Winona & St. Paul at Green Bay, and also the necessity of utilizing the tracks of the Milwaukee, Lake Shore & Western from Manitowoc, Wis., in order to put down eastbound freight at an open lake port during the winter season.

The Huron Bay Railroad, which has been in the course of construction for the past summer, is almost complete. It extends 35 miles from Champ-lain, Mich., to Huron Bay, Mich. A short, narrow-gauge line, built from Huron Bay to Avon for hauling slate, has been widened. It is said that orders have been given to extend the southwestern end of the line from Champion to Michigamme, Republic, Ishpeming and Negaunee, thus tapping the Marquette iron range at the principal points along its entire course. At Huron Bay, the lake terminus, an ore dock, a duplicate of the one at New Marquette, minutely described and illustrated in the *ENGINEERING AND MINING JOURNAL*, Vol. LI, pp. 62, 88 and 116, is being constructed. At the present time it is ready for the superstructure. The line opens a country, rich in mineral wealth, besides tapping the Marquette range. Rumor has it that an effort is being made to induce the company to build a line northwest into the copper country, a distance of about 60 miles.

It is currently reported in this region that there is an engineering corps in the field which is running a line from Manistique, on Lake Michigan, to Ishpeming, in the interests of the lumber and furnace industries centered at the former place. If constructed, it will tap a large and valuable lumber belt, and will furnish the center of the Marquette iron range with another lake port.

On July 25th, the *ENGINEERING AND MINING JOURNAL* published an item to the effect that the Milwaukee & Northern Railroad Company (owned by the Chicago Milwaukee & St. Paul Railroad Company), was contemplating the construction of ore docks at Menominee, Mich., and that it would reach the same over its own line via Ellis Junction, 22 miles distant. We learn from inside sources that such work will be commenced and presumably completed before the season of 1892. The company now ships from the port of Gladstone, utilizing the Minneapolis, Sault Ste Marie & Atlantic line from Pembine, a distance of 50 miles. By the new arrangement the haul will not be shortened.

The company has in contemplation considerable construction work for the ensuing year. At present it has a line north from Milwaukee, Wis., to Champion, Mich., and another from Ontonagon,

Mich., south to Sidnaw, Mich. In connecting the two separated lines; it uses the tracks of the Duluth, South Shore & Atlantic Railroad Company for a distance of about 50 miles. For several years it has been known that the company intended to build into the heart of the copper country from the Ontonagon branch of its line. Inasmuch as the Duluth, South Shore & Atlantic Railroad Company has a monopoly of the copper rail-freight business, it would be necessary for the Milwaukee & Northern R. R. to own its own track before it figures as a competitor. With this end in view it is soon to build from Sagola, a point on its main line 30 miles north of Iron Mountain, directly north, 55 miles, to Sidnaw. This work will probably be completed in the course of a year. It is known that a survey has been made into Houghton, Mich., from Pori, a point on the Ontonagon branch about 25 miles from Ontonagon. This line will not be likely to be built during the present year.

The board of control of the Michigan Mining School at a recent meeting elected Hon. J. A. Hubbell president and A. L. Rees secretary.

Last week the transfer of the two Portage Lake canals took place in conformity to Congressional action. By the act these waterways are now free to commerce, as mentioned on various occasions in the *ENGINEERING AND MINING JOURNAL* for the current year.

COPPER.

The total mineral product of the seven largest lake producing mines for July was 6,248 tons, against 5,598 for July, 1890, an increase of 650 tons. For seven months the aggregate product was 41,021 tons, against 35,291 tons last year, an increase of 5,730 tons.

CENTENNIAL MINING COMPANY.—The rock now being stamped is taken from the stopes in the first, second, third, and fourth levels north of No. 6, about one-tenth of which is discarded in the rockhouse; the rock stamped is yielding fully 2%. The new boiler at the stamp-mill has been set up. More rock would be stamped, says the *Calumet News*, if there were sufficient machines to treat the rock when stamped, and arrangements to do this are now being made. At No. 7 the shaft is down about 22 ft. On the 6th inst. the foot-wall of the lode was struck. The first level extends north of No. 6 to within 50 ft. of No. 7, and is in good paying ground; it is intended, therefore, to sink this shaft whether copper should be encountered at the surface or not. No. 3 shaft is down about 2,600 feet. The lode shows very little copper.

KEARSARGE MINING COMPANY.—The mineral production for July was 85 tons, an increase of 15 tons over July last year. This makes 567 tons produced since January 1st, against 575 tons last year, a decrease of eight tons.

OSCEOLA MINING COMPANY.—The production for July amounted to 305 tons of mineral, against 230 tons in 1890, making 2,111 tons produced since January 1st, against 1,601 tons a year ago, an increase of 510 tons.

QUINCY MINING COMPANY.—This company continues to push the work of putting the North Quincy (Pewabic) in shape for production, notwithstanding all the talk about filing bonds and closing down, etc., pending the decision of the United States Supreme Court in the appeal case, says the *Michigan Mining Journal*. Construction at the stamp mill also continues. The foundation walls for the additions to contain the two new heads are completed, a larger pump is being put in, and four new boilers are being added to the boiler plant.

TAMARACK MINING COMPANY.—The production for July was 930, against 667 tons of mineral for July, 1890. The production for seven months foots up 6,043 tons, against 3,194 tons a year ago, an increase of 2,849 tons.

IRON.

LAKE SUPERIOR IRON COMPANY.—The recently published annual report for 1891 shows gross receipts amounting to \$1,364,603.25, with expenditures aggregating \$1,070,276.01, and a net profit of \$475,862.16. The company paid \$4 a share in dividends during the year, and has just made another division of \$2 a share on the new year. A good showing was made by the two steamships of the company which were in commission during the season. The company now has four steamers in service. Mr. J. S. Fay, Jr., of Boston, treasurer and general manager, says with reference to the present year: "The outlook is decidedly poor. Fairly large sales of the current product have been made, but the prices obtained were very low. The company's steamers will only earn a moderate living, but the buildings, equipment and preparatory work at the mine are in such excellent condition that it should enable the business to be conducted with economy. In the meantime it will be my policy to keep the work of development under ground well up to and in advance of the current product, but to economize in every other direction."

MENOMINEE RANGE.

SHAFER.—This mine has been attached by local parties to satisfy claims aggregating between \$5,000 and \$6,000. Operations have been suspended.

GREAT WESTERN.—This mine, which was practically idle early in the season, is said to be shipping 1,000 tons of ore per day.

MISSOURI.

JASPER COUNTY.

(From our Special Correspondent.)

JOPLIN, Aug. 10.

There was a large output of ore last week and the ore buyers were in the market for all there was in sight at an advance over the previous week. Zinc ore ruled strong during the week at \$23@25 per ton. Lead ore advanced to \$25.50 per thousand. Following is the output of the different camps as far as reported:

Joplin mines, 1,730,410 pounds zinc ore and 167,400 lead; value, \$24,170.

Webb City mines, 378,040 pounds zinc ore and 47,480 lead; value, \$5,557.75.

Casterville mines, 1,639,610 pounds zinc ore and 151,340 lead; value, \$23,288.75.

Zincite mines, 299,230 pounds zinc ore and 3,230 lead; value, \$3,843.

Galena, Kans., mines, 800,000 pounds zinc ore and \$3,940 lead; value, \$11,149.

Districts total value, \$68,008.50.

The Roaring Springs Land and Mining Company's tract of land, just south of the city, is becoming a live mining camp. Prospect shafts are being put down in all directions, and some good ore bodies opened at a depth of 50 ft. Hood & Co., who have been developing for some time, are now washing and cleaning ore, and last week turned in 11,850 lbs. zinc.

Mr. F. S. Treadway, superintendent of the Mineral Creek Mining Company, operating in the Old Sherwood district, called on your correspondent this morning and reported having cut a fine body of free zinc ore at a depth of 130 ft. Heretofore all the mining in this district has been on the shallow deposits, but depth now has proved the continuity of the ore, which contains less iron pyrites.

Rice & James, operating the Mahaska land, are running steady and producing a large amount of ore.

HOLDEN MINES.—The property situated at Belleville was bought last week by Chicago parties for \$30,000. The property, 40 acres of developed land, has been a steady producer of lead and zinc ore for the past four years. The new company is said to be making arrangements for putting in a heavy plant of machinery and operating the mines on an extensive scale.

MITTLEBERG LEAD AND ZINC COMPANY.—This company, operating on the Oswego land, has been doing dead work for the past two weeks so as to open up some new ground, but will again commence cutting on ore and making regular turnings.

SOUTH JOPLIN MINING COMPANY.—This company is pushing development on this property and opening up some fine bodies of ore. The new concentrating plant has been finished and Colley & Elmore will soon place the machinery in position.

MONTANA.

Work on the road from Ellensburg to the Peshastin gold mines is progressing rapidly. The Culver Quartz Mining Company is making arrangements for the transportation of its new 10-stamp mill from that town; it has 22 men at work, and has purchased all the old Marshall Blinn or Cascade Mining Company's quartz mines and milling outfit.

BEAVER HEAD COUNTY.

HECLA CONSOLIDATED MINING COMPANY.—It is rumored that an Eastern syndicate is about to purchase this company's property located at Hecla and Glendale, the price being \$1,500,000, of which \$100,000 is to be paid down.

CHATEAU COUNTY.

Messrs. C. A. Ness and J. S. Roberts, with eight experienced coal miners, have started to explore, by tunneling and shaft-sinking, the quantity of the coal in the Black Coulee coal fields. Several hundred tons are to be taken out and shipped to be tested by Butte & Boston Mining and Milling Company, which sent out the above-named party.

DEER LODGE COUNTY.

BI-METALLIC MINING COMPANY.—According to report, this company has started a crosscut south in the main working shaft on the Jas. G. Blaine lode from the 700-ft. level, with the evident intention of exploring the Rattlesnake ground, the property of the Elizabeth Mining Company. Under the old West Granite management all of the underground workings from the Rattlesnake shaft were to the north, in the vain hope of striking the Granite lead, but since then the Granite company has proved the existence of a rich vein of ore directly east and adjoining the Rattlesnake, in the Sunnyside claim.

CARBONATE EXTENSION MINING COMPANY.—Active development work is being done at this mine. The trustees decided recently to levy the first assessment of one cent per share, payable on or before the 15th inst.

COMBINATION MINING AND MILLING COMPANY.—This property is reported to be in good shape, more than 100 men being on the pay roll, and two batteries of five stamps each being added to the mill, which is expected to be in full blast shortly.

CHAMPION MINING COMPANY.—The mill turned out 11,000 ozs. for the 20 days' run in July. The air

compressor recently purchased is not yet in operation.

LION MINING COMPANY.—Another one-cent assessment has been levied for the purpose of carrying on development work.

LEWIS AND CLARKE COUNTY.

A vein of anthracite is reported to have been discovered at the mouth of the McClellan gulch, about ten miles east of Helena. The shaft was put down to a depth of 50 ft., at which point the vein was found to be about 4 ft. in width. A level is now being run to a depth of 50 ft. to further test the extent of the vein.

MEAGHER COUNTY.

The Iron Chief, Armada, California, Legal Tender and many other mines are temporarily closed, awaiting a railroad to transport the ores to market or means for treating the ores at home.

Owing to the difficulty of getting ore from the Baker and Neihart mines to Great Falls, the smelter at that point has closed down and will remain so until the railroad can transport it. There has been a great deal of trouble on account of washouts, and there is not enough ore coming in to keep the works going. Until within a few weeks there has also been a lack of ore at the Helena works, but now the stacks are kept going and there is a slight accumulation. The improvements at the Helena smelter have also been delayed by the wet weather.

The mine owners in the vicinity of York have united in a petition to the Secretary of the Interior, calling his attention to what they call the wholesale and disastrous denudation of the public lands on both sides of the Missouri River in that vicinity. According to the petition the Butte & Montana Commercial Company is the guilty party. The miners say that in the territory in which the company is operating there are more than 100 mining locations upon which the annual reclamation work is being done. The timber is being cut from the water-sheds of Beaver, Soap, Trout, Kingsbury, Magpie, Cave, Neversweet, White's Avalanche and Confederate creeks, and these streams, they allege, are their sole dependence for water for mining and agricultural purposes. The ranchmen also join in the petition, and both allege that the timber is absolutely necessary, not only for the quartz and placer mines, but also for making improvements on ranches. It is also asked that in case the Butte & Montana company should apply for the privilege of cutting timber from land in this section, the application be denied. The petition is signed by F. O. Spratt, representing the Trout Creek Gold Mining Company, and 51 mine owners, both quartz and placer, and ranchmen. The matter will be placed in the hands of the Governor with the request that he send it to Secretary Noble.

CASTLE COAL AND COKE COMPANY.—This company has been incorporated to work the coal deposit that the Doucet family recently discovered near Castle. The officers are: O. P. Dabney, president; Mrs. Mary Doucet, treasurer; Mrs. Dottie Donovan, secretary. The capital is \$500,000, shares \$1 each.

GOLD, SILVER, PLATINUM AND TELLURIUM COMPANY.—Development work is being pushed vigorously on the eight claims owned by this company. It is stated that a block of ore weighing about 400 lbs. has been stored in the ore-house with the view of sending it to the World's Fair in 1893.

SILVER BOW COUNTY.

ALICE MINING COMPANY.—Sinking in the shaft of the Alice, recently resumed, will be continued until the 1,500 ft. level is reached, the 1,400 having been passed. This will make the shaft 35 ft. deeper than that of the Lexington, but as the mouth of the former is about so much higher than the latter, the bottom of each will reach about the same level.

BUTTE & BOSTON MINING COMPANY.—The capacity of the smelter portion of the works of this company is now 400 tons per day, while the mill crushes about 75 tons more, says *Butte Daily Miner*. The company's bullion shipped by the express offices of Butte all comes from the mill, while that contained in the smelted ores goes out by freight in the shape of matte. The ore milled is taken principally from the company's silver claims on the hill, while that smelted comes from the Silver Bow, Ground Squirrel, Belle of Butte, East Gray Rock and West Gray Rock. At the East Gray Rock the company is just finishing a new hoisting works, which is much larger than the old structure. The shafts of both the Gray Rocks are now getting so deep that larger machinery has to be employed, which necessarily requires larger galloways frames. The Ground Squirrel, from which the smelters are getting ore, is a large copper property; it was not expected to contain a pound of pay rock until about three months ago. The shaft has not yet reached a depth of more than 200 ft. There are now about 400 tons of good ore on the dump. Two new O'Hara furnaces are being added to the Butte & Boston works, which, when complete, will make a total of eight O'Hara and six Brueckner roasters.

LEXINGTON MINING COMPANY.—The west half of the mill belonging to this company was recently closed down for repairs. That portion of the mill now running is getting its supply of ore from the

upper levels of the mine and the various leases on the surface. The company is still exploring the lower workings of the property.

PARROT SILVER AND COPPER COMPANY.—Both the smelting plant and mines of this company are in full operation. The new engine at the Parrot proper is now in good running order. The old engine has been taken to the Little Mina, a recent purchase by the company, where it will be put to work in a short time.

NEBRASKA.

DOUGLAS COUNTY.

OMAHA & GRANT SMELTING AND REFINING COMPANY.—The eight-hour day agitation, which has for some time gone on among the men at this smelter, where they have been working 12 or 13-hour shifts, is of late causing serious trouble. When the eight-hour law went into effect on the 1st inst. the company wanted the men to sign contracts binding them to work the same number of hours for the same pay as before. The prompt discharge of those who refused to sign, infuriated the men; they held a meeting, discussed the question and marched in a body to the works, where the police, though reinforced, was unable to cope with the crowd. The mob, numbering about 1,000 people, drove the employes who had remained at their post from the furnaces. The crowd which did not otherwise behave in a riotous manner, left the works in charge of the police, taking with them even the 60 men who were to stay to watch the fires die out. Nobody was hurt, but some damage was done arising from the cupolas being chilled. President Barton stated in an interview that the smelter will be shut down for an indefinite period, and perhaps removed from Omaha, several cities, among them Denver and Council Bluffs, being anxious to get the works.

NEVADA.

DOUGLAS COUNTY.

(From our Special Correspondent.)

The reports which have been arriving from Pail Mt. during the last few weeks appear not to have been much exaggerated. The work done so far has been of a superficial character, there only being one claim where a shaft has been sunk to any depth, it being about 50 ft. deep. The largest amount taken out in one day, \$400, was from this claim. The formation is volcanic; the gold, being mostly free, is found in a geological formation showing contact veins in slate. A. R. Jackson, formerly of the Sutor tunnel, is of the opinion that the ledges apparently were forced up through the limestone cap by volcanic action, and the cross veins forced up at a later period. The free gold came originally from decomposition of iron pyrites. Considerable gold-bearing quartz is exposed. So far the place is only surface-scratched, and anywhere a pan of dirt is washed a color can be obtained.

For a time it was feared that there would be bloodshed over disputed locations, but everything is reported quiet now and a district is to be formed to save journeying 20 miles to Genoa for the purpose of recording claims.

ELKO COUNTY.

(From our Special Correspondent.)

SAN FRANCISCO, Aug. 8.

COMMONWEALTH MINING COMPANY.—No. 1 winze on the fourth level is down 28 ft., having passed through the ore 15 ft. below the level. It will be continued straight, there being less water than in the ore and cross-cut at 50 ft.

DEL MONTE MINING COMPANY.—The assays from the face of No. 1 north drift, third level, have ranged as high as \$82.75 per ton. The vein is five feet wide in No. 2 north drift, the ore showing all through.

NORTH BELLE ISLE MINING COMPANY.—The upraise on the east vein, 450-ft. level, is in hard rock, showing many seams of good ore. The west cross-cut from the north end of Belle Isle, 450-ft. level, has been extended 14 ft.

NORTH COMMONWEALTH MINING COMPANY.—Last week the first-level stopes yielded ten cars of ore, the average assay being \$300 per ton. On the third level No. 2 raise extended 15 ft., cutting about three feet of ore, some of which is high grade.

EUREKA COUNTY.

EUREKA CONSOLIDATED MINING COMPANY.—This company made a shipment of \$18,500 bullion on the 7th inst.

STOREY COUNTY—COMSTOCK LODGE.

CONSOLIDATED NEW YORK MINING COMPANY.—At the annual meeting of this company, 91,850 shares were represented, and the following board of directors elected: C. Hirschfeld, president; M. Rehtisch, vice-president, and W. Erskine, M. Jaffe and Thomas Anderson, directors. Charles E. Elliott was re-elected secretary, and his financial statement showed a credit of \$8,611. A. C. Hamilton was re-elected superintendent.

VIRGINIA & GOLD HILL WATER COMPANY.—At the recent meeting of this company the old directors and officers, with Capt. Overton as superintendent, were re-elected.

(From our Special Correspondent.)

The following is the weekly statement of ore

from Comstock mines milled, with the battery assay values:

Mine.	Extracted, Milled.		Assay Value.	
	tons.	tons.	Aug. 1.	July 26.
Con. Cal. & Va.	1,681	2,285	\$24.50	\$22.60
Chollar.....	520	520	19.10	10.20
Justice.....	...	174	18.11	16.26
Ophir.....	...	a 239	...	...
Occidental.....	b 740	325	17.30	...
Overman.....	913	879	c 4.57	...
Savage.....	d 591	505	20.00	18.19
a Accumulations of exploration ore.				
b Approximate.				
c Car sample assay \$14.35.				
d Cars.				

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—John W. MacKay has assumed charge of this and other of the north-end mines this week, Mr. Lyman leaving for a vacation. During the present week the work of stopping out ore on the 1,100 level has been discontinued and the work of extending the south drift resumed. The ore body discovered some time ago on the 1,100 level, and which the West Consolidated Virginia people maintained was a continuation of the West Consolidated vein, bids fair to be another bone of contention between the rival companies. Mr. MacKay is reported as having said that he intended to open it out, and if he does, there will be war. It is worthy of remembrance that when the Consolidated Virginia Company sunk a winze from the 1,650 to the 1,750 level in ore, it also ran a drift from the 1,100 west of the shaft. Owing to the natural pitch (45°) of the Comstock ledge, from which the bonanzas were taken, it would have been necessary to drift east from the shaft to strike that ledge, from the fact that the bonanza on the 1,200 level was 200 ft. east of the shaft. It seems conclusive, then, that the new ore body, whether a continuation of the West Consolidated or not, is an independent ledge, as is being asserted by some in authority.

On the 1,650 level ore of fair quality is being extracted from the drift run west from top of upraise 59 ft. above southwest drift. During the last week bullion was shipped to the Carson mint valued at \$47,762.97, there being bullion remaining at the assay office valued at \$23,500.

OPHIR MINING COMPANY.—Prospecting work is being carried on from the opening in vicinity of the point where the upraise from the sill floor, 1,465 level, connects with the drift run west from the winze, 122 ft. below the sill floor of the 1,300 level. All accumulated ore has been shipped to the Morgan mill.

OCCIDENTAL MINING COMPANY.—The south drift, No. 2 crosscut, on the 650 level, is in ore of the average value of \$22 per ton. The openings on the 600 level have been yielding on an average 10 tons per day.

POTOSI SILVER MINING COMPANY.—The winze is down 67 ft. below the 1,500 level, the bottom being in porphyry and stringers of quartz. The drift on the 1,300 level has been run into Bullion ground, and on the 1,500 level a station has been opened and will get into Bullion ground within a few weeks.

SAVAGE MINING COMPANY.—On the 1,400 level a northwest drift has been started from the station at the bottom of the 1,300 winze. No. 2 west crosscut, same level, has been advanced 66 ft., the face of the crosscut being in fine ore on this same level, back of the incline, and 160 ft. north of south line a good body of ore was found which is said to be on the ledge alluded to as being in dispute between the Con. California & Virginia and West Con. Virginia companies. In the Chollar mine, too, it is reported that they passed through the Black Dyke wall to the west and found a fine body of quartz giving low assays in gold and silver.

NEW MEXICO.

The shipments of ore, concentrates and bullion by freight and express from Silver City during July amounted approximately to 5,120,000 lbs. of iron ore; 560,000 lbs. of lead ore; 40,000 lbs. of silver ore in bulk; 100,000 lbs. of high-grade silver and gold ores in sacks; 600,000 lbs. of concentrates; 22,631 lbs. of bar copper; \$16,273 in gold dust and bullion, and \$405 in silver bullion. These shipments are about three times as large as those in June, which were much larger than during the preceding months.

TUERTO MOUNTAIN COPPER AND GOLD COMPANY.—Large copper and gold deposits have been discovered on the northern slope of the Tuerto Mountains of this State, and the above company has been organized at Santa Fe to work them. The company has a capital of \$1,000,000. The incorporators are Governor Prince, of New Mexico; Bank President L. Spiegelberg, Col. R. W. Webb, both of Santa Fe; S. E. Raunheim, of New York.

SANTA FE COUNTY.

ALPHA GOLD MINING COMPANY.—This company has been incorporated under the laws of the Territory of New Mexico by M. Slattery, R. G. McDonald, and G. A. Rothgeb; T. B. Everett, manager. Principal office will be at Las Vegas. The company has leased the Fiske mill at Dolores and is now making its first mill run.

OHIO.

COLUMBUS & HOCKING COAL AND IRON COMPANY.—The report of this company, in addition to what we published last week, says that the present management, on taking control, found itself

with few desirable orders on the books, some of the best having been transferred by the retiring officers and agents. They were confronted with a claim from the Milwaukee, Lake Shore & Western Railroad for a deduction of \$6,770 on account of inferior coal furnished the previous year. They were also obliged to pay judgments amounting to \$2,431 for damages occasioned two years ago by coal slack washed down upon other property. Over \$8,000 have been charged off on account of bad debts, and a mining machine privilege, carried as an asset at \$3,000, has been charged off. Property in the city of Columbus was sold for \$16,500, and negotiations are pending for the sale of the balance of real estate owned in that city. The company owns between two and three thousand acres of land which do not contribute to the income account, but on the contrary cost considerable in taxes. This land is to be sold and the proceeds used to retire first mortgage bonds. The capacity of the several mines has been increased during the year, and about \$4,500 will be used in making further improvements in the year to come. This will make the capacity of the mines on the Hocking Valley road about 4,000 tons daily, and on the Baltimore & Ohio road about 1,000 tons, or a total capacity of 5,400 tons. The introduction of an electrical machine plant at one of the mines, at a cost of \$25,000, is recommended. About half the total tonnage mined by the company is subject to a royalty of 10 cents a ton, involving an annual outlay of about \$35,000. The total tonnage last year was 713,283, and would have been larger but for the fire at Ashland, Wis. The stockholders authorized, something over a year ago, an issue of \$500,000 of preferred stock; \$200,000 were sold at 80, but the condition of the money market has not permitted the sale of the remainder at that price. Members of the board have, therefore, provided working capital in order to economically market and mine coal to meet the Northwestern demand of \$100,000 a month for about three months.

OREGON.

BAKER COUNTY.

JAY GOLD.—Litigation has until very recently prevented development work on this mine in Hilbard Gulch, but the case now being decided, the company is pushing the work, and the mill will be running shortly. The stamps are being taken from the Virtue mill to work at the Jay Gold.

SAN FRANCISCO, Aug. 8.

MULTNOMAH COUNTY.

(From our Special Correspondent.)

The trouble in which the smelting works have been involved culminated on Wednesday, when Messrs. Selover & Bunker, who were prepared to resist armed force, capitulated to an attachment. The Bank of British Columbia held the company's note for \$30,000, which was transferred to T. R. Dawson, who at once sued out an attachment. The charge in the capula ran out and the fires were extinguished.

PENNSYLVANIA.

COAL.

An explosion of gas took place at the York Farm mines near Pottsville, on the 8th inst., killing or severely injuring several miners. Fire is raging in the mine. The air pressure was put to work but could accomplish nothing. Air fans were then placed in position, and it is believed that the gas can be driven out and the flames thus placed under control.

ENTERPRISE COAL COMPANY.—Messrs. John R. Davis, W. L. Connell, J. A. Connell, W. L. Gearhart, of Scranton, and B. A. Hill and D. F. Hughes have purchased the colliery, breaker and other property of this company, near Shamokin. The capital is \$300,000, taken in blocks of \$50,000 each, except those of Messrs. Hill and Hughes, who have that amount equally between them. The daily capacity of their property is 800 tons from the Mammoth vein, with all "dead work" done to take out a million tons of coal, and more of the same vein ahead of them, and also a 10 ft. vein of Lyken's valley red ash opened by a slope of 300 ft. As soon as the red ash vein is opened to capacity for it they propose to build another breaker. Mr. Hughes has been appointed superintendent.

PHILADELPHIA & READING COAL AND IRON COMPANY.—Workmen at this company's colliery, near Ashland, struck the north dip of the mammoth vein on the 7th inst. The find is regarded by the company as one of importance, as the new vein averages a thickness of 32 ft. Three shifts of men have been engaged to develop the new vein to its fullest extent.

SOUTH DAKOTA.

BUTTE COUNTY.

A vein of lignite coal, reports state, has been discovered at Belle Fourche. The vicinity will be further prospected.

LAWRENCE COUNTY.

The total semi-monthly shipments of bullion from Black Hills mines, made on the 7th inst., aggregated nearly \$195,000.

BULLION MINING COMPANY.—This company, of Galena, is working 10 men at present, the force having been decreased on account of the water found in many drifts of the mine. Forty tons of ore averaging \$30 per ton have been shipped to Denver and satisfactory returns received. No further shipments will be made until it can be as

certain what rate for treatment can be secured for the ores at Deadwood and other places.

DEADWOOD & DELAWARE SMELTER.—This smelter completed its fifth day's run on the 3d inst. Of the two carloads of matte, valued at \$6,000, which has accumulated, one will probably be sent to Aurora, Ill., for refining.

GOLDEN REWARD REDUCTION WORKS.—The semi-monthly shipment from this company on the 7th inst. amounted to 15,000 in a gold brick.

TEXAS.

In the foot-hills of the Organs, between El Paso and Las Cruces, according to report, a 3-ft. vein of coal has been discovered.

UTAH.

The ore and bullion receipts at Salt Lake City for the seven months of 1891 amounted, in bullion, to \$2,740,793, and in ore valued at \$2,432,875. These amounts are exclusive of operations, which make reports at the end of the year only. The shipments from Salt Lake City for the same period amounted to 10,932,147 pounds of bullion, 3,415,586 pounds in lead, 1,528,710 in matte and 76,625,551 pounds of ore.

BEAVER COUNTY.

HORN SILVER MINING COMPANY.—During the first six months of this year this company shipped 83 lots of ore, aggregating 11,128 tons and 1,234 pounds. During July, 20 lots, aggregating 2,209 tons and 772 pounds were shipped. The most of this ore is shipped out of the Territory.

JUAB COUNTY.

BULLION, BECK & CHAMPION MINING COMPANY.—Mr. W. H. Smith, superintendent of this company, says the shaft is nearly 900 ft. down, and that the station will soon be cut out there. The 700-ft. level is pretty well opened up, and on it there are several large bodies of good ore, and the 800-ft. level is being cut with good results, large bodies of ore being uncovered. The daily average shipments amount to 100 tons.

PARK COUNTY.

ALLIANCE MINING COMPANY.—Reports from Park City state that ore has been struck in the face of the main tunnel.

PIUTE COUNTY.

GOLD BELT MINING AND MILLING COMPANY.—This company has filed articles of incorporation at Salt Lake City. The capital stock is \$500,000, shares \$1 each, and the officers are: President, W. F. Colton; vice-president, James A. Chute; secretary, W. H. Donnell; treasurer, E. L. Carpenter; general manager, C. L. Ames. The property consists of four mining claims, three of them being recent discoveries, and located near the Dayton Gold Mining and Milling Company's property in the Ohio mining district, near Marysville.

GOLD HILL MINING AND MILLING COMPANY.—This company has been organized in Salt Lake, with a capital of \$2,000,000, shares \$5 each. The officers are: C. E. Stanton, president; W. F. Neary, vice-president; J. M. Stull, treasurer, and W. H. Munson, secretary; these with Thomas Cuff, E. J. Eddards and A. D. Elliott form the board of directors. The company has 17 claims in the Marysville country, the prominent ones being the Lorette, Nancy and Mary, on which it has about 1,500 ft. of cuttings. The Millis Ford and Wasatch are two other claims of the group.

SALT LAKE COUNTY.

NIAGARA MINING AND SMELTING COMPANY.—A body of ore 15 ft. thick, worth about \$70 per ton, is reported to have been struck in the Utah mine.

SUMMIT COUNTY.

DAILY MINING COMPANY.—The production of this company for the seven months of 1891 amounted to sulphides valued at \$220,195.44. The ore sales netted \$135,543.65.

ONTARIO MINING COMPANY.—The production for the seven months of 1891 amounted to 533,540 ounces of bullion. The ore sales made during this time amounted to \$376,169.60.

WASHINGTON COUNTY.

DIXIE MINING COMPANY.—This company contemplates the erection of a smelter at St. George to treat its ores. It has a 15-ft. vein, which will average well in copper. At St. George there are two mill sites with about 200 miner's inches of water and a 60-ft. fall, which will furnish power enough for operating a smelter. Besides this copper ore there is said to be considerable ore that runs 15 per cent. lead and 5 to 25 ounces silver.

WASHINGTON.

SNOHOMISH COUNTY.

HORSE SHOE BEND GOLD MANUFACTURING COMPANY.—This company has accepted the offer from a Leadville miner to open and continue to operate its placer claims, located on the Sultan, for a half interest, without any expense to the company.

OKANOGON REDUCTION COMPANY.—This company's mill has commenced operations, running 10 tons of ore every 24 hours.

WISCONSIN.

BAYFIELD COUNTY.

Mr. Frank Eryga, assistant superintendent of repairs of United States buildings, recently inspected the brownstone quarries about Bayfield with a view of using the stone in the construction of public buildings.

WYOMING.

CONVERSE COUNTY.

FETTERMAN COAL COMPANY.—Reports state that the fire in this company's mines at Glen Rock is more serious than was at first supposed. All the entries have been closed. It is estimated that the loss will be fully \$50,000, and it may be necessary, when the flames are smothered, to make new entrances.

FREMONT COUNTY.

GARFIELD.—Mr. Arthur Sparhawk, manager of this mine, in the Atlantic district, has interested Boston and Canadian capitalists, who are said to have invested \$25,000. The mine was abandoned twelve years ago after a cave-in and a flood. John Lenne relocated it. The new owners have ordered hoisting and pumping machinery and a ten-stamp mill that can be increased to forty stamps.

JOHNSON COUNTY.

It is announced that a Bennett amalgamator has been secured for the Bald Mountain placer fields and the plant shipped from Denver.

FOREIGN MINING NEWS.

GERMANY.

During the past few weeks borings for salt have been made in eight different places near Heilbronn. In the boring made by Messrs. Solvay, at Saarlalben, salt was found at a depth of 502 ft., and, after the finding had been officially notified, the right of working a district of 500 acres was obtained.

MEXICO.

The Geological Commission of the Republic, which was to have expired by limitation on the first of August, has been reorganized by the President and the term extended for one year more, says *El Minero Mexicano*. The geological map of Mexico, formed by the commission, took the first premium at the Paris Exposition and now the same commission will devote the present year to the correction of the map and its construction on a large scale so that it can be presented at the Chicago Exposition. The new map will be on the scale of 1—2,000,000, or one-third larger than the former one. Of this work a large part of the states of Chihuahua and Sonora has been corrected from recent data obtained in the field by Mr. Baltasar Muñoz, mining engineer. A large part of the Territory of Tepic has been explored by Mr. Lamberto Cabañas, mining engineer, who is now exploring that territory on the Pacific Coast as far north as Mazatlan. The tropical part of the State of Vera Cruz, as far south as the line of the State of Oaxaca and the whole State of Puebla, have been studied by the paleontologist, Mr. Jose Guadalupe Aguilar, who made a long stay in those regions while prospecting for coal mines for account of a foreign company.

CHIHUAHUA.

The silver mills of Nueva Australia, and La Gloria, situated near Batopilas in Cerro Colorado, have been completed, and their wire rope tramways for the transportation of the ore from the mine have been set to work. Each of these mills is fitted up on the Huntington system and the motors are large turbines. The capacity of each mill is 75 tons of ore a day.

COAHUILA.

The Alamo and Hondo coal mines are together producing 450 tons of coal daily. The miners are American and Chinamen, the latter doing fair work. A fine coal washer erected there washes from 400 to 500 tons daily. The washer was built with all modern improvements by the Fort Scott Foundry and Machine Works, of Kansas City. Sixty coke ovens are turning out about 30 tons of coke per day and 40 more ovens will soon be ready for operation. The mines are reached by a branch line of the Mexican International Railway.

FRONTERIZA MINING COMPANY.—This company, of the Sierra del Carmen, has bought a property in the town of Musquiz on which to establish smelting works which will run on ores largely from the Carmen mine.

NEW ZEALAND.

The gold and silver sulphide ores of the Champion mines, situated in the Thames district, are so refractory that the process most successful hitherto extracted from 85% to 87% of the gold and from 72% to 86% of the silver. Messrs. J. C. Montgomerie, of Dalmore, Ayrshire, and H. Parkes, of London, England, have during the past few months experimented with these ores, with the following results: Ore assaying 1 oz. 1 dwt. 11 grains gold and 39 oz. 4 dwts. 21 grains silver, is said to have yielded 98% of the gold and 93½% of the silver; and from ore assaying 2 oz. 9 dwts. gold and 59 oz. 19 dwts. 7 grains silver, as high as 99.62% of the gold and 95.39% of the silver have been extracted.

QUEENSLAND.

The recent discoveries of argentiferous copper lodes at Watsonville, says the *Australian Town and Country*, are attracting considerable attention. One lode of black ore yielded 40% copper, and from 16 oz. to 42 oz. silver to the ton. It can be traced on the surface for 1,200 ft., and the width of the lode is unknown. In ground comprised in the Herberton Broken Hill Silver mine are nine lodes radiating from the central lode, which is 800 ft. wide. It adjoins the New North Australian tin mine. In the east lode of the Great Northern tin mines there has been discovered at the 400-ft. level one of the best bunches of tin ever met with in this mine.

close to \$4.85. Scorpion had one sale of 400 shares at 45c. Utah shows transactions aggregating 800 shares at 90c. @ \$1. Consolidated California & Virginia disposed of 120 shares at \$6@6.50. This company has declared a dividend of 50 cents, payable on the 17th inst. Gould & Curry was quiet at \$1.75@1.90. Hale & Norcross, under sales of 300 shares, declined from \$2.25 to \$1.85. Ophir had one sale at \$3.75 and Savage another at \$2.25. Sierra Nevada was quiet at \$3.25. Yellow Jacket declined from \$2.05 to \$1.85 with 300 shares sold. Belcher levied an assessment of 50 cents on August 4th; delinquent September 27th.

Of the Tuscarroras Nevada Queen has one sale of 200 shares at 25c.

There were 100 shares of Mt. Diablo sold at \$2.35.

Among the California stocks Astoria shows reported sales of 7,800 shares at 1c. Of Belmont 1,250 shares changed hands at 8c. The superintendent of this mine has telegraphed to Mr. H. R. Lounsbury, the transfer agent, that the bullion for the month has been shipped. The stopes are reported to be looking well and the mill is quite busy. Hollywood, which has not been dealt in for quite a long time, shows sales this week of 2,000 shares at 2c. Sales of Middle Bar amounted to 3,000 shares at 1@2c. Standard was in considerable request during the week, and 1,600 shares were sold at \$1.10@1.20. Brunswick Consolidated disposed of 1,000 shares at 10@11c. The superintendent of this mine writes that the ledge is widening and the ore improving; from 6 to 10 cars of ore are being extracted daily and the mill is kept busy.

There were 800 shares of Ailee sold at \$1.75@1.85. The company has declared a dividend of 6 1/2c and the reports from the property are said to be very good.

We note a sale of 100 shares of Deadwood-Terra at \$1.35. This company has declared a dividend of 5c. The last dividend was declared in November of 1887.

There was one sale of 100 shares of Caledonia at 70c.

Among the Colorado shares Iron Silver, which has not been dealt in for a long time, turns up this week with a sale of 1,000 shares at \$1.10. Leadville Consolidated was dealt in to the extent of 200 shares at 10c. Little Chief shows a sale of 500 shares at 30c.

El Cristo returned to the Exchange this week, and managed to dispose of 600 shares at 30c.

Prices and sales for the week ending Aug. 10th:

Table with columns: Company, Mines, Alleghany, Amity, Bangkok-C-B, Bates-Hunter, Brownlow, Calliope, Cash, Clay County, Gettysburg, Gold Rock, Leavenworth, Little Hole, Matchless, May-Mazepa, Oro, Pay Rock, Puzler, Reed National, Rialto, Running Lode, Whale, Bal. Smuggler, Prospects, Argonaut, Big Indian, Big Six, Century, Claudia J., Nat. G. & Oil Co., Diamond B., Emmons, Golden Treas., Ironclad, John Jay, Justice, Legal Tender, Morning Glim, Park Consolidated, Potosi. Includes 'Total' and 'Buyer' information.

Total 33,100. * Buyer 30. † Buyer 60. ‡ Seller 60. § Seller 30. a Asked. b Bid.

Boston. Aug. 13. (From our Special Correspondent.)

The market for copper stocks has lapsed into a state of dullness, and there is no prospect of improvement for some time to come. A few scattering orders to buy the dividend-payers for investment serves to keep prices steady for this class.

In Calumet & Hecla there was a little spurt a few days ago which carried the price up to \$255 for a few shares, but it has since declined to \$245 ex-dividend, the net gain for the week being \$5. Tamarack also shows a gain of \$2 on small lots, from \$153 to \$155. Quincy advanced from \$98 to \$100 for 20 shares, and Osceola declined from \$35 to \$34 on light transactions. The Montanas have been fairly well sustained in prices, but the trading in them has been very light, the aggregate sales for the week being less than 1,000 shares. Boston & Montana sold up to \$42, and closed steady. Butte advanced to \$14 1/2, losing the fraction later.

Centennial sold at \$13 1/2 and Franklin at \$15, as last week.

Kearsarge was heavy and declined to \$10. Atlantic sold at \$13.

Allouez was quite freely pressed for sale and declined to \$1 1/2. The latest report from the mine says that the water supply is now ample, owing to heavy rain.

Huron sold at \$1, an advance of 10c. Santa Fé is neglected, although the reports are flattering.

3 P. M.—Calumet & Hecla sold this afternoon at \$250@246, six shares being sold. Quincy declined to \$98 for ten shares, and five shares Osceola sold at \$35.

Silver stocks are quiet, with sales of Catalpa at 25c.

Lake Superior Iron, Gold and Silver Stocks. (Special Report by A. M. Helmer, Milwaukee, Wis.)

Table of stock prices: Iron Range (Anvil, Ashland, Aurora, Bessemer Consol, etc.), Menominee Range (Aragon, Chapin, Commonwealth, etc.), Vermillion Range (Chandler, Chicago and Minnesota Ore Co., etc.), Marquette Range (American, Champion, Cleveland, etc.), Gold and Silver (Badger Silver Mining Co., Michigan Gold Co., etc.).

San Francisco. Aug. 14. (By Telegraph from our Special Correspondent.)

There has been a hardening tendency during the week just closed, and the market opened to-day at a slight advance upon yesterday's prices. Trading, however, has not been very active, and most of the business has been done by inside operators and customary traders.

Consolidated California & Virginia by slow degrees scaled to \$7.12 1/2 to-day, with only moderate sales. The bonanza firm has been figuring as buyers during the week, but to no great extent.

Opb sold to \$300, Mexican to \$255, Sierra Nevada to \$310, and Union to \$265, all these prices comparing very favorably with the rulings a week ago.

The sales of stocks of the middle group of Comstocks have been somewhat larger, without being any out of the ordinary run. Best & Belcher sold freely this morning at \$3.50, Chollar for \$1.85, Hale & Norcross, \$1.80; Potosi, \$4.40; Bullion, \$4.35, and Savage, \$1.70. The strength displayed by Bullion and Potosi may, perhaps, be accounted for by reasons set forth in the news columns.

The Gold Hill stocks have hung fire and the dealings have been very light. Overman has been the most active at \$2.10. Crown Point has been selling moderately well at \$1.85, Kentuck at 35 cents, and Yellow Jacket for \$1.70. Exchequer, after the call to-day, displayed some strength, ruling at 85 cents, with 1,500 shares sold. This latter mine belongs to the group of middle Comstocks, which will soon witness active prospecting work in a large block of virgin ground.

The outside stocks have continued inactive, there being absolutely no trading.

St. Louis. Aug. 12, 1891. (From our Special Correspondent.)

St. Louis mining matters still remain dull and uninteresting. Only a few stocks have enjoyed any business and prices are for the most part stationary. The brokers are evidently letting matters rest quiet during the present season, and are waiting expectantly for the usual autumn trade.

Granite Mountain has been one of the few active stocks. The week's business, amounting to 30 shares, sold at \$23. At one time the stock was bid at only \$22.75 but is now back to \$23.

Elizabeth is another stock that held its own this week and recorded several sales, but the market was very quiet and trading listless. The stock opened at \$1.50 and later sold at \$1.52 1/2, 100 shares going at that figure. On Saturday 400 shares sold at the same figure. Since then there has been no trading and the closing bid was \$1.50.

Montrose was the feature this week, and surprised its best supporters by its showing during the present dull season. It opened at 61 1/2c.; later 150 shares sold at 68 3/4c., followed by a sale on Saturday of 1,500 shares at 72 1/2@71 1/4c. On Tuesday the stock sold at 70c., 500 shares going at that figure. To-day 68 3/4c. is bid.

Yuma was a trifle firmer this week and rose from an opening bid of 43 to 43 3/4c. During the week the stock was bid as low as 42 1/2c. and one sale at 43 3/4c. of 200 shares was made.

Adams grows stronger each week and to-day \$1.87 1/2 is bid, \$1.85 being the quotation at the opening of the week.

Silver Age fell from an opening of 97 1/2 to 90c. now bid with \$1 asked. No sales.

Salt Lake City. Prices and sales for the week ending Aug. 8, 1891.

Table with columns: Name and Location of Company, Open-ing, High-est, Low-est, Clos-ing, Sales. Lists various Utah and Idaho companies like Alice, Alliance, Anchor, Apex, Barnes Sulphur, etc.

Total sales..... 46,100

DIVIDENDS.

American Coal Company, of Allegany County, Md., declared on August 10th a semi-annual dividend of 3% upon the capital stock of the company, payable September 10th, No. 1 Broadway, New York City. The transfer books will be closed on August 29th, at 3 o'clock P. M., and reopen on the morning of September 11, 1891.

Deadwood-Terra Mining Company, dividend No. 32, of five cents per share, \$10,000, payable August 20th, by Messrs. Lounsbury & Co., transfer agents, Mills Building, New York. Transfer-books close August 14th.

ASSESSMENTS.

Table with columns: COMPANY, No., When levied, D'l'nq't In office, Day of sale, Amt. per share. Lists companies like Anchor, Belcher, Best & Belcher, Bullion, Challenge, Clara, S. Dak., Chollar, Crown Point, Exchequer, Garden City, Golden Fleece, Gould & Curry, Hartrey, Homore, Iron Hill, Justice, Massachusetts, Northwestern G. & S. B. C., Pocalontas, Potosi, Troy, U. S. Grant.

PIPE LINE CERTIFICATES. (Special report by Messrs. WATSON & GIBSON.)

The oil market this week has been very quiet after the flurry of last Saturday. It has settled in the neighborhood of 65 to 68 cents per barrel, but is inactive though strong. There are about 8,000,000 barrels of surplus Pennsylvania oil and about 23,000,000 barrels of visible supply of Ohio. The Standard is in position to control the prices absolutely and it is folly to predict what it may undertake to do. It took off the premium which it had been paying for new oil in the Pennsylvania fields, which was the excuse for the speculative advance last week. Looked at as we regard it, however, the removal of the premium removes the incentive to further development work, showing that the Standard has all the oil which it cares to store in its tanks.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

Table with columns: Opening, Highest, Lowest, Closing, Sales. Lists dates from Aug 8 to 14 with corresponding price ranges and sales volume.

Total sales in barrels..... 801,000

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Aug. 8.....	60	70	60	70	83,000
10.....	.....	.....	.....	.....	.....
11.....	.....	.....	.....	.....	.....
12.....	.....	.....	.....	.....	.....
13.....	64	66 1/4	64	66 1/4	33,000
14.....	.....	.....	.....	.....	.....
Total sales in barrels.....					116,600

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Aug. 14.
STATEMENT OF shipments of anthracite coal (approximated) for the week ending August 8th, 1891, compared with corresponding period last year.

Regions.	Aug. 8, 1891.	Aug. 9, 1890.	Difference.
Wyoming Region.Tons	391,630	423,348	Dec. 31,718
Lehigh Region "	116,137	128,278	" 12,141
Schuylkill Region "	220,887	250,819	" 29,932
Total..... Tons	728,654	824,445	Dec. 95,791
Total for year to date Tons	22,557,095	19,696,895	Inc. 2,860,200

PRODUCTION OF BITUMINOUS COAL for week ending August 8th, and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

	1891.		1890.
	Week.	Year.	
Phila. & Erie R.R.....	3,502	114,697	80,421
Cumberland, Md.....	.....	.....	2,237,383
Barclay, Pa.....	3,719	111,564	30,217
Broad Top, Pa.....	9,255	297,689	310,237
Clearfield, Pa.....	729,230	4,313,148	2,318,634
Allegheny, Pa.....	215,095	11,591,187	803,907
Beach Creek, Pa.....	46,344	1,437,967	1,139,226
Pocahontas Flat Top.....	384,871	18,119,944	1,159,163
Kanawha, W. Va.....	37,100	1,380,149	1,229,474
Total.....	1,429,116	37,366,345	9,369,712

WESTERN SHIPMENTS.

Pittsburg, Pa.....	26,750	818,608	516,899
Westmoreland, Pa.....	300,565	1,740,474	775,597
Monongahela, Pa.....	142,000	604,144	286,202
Total	469,315	3,163,226	1,518,698
Grand total.....	1,898,431	41,529,571	10,948,410

Anthracite.

The production for the week ending August 8th was 728,654 tons, a decrease of 95,791 tons over the corresponding period of 1890. The total production of the year up to date is 22,557,095 tons, as compared with 19,696,895 tons for the same time last year, an increase of 2,860,200 tons in favor of 1891.

There is no change in the main features of the anthracite coal trade as reported last week. New business, if there is any, is very slight.

A fully attended meeting of the sales agents was held on Thursday, the 13th inst. It was decided to restrict the output for September to 2,500,000 tons, and prices for next month were agreed upon as follows: Broken, \$3.65; egg, \$4; stove, \$4.25; chestnut, \$3.90, all f. o. b.

There can be but little doubt now in the minds of those who have stubbornly refused to believe that a change for the better was possible, that the companies will stand by their agreement. There is any amount of evidence that this month will see an improved state of affairs in this market, due to the sincere efforts of the companies to adhere to the agreement. Last week the output was actually 8,000 tons short of the amount agreed upon.

The coal trade has been in poor shape for so long a time that, albeit it begins to show signs of improvement, it is as yet far from being in first-class condition. The producers are making decided efforts to place it on its feet, and buyers should pay heed lest they be obliged to pay more money for their coal.

Many consumers who persist in disbelieving that the companies will keep faith henceforth (for some time at least) are taking no steps to secure coal at present. They think that the old regime is still in vogue, and that they will find no difficulty in obtaining supplies at their leisure and inclination. But they may be disappointed, for procrastination, admittedly the thief of time, quite often proves a thief of money. It behooves those who are interested to keep their eyes open, for the coal trade is changing, and changing for the better.

Bituminous.

We must report once more no change whatever in the condition prevailing in this market. The trade keeps on shipments, but is generally quiet. The low ocean freights reported last week continue; occasionally a slightly lower rate is quoted for special inducements. We quote water freights as follows: Norfolk, Newport News, Philadelphia and Baltimore, to Boston and other New England ports, 55 to 60 cents, with 5 cents off on very large vessels. It is a noteworthy fact in connection with the present low freights that the same rate is made to almost every important port in New England; under usual conditions, there is a difference of

from 5 cents to 15 cents between Long Island Sound ports and points round the Cape.

The local trade is very quiet. Consumers are taking their usual quota as shipped to their contract. Very little, if any, new business is doing. Prices are: Norfolk, Newport News, and Baltimore, \$2.60, f. o. b. Philadelphia, \$3.15, f. o. b., the Amboys, and \$3.35 alongside, New York harbor, for the best coals. The lower grades are correspondingly lower in price.

The excessive heat of the past week had its effect on the trade in a way not suspected by many. Many of the men on the railroads were overcome by the weather; this caused a considerable shortage of cars, especially on those roads by which on account of the prevailing freights it is most advantageous to ship.

A big mass meeting of miners and mine workers was held at Edwardsville, Pa., on the 12th inst., to discuss and take action on the two weeks' pay bill. Daniel Lloyd, of Edwardsville, was chairman. Addresses were made by Attorneys T. R. Martin and W. H. McCartney, of Wilkesbarre. Resolutions were adopted calling upon the companies throughout this region to comply with the law and pay every two weeks. Committees were appointed for each colliery on the west side of the river, to circulate petitions among the miners for signatures, requesting the different companies to commence the new system of pay forthwith. The Red Ash Coal Company, of which Mr. M. B. Williams is manager, has notified its employees that after September 1st it will pay every two weeks.

The New York and New England Railroad Company has just awarded the contract for all its coal for one year to the Cresson & Clearfield Company.

NOTES OF THE WEEK.

The Tennessee Board of Prison Inspectors has ordered the removal of the convicts from the Briceville mines, where the recent trouble occurred.

Coxe Bros. & Co. have filed bills in equity in the Luzerne courts against the supervisors of Hazle Township, Pa., to try to restrain them from collecting the very heavy road tax assessed against the firm's property. The company have heretofore worked out their tax, but the present supervisors refuse to allow this to be done during 1891. The tax amounts to a large figure and much interest is centered in the suit.

The general freight agent of the Chicago, Milwaukee & St. Paul Ry. Co. has issued the following order to local agents: "You will at once call attention of coal dealers to the fact that if they do not lay in their winter's supply within the next six or eight weeks it is almost certain that there will be great suffering from lack of fuel before the winter is over. Last year, in the face of the comparatively light crop, Western railroads were unable to supply the demand for cars. From information now at hand it is evident that within the next two months the demand for cars will be greater than we can supply—a car famine is highly probable. Notwithstanding the fact that we are increasing our equipment as rapidly as possible, it is not likely that we will be able to supply our stations with fuel unless dealers provide for the inevitable emergency. This subject is of the utmost importance, and agents are directed to urge prompt action."

Boston.

Aug. 13.

(From our Special Correspondent.)

The anthracite market continues to hold its own in good shape. There is not a great deal of business passing, but this fact does not dishearten agents who are holding out patiently for the much-looked-for improvement. From information gleaned at some of the most prominent shipping points, it is safe to say that the curtailment so much doubted by the trade is a reality. Agents say that if the market is protected in regard to the output, there will be a decided change in its aspect before the Fall demand commences. The present price is not as feeble as many are prone to think, and it promises, ere many weeks elapse, to become much stronger. Its tone is comparatively firm, as buyers are gradually finding out, and the reported concessions are practically confined to individuals.

A seasonable quietness marks the bituminous market. Offerings continue liberal, and the demand is of the smallest kind. Prices rule easy, and there is no saying what a large purchaser could trade at. Coal is coming forward freely on old orders. Lots on cars here are quoted at \$3.40.

Freights are dull and featureless. Tonnage is offering freely with very little demand for it. From New York 45@50c. is quoted; from Philadelphia, 50@60c., and from Baltimore, 55@60c.

The retail demand continues quiet. Prices are held firm, and when the demand commences, an advance would not be at all improbable.

The receipts of coal at this port for the week ending August 8th, were 39,809 tons of anthracite and 6,513 tons of bituminous, against 31,633 tons of anthracite and 23,163 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 1,124,919 tons of anthracite, and 726,201 tons of bituminous, against 985,360 tons of anthracite and 608,560 tons of bituminous for the same time last year.

Buffalo.

Aug. 12.

(From our Special Correspondent.)

The anthracite and bituminous coal trade continues dull, with quotations unchanged. Some old orders are being filled, but new business comes in very sparingly. Dealers hope for an active fall trade to make up for past deficiencies. It is reported that some of the mining companies have shut down for a few days, and that others will follow suit, so that the output may be restricted.

Coal freights by lake are steady; tonnage is in large supply, but shipments comparatively light, and many vessels are left without cargoes, as there was no coal ready. The rates during the past seven days were as follows: 50c. to Chicago, Milwaukee, Portage, Houghton, Menominee, Green Bay, and Hancock; 40c. to Marquette, Saginaw, and Alpena; 45c. to Gladstone; 30c. to Duluth, Superior, Bay City, and Ashland; at the close, vessel men were trying to obtain 40c. to Duluth and Lake Superior ports.

The quantity of coal shipped hence by lake from August 6th to 12th, both days inclusive, was 60,645 net tons, distributed about as follows: 21,860 to Chicago, 12,940 to Milwaukee, 2,700 to Duluth, 12,070 to Superior, 700 to Menominee, 400 to Alpena, 400 to Saginaw, 700 to Detroit, 2,450 to Houghton, 650 to Hancock, 25 to Ashland, 850 to Bay City, 1,000 to Gladstone, 1,300 to Green Bay and 2,900 to Marquette.

Receipts of coal by canal, first week in August, none; shipments, 927 tons.

Col. Alexander says that the newspaper dispatches from Lockport stating that a secret agent from his office was in that town creating a hubbub in the local coal exchange have no foundation in fact, but were gotten up for some ulterior object.

The cost of lighting Buffalo by gas and electricity for the month of July was \$26,260.

The Canadian Government has decided that Carroll Bros. and the Erie County Natural Gas Company have authority to lay a pipe under the Niagara River to supply Buffalo with natural gas from the Welland gas-fields. The work is progressing rapidly, and soon an almost unlimited supply of that fuel will be delivered in our city.

The buildings of the Calumet & Hecla Mining Company in this city are rapidly progressing toward completion, and the rebuilding of the Union Iron Works is well under way, as also are the blast furnaces connected therewith.

Chicago.

Aug. 12.

(From our Special Correspondent.)

There is certainly a better inquiry for anthracite than there was a week ago; country dealers are taking hold a little more freely, and there is more coal moving. But notwithstanding this, there is no disguising the fact that stocks are very large; as one shipper put it, "The city is full of coal." A responsible broker required 50 tons to complete an order, when a large operator here told him if the size suited he would "name a price and fill with a promptness which would make his head swim." Comment is unnecessary. The new rate made by the Wabash and Missouri Pacific railroads completely bars shippers here from Southwestern trade. To illustrate: 15,000 tons of anthracite were sold by a Chicago shipper at Chicago price for the Missouri River trade, but not one carload of this order has been forwarded on account of the discrimination in rates against this city. It is claimed by some shippers that there is a dearth of all-rail coal, and every day from now on will add an element of strength to the situation. Still, all-rail coal can be shaded 15@20c. from the \$5 rate, and consumers can and do buy at \$5.65 delivered.

Soft coal from the East is accumulating, particularly Ohio grades. Prices are not as firm as they were, and concessions are made according to quantity required. Indiana coal is also plentiful and weak, and Illinois in much the same condition. From the former State a notable shortage of cars is reported, and some mines are working on short time, as requisitions for cars are only partly filled. There is some scarcity of smelting coal, and prices are firm. General demand is good, but supply is much in excess of present requirements.

There is a fair market for the gilt-edged Connells-ville article, but inferior quality is a drug. Deliveries on contracts continue heavy, and furnaces and other large consumers here are piling up large stocks.

Prices of anthracite per ton of 2,000 pounds f. o. b. Chicago are: Lehigh lump, \$6.75; large egg, \$5; small egg, range, and chestnut, \$5. Retail prices per ton are: Large egg, \$6; small egg, range, and chestnut, \$6.

Prices of bituminous per ton of 2,000 pounds f. o. b. Chicago are: Pittsburg, \$3.25; Hocking Valley, \$3; Youghioghny, \$3.40; Indiana block, \$2.40@ \$2.50; Illinois block, \$1.90@ \$2.

Coke.—Connellsville, 72 hour, per ton f. o. h. Chicago, \$5.05; crushed, \$4.75; Walston, \$5; New River, \$5; West Virginia, \$4.50.

Pittsburg.

Aug. 13.

(From our Special Correspondent.)

Coal.—The market since our last report shows no particular change. The season is drawing to a close;

year. This also applies to several manufacturers of Ohio softeners, which are in fair demand in small quantities. Lake Superior charcoal is rather more active, though some further weakening is reported, a sale of several hundred tons being made at \$16.90; and inquiries are in the market for 500 to 2,000 tons. Southern coke iron still sags; some good orders were placed during the week, but at very low prices. The chances are that the latter part of the month will witness a good buying movement.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$17@17.50; Lake Superior coke, No. 1, \$15.25@15.75; No. 2, \$15@15.25; No. 3, \$14@14.50; Lake Superior Bessemer, \$17; Lake Superior Scotch, \$17@17.50; American Scotch, \$17.75@18.25; Southern coke, Foundry No. 1, \$15.75; No. 2, \$15.25; No. 3, \$14.50; Southern coke, soft, No. 1, \$15.50; No. 2, \$14.50; Ohio silveries, No. 1, \$18; No. 2, \$17; Ohio strong softeners, No. 1, \$18; No. 2, \$17; Tennessee charcoal, No. 1, \$17.50; No. 2, \$17; Southern standard ear wheel, \$21@22.50.

Structural Iron and Steel.—Outside of the demand for bridge and viaduct work, demand is comparatively light. Plans for several structures are nearly completed, and specifications will be issued shortly. Quotations for ear lots f. o. b. Chicago are as follows: Angles, \$2@2.10; tees, \$2.60@2.70; universal plates, \$2.35@2.45; sheared plates, \$2.30@2.40; beams and channels \$3.20.

Plates.—Orders from stock are of good volume. General mill business is very fair, and prices steady on standard makes. Prices on boiler tubes and pipe have been advanced by the association. Steel sheets, 10 to 14, \$2.70@2.80; iron sheets, 10 to 14, \$2.60@2.70; tank iron or steel, \$2.50@2.70; shell iron or steel, \$3@3.25; firebox steel, \$4.25@5.50; flange steel, \$3.25@3.40; boiler rivets, \$4.25; boiler tubes, 2 3/4 in. and smaller, 55%; 3 to 6 in., 60%; 7 in. and upward, 55%.

Merchant Steel.—A good demand continues from dealers and manufacturers and prices are steady with advancing tendencies, as mills are getting well booked up. Tool steel is in excellent demand from railroads, mines, machine shops, etc. Tool steel, \$6.75@7 and upward; tire steel, \$2.30@2.50; toe calk, \$2.50@2.65; Bessemer machinery, \$2.20@2.30; Bessemer bars \$2@2.10; open-hearth machinery, \$2.60@2.75; open-hearth spring, \$2.75@3; crucible spring, \$3.75@4.

Steel Rails.—A fair inquiry is noted for the lighter sections, with orders for several round lots placed during the week. Standard weight rails are in moderate demand for small lots of 500 tons and upward; contracts were also placed for 3,000 to 5,000 tons. Quotations remain steady at \$31.50@33, according to quantity, delivery, etc. Other track supplies are in moderate request. Regular quotations are: \$1.95@2 for steel and \$1.85@1.90 for iron; spikes at \$2.15@2.20 per 100 lbs. track bolts; hexagonal nuts, \$2.85@2.90.

Galvanized Sheet Iron.—Business is only fair, and while discounts are steady here, at Missouri River points they are shaded 5% to 10%. We quote: 67 1/2% off on Juniata and 67 1/2% and 5% off on charcoal.

Black Sheet Iron.—There is a better demand and some mills have advanced prices a dollar a ton. Quotations are 2.90@2.95c. for No. 27 Common, though some makers are taking orders at less. Dealers figures are 3/10c. from stocks, for same gauge.

Bar Iron.—As mills are well filled with orders for several months ahead the tendency of prices is upward, and some Valley mills are now asking 1 60c. at mill. Demand is moderately good from jobbers and general manufacturers and the market in good shape. Local mills quote 1.65@1.70c., the inside figure being very firm. Demand from stocks and agents' warehouses is good and prices steady at 1.80@1.90c. rates.

Nails.—Steel-cut are being taken more freely by the jobbing trade to the West and Northwest. A sale of 25,000 kegs to one firm in that direction was consummated last week at a price said to be satisfactory to the Wheeling mill agent. Factory price is \$1.65 regular average and \$1.75 from dealers. Wire nails are moving more freely, and inside price from factory is \$1.90, though some quote \$1.95; jobbing price is \$2.15.

Scrap.—Best wrought grades are in demand and prices firm. Railroad lists this month are very light, and what little there is of that quality is held by dealers.

Quotations are: No. 1 railroad, \$19.50; No. 1 forge, \$18.50; No. 1 mill, \$14.50; fishplates, \$21; axles, \$24; horseshoes, \$19; pipes and flues, \$13; cast borings, \$8; wrought turnings, \$10.50; axle turnings, \$12.50; machinery casting, \$12; stove plates, \$8; mixed steel, \$11; coil steel, \$14.50; leaf steel, \$15.50; tires, \$17.50.

Old Rails and Wheels.—Some small lots of iron rails sold at \$23 and 10,000 tons at \$23.25. Several sales of old steel rails are reported at \$14.50@16.50 according to length. Car wheels are a drug at \$15.50 nominally.

Cleveland. Aug. 12.
(From our Special Correspondent.)

The iron ore trade is at a complete standstill, no sales whatever being made. Lake freights have

been on the rise for the past ten days, reaching a high-water mark of \$1.10 from Escanaba, \$1.25 from Marquette, and \$1.35 from Ashland. These rates, however, declined a little this week, and at this writing rates are quoted at \$1 from Escanaba, \$1.15 from Marquette, and \$1.25 from Ashland.

This rapid rise in the cost of lake transportation, due to high grain rates at Chicago, has filled the minds of the ore men with uncertainty, and they are very chary about making quotations for ore yet to come down.

With an advance in lake freights of from 30 to 40 cents per ton since the opening of navigation, it will not be long before ore prices will rise at least to the advance in the cost of transportation, though the furnace-man is not yet prepared to see it in that light.

This is a year of phenomenal direct shipment from vessel. The ore docks were piled full at the opening of the season, and there was practically no room for any more; consequently, the ore brought forward this year has gone forward to the furnaces with a tremendous rush. The ports of Cleveland, Fairport and Ashtabula for the past month have each been forwarding from 75,000 to 100,000 tons per week to consumers.

Quotations remain nominally as follows: Specular and Magnetic Ores: Bessemer 66@69, \$5.25@5.60; Bessemer 60@64, \$4.25@5.00; Non-Bessemer 66@69, \$4.50@4.75; Non-Bessemer 62@65, \$4.00@4.50; Non-Bessemer 57@60, \$2.75@3.75. Soft Hematites, dried at 212°: Bessemer 62@65, \$4.00@4.50; Bessemer 58@61, \$3.50@4.00; Non-Bessemer 55@63, \$2.75@3.25. These prices are for deliveries at Lake Erie ports.

Louisville. Aug. 11.

(From our Special Correspondent.)

The iron situation remains about as last week, few sales, ranging from 100 to 300 tons of silvery. Foundry and mottled grades sold at very low figures. If any change, there is a more easy feeling. We quote as last:

Hot Blast Foundry Irons.—Southern coke, No. 1, \$14.25@14.50; No. 2, \$13.50@14; No. 3, \$13@13.25. Southern charcoal, No. 1, \$16@17; No. 2, \$15.50@16. Missouri charcoal, No. 1, \$17@17.50; No. 2, \$16.50@17.

Forge Irons.—Neutral coke, \$12.50@12.75; cold short, \$12.25@12.50; mottled, \$11.75@12.

Car Wheel and Malleable Irons.—Southern, standard brands, \$19@19.50; Southern, other brands, \$17@18. Lake Superior, \$20@21.

Philadelphia. Aug. 13.

(From our Special Correspondent.)

Pig Iron.—A gradual improvement is setting in, in the pig iron trade, at this time; it is thought that prices have reached their lowest point, and there will now be a change for the better. Some buyers have been in the market for large lots, and in most cases bids were taken at 25 to 50c. below quotations; this shows that some are in want of iron, and as holders stick to their prices, some improvement is bound to result. Even inferior grades are held rather firm at this time, while best brands are selling at steady prices. Pennsylvania is quoted at: No. 1, \$17.75 to \$18; Pennsylvania No. 2 at \$16.50 to \$17. Grey Forge is still quoted at \$14.50 to \$15.

Foreign Material.—Ferro-manganese is still held at \$64.50, but no sales are reported.

Muck Bars.—Asking prices are \$26.50@27 at mill, and a few lots have been taken at \$26.75@27, delivered. Neither buyers nor sellers are willing to make concessions at this time. The intense heat of the past few days will favor holders if it should continue, as it certainly lessens the output.

Steel Billets.—About the same could be said of steel billets to-day as was reported last week. There is very little change in the situation. Prices are low indeed, being from \$27.25 to \$28, but no sales are reported to have taken place. Buyers do not seem in a hurry to place orders.

Skelp Iron.—There is very little demand for skelp iron at this time; nominal quotations for grooved skelp are from \$1.70 to \$1.75, but it is believed that a trifle less would be taken now if an offer was made for a good-sized lot.

Plates.—We are able to note at this time a moderate demand for plates, some good-sized orders being placed during the present week. The output at present is just about enough to supply the current demand. It is expected that the Reading Terminal Company will soon be in the market with its order, but as yet nothing of importance is known in regard to it. Prices are a little irregular. Tank plates are quoted at \$1.95@2.05; shell at \$2.30@2.40; flange at \$3.20@3.30.

Bar Iron.—There is nothing of special interest to report just now in the bar-iron trade, as we are not experiencing any great activity. The extreme heat of the past week has also affected the output of this iron, and therefore the output is about equal to the supply. For best refined iron, city delivery, \$1.75@1.80 is asked, but on large lots it is said that concessions will be made.

Sheet Iron.—There is some little call at this time for heavy sheets, but the demand for thin sheets is not worthy of note. It is generally believed that the next few weeks will see some large orders placed for thin sheets, as they will be needed before long. The market is, however, dull

at present. Best refined is quoted at from 3 to 3.50c., and best soft steel 3 to 4c.

Structural Material.—There is an improvement noticeable in this department of the iron trade, and a few large orders are soon to be called for. There is not very much call for future deliveries to be noted. Angles are quoted at from \$2.05 to \$2.10; sheared plates at from \$2 to \$2.10; tees at from \$2.50 to \$2.60; beams and channels at \$3.10.

Wrought Iron Pipe and Tubes.—Some little wrought iron pipe is selling at this time and at fairly good prices; some boiler tubes have also been taken. Discounts, 57 1/2% on large sizes.

Old Rails.—Old iron rails are quoted at from \$21.50 to \$22.50, but inquiries are very few; steel at \$17.50@18, according to point of delivery and quality.

Steel Rails.—We hear of a little more inquiry with a few sales of steel rails from the West just now, but there is no change in the situation at this point. Quotation is \$30 at mill for small lots.

Scrap.—There is no regular demand for scrap of any kind. No. 1 Railroad is held at from \$20.50 to \$21.50.

Pittsburg. Aug. 13.

(From our Special Correspondent.)

Raw Iron and Steel.—The past week will certainly go on record as the dulllest of the present year. Sales were very few. This fact is owing to various circumstances; first, many of the iron men are absent from the city taking a needed rest to be prepared for the fall trade, which is expected to open early in September. Again a large amount of the iron and steel sold during the last two months has not yet been delivered, so that when operations commence in the fall consumers will have a sufficient supply on hand to last until other purchases can be made. The builders' and carpenters' strike has no doubt tended to cut down the sales of iron and steel, thousands of tons being now used for that purpose, where a few years ago the amount was hardly worth mentioning.

Prices of leading articles are certainly weaker than at date of last report; consumers having a good stock on hand can afford to wait, unless sellers are disposed to make concessions. On the other hand many furnaces, more particularly in the Mahoning and Shenango regions, have sold quite a large amount of iron for later delivery and are generally inclined to hold out for present rates. At the same time reports are going the rounds that Grey Forge and Bessemer Pig have been offered at a decline; so far we have been unable to find good authority for these reports.

Stocks of iron in first hands are increasing. The amount of pig iron on hand July 1st was about 235,600 tons; amount August 1st, estimated, 266,700 tons. Thus the July increase reached 31,100 tons. The surplus is accounted for by the fact that a number of works that have been closed, taking stock and making repairs, have not yet started up; when they do the accumulated stocks will soon disappear. Unless all signs fail, the fall iron business will be unusually heavy. In speaking of the Eastern iron trade, a well-informed dealer has this to say: "There has been a considerable amount of inquiry for pig iron during the week, with bids for large lots provided sellers would shade prices about 25 cents per ton. It may, therefore, be regarded as an established fact that the tide has turned, that business is already on a larger scale, and that consumers have confidence enough to bid for iron in good-sized lots. Compared with the position during June and July this is certainly an improvement, but how much further it will go remains to be seen." The demand for all descriptions has been exceedingly light; this, as a matter of fact, makes certain parties more anxious to sell. Bessemer, about 25 cents lower; Grey Forge about the same; scrap material very much neglected; old rails scarce, firm. Other descriptions show no material change.

Coke Smelted Lake and Native Ores.

1,300 Tons Grey Forge, Valley Furnace.....	13.60 cash.
1,000 Tons Bessemer.....	15.90 cash.
1,000 Tons Bessemer.....	16.00 cash.
800 Tons Grey Forge, City Furnace.....	14.00 cash.
750 Tons No. 1 Foundry, City Furnace.....	16.50 cash.
500 Tons Off Bessemer.....	15.10 cash.
200 Tons No. 1 Foundry, City Furnace.....	16.40 cash.
200 Tons White Iron, City Furnace.....	13.50 cash.
300 Tons Grey Forge.....	14.00 cash.
100 Tons Silvery.....	16.00 cash.
100 Tons No. 2 Foundry.....	15.00 cash.
50 Tons No. 1 Foundry.....	16.50 cash.
50 Tons No. 3 Foundry.....	14.75 cash.

Charcoal.

150 Tons Southern Cold Blast.....	25.50 cash.
50 Tons Southern Warm Blast.....	19.50 cash.
50 Tons Cold Blast.....	26.00 cash.
50 Tons No. 2 Foundry.....	21.00 cash.
50 Tons No. 1 Foundry.....	22.00 cash.

Steel Slabs and Billets.

800 Tons Steel Billets.....	25.50 cash.
750 Tons Steel Billets.....	25.50 cash.
500 Tons Steel Billets.....	25.25 cash.
600 Tons Steel Billets, at mill.....	25.25 cash.

Muck Bars.

500 Tons Neutral.....	26.75 cash.
500 Tons Neutral.....	26.50 cash.

Ferro-Manganese.

75 Tons 80%, Domestic, Pittsburg.....	66.50 cash.
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Bloom Ends.

500 Tons Bloom Ends.....	17.50 cash.
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Scrap Material.

200 Tons No. 1 Yard Scrap, net.....	18.00 cash.
50 Tons Iron Axles, net.....	27.00 cash.

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

Main table of New York Mining Stocks Quotations, including columns for Name and Location of Company, dates from Aug. 8 to Aug. 14, and Sales. Dividend-paying mines are on the left, non-dividend-paying on the right.

*Ex. dividend. +Dealt at in the New York Stock Ex. Unlisted securities. ± Assessment paid. § Assessment unpaid. Dividend shares sold, 7,770. Non-dividend shares sold 19,820. Total New York, 27,590.

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations, listing company names and prices from Aug. 7 to Aug. 13, with sales figures.

Boston: Dividend shares sold, 1,741. Non-dividend shares sold, 2,348. Total Boston, 4,089.

COAL STOCKS.

Table of Coal Stocks, listing company names and prices from Aug. 8 to Aug. 14, with sales figures.

†Sales in New York, 3,410. In Philadelphia, 5,882. Total sales, 41,123. † Par value, \$50.

Deadwood.

Table of Deadwood stock prices, listing company names and prices from Aug. 8.

Aspen.

Table of Aspen stock prices, listing company names and prices from Aug. 11.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations, listing company names and closing quotations from Aug. 7 to Aug. 13.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Main table with columns for Name and Location of Company, Capital Stock, Shares, Assessments, Dividends, and Date of last payment. It lists 153 different mining companies and their financial details.

Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. + This company, as the We Tern, up to December 1881, paid \$1,400,000. † Non-assessable for three years. ‡ The Lead wood previously paid \$250,000 to the Consolidated and the Terra \$75,000. Previous to the consolidation in August, 1884, the California had paid \$31,320,000 in dividends, and the Virginia 40,000,000. ‡ This company acquired the property of the Raymond & Ely Company which had paid \$3,075,000 in dividends.

STOCK MARKET QUOTATIONS.

Table with columns: COMPANY, Bid, Asked, L. H. for Baltimore, Md. Aug. 13.

Prices bid and asked, lowest and highest, during the week ending Aug. 13.

Birmingham, Ala. Aug. 12.

Table with columns: COMPANY, Bid, Asked, L. H. for Birmingham, Ala. Aug. 12.

* Bonds. † First mortgage. ‡ Second mortgage. ** Without interest.

Helena, Aug. 5.

Table with columns: COMPANY, Bid, Asked, L. H. for Helena, Aug. 5.

Pittsburg, Pa. Aug. 13.

Table with columns: COMPANY, Bid, Asked, L. H. for Pittsburg, Pa. Aug. 13.

Table with columns: COMPANY, Bid, Asked, L. H. for St. Louis, Aug. 12.

CLOSING PRICES.

Table with columns: COMPANY, Bid, Asked, L. H. for Closing Prices.

Trust Receipts.

Table with columns: Sales, H. L. for Trust Receipts.

Trust Stocks. Aug. 14.

The following closing quotations are reported to-day by C. I. Hudson & Co., members of New York Stock Exchange:

Table with columns: COMPANY, Bid, Asked, L. H. for Trust Stocks.

Foreign Quotations.

London. Aug. 6.

Table with columns: COMPANY, Highest, Lowest for London, Aug. 6.

Table with columns: COMPANY, Bid, Asked, L. H. for Paris, Aug. 6.

CURRENT PRICES.

Those quotations are for wholesale lots in New York.

CHEMICALS AND MINERALS.

Table with columns: Chemical Name, Price for Chemicals and Minerals.

Table with columns: Mineral Name, Price for various minerals like Litharge, Magnesia, etc.