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THROUGH a slip of the pen we stated in our issue of the 7th inst., referring to the properties of aluminum as described in Mr. ALFRED E. HUNT'S lecture before the Society of Arts in Boston, "that other elements than aluminum can better be employed to harden iron, and its presence in iron is to be regarded as deleterious and to be avoided if possible;" which, of course, should have read that other elements than iron can better be employed to harden aluminum, *et seq.*

Mr. Hunt informs us that his statement "that alloys of aluminum increase in brittleness more than they do in hardness" had special reference to castings. Cast ingots of aluminum hardened with titanium, silver or copper, increase in hardness very materially over the pure metal by cold rolling or otherwise working, and increase in hardness to a much greater extent than they do in brittleness; so that it is perfectly possible to get, especially with the use of titanium, a metal which will make a cutting edge and yet will have a very considerable amount of elasticity. It is now found that pure aluminum is a much better conductor of electricity than the ordinary grade, metal over 99½ per cent. pure having an electrical conductivity of at least 63 against pure copper as 100.

THE INTERSTATE COMMERCE COMMISSION'S DECISION IN THE COXE CASE.

The Coxe case against the Lehigh Valley Railroad, so familiar to everyone in the coal trade, has at last reached a decision at the hands of the Interstate Commerce Commission, and this decision, summarized on another page, appears to have been a compromise.

The important points decided are that a discrimination may properly be made in freight rates between bituminous and anthracite coals, as between the larger and more valuable sizes and the smaller cheap sizes of anthracite.

On this it is doubtful if Messrs. Coxe Brothers expected a decision in their favor. In the essential question, as to whether the Lehigh Valley road had discriminated against Coxe Brothers and had charged them excessive tolls, the decision is fully in their favor, though the reduction in rates being only 15 to 20 cents a ton is probably less than was expected, for it leaves the tolls still at about 1 cent a ton mile, which has been considered excessive.

It has appeared very strange that the decision gives no damages for past overcharges.

The reduction in rates ordered by the Commission, it is said, will be appealed against by the Lehigh Valley Railroad. It would occasion a reduction in that company's income of nearly a million dollars a year, or, say, one half the dividend the company has been paying. All the other coal roads would also have to conform to this far-reaching decision, so that its importance to them and their stockholders is apparent.

The effect will be to reduce tolls all round, and, since prices are practically regulated by the independent operators, the selling price of anthracite is likely to be lower, unless, indeed, some more efficient means of regulating prices can be found than that with which the trade has been so long familiar.

COLOR PHOTOGRAPHY.

At the meeting of the Academy of Sciences in Paris, February 2d, the announcement was made by Mon. G. LIPPMAN, of the University of the Sorbonne, that he had succeeded in photographing the colors of the solar spectrum, a description of his method being given in *Comptes Rendus*, cxii., p. 274.

This interesting experiment was conducted as follows: A plate prepared with a sensitive film is supported in a hollow frame filled with mercury, the surface of which forms a mirror in contact with the plate. The film used on the plate is similar to that ordinarily employed in photography, consisting of bromide or iodide of silver held in suspension in a transparent support such as gelatine, albumen, or collodion. It is necessary, however, that the sensitive silver salt be distributed throughout the film in an almost infinitely divided state, and in a thoroughly continuous manner. The theory of the process is that the incident rays of light which form the image in the camera interfere with the reflected rays from the surface of the mercury. There is formed, consequently, in the interior of the sensitive film a series of fringes, *i. e.*, of luminous maxima and dark minima. The maxima alone act upon the sensitive coating of the plate, and at the close of the photographic operations they are marked by a series of transparent layers of reduced silver, separated by the same interval which separated two maxima—that is to say, half a wave length.

Thus the film is divided into series of thin laminae, which are of the precise thickness necessary to reproduce, by reflection, the color of the incident rays. The colors visible are exactly of the same nature as those seen on soap bubbles, although, it is said, even more pure and brilliant. By transmitted light the proof is negative, each color being represented by its complement.

The plate is developed and the image fixed in the ordinary manner. The pictures are said to be permanent, uninjured by exposure to the light of day or to the concentrated rays of a powerful electric light.

The art of color photography is one upon which physicists and photographers have been investigating for many years, and if the statements communicated by M. LIPPMAN be substantiated by further experiment, his discovery will rank in importance almost with that of DAGUERRE.

LUBECK, at the beginning of the century, and later HERSHELL, in 1841, had observed that the solar spectrum left an image, more or less vivid, upon a film of argentous chloride, and in 1848 M. EDMOND BECQUEREL took up the subject and developed a process whereby the image of the spectrum was obtained. The great difficulty, however, was found in fixing the colors, which could only be preserved in darkness. Since that time, comparatively little progress has been made.

Almost all of the work which has been done hitherto has been toward the discovery of suitable substances which would be chemically changed by the different colored rays of light, assuming the tint conformable. Thus many experiments have been made with the various aniline colors, and investigations of M. FEER in this direction were described before the Society of Arts, in London, in January last. M. LIPPMAN'S experiments differ from all of these in being of a purely physical nature. So far he has gone no further than to photograph a window of stained glass, and,

of course, it is very doubtful if he will succeed in reproducing the shaded and more delicate colors of nature.

COMSTOCK DIVIDENDS AND STEALINGS.

The recent rise in the value of Consolidated California & Virginia shares, and those of other companies operating on the Comstock lode, is now exciting the gudgeons who dabble in the mining stock exchanges with the idea that there may be a return of the wild speculation of the bonanza years. Reports, from mysterious sources, are circulated among the ignorant and the thoughtless, to the effect that big bodies of rich ore are being uncovered in various levels of the Consolidated California & Virginia; the output in bullion is to be doubled during the current year; and the payment of dividends is to be resumed. As evidence of the truth of these statements are cited the facts of the increase in output in February over the preceding month and the gradual increase in value of the battery samples of ore milled. Four weeks ago the grade of ore run through the Eureka mill, according to published statements, was \$19.25 per ton; now it is reported to be \$29.60 per ton.

These stories may serve to deceive unwary investors and reckless speculators again as similar ones have done in the past. As a matter of fact, however, the recent rise in Comstock stocks and the increase in the assay value of the pulp are probably the result of nothing but a new and very transparent move on the part of the mill ring which has played its swindling game with such success for so many years.

After the long story of continuous assessments and of the stealings of the mill ring, which has recently been told by the Stock Association in its suit with the ring, it has become necessary to do something to prevent a general assault by stockholders, and so assays have been marked up temporarily; in other words, the ring has decided to curtail somewhat its stealings for a time, in the hope that stockholders will be induced to refrain from pushing these troublesome investigations.

Another explanation is suggested in the proposal to pump out the lower levels of the Comstock. The ring may be advancing the stock to unload it on the public preparatory to making the inevitable assessments the pumping-out will entail.

Let no one be deceived. The leopard has not changed its spots, and the "mill ring," under the leadership of U. S. Senator JOHN P. JONES, is still the same which has swindled the stockholders for years past. The best course the stockholders can take is to unite in prosecuting the ring, and the largest dividend they can get is that which is now within their reach, namely, the reimbursement of the amounts the "ring" has stolen. This would make a very handsome dividend; and the turning out of the swindlers, and putting in an honest and efficient management of the mines, would insure many satisfactory dividends, while the sop now offered will be collected out of the stockholders in assessments by the present corrupt managers if they be allowed to remain in control.

Let all the Comstock shareholders unite, and they can quickly help themselves and stop the leaks that have given them assessments instead of dividends for these many years.

THE ELMORE PROCESS FOR MAKING COPPER TUBES.

The Elmore process for making electrolytic copper tubes, which was first described in the ENGINEERING AND MINING JOURNAL of May 1st, 1886, and subsequently on August 18th, 1888, and August 20th, 1890, consists in depositing the metal from an electrolytic bath on a revolving mandril, against which presses an agate burnisher that flattens and compresses the freshly deposited copper. The apparatus and process are fully described on another page. The process is undoubtedly very ingenious, and, it was supposed, would produce tubes of excellent quality. Unfortunately, it is only in actual practice that the defects of what in theory seems to be a satisfactory process can be ascertained, and in the case of the Elmore invention, the difficulties appear to come in the foliated character of the deposit, which, notwithstanding the pressure of the burnishers, upon heating even to a very moderate degree, exfoliates. The very handsome tubes shown are, we believe, all cold drawn.

It would seem probable that eventually this difficulty which has been met with will be overcome; but if we are correctly informed from what we consider reliable sources, the company owning the Elmore process is not content to await the perfecting of the process before reaping a harvest; indeed, it is very openly charged that the process is being worked as a stock speculation rather than an industrial investment.

The history of the Elmore Copper Depositing Company to the present time has been about as follows. The shares of the parent company were largely taken by the British public, and works were commenced at Leeds about one year ago. As yet, however, little real business seems to have been done there. The first step toward the disposition of the foreign patents was the organization of the Elmore Foreign and Colonial Company among a few of the inside shareholders of the home company, who, it is said, had already done very well in the business. The Foreign and Colonial Company then commenced the organization of others, beginning with the French and Austro-Hungarian companies. The former paid

£87,000 in cash and £50,000 in shares for the French patent, and the latter a like amount for those granted in Austria.

The controlling patent of the Elmore Copper Depositing Company covers the use of a burnishing device applied to a rotating cathode under the level of the electrolytic bath. The electrolytic wire patent protects the method of spirally slitting a tube, formed as above, by circular shears or other appliances. The sum of £100,000 was paid by the Elmore Wire Company for this patent.

The use of a revolving mandril immersed in a bath and a burnishing device above the level of the latter are public property, having been patented in England in 1876.

It has been stated, on reliable authority, that much difficulty has been found in securing a perfectly homogeneous deposit of copper by the process, although this result is sometimes attained. The great drawback to the use of the tubes, however, seems to be that it is very doubtful whether they can be worked at a red heat, although statements that they cannot, have been denied by the company. Experiments made with small specimens certainly show that the copper flakes when heated, and the fact that the tubes shown by the company have been drawn down without annealing, may be accepted as support of this statement, as they undoubtedly be heated and worked soft if the material permitted. The wire, also, is hard drawn and annealed (carefully at black heat) only when drawn to size.

We set forth these facts so that investors in this country may be informed concerning a matter which will undoubtedly come up before them, for it is stated that the organization of a United States auxiliary company is contemplated.

We do not wish to be understood as condemning the Elmore process, defects in which may possibly be remedied, but we desire to warn those who may be invited to invest in it here that the operations of the company abroad savor very strongly of stock jobbing, and that the process has not yet produced on a large scale the results expected of it.

NEW PUBLICATIONS.

KATECHISMUS DER BERGBAUUNDE. By G. Köhler, of the Clausthal School of Mines. 312 pages. Illustrated. J. J. Weber, publisher, Leipzig, Saxony. Price, 4 marks (\$1).

The details of the author's more extended treatise on the same subject have been condensed into this handbook. It is questionable, however, whether the method of question and answer is well adapted to the ends of a work of this kind. Where it is desirable to impress upon the student some vital point of a discussion with greater pertinacity, this system has doubtless its advantages; but in this case it would necessitate such a number of questions that the book would have to be enlarged, and thus lose its character. A technical treatise on mining will generally go to readers who do not need any such intellectual crutches to make the subject interesting or a discussion intelligible.

As was hardly to be otherwise expected, the questions here mainly serve the purpose of subheads of chapters. Examples from practice are referred to as frequently as the limited space allows, and the force and weight of different kinds of machinery, given in some instances, afford a means of comparison with practice in this country. The illustrations are very good, and form a valuable adjunct to the text. It is to be regretted, however, that Mr. Köhler has not given the scale of his drawings, and in some cases, perhaps, detailed dimensions.

The author treats of the different kinds of ore deposits and their faultings as an introduction, and then devotes the remaining chapters to the different methods of exploring and working them, and all the other subjects which would naturally be considered in a treatise of the kind. The book will be found of much value as a general reference or text book.

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 Mines of Leadville.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Will you kindly permit one who is interested in the prosperity and good name of Leadville to take exception to what strikes me as a falling inflection in your admirable article of March 7th on "The Mines of Leadville," as contained in its last paragraph.

Is it not a fact that the annual production of Leadville has decreased, owing not to the failure of the ore chutes in either continuity or depth, but because of the gradual appearance of sulphur and zinc in the ores as their distance from oxidizing influences increased?

Mining has become more costly only because in the hunt for carbonates, these sulphides have had to be handled and put aside for future treatment, and the annual output has decreased with the quantity of such carbonates. However, the sulphides remain, and Leadville is adjusting herself to new conditions. That the quantity of these ores is enormous, all reports agree in maintaining, and the cost of extraction is not likely to be greater than in the past, with the knowledge now possessed by her engineers. True there is no process now in operation that saves more than half the value of these sulphide ores, but the problem offers sufficient inducement to warrant a hope of its speedy solution. Even with present appliances such ores are yielding a not inconsiderable portion of the output of Leadville, and I wish only to add that, while the maximum of 1882 may not be exceeded, it is not improbable that when the processes are adjusted to the conditions, mining will be conducted on a larger scale than ever before, and Leadville enter again upon an era of ascending annual output.

PHILADELPHIA, March 9, 1891.

A. J. VOLLRATH.

Costs of Production of Fine Copper.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Manufacturers give as one of their reasons for not buying freely at the present low prices of copper, that the profits of the copper producers are too large, and that they could afford to make sales at a lower figure. It may therefore be interesting to show the actual cost of producing copper by different prominent copper companies, taking their own published reports as a basis and guide.

Among the Lake Superior companies the Calumet & Hecla claims to lay down the copper for less than 9 cents per pound; the Quincy costs 7½ cents per pound; the Atlantic, 13 cents, and the Osceola, 11½ cents. The Tamarack copper, as proved by the article in the ENGINEERING AND MINING JOURNAL, October 25th, 1890, is delivered in New York at 11.32 cents per pound.

From the Butte (Montana) mines the only report published is that of the Boston & Montana Consolidated Copper and Silver Mining Company; but from its contents we may be able to judge the cost of production of a good many other Montana copper concerns. While some of them have the latest improvements at their plants, they have to treat copper ores of lower grade than the Boston & Montana, the latter thus making up in quality of the raw material for the improved plants.

The Boston & Montana report for 1889-90 (ENGINEERING AND MINING JOURNAL, November 26th, 1890) puts the cost of copper in the matte laid down in New York at 8.19 cents; and adding construction account, but not including the extraordinary expense (\$151,500) at Great Falls, bonds redeemed and interest on bonded debt, amounting to 1.13 cents, makes a total of 9.32 cents per pound of copper in a 60% matte. Add refining into ingots, say 2 cents, and the cost of ingot copper is 11.32 cents per pound, this being equal to the present price of casting copper in the market, and leaving no profit for the stockholders at the present time.

From 1887 to July 1st, 1890, the company produced 59,024,435 pounds of copper, which, including silver, brought \$7,174,305.95, or 12 cents per pound of copper; while the expenses of production were: Actual costs, including shaft construction, \$5,177,348; redemption of bonds and interest on bonded debt, \$345,844; total, \$5,523,192, or 9½ cents per pound of copper in matte; adding two cents per pound for refining into ingot, the total cost was 11½ cents per pound of fine copper laid down in New York. The construction at mines during this and the coming year is still going on at the same rate, or more, and the redemption of bonds and interest on bonded debts are the same, if not more; therefore the cost of producing copper in matte will be not less than before. The cost of construction of the plant at Great Falls is not taken in consideration in this statement.

To sum up, there is at present prices no profit in producing Montana copper, but little in Arizona copper, and little profit in most of the Lake Superior mines with the exception of a few like the Calumet & Hecla and Quincy. Some small mines owned by individuals at Butte City, Mont., have already closed down.

NEW YORK, March 19, 1891.

The Precipitation of Gold from Chloride Solutions.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In the closing remarks of my letter in the ENGINEERING AND MINING JOURNAL of February 14th, I stated that Mr. L. D. Godshall must be mistaken in his chemical formula showing that gold is precipitated by copper sulphide as a sulphide, as thus expressed: $3\text{CuS} + 2\text{AuCl}_3 = \text{Au}_2\text{S}_3 + 3\text{CuCl}_2$.

I am surprised to find him defending this statement with hypothetical conjectures in his reply in your issue of March 7th. In precipitating gold chloride solution with precipitated copper sulphides we have to deal principally with the three participants, viz., gold chloride, copper sulphide and water. The easy decomposition of gold chloride in aqueous solution to metallic gold and hydrochloric acid by standing and exposure to light alone, as well as the affinity of precipitated copper sulphide for oxygen, and its easy oxidation to copper sulphate, are both well-known facts. Is it, therefore, an unreasonable thing to expect a reaction as expressed in the following formula:



where the greater affinity of chlorine to hydrogen overcomes the smaller one for gold and produces metallic gold on one side, and the strong affinity of the copper sulphide to oxygen forms copper sulphate on the other, both acting simultaneously on the water and dividing its components? Where does such a simultaneous action of precipitated copper sulphide and chlorine on water take place in the chlorination barrel on which Mr. Godshall bases part of his argument?

But to end further argument and to verify my statement, I refer to Mr. C. H. Aaron, in his article on the Hydro-Metallurgy of Gold, in the report of the State Mineralogist of California of 1888, page 839, where he writes: "There are many other substances which throw the gold down in the metallic state, and among them is precipitated copper sulphide. The copper sulphide is converted into sulphate, which dissolves, while the gold is deposited in the metallic state."

The objections and difficulties which have been met with where the precipitation with copper sulphide has been tried on a large scale, and which I only outlined in a few words in closing my communication in the ENGINEERING AND MINING JOURNAL of February 14th, are well illustrated in the following notes from Mr. John E. Rothwell:

"In the treatment of the solution from 150 tons of ore, by precipitation with CuS the following objections and comparisons are made.

"Using a press, in which the CuS is placed in a chamber and the solution allowed to filter through it, it was found impossible to test, in a reasonable time, the solution running away from the press for gold, as ferrous sulphate used does not give a definite reaction after a certain extraction has taken place. The amount of gold running away can only accurately be arrived at by evaporation and assay of residue. Of course this gold might be collected in the copper tank; but it is not an agreeable feature to rely on. The absolute necessity of heating the solution to a high degree is another objection to the general plant. Another difficulty to the practical application is the fact that, as CuS is replaced with gold on the filtering medium, there is a point where there is not sufficient of it to continue precipitation

at the ordinary rate of running through. Then the solution immediately exerts its solvent action, and dissolves the finely divided metallic precipitate that has been formed and carries it off. Therefore unless constant attention is given to the testing of the solution running away, there is a great chance for loss. In other words, in practice one has to rely on the attention which will be given to the process by the employé to whose care it is intrusted. It is also an objection to its use on this (our) solution, that it precipitates another base, the nature of which was not investigated, but the quantity of which was a great detriment to the filtration. When it (CuS) was applied as ferrous sulphate is—viz., by stirring it into the tank of solution—it was found very difficult to get a perfect precipitation in all parts of the tank, and the precipitate was in a very finely divided state, which required about the same time to settle thoroughly, and therefore does not give it any advantage over FeSO₄.

"In comparing CuS and FeSO₄, as precipitants, with H₂S gas, the size and capacity of the precipitating tanks is a considerable item. Whereas, with H₂S as the precipitant, a tank to hold 7,000 gallons need not cover a floor space of over 140 square feet, or 10 × 14, it being 10 feet deep, a tank to hold the same quantity with FeSO₄, or CuS, would have to cover double the area and half the depth; but on account of inability to get a perfect mixture thus, a tank of this size would not be practicable, and smaller tanks to hold this quantity of solution would increase the amount of space required and a loss in gold when a clean-up is made."

I am well aware of the objections that might be made to the method of precipitation with hydrogen sulphide where large amounts of copper in solution are unavoidable. I only suggested one way in which the difficulty might be overcome, and I admit that the elimination of the precipitated copper sulphide, in the manner described, would not be practicable in all cases; although a judicious roasting, if practised in such instance, would go a long way. I refer here to Mr. Ireland's general remarks on the application of the Platner process in Lock's "Practical Gold Mining," page 649.

There is another method which may serve the purpose and is worth consideration. I will outline it as follows: After the ore is crushed and dead-roasted, it is charged into the barrel and an addition of dilute sulphuric acid is made, proportionate to the quality of copper oxide present in the charge. The barrel is then revolved for such a time as is deemed necessary to dissolve the copper, and leaching commences. The system of leaching and chlorinating in the barrel as introduced and worked out by Mr. John E. Rothwell, and described in the issue of the ENGINEERING AND MINING JOURNAL of February 7th, may here be of great practical importance. After the copper is thus dissolved and leached out the barrel is charged with chloride of lime and sulphuric acid, and chlorination commences in the usual way. This method of extracting copper from roasted nickel matte has been practised for years in the American Nickel Works in Camden, N. J.

The presence of lead and zinc in an ore is of no detriment whatever to the precipitation with hydrogen-sulphide gas in works where barrel chlorination is practised, as lead, if in solution, is, practically, completely precipitated and eliminated in the process of chlorination in the barrel, being thrown down as a sulphate. The zinc, however, is not precipitated from an acid solution by H₂S at all, and cannot consequently be precipitated out of the gold solution. The objections and argument which Mr. Godshall bases on these two metals are therefore without any foundation. In comparing the two articles of Mr. Godshall in the issues of November 29th and March 7th, one will be impressed with the sudden changes which he is advocating and proposing to make with the copper-sulphide method. This does not seem to indicate that it has yet arrived at a practical form of application. He changes suddenly from the continuous process of precipitation and filtration with his, three differently arranged, mechanical filter-presses, of which he says that "The above filter works very nicely," etc., to the intermittent process of precipitation, as described by Mr. Küstel, and practised at the Golden Reward Chlorination Works. He says: "It is admitted that there are some difficulties connected with the use of precipitated sulphides, but these difficulties come principally from the manner in which the sulphides have been used. If we have an imperfect filter-press (such as he advocates in his first article), and persist in precipitating and filtering at the same time, and find, as a matter of course, that some gold is escaping!" He advocates the destruction of free chlorine with SO₂, recommends an accumulation in the tank bottom, half monthly cleanings, and is all prepared to state: "It will be seen from the above that all the advantages (of a practical handling) claimed for the H₂S process can with equal propriety be claimed for the precipitated sulphide process if the sulphide is applied, as any other precipitant generally is, directly to the solution in the tank."

The whole method of copper-sulphide precipitation has in consequence a more practical aspect, but Mr. Godshall does not seem to appreciate the difference that there is in handling and operating a tank of 5,000 gallons of gold solution in practice and a beaker-full of solution in the laboratory. If he expects that the excess of copper sulphide added to the first batch of a tank of 5,000 gallons of solution, which has settled to the bottom of the tank, can be easily stirred up and mixed in a thorough manner with the gold solution, he is very much mistaken. The thorough mixing of a precipitate, such as copper sulphide, with a solution in a large tank, is a very difficult task; the more it is stirred the firmer divided will be the precipitate, and the longer the time required for it to settle. Referring to the stirring-in of ferrous-sulphate solution in a large tank of gold solution, a complete and thorough mixing is even here not so easily arrived at. H₂S and SO₂ gas introduced in a large tank of solution are eagerly absorbed and transferred very quickly to every part of the solution.

No mention whatever is made by Mr. Godshall of the difficulty that presents itself, as Mr. Charles Butters has shown in his able article in the issue of the ENGINEERING AND MINING JOURNAL, December 20th last, of detecting the gold in copper solution, in order to find when the precipitation is complete. Neither the solvent effects of metallic salts on gold nor the extreme fineness in mechanical subdivision seems to trouble Mr. Godshall much in his precipitation in cupreous solution. Whether my statement is an exaggerated one, that "The precipitation with copper sulphide is of so recent date, having as yet been worked on only laboratory scale, that its application for practical work has not been demonstrated," I leave the reader to judge.

WERNER LANGGUTH.

DEADWOOD, S. D., March 14, 1891.

RED MOUNTAIN (COLORADO) SILVER MINES.

Written for the Engineering and Mining Journal by William Weston, M. E.

The scarlet peaks of Ouray County, Colo., which since 1885 have been an object of scenic interest to the prospector, and later to the traveler for pleasure, now mark the location of what seems destined to become one of the great silver bonanzas of the present century; for down in the valley, 2,000 feet below their rosy summits, men are digging out ore of wonderful richness, and the hillsides and pine-clad knolls, where in 1876 we used to look for blue grouse and blacktailed deer, and the bear used to come to gorge himself on berries, where the wolverine feasted on the snow-shoe rabbit, and the pine-marten got fat on the young of feathered game, are now covered with the buildings of powerful hoisting and pumping machinery; tall smokestacks puffing out their black clouds, snorting railway locomotives continually tugging away at train loads of ore on its way to the outside smelting centers, and the screams and roars of rough-throated steam whistles, and the reverberation of a thousand blasts, have scared away all animal life but the ground squirrels and camp-birds. Even the ptarmigan, that used to crow of a spring morning above timber line, are gone, and the big-horns, many a hand of which I used to see on the mountain sides in days gone by, have disappeared. And this not so very long ago, either, for it was only in 1881 that the Guston mine was discovered. This was followed by the Yankee Girl, in 1882, the under being after deer at the time; and in September of that year the lucky hunter and his three partners went out with what was more to them than fat venison—viz., \$125,000 in coin of the realm. This was not a bad price for a hole 20 feet deep, but the hole was lined with glittering silver ore.

This hole is now upwards of a thousand feet deep, and it and its ramifications, which have yielded some two millions of dollars, are owned by a London company stocked at £260,000, the shares being now at a premium.

The Guston reef when discovered, protruded from a great bank of yellow dirt, and showed a mass of lead ore, of too low grade, however, to pay then; the owners worked it to 100 feet in depth, when it, too, in 1885, passed into British hands for \$100,000. More depth produced more riches. Upwards of a million dollars has been taken out of this mine, and last January's output is given at 600 tons of ore worth \$62,000.

So in the winter of 1882-83 we were all excited by the Yankee Girl output, and the writer, like many other prospectors, found himself working a claim there in January, living in a tent at 10,000 feet above tide-water, and only kept from freezing at night by snow banked up outside and a sheet-iron stove within, and in the daytime by working in the tunnel of the "Jackstaff," now owned by the Red Mountain Mines, Limited, of London. The town of Ironton was laid out and a score of log cabins run up, and while these were being roofed one fine winter's morning, some prospectors on the hillside fell through the snow into a cave and so disturbed two bears retired for the winter, which, rushing down the hill, were each perforated by a Winchester bullet, in full view of the toilers on the house tops.

Then came a sharp lawyer from Cincinnati, who secured a lot of claims within pistol-shot of Ironton, and having on one of them, called the Silver Bell, an outcrop of valueless iron pyrites, began sinking a shaft on the same; the *cognoscenti*, the real miners, and the bar-room miners, all convulsed with laughter, so to speak, at this exhibition of "— fool mining."

At 90 feet, however, his valueless pyrites had become ore that carried 27 ounces of silver to the ton, and at 250 feet it carried 150 ounces. Tons of rich ore came tumbling out daily. As if by magic, big buildings and hoisting machinery arose over the mine, and the great whistle, as it blew, morning, noon and night, screamed derision at the *cognoscenti et al.*, who then only were cognizant of the fact that they didn't know as much as they thought they did, while the lawyer had become suddenly an authority and an expert on Red Mountain mining. In 1886 I was down in this mine and stood in a chamber about 15 feet square, and the lawyer offered me a ten-dollar note if I could find any gangue in it. I tried, but couldn't; the walls, roof and floor were solid ore. In this year he shipped 1,111 tons of ore, which realized, after deducting the cost of freight and treatment, \$106,930, and all this came from above the fifth level, or a depth of about 250 feet. But this mine, like the others, had its "winter of discontent" to the shareholders, during which the "frost" closed it. Now, however, it belongs to the American Belle Mines, Limited, of London. The tons of rich ore are rolling out again, and the deeper it goes the richer it gets. For the last time I was on the dump, four months since, I saw among the ore stromeyerite, which is half silver and the other half copper and sulphur, and the output for January is given at 250 tons of a value of \$35,000. But the lawyer is not in it any more, though why he left it, none of us ever knew.

Then, in the same early days of the Silver Bell, a prospector, incited by the success of that mine, and who owned a claim on the flat below it, with its end stakes in the town of Ironton, began a shaft on the outcrop which showed iron pyrites and small spots of gray copper, and in 50 feet the Colorado Boy (for that was its name) had a fine body of ore, bunches of which yielded by assay 30 to 300 ounces silver to the ton. But the ore dipped out of his shaft and water came in; his money dipped out of his pocket, and he was forced, like many another brave prospector, to suspend work for need of capital.

It takes money as well as ore to put a silver mine on a permanent dividend-paying basis, and many a poor prospector has had to give up with a fortune almost in sight. The Colorado Boy forms one of a group comprising from 40 to 50 acres with several reefs running through it, showing particles of rich ore on their outcrop, and this property also will probably soon be acquired by a London syndicate, and the prospector who has held on to his claim will get a substantial sum of money. In those days also came rumors of the National Belle, with its great caves lined with glittering but too-low-grade to ship galena. I did not see it then, but I have since; and four months ago I stood in one of its chambers of ore some 300 feet below the surface, which, as nearly as I can guess, was 60 feet long and 20 feet wide, and as many high. It was all ore, a black copper ore carrying silver, and it looked more like a coal mine than a silver mine. But the superintendent told us that the vast body of stuff we saw carried 20 to 30 ounces of silver per ton, and I believe him. This mine is owned now by the American Belle Mines, Limited, of London, as

are also the Congress and Hudson, both of which were opened in 1882. When I saw the latter in that year, it was producing a black arsenical copper ore carrying silver and some gold, which they stated was averaging \$-0 per ton. The Vanderbilt was also located in 1882 by two worthy Germans, or rather by their mining partner in Red Mountain, who staked and worked their claims, while the others sold groceries in Ouray, and put up the sineews of war in the shape of provisions, powder and steel. The mining partner did his work so well that he discovered in the Vanderbilt the vast body of low-grade silver-lead ore that eventually brought them \$100,000 for the mine, and the two Germans are now in their beloved Fatherland with probably \$150,000 in cash, and such a faculty for enjoyment of the good things of life as is only begotten by 14 years of roughing it. Their mining partner still "holds down" some of the best claims in Red Mountain, and this year will probably let him out with a fortune too.

The Genessee was located in 1882 by Jasper Brown, and Adelbert Parsell, then sheriff of Ouray County. It had a body of galena three feet thick when discovered, and the first anglesite or sulphate of lead I had seen in our district.

Both Genessee and Vanderbilt have passed through many vicissitudes and had their period of depression, but they are now consolidated, and owned by a St. Louis company, and under the management of an able engineer. It will not be long before we hear that their long tunnel has intersected the vast ore body at great depth, and we hope that yet another bonanza will be added to the list.

The Red Mountain Silver Mines, Limited, of London, England, is the name of a new company which has just acquired a remarkably fine group of claims (about 40 acres) in the very midst of the bonanza mines—in fact, about 1,000 feet from the Guston, and adjoining the Silver Bell. This group is traversed by one of these great reefs of quartz or quartz-porphry showing iron pyrites and other minerals, which up to date have proved an indication of riches beneath. In fact, one of the chief owners of the Yankee Girl, and the man whose shrewd management made the mine what it is, said to me last autumn: "Wherever you have those 'blow-outs' of quartz showing mineral, the getting of rich ore and plenty of it is only a question of depth." This was his experience, and it obtains in the Red Mountain district.

With reference to this group, a fact well worthy of notice as being a new departure, and a commendable one, is that the owners, nine in number, all took stock in the company for their claims instead of cash, thus showing that they believed in their property and the honesty of the management, and had the courage of their opinions. If this were more generally done, 100 mines would be worked where one is now, and it must come to it sooner or later in disposing of properties in which the value is chiefly prospective.

The usual way for owners of a group of prospects is to ask a big payment down and give time on the balance, taking their chances of getting it; but as the payment asked down is generally as much as the property is then worth, they don't take many chances. But this cock won't fight in Red Mountain any longer, at least not among sensible investors. They object to paying a large sum of cash down for the privilege of prospecting some utterly unproductive ground, because it happens to be in the immediate vicinity of some big mine, or on the probable course of its ore-bearing reef—and very properly so, too; if the prospectors or original owners are fortunate enough to have secured claims in a good location, and have not the means of development themselves, they can certainly give some one who will furnish those means, the time necessary to properly spend them in exploration, providing always they have a reasonable assurance that the management of the work will be honest, intelligent and economical.

On the other hand, we can hardly blame the prospector for refusing to part with his holding without a substantial sum of cash being paid down. He knows that if he deeds his property to a company, and receives in pay half its stock, he is still, as it were, in the minority, as he holds half the stock and has no money, while the other half is backed by capital and has the management. We have, all of us, seen superintendents appointed who spent the company's money—some in riotous living, some in foolish and costly experiments, some in expensive machinery and surface improvements before they have proved their mine, and some in mills which proved, as soon as the first wheel turned, that they could not save the product. We have seen managers appointed on purpose to waste money and run away from the ore, while the freezing process was carried on, and to sign reports which were made out for them by the wire pullers; and we have seen others discharged because they would not pick the eyes out of the mine and make false reports to facilitate some nefarious stock deal, or otherwise allow the stockholders to be defrauded. In view of all this, then, who can wonder that the prospector wants cash? But cash down for prospects cannot be had any more, and the owner must first satisfy himself he is in good hands and then go ahead.

Many a man I have seen, in days gone by, walk out on his dump, and, throwing his chest out, stoutly declare that his price was so and so, and whoever wanted to buy his mine must come up on the dump with the money. These times are all changed, and we have found out that, as a rule, business men do not come up on the dumps with the money; in fact, that there is a very decided tendency on the part of the buyer to require to be allowed to work and test the property very thoroughly before he thinks of paying out any greenbacks at all. And this is as it should be, and I hope for the sake of my old comrade, the prospector, who at these great altitudes braves hardship, danger and death in pursuit of his calling, that he will come to this way of thinking, put his prospect against another man's money, and so get the claim worked. For I have in my mind's eye one of them, whom I heard many years ago tell a man that he must "come up on the dump with the money." He was then rugged and strong, but now he is getting feeble and his hair is nearly white. He still owns the claim, and, I fear, now will keep it, till he who comes up on the dump will carry, not money, but the scythe and hour glass, and will take him away over that range which no prospector ever recrosses.

Between the Red Mountain Silver Mines, Limited, and the Guston is a group comprising three claims—the Buckeye Boy, American Girl and Hawkeye Girl. A private syndicate has an option on them, and they are being worked under the management of Mr. T. E. Schwarz, M. E., formerly manager of the Yankee Girl. He has already got a chimney of ore and is sinking on it, with fine prospects of a mine.

The Paymaster, between the Red Mountain Silver Mines, Limited, and the Silver Bell, is reported in bonanza during the last ten days, ore on top, below, insides and breast, and still driving in it.

What seems to me a very remarkable fact is that between the Yankee Girl and National Belle, a distance of about 4,000 feet, the ground, which is unquestionably traversed by this great ore belt, is still in the hands of the original owners, and reasonable men, too, who have faith in their property and will give fair terms in order to get it worked. But I hear that the big corporations near by, which are driving their prospecting drills in all directions underground, are after them, and they will probably all change hands in the coming summer.

The Highland Chief, Union Trust and Diana form one very promising group, with certain indications of the existence of the ore reef within their boundaries. Another comprises the Matthews, Friendly, Rogers and Comoro, adjoining the American Belle and on the same ore course.

The published statements of the Yankee Girl mine show that up to May, 1890, the mine produced at a depth of 971 feet 13,104 tons of ore, which realized \$1,831,250. Some of it was phenomenally rich, carload lots of 10 tons each yielding 1,500 ounces, 3,300 ounces and 5,300 ounces to the ton, while during the latter part of 1889 and spring of 1890 50 tons were shipped, which yielded \$110,222.

The published statements of the Guston mine show that in two years' working ending June 30th, 1890, \$440,000 were paid in bonus and dividends, the ore shipped being of the value of \$648,662.

The great ore belt, on which are situated the Colorado Boy group, Silver Bell, Paymaster, Red Mountain Silver Mines, Buckeye Boy group, Guston, Yankee Girl, Orphan Boy, Highland Chief, Vanderbilt, American Belle, Hudson and Congress, extends from the town of Ironton to the summit of the divide between the waters of the Uncompahgre and Animas rivers, a distance of about three miles. Ironton is distant from the town

ORE SUPPLY FOR VIRGINIA FUERNACES.—III.

Written for the Engineering and Mining Journal by Edmund C. Pechin, Roanoke, Va.

(Concluded from page 322.)

In my second article the following appears: "Of the magnetic ores of the older rocks little is known as yet as to quantity, and the mining is on so limited a scale as to make them valueless, except for admixture, to a small extent, with the brown ores." Since that was written I have made an examination of the only mining operations on these ores in Virginia, and can give some details that, if not of positive value, are at least interesting.

The mines (so called) are at Pittsville, seven miles from Franklin Junction, Pittsylvania County, Va., on the Franklin branch of the Virginia Midland Railroad. Mr H. B. C. Nitze, E. M., last July, made a very careful examination of and gave an elaborate report upon the property, from which I make some extracts. "The vein of ore, which varies in character from a true magnetic to a specular hematite verging into a magnetic, is situated in a long low ridge striking nearly northeast and southwest with the same. Its longitudinal extent on the Pittsville property is about three miles, about one mile of which has been developed at different times.

"The general strike of the vein is between north and northeast and south and southwest. At the "Cook" shaft the vein has a normal dip to the southeast of from 60° to 70°; east of this, at the "Davies" shaft, it stands almost vertical, while at the eastern extremity of the present workings the general dip is toward the northwest, varying from the vertical to 15°, occasionally lying quite flat, though usually more inclined, but showing strong evidence of folding. Evidently some local pressure has disturbed the vein here and produced a rotary fault. The true hang-



SILVERTON.

of Ouray, which is a terminus of one of the branches of the Denver & Rio Grande Railway, about eight miles. All the properties mentioned are traversed by Mear's Silverton Railroad, which conveys their ores to Silverton (about fourteen miles distant), another terminus of a branch of the Denver & Rio Grande Railway, and from Silverton they are conveyed to Durango, Pueblo and Denver smelters. And here I wish particularly to impress on those who daily see accounts of very rich ore discovered in very inaccessible places that a large body of \$3 ore on the line of a railway will often pay very much better than a small body of \$300 ore a long way from one.

So far, English capital has acquired most of the bonanzas of the Red Mountain district, which is a matter for congratulation, as it will do much to eradicate the bad impression in London regarding mining in Colorado, an impression caused by a few rascals on this side, aided in every case by an equal number of British rascals in London, who victimized in times past some of the dwellers in the "tight little island."

DENVER, Colo., March 14, 1891.

The World's Population in 1890.—In the proceedings of the Royal Geographical Society for January, 1891, it is estimated that the population of the world in 1890 was 1,437,600,000, representing an average of 31 to the square mile and an increase of 8% during the decade. Of the continents, Asia has the largest population, 850,000,000, and the lowest percentage of increase, 6%. Australasia has the smallest population, 4,730,000, and the smallest average per square mile, 1.4, but the highest rate of increase during the decade, 80%. Europe is the most thickly settled continent, with a population of 380,200,000, which is 101 to the square mile. The population of North America is estimated at 89,250,000, which is an average of 14 to the square mile, and represents an increase of 20% during the past decade.

ing wall of the vein at the western end of the workings, where the vein is in a normal position, is a hard, compact, garnetiferous gneiss, the foot wall being a slaty sandstone."

I went through all of the levels that were accessible, the lowest being at a depth of 150 feet. At places, notably at the face of a level 90 feet deep at about the middle of the workings, there was fully four feet of excellent-looking ore. At other places the lead had pinched to 20 inches, 18 inches and 16 inches, and I was told that at times it was narrower; then again it had evidently widened to possibly six or seven feet. As nearly as I could ascertain, the ground had been opened in 1879, by the Pennsylvania Steel Company, which states that it received from these mines some 155,450 tons. It abandoned them a number of years since, the reason being given that the freightage to its works was too heavy. Since then the mines have been worked in a small way by Major E. S. Hutter, of Lynchburg, Va., and lately and now by a lessee under him, and the product has been shipped to a number of Pennsylvania furnaces, and to the Pulaski, Crozier, Glen Wilton and Lynchburg furnaces, of Virginia; it is now going to the Buena Vista furnace.

The mining at present is being done in the crudest sort of a way, and can scarcely be called mining at all. There is no attempt at assortment, and the lump and smalls, the latter containing gangue and at times being very dirty, are dumped on a common pile.

Even as it runs, the ore is fairly within Bessemer limits. A large number of analyses, running over two years, kindly furnished by the Pennsylvania Steel Company, give the iron from 58.61% to 63.42%, and the phosphorus from .047% to .064%. Six analyses in February, 1891, gave iron 59.04%, silica 9.93%, alumina 4.73%, phosphorus .049%, lime .53%. The Pulaski Iron Company, in 400 tons received in the spring of 1889, found about 62% iron, the fine running lower and the lump somewhat better; it was low in manganese, and phosphorus did not exceed .04%.

Edmund D. Smith & Co., of Philadelphia, write, April 29th, 1890: "Upon examination of shipments of this ore made to Carnegie Bros. and others, we find the average analyses of run-of-mine ore, which included

red specular and magnetic, about two-thirds fine and one-third lump, 58.01% iron and .061% phosphorus. A number of the analyses of magnetic lump ran from 62.353% to 64.224% iron, with .056% to .044% phosphorus. The red specular ore averages from 55.387% to 57.44% iron, with phosphorus .042% to .043%.

The average of over 400 analyses of the ore, representing actual shipments without assortment as taken from the mines, gave: Iron, 59%; phosphorus, .05%; silica, 8.40%; titanium, none; manganese and sulphur, traces; lime, .56%.

The samples taken by Mr. Nitze, from the workings at four shafts, gave respectively:

	Iron.	Phosphorus.	Silica.	Manganese.	Lime.
No. 1.....	62.341%	.044%	7.93%	.09%	.72%
No. 2.....	57.014	.056	10.94	.07	.64
No. 3.....	63.161	.058	7.42	.05	.56
No. 4.....	64.536	.034	7.26	.12	.61

While I was there, considerable shipments were being made from the stock piles, some of which looked to me to be pretty dry.

I was fortunate enough to be able to follow these, and am just in receipt of the following analyses:

	Sample taken from all the cars.	January 6th.	January 9th.
Iron.....		53.90%	61.25%
Silica.....		15.99	10.03
Alumina.....		4.20	2.48
Lime.....		2.80	1.01
Phosphorus.....		.069	.064
Manganese.....		.13	

I have gone thus fully into these analyses, first, because, as far as I know, this is the first time they have been given to the public, and secondly, because it seemed to me that, with proper care in mining throughout the workings and assorting, it would be possible to get a thoroughly good ore.

It is very apparent that in different portions of this lead the ore varies in character and condition. In some places it is highly magnetic, and in others specular. At times it is hard, clean lump, and at other times soft, with considerable gangue.

Is it not possible that the higher phosphorus comes with the latter, and that with more careful mining and better preparation a first-class product will result as to the friable ore? Further than this, in very considerable portions of the mine, the ore may be strictly within Bessemer limits, and these sections may be determined in advance by chemical examination.

The important questions to be determined are: Is the ore here in quantity? and can it be wrought on a commercial basis? The latter is answered first. With a proper mining captain in charge, and with a proper mining plant, from what I saw, and figures of cost obtained, it seems to be perfectly possible to mine this ore at a cost of say \$1.60 to \$1.75 a ton, especially if power drills be used when the ore gets hard.

When the ore thickens up, between it and the slate wall there is a soft, black, sandy "mass" which the miners call "dig," and which gives an admirable "bearing in." The walls are good, requiring little timbering.

The important point to be settled is, Does this vein continue in depth, or pinch out as at other places in Virginia?

I quote Mr. Nitze: "An average width of three feet may safely be relied upon throughout the extent of the vein. If anything, I think that the width will increase with the depth. The indications at the lowest levels were the most favorable, and, in my opinion, the deposit extends to a great depth. The vein is continuous in structure, and free from lenticular bedding, common to the 'greenway' section in Buckingham, Nelson, and Amherst counties."

Mr. H. M. Chance, so widely and favorably known, under date of August 27th, 1890, says: "I believe the Pittsville is a regularly bedded vein, and will be found continuous for a long distance and persistent to a great depth."

I hardly think that the workings, as a whole, will average three feet, but Mr. Chance calls attention to the fact that the vein proper is probably not over from one to two feet, but that ore chutes or chimneys of considerable thickness occur. By confining the mining operations to simply driving the levels through the thin ore, and only stopping it down when it is thicker, the average of the ground worked in this way might be better than three feet, and wrought at a less expense.

In my judgment, it would not be safe to establish a large mining plant there on any theory that the ore runs in depth. The only proper and safe plan would be to put down a series of drill holes in advance of the dip and along the workings. If the ore should prove to be there at a depth of, say, 500 to 600 feet, it would be perfectly safe to put up a good plant and open a big mine, which might, if wrought under proper management, prove very profitable.

If the mine should prove profitable to the owners it would be of immense importance to the iron industries of Virginia. Its position would enable its products to reach nearly every furnace in Virginia. As a dilutant of the Potsdam brown ores, high in phosphorus and manganese, it would be invaluable. If the Adams process proves the success, as is indicated, assorted Pittsville ore would make a first-class ore for treatment by this process, and ought to give a properly located Virginia steel plant a big advantage in prime cost.

What this section particularly needs is a good "fix" ore. It is now dependent upon Lake Superior or Champlain ores, and these are necessarily expensive. The Pittsville ore was tried at the Roanoke Rolling Mill with rather contradictory results. One statement is that it did not work well, and another that no difference was observed.

Mr. Haupt, the superintendent of the mill at that time, states that, having no grinding-pan then, it was used as "cold fix." Until actually disproved, I see no reason why the Pittsville ore, properly assorted at the mine and properly treated at the mill, should not make a thoroughly good "fix." If it can be so used, it can be delivered to all mills through this section at a price very much below the cost of foreign ores, and still leave a handsome margin to the mine owner.

The importance of at once testing these ores for depth and, hence, quantity cannot be overestimated.

The measures carrying them can be traced, it is stated, for a long distance through Virginia, and, depth being proved, it would unquestionably be a potent inducement to take up other properties and open other mines, and so make this a positive and permanent mining industry.

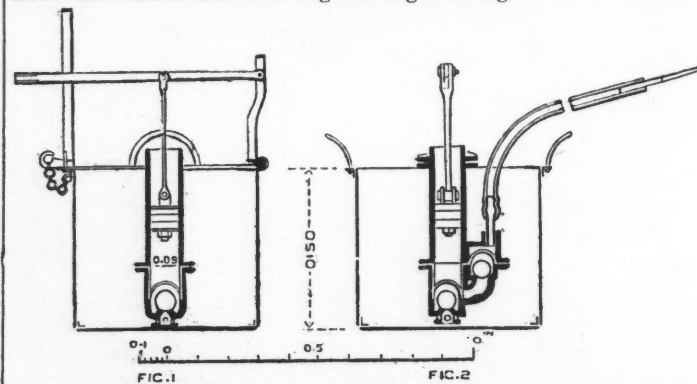
METHOD OF REPAIRING WET TUNNEL ARCHES.

A method of repairing damp tunnel arches, employed on the Trier division of the Prussian State Railway by Herr Blum, and said to have given very satisfactory results, is thus described by the *Engineer*, to which we are indebted for our illustration.

The plan of the work was very simple, being merely the injection of cement through cracks and holes in the masonry, which became practically a monolithic mass as soon as the cement had hardened. This method of drying a tunnel was not employed, however, until a careful examination of the surface of the ground had been made and it was found impossible to remedy the faults by draining.

Where drainage will not suffice, the tunnel walls are carefully examined, and all joints not tight are scraped out to a depth of 2 inches and caulked with about four-fifths of an inch of oakum, the remaining void being filled with cement in the usual manner.

At the same time that this work is being done, workmen are boring holes one and one-half inches in diameter through the masonry, into which a current of cement is to be injected. This cement is intended to fill not only the outer parts of the joints, but also to cover the whole exterior of the masonry if there are air spaces about it. As the work of boring these holes is expensive, care should be taken that they are driven at the most advantageous points. Experience has shown that a distance of three feet between the holes is as great as is consistent with good results; in very wet places this should be reduced by a third. Whether the holes are best driven through the stone or in the joints depends entirely upon the nature of the arch, especially the character of the stone, and must be determined independently for each case. Where soft stone is employed, it is generally better to drill through the voussoirs, especially if their faces were not dressed flat, since the holes through the joints will be very rough and uneven in such cases, and the additional labor in injecting the cement will more than counterbalance the slight saving in boring.



The semi-fluid cement that is forced into the crevices is composed of five parts of cement and four of water. The injecting pumps are shown in Figs. 1 and 2. The pump barrels are of brass, and the nozzle at the end of the rubber pipe is copper. The price of the apparatus, with 10 feet of two-inch rubber pipe, was about \$40. With a wooden tub, however, the cost would be considerably less. The cement must be carefully stirred, and it is necessary to clean the pumps thoroughly at least once every day. The cement is first injected at the crown by thrusting the copper nozzle through the oakum caulking, and pumping until the material shows in a neighboring hole or joint. Whenever the cement appears in the joints the openings are carefully plugged, the pumps stopped, and moved to the next hole. The work is usually done by means of scaffolding mounted on wheels, running on the track in the tunnel. As soon as the crown has been made impervious the sides of the tunnel become damp. This is best remedied by breaking small openings through the tunnel sides, and making, if possible, small drains, filled with stone, up toward the crown on the outside of the masonry. The cost of the work varies greatly with the condition of the tunnel, as may be seen from the following figures. The Heinzkyller Tunnel is constructed of sandstone masonry, and was very wet for years. The interior was rendered dry by injecting cement over 2,425 square yards of tunnel surface, at a cost of \$2.45 per square yard. This sum includes the cost of constructing drains. In the Mettericher Tunnel the cost of the work, not yet completed, has averaged \$3.13 per square yard. In the Looskyller Tunnel 4,656 square yards were improved, at \$1.56 per square yard. In the Nitteler Tunnel 2,830 square yards were made dry, at a cost of \$2.87 per square yard.

Testing the Value of Paving Stones.—The following plan of testing the comparative value of paving stones is adopted at the Paris Laboratory for Testing Materials, says the *Engineer*: A sample of the rock of regular form is placed upon a horizontal plate, rotating round a vertical axis, and pressed against it by suitable contrivances. The wear is then compared with that of a standard material under the same conditions. The coefficient of wear is the proportion between the volumes worn, which can easily be ascertained by weighing the specimens, and determining the volume from this weight, and the specific gravity of the material in question. The rotating surface is cast iron. The two specimens, viz. test piece and standard, are placed at opposite ends of a diameter of the rotating plate, against which they are pressed by equal weights. The standard used is Yvette sandstone, and first-class materials have a coefficient of from 1 to 1.40, whilst with second-rate materials the coefficient is between 1.40 to 2.40; if the wear is greater than that represented by the latter figure, the material is rejected. An additional test is made by placing specimens of the stones to be tested in a cylinder, which, like those used in clearing scrap iron from rust, is mounted and rotates on an axis which does not coincide with its center of figure. The amount of detritus produced after the material has been treated for a certain time in this machine is compared with that from a standard rock under the same conditions,

REPRESENTATIVE MEN IN THE MINING INDUSTRY.

Thomas Weir.

A man who has successively directed the affairs of two of the greatest silver mining companies in the United States may well be selected as a representative of this important branch of the mining industry. This honor has fallen to Thomas Weir, who, although still a comparatively young man, has already achieved a high reputation as a mining engineer.

Mr. Weir was born in Coila, Washington County, N. Y., on February 14th, 1855. He received his early education at the Washington County Academy in Cambridge, where he prepared for Union College, which he entered at the age of 17. There he took a course in civil engineering, and he was evidently an apt student, for when he graduated, in 1876, he stood at the head of his class. For a year after leaving college, Mr. Weir taught school at Cambridge, N. Y., but in March, 1878, abandoned this, and removed to Beatrice, Neb. In the following August he obtained employment in connection with the Government improvement work on the Missouri River at Omaha and Council Bluffs. Early in the next year, however, he was transferred to the Mississippi River Commission to assist in the surveying work. He also had charge of a party engaged in making borings in the marine deposits along the lower river.

Attracted by the mining excitement, then at its height, in the new district at Leadville, Colo., Mr. Weir resigned his position with the Mississippi River Commission and went thither in March, 1880. He occupied himself with general surveying work until August of the following year, when he was offered and accepted a position as Secretary and Mining Engineer with the A. Y. and Minnie Mines, which were then just

Mr. Weir is a man of quiet and somewhat reserved manner, but his kind, honest and hearty character has won him a host of friends. He is exceptionally modest and seldom speaks of his own connection with his work. He has attained his present high position and the esteem and confidence in which he is held by his employers, through his own merits alone.

SEPARATION OF BISMUTH AND COPPER.

Edward Matthey, in the *Chemical News*, describes a new method for the separation of copper and bismuth, discovered while working with a view to part the two metals by fusion with bismuth sulphide. He states that bismuth frequently contains a small proportion of copper, an element most detrimental even in small traces, and hitherto only eliminated by a wet process, costly in practice and tedious in operation. It is necessary by such method to dissolve the whole of the alloy and precipitate the bismuth in the usual manner—a bulky operation, and one requiring a considerable amount of time. It is desirable, therefore, in order to treat cuprififerous bismuth rapidly and upon a commercial scale, to effect this separation, if possible, by means of a dry process.

In the course of researches in the metallurgy of this interesting metal, a case was found in which bismuth contained a very small proportion of copper, under 0.5 per cent., but sufficient to render the metal useless, and, in fact, to destroy those characteristic properties upon which its industrial applications depend.

Instead of treating this cuprififerous bismuth by fusion with bismuth sulphide, which necessitates a temperature sufficiently elevated to bring about a complete fusion of the bismuth sulphide, and, consequently, un-



THOMAS WEIR.

being opened. Mr. Weir performed his duties so creditably that in October, 1884, he was promoted to the general management of the property, which, by this time, was giving promise of becoming one of the most important mines in the Leadville district. It was located between the Stone mine of the Iron Silver Mining Company and the Colonel Sellers, upon a portion of the great ore deposit known as the Stone chute, one of the largest bodies of silver-lead ore ever known.

At the time that Mr. Weir assumed the management of this property, the great ore body had been only partially opened, and to him fell the task of its further development, together with the exploration of the northern portion of the mines, in which the Smuggler and White Cap ore chutes were supposed to lie.

This work he performed in most intelligent, careful and systematic manner, and under his management the mine paid large dividends to its owners. The Minnie ore was mined at a lower cost than in any other sulphide mine in Leadville at that time. The cost of management and superintendence was reduced to a particularly low figure, in great contrast to the practice in many of the other mines.

Mr. Weir was distinguished for his caution and conservatism and the care with which he attended to the minutest details in connection with his duties. Dressing works were erected at the mine in 1887, and he was the only man who, up to that time, had successfully concentrated these complex and difficult ores.

In March, 1888, after the exploration of the great Minnie ore body had been practically completed and the work of extraction commenced, Mr. Weir resigned his position to accept the superintendency of the mine and mills of the Granite Mountain Company, of Montana. The record of this wonderful property during the past two years is well known to the readers of the *ENGINEERING AND MINING JOURNAL*. The sum of \$4,800,000 has been distributed in dividends to its shareholders during this time. In the operation of this mine and the amalgamating mills connected with it, Mr. Weir has shown the same marked ability as he did in Leadville.

less very great care be taken, great loss by volatilization of bismuth, the idea occurred to the author to fuse the alloy, and at a temperature a little above its melting point to add a small proportion of sodium monosulphide. The mass was then stirred well so as to bring every portion of the fused alloy into contact with the fused sulphide.

After about one hour's stirring a test was made of the molten metal, and it was found that the amount of copper in it was very considerably decreased.

By skimming off the film of scoria which had risen to the surface, adding a further small proportion of the sodium monosulphide, and continuing the operation of stirring, every trace of copper was eliminated and the bismuth, so freed from copper, rendered in every way suitable for industrial use.

The first experiment was made upon a quantity of 105 kilograms, which yielded 94 kilograms of bismuth free from copper, and about 11 kilograms of skimmings containing the whole of the copper, their bismuth contents of course being available for reduction with further and larger quantities of skimmings as they accumulated.

This process has been repeated upon very considerable quantities of cuprififerous bismuth, and has proved to be successful.

This question of keeping the temperature low is of much importance, for the lower the temperature the less tendency there is for the bismuth to volatilize, and as it is necessary to obtain the bismuth free from traces of impurity, which entirely change its nature, it will be seen that any improvement in manipulation, or in the process itself, which enables pure metal to be obtained, possesses much interest.

Tin in New South Wales.—The tin-fields of New South Wales were not opened until 1872, but since that date tin and tin ore to the value of nearly \$45,000,000 has been taken from them and shipped from the colony. The ore has come mainly from alluvial deposits, but huge stanniferous dikes intersecting the granite country rock, which give much promise, have recently been discovered.

DECISIONS IN THE COXE CASE.

The Interstate Commerce Commission, on the 13th inst., in an opinion by Commissioner Morrison, decided the case of Coxe Bros. & Co. against the Lehigh Valley Railroad Company. The points decided are briefly as follows:

1. Classification not obligatory on roads, but when misused Commission may correct.
2. Besides terminal expenses there are other considerations which justify lower proportionate charges for longer distances.
3. Several connecting lines doing through business treated as one in the adjustment of rates.
4. Commission is authorized to determine what rates are reasonable as well as what are unreasonable.
5. The present system of grouping mines in the Lehigh and Mahoning anthracite coal regions for rates East and West subjects complainants to no undue prejudice.
6. The rates, which are now \$1.70, \$1.40, and \$1.30 per ton, according to sizes, are to be reduced to \$1.50, \$1.25, and \$1.05.

In the opinion the commission says:

The questions presented for the determination are the alleged undue preferences, unjust discrimination, and unreasonable rates, pertinent to which the complainants submit for the consideration of the commission proposed findings of fact in substance as follows:

1. That the Lehigh Valley Railroad Company carries anthracite and bituminous coal over the same distance, in the same direction, under different classifications; that the tariff sheets and rates applicable to anthracite do not apply to bituminous, and that the two coals are a like kind of freight, and should be classed together as one class of freight.
2. That the acts done by the Lehigh Valley Coal Company connected with the buying and selling of coal and the transportation of the same over the road of the Lehigh Valley Railroad Company are the same as if done by said railroad company, and as done constitute illegal and unjust discrimination against the complainants and the public generally; and that the proper rate to be paid by all shippers over said road between the same points at the same time is ascertained by deducting from the established rate the loss sustained by said coal company as a buyer of coal for shipment over said railroad.
3. That the average rates per ton per mile charged by the Lehigh Railroad Company on anthracite coal are higher than on general freight, and that the rate of \$1.30 per ton of 2,240 pounds to Perth Amboy from the Lehigh coal region, a distance of about 135 miles, is excessive and unreasonable, and should be reduced to what the commission may decide to be a reasonable rate.

It is conceded, says the commission, that the bituminous coal mines are twice, or more than twice, as distant as the anthracite mines from New York harbor or Perth Amboy, while the transportation charges on bituminous were and are greater than the aggregate, but less in proportion to distance or per ton per mile. It is shown that in the last ten years the price of anthracite in Eastern markets has been maintained and the price of bituminous considerably reduced, and that many manufacturers and consumers discontinued the use of anthracite and substituted bituminous; while the complainants and other producers failed to find profitable markets for anthracite they produced and were prepared to produce.

The complainants insist that the displacement of anthracite by bituminous has deprived them and other miners of hard coal of profitable markets, and that this condition is the result of excessive rates on anthracite and of inequality and discrimination in favor of bituminous; that a readjustment of rates on a basis of the relative distances of the fields of production would reinstate the anthracite in Eastern markets, and that the classification of the two coals as one freight would remove the inequality and discrimination in favor of bituminous and establish all coal charges on a mileage basis, except to the extent that terminal expenses might modify the rate per ton per mile for longer distances.

For convenience in making transportation rates and charges, freight is arranged and put into different classes according to expense of carriages, bulk, value, risk, competition, and other considerations affecting the cost and the value of transportation service.

What is known as the official classification is in force in a large part of Illinois, and in all the district of the country east of that State and north of the Ohio and Potomac rivers, including the anthracite coal fields. Under this classification, freight, with few exceptions, is collected, arranged and numbered into six classes, and given as many separate rates. The freight not included in any of the six classes is mostly coal and other minerals and articles of great weight as compared with their value. These are classified or rated by name as a commodity. Anthracite and bituminous coals are so named and rated respectively as such, or as hard and soft coal, and, as a rule, a higher rate is charged on the hard or anthracite.

One complaint we are to consider, and which we are asked to remedy, is this separate classification or rating of hard and soft or anthracite and bituminous coals. We are asked to find that the two are the same freight, a like kind of traffic of which would be to subject them to the same charge when carried under like circumstances.

In the present state of the law, classification or the arrangement of articles together for convenience in rating them is not obligatory on the roads. They might legally fix a rate on every article of freight by name without other arrangement or classification. Such a system has proven to be so cumbersome and inconvenient that the arrangement of freight into classes is deemed by the roads an essential part of rate making, and it is so treated by the act to regulate commerce, which requires that the schedule of charges which every common carrier must keep open to the public "shall contain the classification in force."

The grounds upon which we are asked to find these two coals to be the same freight, a like kind of traffic, is that they are loaded, unloaded, and transported in the same way, and substantially at the same expense to the carrier, and are largely used for the same purposes, though one-half or more of the anthracite is used for domestic purposes.

The rule insisted upon and claimed to be especially applicable to coal, that the cost of the service alone should determine freight classification and freight charges will apply as well to different sizes and values of anthracite as to bituminous and anthracite.

The result of classifying and rating all coal, including these lower grades or smaller sizes, as one freight, would be that the smaller anthracite coals at the increased rate would be at still greater disadvantage than they now are, and for ordinary steaming would be cut out by bituminous, while for the uses in which anthracite is indispensable the larger sizes at the same rate would displace the smaller. The consequence would be

that 25 per cent. in quantity, or about 16 per cent. in present value of all anthracite mined, would be unable to bear the burden of transportation, and would be waste until such time as it could be locally converted into power and the power transmitted. There is, therefore, for the present no hardship but economy in making the best bear some of the burden of the inferior, which is not a voluntary but a resulting production. To determine otherwise and make waste of lower grades is to impose on the higher grades the entire cost of producing both. The result would be to largely increase the cost of production and the price of merchantable anthracite, and make waste of about one-fourth of all that is mined.

The complainants ask relief through lower charges on anthracite, at the same time insisting that the charge on the two coals shall be in proportion to the distance of carriage. The effect of such a rule, as already shown, is to require increased bituminous rates or to make them higher than they would otherwise be over the longer distances, and thus shut the cheaper coal out of New England and Atlantic coast markets. The effect of any regulation resulting in the increase of rates on bituminous is to close the markets further East against it and give them the more expensive anthracite confined to the limited territory in eastern Pennsylvania already monopolized. Any regulation imposing additional transportation or other burdens on bituminous coal to keep it out of Eastern markets would some time challenge the wisdom which deposited an abundance of cheap fuel in the east side of the Allegheny Mountains.

In addition to the alleged undue preference in favor of the bituminous coal traffic to the disadvantage of the traffic in anthracite, the complainants aver that the defendant railroad company is giving undue preference to the Lehigh Valley Coal Company, by charging complainants more for the transportation of anthracite coal than is charged to said coal company.

In support of this averment of illegal preference in favor of the Lehigh Valley Coal Company, it is shown that the railroad company owns the capital stock, property, and franchises of the coal company. The same persons are officers of both companies.

Whatever opportunity for oppression and abuse may be afforded, or whatever possible injury might result to the public interest from the corporate ownership and control or corporate relations existing between the Lehigh Valley Railroad Company and Lehigh Valley Coal Company, the authority of this commission extends to such abuses only as are in conflict with the act to regulate commerce or some of its provisions. While the coal company may in the exercise of its chartered rights buy and sell coal, certainly this commission cannot determine the prices at which it may buy and sell, so that the railroad company may realize its established freight rates as carrier and suffer no loss as stockholder. The commission would be incapable of any such determination if it had any authority to make it. With the market fluctuations in coal as well as other products, which may rise and fall from day to day, it is not practicable to determine in advance at what price the coal company must buy that it may sell at such profits as to pay full freight charges. Conditions so variable can form no basis for determining rates which must be reasonable, and afford no standard by which to measure the extent to which charges may be excessive. Yet the fact that the railroad company, directly as a carrier, and indirectly through its coal company as an operator, so conducts the business of buying, shipping, carrying and selling coal, that the road realizes less for transportation than its established rates, affords evidence of the defendants' readiness to take the freight at less than full charges, and justifies the conclusion that the charges to others are to some extent excessive.

In concluding a long argument on the subject of a reduction of the rates on all sizes of coal to tidewater, the decision says:

The practicable and necessary adjustment of the rates on such eastbound short-distance traffic which we have determined upon as reasonable per ton of 2,240 pounds from the collieries of complainants to Perth Amboy is, on the prepared and larger sizes, \$1.50 on pea, \$1.25 on buckwheat, and culm, \$1.05. The charges so adjusted on the several grades or sizes of coal and applicable to complainants' shipments to Perth Amboy are not meant to affect or to establish the relation of the charges made or to be made on Buffalo and longer-distance shipments, where lower anthracite rates are maintained than are or may be in force on tide shipments.

The rates now determined upon are believed to be liberal for freight so inexpensive as coal, and if, after trial, it is found that they are too high, we will not hesitate to require further reductions; but, in view of interests so vast as the east-bound anthracite traffic which may be affected, we do not now feel justified in determining upon any lower scale of charges. These rates go into effect April 2d, 1891.

BASIC BESSEMER PROCESS.

The *Nation*, of New York City, in its issue of February 26th, says: "The Scientific Publishing Company, of this city, sends us Wedding's 'Basic Bessemer Process,' translated from the German by Wm. B. Phillips and Ernst Prochaska. To those who are specially interested in iron manufacture, even if only from a purely scientific point of view, this work will be of great value. It contains a full historical account of the development of the so-called basic-lining Bessemer process as now practised in Europe, though not as yet to any great extent in this country, while a supplement by one of the translators, Mr. Prochaska, gives the details of the application of the same fundamental principle to open-hearth furnaces. The credit of the successful introduction of this first-class improvement is due to Sidney Gilchrist Thomas, whose first English patent bears date April 10, 1879. The principle involved is simple; the success of the process in removing phosphorus almost wholly from iron depending upon the fact that phosphorus, oxidized in presence of bases—lime, magnesia, etc.—yields phosphates of the bases, which may be slagged off and removed, while in the presence of silica the removal is possible only to a limited extent. The principle involved was not new, but Thomas made its application a success. The work is full of details of the application, and must take its place as a standard book of reference."

Preparation of Glass for Optical Purposes.—A new method for the preparation of glass for optical purposes has been devised in Sweden, and, according to *Revista di Artiglieria e Genio*, has met with marked success. The main improvement is said to consist in adding to the composition of the glass certain quantities of phosphorus and chlorine, which impart to it an absolute transparency, great hardness, and susceptibility of the finest polish. For achromatic lenses and fine optical instruments this glass is far superior to any make hitherto known, and it is said that the power of microscopic lenses can be greatly increased by this process.

A REVIEW OF THE CHEMICAL LITERATURE OF THE MINERAL WAXES.—II.

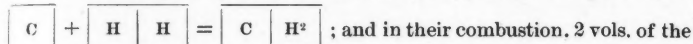
Written for the Engineering and Mining Journal by Dr. Henry Wurtz.

(Continued from page 327.)

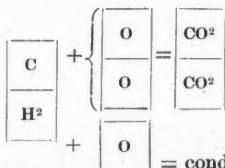
Since the former instalment of this review was handed in, two old memoirs have been discovered, of great interest in relation to the subject, which had been previously searched for without success, and which must therefore be brought in here, though out of their order. They should indeed have been first of all on the list. One of these sets forth an extensive investigation and discussion of various oily, fatty and waxy materials by the Swiss scientist De Saussure (the younger), published in 1820, in the *Bibliothèque Universelle de Genève*, Vol. 13. On page 113 is found what is probably the first recorded analytical investigation of a natural hydrocarbon wax, though not in this case of mineral but of vegetable origin. De Saussure discovered that *Essence de Rose*, or "Otto of Roses," as it is often called, is separable by cold and pressure into a liquid essential oil and a solid or "concrete" inodorous constituent, such as is sometimes called a "stearoptene" (though most of the stearoptenes of essential oils are camphors or camphoroid bodies). This constituent of the rose oil is waxy in its character, and De Saussure attempted the analysis of it by the method of determining the relative volumes of the oxygen consumed and the carbon dioxide produced during its combustion. This mode might even now be returned to for C determinations, in cases where a carbon compound to be analyzed is obtainable in small quantity only; for measurement of the gaseous volumes is a much more sensitive method than the customary weighing of the products of combustion. In this case, De Saussure found the oxygen had to the carbon dioxide the ratio in volumes of 100 to 66.96, or, closely enough, 3 to 2.* He remarks that this is the same result as in the analysis of olefiant gas; that is, of one of the C_nH_{2n} isomeric homologues, which we now call olefines. He burned but 0.0535 gram (about 0.8256 grain) of material, and computes (of course with incorrect equivalents: see above): C, 86.743; H, 14.889—101.632. C, 85.35; H, 14.65—100.00. Corrected by our present equivalents, this result becomes: C, 86.729; H, 13.271—100.000.

It can, therefore, represent no hydrocarbon of the $C_nH_{2n} + 2$ series, the carbon being much too large. The only known series containing solid hydrocarbons to which it can reasonably be assigned, is the olefine series C_nH_{2n} , to which the last (corrected) computation presents quite as close an approach as could be expected when so little material was burned.

De Saussure's analysis may be elucidated very simply by diagrams. The olefines are formed by the condensation of n volumes of C-vapor, and 2n volumes of H-gas, into 2n volumes, thus, as the simplest case:



and in their combustion, 2 vols. of the olefine (in vapor) combine with 3 vols. of O-gas, forming 2 vols. of CO_2 gas and 2 vols. of steam (the latter condensing before measurement). Thus:



= condensed water; three volumes of aerial oxygen thus giving two volumes of carbon dioxide gas.

In Schorlemmer's "Chemistry of the Carbon Compounds," page 75 (Ed. of 1874), there is what appears to be a brief allusion to this observation of De Saussure, as follows: "Solid paraffines occur also in nature (meaning in the vegetable kingdom); thus attar of roses contains one which appears to be $C^{16}H^{24}$." Unless Schorlemmer had here in view some later analysis of this material, differing irreconcilably from De Saussure's, the formula he assigns does not seem to fit well. This formula corresponds to 16 vols. of C-vapor, which will burn as above, with 32 vols. O-gas to 32 vols. CO_2 -gas, together with 34 vols. H-gas, which will burn with 17 vols. O-gas to water. Hence $32 + 17 = 49$ vols. O must produce 32 vols. CO_2 . Proportionally to this, 100 vols. O can form but 65.3 vols. CO_2 , instead of the 66.96 of De Saussure. Now, as an olefine must form 66.67 of CO_2 , De Saussure's figure differs from an olefine by only 0.19 volume, whereas Schorlemmer's differs by 1.66 vols., or more than eight times as much.†

The existence of solid olefines as products of vegetation has other probable support. A waxy material, extracted from dried grass (hay) by solvents has been stated to be a hydrocarbon. Whether this wax be an olefine or a paraffine, its occurrence in such extremely abundant plants as the grasses is highly suggestive in a genetic connection.

[The writer would here refer to his paper of July 27, 1889, in this journal (pp. 73-4 of that issue), on a "Theory of Asphaltogenesis," for genetic suggestions in this field. He hopes soon to present your readers with a novel view of rock-oil genesis, which has arisen in his mind during recent generalizations of the facts known.]

The other article, just discovered, has already been referred to as one which had not then been encountered, namely, the original announcement of the Rev. J. J. Conybeare of the discovery of *hatchettine*—the first mineral wax—in the ironstone of Merthyr-Tydvil, in South Wales. This has at length been found in Vol. I., 1821 (and not 1822, as several authorities, including Dana, state), of the second series of Thomson's *Annals of Philosophy*.‡

* The all-important law of Gay-Lussac, of the multiple relations of gaseous equivalent volumes, had then been known already for twelve years.

† Since the above was written I have encountered two well-concurrent analyses of this rose-leaf hydrocarbon, made by Liebig's methods, in 1832 or 1833 by Blanchet. They are stated to have been computed with C = 12.26 (and doubtless also with O = 16.025). This has enabled me to correct them:

	Mean of 2.	Recomputed.
Blanchet.....	85.78 14.38	85.447 14.553
	100.16	100.000

The corrected figures differ from the paraffine assumed by Schorlemmer, $C^{16}H^{24}$ (which has H = 15.044), about twice as much as from an olefine.—H. W.

‡ This volume was not forthcoming at the Astor Library, but was subsequently found in the library of Columbia College.—H. W.

The discoverer there said: "It appears to me to differ from all the varieties of bituminous matter hitherto discovered, sufficiently to form a separate species. I will propose that it should be distinguished by the name of hatchettine, in reference to that eminent chemist, to whom we are indebted for the most valuable contributions toward the history and analysis of this class of natural substances." He describes it as follows: "Color from yellowish-white to wax and greenish yellow. Texture sometimes flaky (like spermaceti), sometimes sub-granular, like bees-wax. Lustre: In the flaky variety slightly glistening and pearly, in the other dull. The flaky variety has, in thin laminae, considerable transparency, while other varieties were opaque. It is very light, and no harder than soft tallow. It has no elasticity or odor and is very fusible, melting in warm water under 170° Fahr. (77° C.). It is readily soluble in ether. When distilled over a naked spirit-lamp flame it gives, with a bituminous odor, a greenish-yellow butyraceous product and a coaly residuum. At a lower heat, a light oil is distilled over. It is found filling small contemporaneous veins lined with calcareous spar and small rock crystals, termed the Merthyr diamonds, in the ironstone."

The Rev. Mr. Conybeare dates his communication "Bath Easton, January 17th, 1821."

[This cannot have been the Rev. Wm. D. Conybeare, the distinguished geologist who discovered the plesiosaurus, etc., but probably another of the same noted family. Among the "valuable contributions toward the history and analysis of" carbohydrogen minerals of the chemist Hatchett, which Mr. Conybeare refers to, are some which the present writer has cited largely in a communication to the ENGINEERING AND MINING JOURNAL. This was in discussion of the new Utah mineral, wurtzilite, of Professor Blake, and of its wide variation from the so-called "elastic bitumen" of Derbyshire, upon which Hatchett published an extensive research as long ago as 1797. Hatchett is especially memorable to American chemists and mineralogists for discovering and naming the metal Columbitum, in 1802.]

We must now recur to our record, and start again from 1836, the date previously reached. Besides the research of Malaguti, there appeared in this year another paper, by Schrötter, with an analysis, also of a Moldavian sample, in this case like that of von Meyer from Slanik. This paper the writer has not yet found in New York, and unluckily, therefore, such of its contents only are available as can be obtained at second hand. Moreover, careful examination of the different citations leads to inharmonious conclusions with regard to the most important matter—the composition of the mineral. The analysis is thus cited:

	(1.) Dana's Mineralogy and Gmelin's Handbook (Cavendish edition).	(2.) Watts' Dictionary and Loewig's <i>Chemie der Org. Verbind.</i>
C.....	84.13 or 86.048	86.21
H.....	13.69 or 13.932	13.79
	98.12	100.00

These figures, though discrepant, are useful in so far as they both indicate plainly the C_nH_{2n} , rather than the $C_nH_{2n} + 2$ series. The writer has experimented with these figures, on the hypothesis that we have under (1) the figures computed by Schrötter from his results, with the Berzelian equivalents of that day—which appear to have been about as follows, reduced to our present notation: H = 1; O = 16.025; C = 12.25; and that the figures under (2) had been corrected to Dumas's equivalents. But this supposition was negatived.

Schrötter states the specific gravity of his sample as .953, which is close to that given by Glocker, = .955. Schrötter's melting-point was 143.5° to 145.5° F., and his boiling-point 410° F. The heaviest paraffine obtainable from Boghead Cannel has a specific gravity of only .94, while the melting-point of this is greatly higher, = 176° F., and its boiling-point is nearly up to a red heat. Boghead paraffines of melting-point 144.5° have specific gravity about .927.

In 1837 Malaguti published a short note in the *Comptes Rendus*, Vol. IV., in which he reaffirms his discovery, before alluded to, that the mineral waxes are composed of a series of bodies which, while all of the same centesimal composition, have different fusing and boiling points and solubilities. He here gives also some further information regarding the solid product of distillation of these bodies at a regulated temperature, which product has already been described. He had called this "ozokerite wax." He here says that it differs so much from paraffine that he proposes to call it by a new name, *paraffine*. Analyses of this product have already been cited.

In 1838 appeared a more complete description of *hatchettine* (first announced by Rev. J. J. Conybeare in 1821, as already related), accompanied by a (dubious) analysis, by J. F. W. Johnston, professor at Durham (London and Edinburgh *Philos. Magazine*, Vol. XII., p. 338). His specimens came from Sir David Brewster. He says it occurs "with iron ores of the coal measures in Glamorganshire and elsewhere in the midland counties of England." It is transparent, yellowish, thinly laminated, of nacreous lustre, greasy touch, consistence of soft wax, no smell. D at 60° = .916; melting-point, 115° F. On cautious heating, seems to distil without change. Becomes dark and opaque in the air. Boiling alcohol dissolves it sparingly, and lets it fall on cooling. Cold ether dissolves little, boiling ether much more, and on cooling forms a coagulum of minute prisms of crystalline, nacreous lustre. Concentrated boiling sulphuric acid chars and decomposes it. Boiling nitric acid is without action. Of a colorless sample: 5.14 of material burned to 15.97 of CO_2 and 6.765 of H_2O . From this he computes—

	Johnston.	Recomputed by H. W.
C.....	85.91	84.736
H.....	14.624	14.623
	100.534	99.359

He states, however, that he could not dry his oxide of copper sufficiently, for fear of vaporizing some of the substance itself. This he regards as vitiating his hydrogen determination. The equivalents which he used (which he specifies also), reduced to our present standards, were closely: H = 1; O = 16.027; C = 12.2505. Johnston's deductions from his analy-

§ ENGINEERING AND MINING JOURNAL, January 11th, 1890, p. 59.

¶ Dana gives two references: *Bibliothèque Universelle de Genève*, III., 184, and *Baumgartner's Zeitschrift für Physik und Mathematik*, IV., 2. Although both of these series exist in our New York public libraries, in each case the special volumes referred to were reported as missing.

‡ *Chemical News*, XXIV, 187; John Galletly, October 20th, 1871.

THE ELMORE COPPER DEPOSITING PROCESS.

Reference has already been made in the ENGINEERING AND MINING JOURNAL to the Elmore process for the manufacture of copper tubes. The Elmore Copper Depositing Company has recently erected works at Haigh Park, Hunslet, near Leeds, in England, and the process as carried out there is described in the issue of the *Engineer* of March 6, to which we are indebted for our illustrations.

The copper is brought into the works in its rough state as Chili bars, which contain about 97% of pure copper. These are first melted in a furnace, and the molten metal is poured into a crucible which holds about a ton. The crucible is carried on a small truck, which runs over a light track, and the metal is poured into a large tank of water in order to granulate it, so that it may be in a suitable condition for use in the vats.

The electric generating plant consists of two Lancashire boilers of 250 horse power each, each 30 feet long by 7 feet 6 inches in diameter, and three engines of 70 horse power each, which drive, by belting, three dynamos, each developing a current of 1,000 ampères at 50 volts when working at 450 revolutions, which is also the speed of the engines. The con-

produced in each tank if required. The plates, *D*, are of copper, and are used to equalize the resistance of the electrolyte round the tube. The granulated copper forms the anode of the cell, and the mandril, *E*, to which reference will be made later, forms the cathode. The copper is deposited by this process from a solution of sulphate of copper onto the rotating cast-iron mandril, which is marked *E*¹ and *E*².

The company has had great difficulty in obtaining perfect mandrils; and although it would appear that there ought not to be much difficulty in manufacturing a cast-iron tube 10 feet or 12 feet long, and of even thickness throughout its length, and without sponginess, it seems that such is the case. If the mandril be thicker at one part than at the other, it causes uneven rotation, and it is very likely to break the driving chain, and if it be at all spongy the holes in the surface are filled with the copper deposit, and it is impossible to release the tube. The method now in use is to fill any small flaws in the surface with lead, and then to deposit a thin coating of copper upon the mandril by the ordinary cyanide process. The copper which is afterward deposited on it does not adhere to the thin copper layer with which it is covered, it being found that an exposure to the air for even a short period produces a coating of oxide which effectually

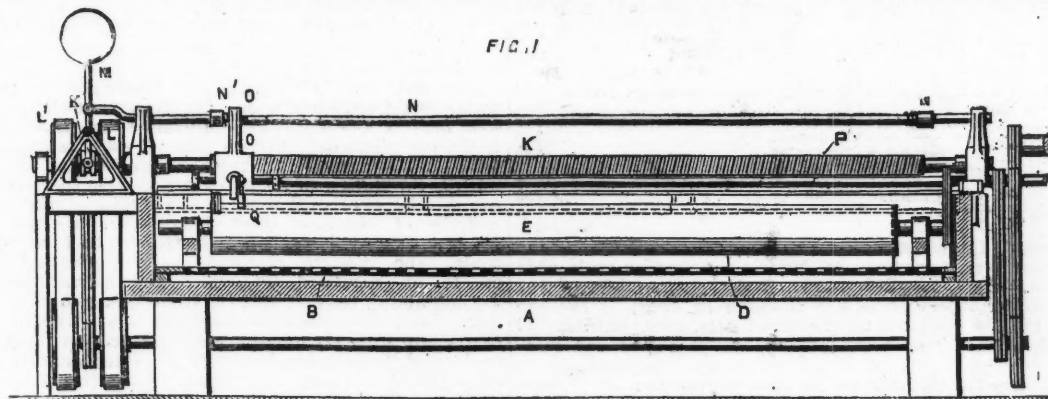


FIG. 1

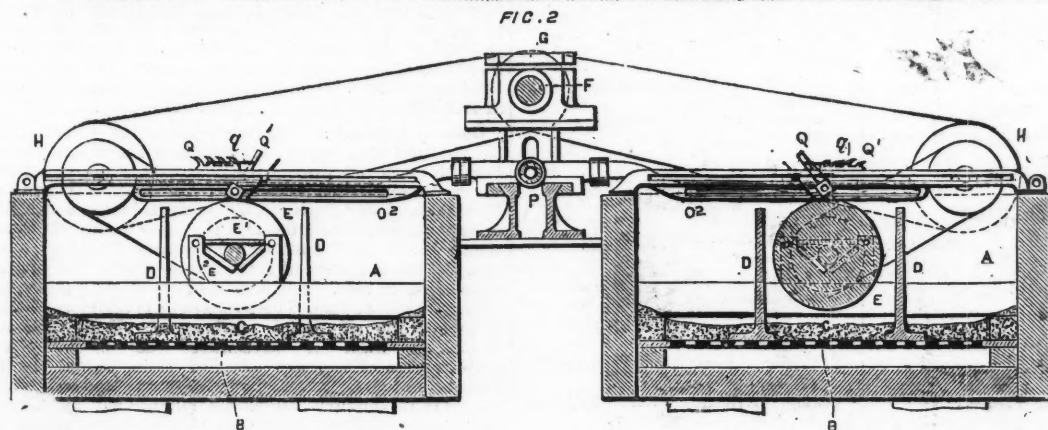


FIG. 2

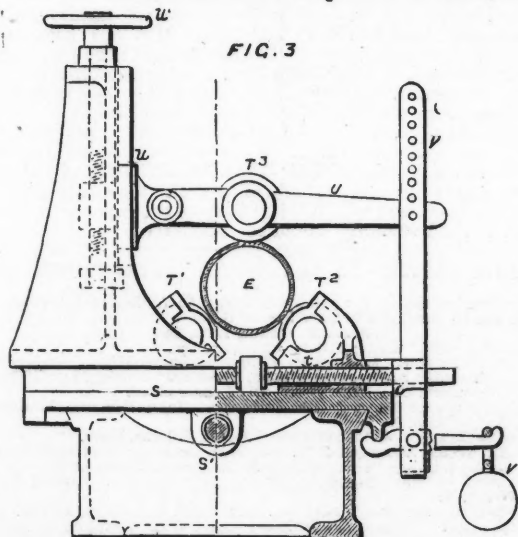


FIG. 3

ductors which run along the floor of the engine house are of solid copper 1 1/16 inches diameter.

The tank shed, in which the copper is deposited and the tubes are produced, measures about 200 feet in length and 40 feet in width, and contains 60 tanks, each about 12 feet long by 3 feet deep by 4 feet wide, but the size varies with the diameter of tubes which are to be produced. The output of this room is from four to six tons of finished tubes per week of 168 hours. On reference to Figs. 1 and 2 it will be seen that the tanks are made of wood, and this is lined inside with a bituminous composition. At the bottom is fixed a perforated copper plate, *B*, which is covered with the granulated copper, *C*, in Fig. 2. Only one tube is in process of manufacture in each tank of the figures but several can be

ally prevents adherence; if a mandril of the size required were not in stock, a tube could be deposited over another tube.

An important feature in the Elmore process is the burnisher, marked *Q* in Figs. 1 and 2, which is employed. This travels from end to end of the rotating mandril, and consists of a holder, *O*¹, at the end of which is fixed a piece of agate; pressure is put upon it by means of an elastic band, the pull of which can be regulated. The pressure upon the burnisher varies from 3 pounds to 13 pounds. The traversing motion of the burnisher is produced by long screws, and the power is applied at the extreme end of a row of about 12 tanks. The travel of the burnisher can be varied in a very simple way to suit the length of the tube being made.

The drop in the electromotive force for each tank is about 0.9 volt, and the current used is 750 ampères. About 1/4-inch thickness of copper is deposited in a week of 168 hours on mandrils 6 inches in diameter. The ordinary length of these is 10 feet, and they are rotated at a speed of 20 revolutions per minute. The sludge which gradually settles at the bottom of the tank is run off with the spent electrolyte into large settling tanks, and, when a sufficient quantity is obtained, is smelted. The process is of course, as a rule, continuous, and so long as the atmosphere does not reach the surface of the tube the next layer will adhere to the former.

The copper is produced of different qualities according to the use to which it is to be put, and the quality is varied by a difference in the solution, and by the difference in the pressure of the burnisher upon the tube. The copper leads have a section allowing for a current of 1,000 ampères per square inch, and the brass portions of the tank fittings 500 ampères, while the density of the current in the copper plates in the tank is 16 ampères per square foot. The average density of the electrolyte is 16.5 Beaumé.

The mandrils are prepared in the machine shop; there the lead is burnished into the porous parts and the thin layer of copper deposited upon the surface. They are then fitted with a wooden spindle at each end, in order to insulate the bearing. In Fig. 3 is illustrated the machine which is used for expanding the tubes on the mandrils. It is in the form of a lathe bed, *S*¹, upon which travels a carriage which is provided with two rollers, *T*¹ and *T*², and above these with a roller, *T*³, which is loaded through levers by the weight, *V*. The carriage travels the whole length

of the tube, and the pressure put upon the tube by the roller *T* slightly expands it, and it is then easy to remove it from the mandril. The bur-nisher used in the depositing process does not travel quite to the end of the tube, and it is therefore necessary to cut off a short rough piece at each end. This is now being done by a circular saw, but a machine fitted with rotary shears is also in use for the same purpose.

New sheds are almost finished, which will be used for depositing copper upon heavy shafts, which may be 60 feet in length. For the copper de-positing in this manner the Elmore Copper Depositing Company guaran-tees a breaking load of 20 tons and 15% elongation. It is stated that no difference in the tensile strength is noticeable, whether the specimen be cut lengthwise or circumferentially from the tube.

OFFICIAL REPORTS.

The Atlantic Mining Company.

The directors of the Atlantic Mining Company have made the follow-ing report of operations during the year 1890: The production of mineral was 5,000,000 pounds, which yielded about 72.4%, or 3,619,972 pounds of refined copper, for which—estimating the portion not sold at 14 cents per pound—there has been realized an average of about 14.94 cents per pound. The following is a summary of the year's business:

PRODUCTION.		COSTS.	
2,821,616 lbs. copper sold for.....	\$429,284.72	Working expenses at mine.....	\$376,748.24
798,356 " " on hand, @ 1c.....	111,769.84	Freight.....	19,595.66
		Smelting.....	35,175.68
		Expenses.....	7,152.69
		Brokerage.....	2,586.49
Add interest received.....	4,466.76	Insurance.....	1,004.19
		Taxes (city and State N. Y.).....	194.08
		Mining profit.....	112,064.29
			\$545,521.32

There was expended for construction, exploring, etc., \$30,495.21; the net gain for the year was, therefore, \$81,569.08; the surplus from 1889 after payment of dividend was \$263,020.93. A dividend of \$40,000 was paid August 1st, 1890, and \$13,168.16 was invested in lands at Salmon Trout River, making the net surplus, December 31st, 1890, \$291,421.85; out of this a dividend of \$1 per share (\$40,000) was paid February 16th, 1891.

The working expenses at the mine are itemized as follows:

UNDERGROUND.		RAILROAD.	
Sinking 184 feet, av-erage \$22.90 net....	\$4,213.88	Labor.....	\$5,959.39
Drifting 4 456.8 feet, average \$3.10 net..	22,731.71	Fuel.....	2,548.20
Stoping 17 983.2 fath-oms, average \$4.21 net.....	71,936.43	Supplies.....	1,337.60
Timbering, tram-ming and labor....	81,644.28		\$9,845.19
Timber, materials and supplies.....	12,231.18	Less received for transportation....	214.25
Pumping and operat-ing air compres-sors.....	27,775.99		9,630.94
	\$220,533.47	STAMP MILL.	
		Labor.....	\$28,010.85
		Fuel.....	36,450.25
		Supplies.....	11,075.49
		Fire insurance.....	950.00
		Teaming mineral, etc	1,038.44
			\$77,525.03
		Less received for dockage.....	219.25
			77,305.78
		CONSTRUCTION ACCOUNT.	
		At mine.....	\$24,398.89
		At mill.....	1,672.48
		Exploring.....	1,257.11
		Legal expenses.....	3,166.73
			\$30,495.21
		Total expenditure.....	\$407,243.45

SURFACE.		SUMMARY OF RESULTS.	
Superintendence, and labor of all kinds, less sundry credit items.....	\$34,653.00	Ground broken in open-ings and stopes.....	18,819.8 fathoms.
Supplies and mater-ials.....	12,941.70	Rock stamped.....	278,300 tons.
Fuel.....	16,612.18	Product of mineral.....	5,000,000 lbs.
Specific tax on copper	1,336.84	Product of refined copper	3,619,972 lbs.
Fire insurance.....	446.00	Yield of refined copper per cubic fathom of ground broken.....	192.3 lbs.
Taxes.....	4,642.23	Yield of rock treated, 13 lbs. copper per ton, or.....	0.65 per cent.
Canal tolls on copper	282.99	Gross value of product, per ton of rock treated.....	\$1.9441
Expenses and sundry repairs.....	1,299.21	Cost per ton of mining, selecting and breaking, and all surface ex-penses, including taxes	1.0414
No. 4 Hoist.....	1,581.32		
	\$73,845.47		
Less amount re-ceived for rents....	4,567.42		
	69,278.05		

The quantity of rock treated at the mill and its average yield were about the same as in the previous year, the latter half of the year show-ing, however, an improvement in the yield of rock.

The cost per ton of handling the rock, as well as the cost per pound of copper produced, was larger than for several years past. A considerable advance in the rates of wages paid to workmen; an increase in the amount of opening and development work and of ground broken, amounting to about 16% over the figures of last year, and an unusual amount of tim-bering in the mine, were the principal causes of this increased cost; be-sides which a large amount of repairs to plant and dwellings were neces-sary. All of these expenditures have been included in the figures of working expenses, and it is probable that a lower average of cost will prevail during the current year.

Fair progress has been made with the work of renewing the hoisting plant and preparing for working the mine to a greatly increased depth. Some explorations with the object of finding other workable deposits upon the property were undertaken during the past season, but have not met with any pronounced success, although two belts of amygdaloid carrying some copper about 2,200 feet east of the vein were cut just as frost set in and stopped the work.

Brick Buildings in China.—The Chinese Government has engaged a German official named Lieske to establish an extensive brick manufac-tory near Hong Kong. The object of the government in starting these works, which will be followed by the establishment of others in various parts of the empire, is to rebuild most of the cities, the houses of which are constructed almost wholly of wood. The frequent fires occurring in these places, almost invariably resulting in the destruction of thousands of buildings, led the authorities to the determination to substitute brick for wood in future construction and to cause the reconstruction of exist-ing buildings as rapidly as possible.

Boundaries of Mining Claim.—Plaintiff and defendant owned adjoining mining lots. Defendant mined a quantity of ore on the side of his lot next to plaintiff; a corrected survey of the whole tract showed that the land from which this ore was taken was within the true lines of plain-tiff's lot, and he brought forcible entry and detainer against defendant. The evidence showed that when the parties went into possession the lots were marked by stakes, and that defendant's operations had been confined to his own lot as originally staked off. These stakes were, as a matter of law, monuments which must prevail over the courses and distances of the subsequently corrected survey.

Jones v. Poundstone, Supreme Court of Missouri, 14 S. W. Rep., 824.

Electrolytic Generation of Hydrogen and Oxygen.—In a paper re-cently read before the *Société Française de Physique*, says the *Electrician*, Commander Renard described his investigations on the electrolysis of water on a commercial scale. He employs an alkaline electrolyte (caustic soda 13% solution) and is therefore able to substitute cheap cast-iron elec-trodes for platinum. Porous pots of asbestos fibre, which are able to withstand a pressure of from 30 to 50 cms. of water without per-mitting the passage of the gases, are used for their collection. The actual commercial apparatus used at the Chalais works is as follows: A large cylinder of common sheet iron serves at the same time as the containing vessel for the electrolyte and as the negative electrode. The positive electrode is a perforated iron tube, fixed on to an insulated lid, which fits hermetically on to the top of the containing vessel. This electrode is surrounded by a large asbestos bag. Two voltmeters of this kind have been in continuous work at Chalais for some six months, and at the end of this period both the elec-trodes and the asbestos bag were in perfect condition. The gases given off are pure, and there is no ozone. According to Commander Renard a battery of 36 large voltmeters could generate about 200 cubic feet of hydrogen and 100 cubic feet of oxygen per hour, which could be com-pressed to a pressure of from 120 to 200 atmospheres in steel tubes, and utilized for therapeutic, laboratory, metallurgical, and other purposes. The total cost of these gases, ready for use in steel bottles at a pressure of 120 atmospheres, when produced on a sufficiently large scale, is estimated at from \$3 to \$3.50 per thousand cubic feet.

Coal in Burmah.—The coal fields in the Upper Chindwin district and the country between the Myittha and Yu Rivers have been examined by English engineers during the past year, who report that the total area of the coal field in this part of the country is estimated at 175 square miles. It consists of two portions, the more valuable one, near the river, measur-ing about 55 square miles and the other about 120 square miles. The coal occurs in Tertiary strata of very regular bedding; the seams are numer-ous, but the majority of them are not thick, few exceeding 3 feet and one measuring 10 feet. The coal is of excellent quality, hard and bright, and makes excellent fuel. The average of 11 analyses of Chindwin coal showed a percentage of fixed carbon of 49.95. Some seams, however, show as high a percentage as 69.59. A syndicate has taken a lease of 6 square miles of these fields. In the Northern Shan States coal has been found near Lashio in isolated basins varying in extent. It occurs in Tertiary sandstone surrounded by Silurian limestone. The outcrops are difficult to examine, being situated in the beds below the water level nearly the whole year round. In the Lashio coal field there is one seam of at least 30 feet in thickness. This has been superficially traced for more than two miles. The coal is not of the first quality, being very light and liable to crack when dry. In the Nammra basin there are numerous coal seams, ranging mostly from 6 to 8 feet in thickness. In several of them the coal is of a very hard description; but it is compara-tively speaking, poor, the percentage of fixed carbon not exceeding 39 in any one of the 11 samples tested. It may now be considered proved that coal occurs in the Northern Shan States in workable quantities of such quality as to give fair fuel, but it will be of no value unless the Northern Shan States are crossed by a railway line, as the expense of carting the coal down to the Irrawaddy would be prohibitive.

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, MARCH 17TH, 1891.
- 448,192. Metal Shears. Henry Aiken, Pittsburg, Pa.
 - 448,213. Rotary Engine. Magnus P. Elgen, St. Paul, Minn., Assignor of seven-eighths to Thorild Wilson, Theodore Grutting, Louis Elgen, Hans J. Nelson and Charles Lobnke, all of same place.
 - 448,218. Arch Plate for Steam Boiler Furnaces. John Fea and William H. Hoag, Amsterdam, N. Y.
 - 448,319. Ore Separator. Antoine Clement-Conti, Feletto, Italy.
 - 448,334, 448,335, 448,336. Rotary Pump. Ellick H. Gollings, Lewiston, Idaho, Assignor to the Gollings Bi-Centric Pump Company, Chicago, Ill.
 - 448,361. Process of Manufacturing Nitrate of Ammonia. Russell S. Penniman, Dover, N. J.
 - 448,362. Preparing Nitrate of Ammonia. Russell S. Penniman, Dover, N. J.
 - 448,472. Separator. William L. Card, La Crosse, Wis., Assignor to the Card Con-centrator Company, of Colorado.
 - 448,480. Process and Apparatus for Refining and Purifying Petroleum. Herman Frasch, Cleveland, O., Assignor to the Solar Refining Company, of Ohio.
 - 448,516. Process of Treating White Lead. Edward V. Gardner, London, England.
 - 448,518. Rotary Pump. Ellick H. Gollings, Chicago, Ill., Assignor to the Gollings Bi-Centric Pump Company, same place.
 - 448,530. Smoke Consumer. John C. Lowdon, Kansas City, Mo., and James Dixon, Kansas City, Kans., said Lowdon Assignor to Schuyler C. Elliot, Kansas City, Kans.
 - 448,576. Steam Boiler Setting. Jeremiah M. Allen, Hartford, Conn., Assignor to the Hartford Steam Boiler Inspection and Insurance Company, same place.
 - 448,600. Process of Utilizing Galvanized Waste. Richard J. Brice, Brooklyn, N. Y., Assignor of one-half to Daniel Cuhane, same place.
 - 448,608, 448,609. Rotary Pump. Ellick H. Gollings, Chicago, Ill., Assignor to the Gollings Bi-Centric Pump Company, same place.
 - 448,620. Wire Nail Machine. Joseph von Serkey, Chicago, Ill., Assignor of three-fourths to Rockwell King, same place.
 - 448,621. Art of Obtaining Motive Power. George J. Altham, Swansea, Mass.

PERSONALS.

Mr. O. H. Hahn, metallurgist, sailed from London for Cape Town, South Africa, per steamship "Mexican" on the 6th inst.

Mr. J. O. Groves has resigned the superintendency of the Silver King Mining Company, of Arizona, and Mr. J. B. Stevens has been appointed to the vacant position.

Mr. John Daniell, superintendent of the Tamarack and other Michigan mining companies, has recently been in Boston. It is said that he is making arrangements for the hoisting equipment of the Tamarack, Jr., mine.

Mr. Robert Billings, who has been for some time purchasing agent of the Pueblo Smelting and Refining Company, of Pueblo, Colo., has resigned and moved to Denver. He has accepted a similar position with the Philadelphia Smelting and Refining Company, and is in charge of its office in Denver.

Governor Prince, of New Mexico, has appointed Messrs. W. H. Llewellyn, of Las Cruces; M. Salazar, of Las Vegas; W. T. Thornton, of Santa Fe, and E. V. Chavez, of Socorro, as commissioners to represent the Territory at the Columbian Fair at Chicago. The Legislative Assembly of New Mexico appropriated \$25,000 for the territorial exhibit.

Maj. Richard J. Hinton recently left Washington for the West to investigate irrigation in the Dakotas. He will lecture on "Irrigation on the Great Plains" at Fargo, Grand Forks, Aberdeen, and Mitchell, and will confer with agents of the Agricultural Department, now in the Dakotas, with reference to spring and summer work. Maj. Hinton has faith in irrigation by the artesian system in the sub-humid region.

Mr. J. J. Corrigan, who at one time was the president of the Richmond Mining Company, of Nevada, and a very wealthy man, disappeared from his home in San Francisco on the 7th inst., and is supposed to have committed suicide, his mind having been unbalanced for some time. He came to California in 1852 and engaged in mining. In recent years stock gambling ruined him financially, and since then he has been depressed in spirits.

Mr. William Guggenheim, late assistant superintendent of the works of the Philadelphia Smelting and Refining Company, at Pueblo, Colo., has gone to Monterey, Mexico, to take charge of the construction of the new works of the Great National Smelting Company, which are to be erected at that place. Mr. A. B. W. Hodges, who has been chemist at the works at Pueblo, has been promoted to the position made vacant by Mr. Guggenheim.

Mr. Wm. N. Symington, mining engineer, has terminated his connection with the St. Louis Smelting and Refining Company, the Rio Grande Smelting Company, and the St. Louis and Zacatecas Ore Company, and has given up his residence in St. Louis, where the main offices of these companies are located. Mr. Symington has resumed his practice as consulting mining engineer, and for the present his headquarters will be at Brevard, Transylvania County, N. C., but communications may be addressed to him at Room 809, No. 18 Broadway, whence they will be forwarded.

Mr. Penny, of Hennepin County, Minn., has introduced a bill in the State Legislature providing that a school of mines be established at the State University at an expenditure of \$6,000, and that \$4,500 be appropriated annually in salaries for the instructors, of whom one is to be a professor of electrical engineering. Two years ago (see ENGINEERING AND MINING JOURNAL, January 5th, 1889), a bill was introduced similar in all vital respects, except that the school of mines was to be at Duluth. It was defeated largely because no place for its location could be agreed upon. Ely and Tower are spoken of in connection with the present bill.

OBITUARY.

Mr. E. Emmons Graves, manager of the Emmons Mining Company, of Park County, Colo., died at his home in Denver on the 10th inst. He was well known in mining circles in Colorado.

Mr. William Rupp, librarian of the American Chemical Society, died in New York on the 17th ult. He was born in New York in 1855, and studied chemistry and mining engineering at the School of Mines, Columbia College, New York. Subsequently he went to Germany and spent two years in the study of mining at Freiberg. On his return he was for some time an assistant in mineralogy at the Columbia School of Mines and afterwards opened an office as consulting and analytical chemist, following this profession at the time of his death. He was a member of the chemical societies of London and Berlin.

The death of Mr. Nathaniel Ferguson, probably one of the best known ironmasters in Pennsylvania, occurred on the 10th inst. at Reading, Pa., where he had spent the last years of his life. He started as a clerk at the Elizabeth Furnace in 1839, and after acting in that capacity for some time was placed in charge of the business; later he moved to the Swatara Furnace, in Schuylkill County, be-

coming a member of the firm of Eckert, Gilbert & Co. In 1860 he joined the firm of White, Ferguson & Co., the former copartnership having been dissolved some years previous. Messrs. White, Ferguson & Co. owned the Robeson Furnace, at Robeson, which is working under an ore right purchased in 1793 from Peter Grubb, a son of the original owner of the Cornwall ore banks. In 1863 the firm name was changed to White & Ferguson, and in 1875 to Ferguson, White & Co., Mr. Ferguson owning a majority of the stock. Mr. Ferguson retired from business in 1885. He died in his 74th year.

Dr. F. P. Grosvenor MacLean, chief examiner in the department of metallurgy in the United States Patent Office, died suddenly at Huntington, Fla., on the 5th inst. The immediate cause of his death was inflammation of the brain, superinduced by abscesses in the ear, resulting from a severe attack of the grip a year ago. Dr. MacLean was a remarkable man, and from his earliest youth had devoted himself to most intense scientific research. Before he reached his twentieth year he had obtained a diploma from the College of Pharmacy in San Francisco. At twenty-two he was professor of chemistry in the Berkeley University, California, and thence he was called to Johns Hopkins University in Baltimore, where, in addition to his duties, which were the same as he had performed at Berkeley, he devoted every possible moment to deep researches in other sciences. About 10 years ago he became connected with the Patent Office, and established the laboratory in that department when he was made chief examiner in metallurgy. At the same time he pursued a course of study in medicine in the Columbian University, at Washington, and received his diploma as doctor of medicine. He was a member of the American Institute of Mining Engineers, *Société des Ingenieurs Civils de France* and other foreign societies. Dr. MacLean belonged to the Clan MacLean, of Iona, Scotland, which had possession of the islands of Mull and Iona as early as A. D. 563, and was next in line for the haronety.

SOCIETIES.

The Western Pennsylvania Central Mining Institute will hold sessions in Pittsburgh, Pa., on the 20th and 21st inst. The subjects named for discussion are as follows: "Shaw's System of Signaling in Mines," "What Modern Safety Lamp would be Best to Adopt for Use in Mines?"

The Engineering Association of the South held its regular monthly meeting in Nashville, on March 12th. A Committee on Highways, comprising one member from each of the thirteen states represented in the association, was appointed, as ordered at its last meeting. President John B. Atkinson extended an invitation to the association to hold its May meeting at Earlinton, Ky., which is in the heart of the western coal field, and the invitation was accepted. The paper of the evening was entitled "Mine Inspection," by Mr. C. J. Norwood, Inspector of Mines of the State of Kentucky.

INDUSTRIAL NOTES.

The Variety Iron Works Company, in Cleveland, O., made an assignment on the 17th inst. The liabilities are reported at \$250,000 and the assets at \$150,000.

The Glasgow Iron Company and the Pottstown Iron Company, in Pottstown, Pa., have made a reduction in the wages of puddlers from \$3.75 to \$3.50, which has been accepted.

The Chicago Brownstone Company, with a capital stock of \$100,000, has been organized at Chicago, Ill., to quarry, work, and sell stone. The incorporators are John L. du Breuil, F. A. Woodbury, and Robert H. Smith.

The Pittsburg Reduction Company, of Pittsburg, Pa., is now manufacturing, on an average, 475 pounds of aluminum daily. The output frequently reaches the amount of 500 pounds per day.

The Oil Well Supply Company, of Oil City, Pa., has purchased the Elba Iron Works and Continental Tube Works, of McKeesport, Pa., for \$550,000. The mills have a capacity of 300 tons daily. Hereafter the Supply Company will make its own tubing.

The Cincinnati Iron and Steel Company, of Cincinnati, O., has made an assignment to S. W. Ramp. The property is the old Riverside Iron Mill, which was held by E. L. Harper, of the late Fidelity National Bank. The assets are said to amount to \$50,000 and the liabilities to \$65,000.

The Columbia Iron and Steel Company, of Pennsylvania, at a special meeting held recently, increased its capital stock from \$400,000 to \$1,000,000. It also decided to increase the bonded indebtedness from \$150,000 to \$600,000. The latter increase, it is understood, will be used partly to pay for improvements at the Uniontown works.

The Ingersoll-Sergeant Rock Drill Co., which adopted the profit-sharing system among its employees some time ago, reports that thus far it has worked successfully. During the past year the

company has declared an employees dividend of about \$6,000, dividing it as a bonus among employees of shops and offices. The sum was larger during the year 1890 than previously, on account of the large increase in the company's business.

SOUTHERN INDUSTRIAL NOTES.

(From our Special Correspondent.)

The Southern Rolling Mill at Avondale, Ala., will increase its capacity by adding 10 puddling furnaces.

The South Boston Iron Works has nearly finished the work of removing its plant to Middlesborough, Ky. The company will be hereafter known as the Middlesborough South Boston Iron Works.

The Alabama Iron, Land and Furnace Company will build a 125-ton furnace at Talladega, Ala., and it is the intention to construct a street railway and endeavor to secure the establishment of other manufacturing enterprises in that city.

The Ellis & Lessig Iron Works, of Pottstown, Pa., are to be moved to Salem, Va. Papers completing the agreement to that effect were signed on the 12th inst. The citizens of Salem offered the company \$100,000 and 40 acres of land as a bonus to locate there.

The Marion Banking and Industrial Company has been organized at Marion, N. C., with a capital stock of \$1,500,000. Mr. W. H. Roberts was elected president of the company. It proposes to put \$700,000 into manufacturing enterprises in addition to doing a general banking business.

The Westminster Land Company has been incorporated at Atlanta, Ga., by Geo. E. Hoppie, W. M. Goldsmith, A. P. Stewart and others, with a capital stock of \$75,000, and the privilege of increasing it to \$150,000. The chief office and place of business of the company is to be in the city of Atlanta.

The Chattahoochee Water and Power Company has been organized. The incorporators were W. B. Lowe, W. H. Venerable, E. P. Howell, George W. Adair, T. J. James, W. I. Zachry, E. D. L. Mohley, C. A. Dunwoody and G. A. Howell, all of whom were elected directors. The officers are G. W. Adair, president; W. B. Lowe, vice-president; W. I. Zachry, secretary and treasurer, and G. A. Howell, attorney. The company is incorporated with a minimum capital stock of \$1,000,000. It controls valuable lands and water rights on the Chattahoochee River, near Atlanta, Ga.

The Bessemer Pipe Works at Bessemer, Ala., have just commenced operations. This is the largest manufacturing enterprise in the State. The works cover several acres of ground, and will employ, when running at full capacity, 800 men, with a pay roll of about \$35,000 per month. The average production of the works will be 250 tons per day, requiring output of two of the largest Bessemer furnaces for the materials. The works will cost \$500,000; and a working capital of \$250,000 is provided. Ground was first broken on June 21st, 1890. John W. Harrison, of St. Louis, is president; Thos. Hard, of St. Louis, first vice-president; F. E. Nichols, of St. Louis, second vice-president, and Peter McArthur, of Bessemer, superintendent. The sand used for the molds comes from Coaldale, Ala. The first order to be filled is one for 4,000 tons of 36-inch pipe from the Baltimore municipal government.

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.

2,117. Second-hand wrought-iron pipe 24 to 30 inches diameter. Connecticut.

2,118. A second-hand core drill with core 2½, 3, or 4 inches. Virginia.

2,119. Riveters, rolls, lathes, punches, and testing machines for boiler works. Pennsylvania.

2,120. Two 50-H. P. engines and boilers for machine shops. Ohio.

2,121. Improved office equipment for a large mining, importing, and manufacturing concern. New Jersey.

2,122. A 6-foot boring mill, a 6-foot pulley lathe, a 20-inch x 16-foot bed lathe, a pattern-maker's lathe, and hand saws. Georgia.

2,123. A cheap furnace for smelting lead ore (carbonate). Tennessee.

2,124. Three hundred and fifty squares fire-proof roofing other than slate, suitable for foundry, machine shops, etc. Pitch sufficient for any kind of roof. Ohio.

2,125. Catalogues and prices of bath tubs, fixtures, and bath room supplies. South Carolina.

2,126. Iron fronts, iron roofing, elevators, office fixtures, etc. South Carolina.

2,127. A second-hand surveyor's transit, either hire or purchase. Florida.

2,128. Silver-plating machine. Ohio.

2,129. A complete core-drill outfit for prospecting in Indiana oolitic stone region. Illinois.

2,130. Derrick and hoisting engine. Illinois.

2,131. Stone-channeller. Illinois.

2,132. A lathe machine. North Carolina.

2,133. Latest and best heavy upsetting and forging machine for making car pins; that is, for couplings. Alabama.

2,134. A set of the very best French burr stones for flour, 36 inches across the face, top stone or runner 16 or 17 inches through the eye and 14 at rim; bed stone 12 inches thick. State net cash price. North Carolina.

2,135. A second-hand horizontal boring mill suitable for boring cylinders, boxes, etc. Pennsylvania.

2,136. A second-hand power pipe machine to cut pipe and nipples from 2½ to 4 or 5 inches. Pennsylvania.

2,137. A second-hand light steam hammer. Pennsylvania.

2,138. One 20 and two 60-H. P. boilers; also a 75 H. P. engine, shafting, hangers, pulleys, and a general line of machinery. Virginia.

2,139. A light boring machine for boring in wood, either horizontal or upright. Tennessee.

2,142. There is a demand for vanadium ores by a manufacturer in New York City, who would make from 200 to 500 ounces of vanadium salts every week. New York.

2,143. Jail and jailor's residence. Eight steel and wire cages and corridors of same material. Cost not to exceed \$10,000. Georgia.

AMERICAN GOODS WANTED ABROAD.

2,140. Estimates on an iron skeleton tower with staircase 30 feet high, at which height is to placed one iron rectangular tank to contain 10,000 gallons of water, width equal to height of tank, length double the size; the tower to sustain on each side one windmill that is to put in motion one pump each, for raising water to tank from canal (level of water 10 feet below and close to ground, where the tower is to be situated); capacity of each pump not less than 500 gallons water an hour. The pumps to be so arranged as to be easily disconnected, and to be connected to horse-power motion, that exists here, whenever there should be lack of wind. Tank covered with corrugated iron roof, and placed on an incline of about 2 inches for easily cleaning out, with valve or cock and cleaning-out tube 3 inches. Windmills, with brakes, to be easily stopped. Outlet of water from tank, 2-inch valve or cock, with 700 feet 2-inch wrought-iron piping and 1,000 feet 1½-inch wrought-iron piping for conducting water, with sufficient number of elbows, tees, unions and flanges where required. Overflow pipe on tank. Separate costs of tower, tank, piping, windmills and pumps to be included in estimates, which are to be accompanied by a complete sketch or drawing of whole plant, with exact sizes of thickness or diameter of iron employed in tower, tank, etc. The tank will come in plates to be riveted here. Estimates to also contain shipping expenses, freights to Callao, and marine insurance. Peru.

2,141. A complete electric-light plant of 300 incandescent lights of 20 candles, 10 of 40 candles, and 1 of 100 candles, for a small town. Peru.

GENERAL MINING NEWS.

ALABAMA.

Most of the coal mines in the State according to the Birmingham *Age-Herald*, are not being worked steadily, on account of the dullness in the trade. At the Blue Creek, Blokton, Gamble, and other mines only four days out of the week are worked.

CALHOUN COUNTY.

(From our Special Correspondent.)

AUGUSTA MINING AND INVESTMENT COMPANY.—This company has recently purchased the Arzo iron properties, and will develop them.

ETOWAH COUNTY.

(From our Special Correspondent.)

ATALLA AND ETOWAH MINING COMPANY.—This company has leased the new coke stack at Gadsden from the Gadsden Furnace Company.

WILCOX COUNTY.

The natural resources of this county having been much discussed of late, the following communication from Mr. L. S. Cook, of Arlington, in the *Mobile Register* may not be without interest as bearing upon the subject:

The county is about 100 miles north of the Gulf of Mexico; the Alabama River runs through it from north to south; the Mobile and Birmingham railroad traverses its western side, and the Selma and Gulf railroad the eastern. Arlington is on the Mobile and Birmingham railroad, 115

miles from Mobile. This point is in the iron and coal belt, which runs entirely through the county from northwest to southeast, and is about one mile wide, but seems to be reduced in width toward Butler County. Iron croppings are found varying in size all along this line. Some of this rock was shipped several years ago to a furnace in north Alabama, tested and showed about 60% iron. Lime can be had in almost inexhaustible quantities all along the line of this iron belt. The prairie or lime lands running all through the state border this streak of iron ore on the south. Prairie Bluff, on the Alabama River, is situated on a high bluff, the walls of which are composed of this lime. The iron rocks are to be found just above Clifton, on the river, and within easy reach of the flux. All the way from the western portion of the county to Coal Bluff, on the Alabama River, coal measures of different sizes are found. This bluff takes its name from the croppings of coal which can easily be seen when the river is low. This stratum of coal crops out in James creek near Arlington. Explorations show it to be at least 12 feet thick. No satisfactory tests have been made in regard to the quality or quantity of the beds of iron or coal. It may be that they are worthy of examination, and should they prove as indicated, with capital and enterprise to develop them they might be very advantageous to Mobile. Water and rail routes can be had without trouble.

ARIZONA.

PIMA COUNTY.

SAGINAW.—The new mill and concentrator near Tucson started up recently. The plant is a 5½-foot Huntington mill, and will crush 25 tons of the ore. It is said to be the intention of the managers to crush the free ore first, of which they have between 2,800 and 3,000 tons on the dump. The tailings will be run over concentrators which have a splendid reputation as close workers of this character on ore.

PINAL COUNTY.

SILVER KING MINING COMPANY.—This mine, one of Arizona's oldest and greatest bullion producers, is reported to have closed down, and now only five men are employed on the property. The ore, apparently, is exhausted, and all effort to discover new bodies has resulted in failure. The main shaft on the mine is 1,800 feet deep—a thousand feet deeper than any other mine in Arizona. The 40-stamp mill is now running tailings, but only has a sufficient supply to keep operating two months.

CALIFORNIA.

In consequence of the repeal of the act declaring the Klamath River a navigable stream, which has already been mentioned in these columns, it is reported that the Trinity company has set four giant nozzles running, and other hydraulic miners are preparing to follow suit.

(From our Special Correspondent.)

SAN FRANCISCO, March 12.

The bill the practical effect of which is to prevent the various valley counties which may bring suit against hydraulic mines from having the trial take place in the county bringing the suit, has received the Governor's approval.

According to the returns made by the superintendent of the San Francisco mint the following was the bullion product of the several Pacific Coast States and Territories for the year 1890: Alaska, gold, \$177,428; California, gold, \$11,250,913; silver, \$1,144,000; Nevada, gold, \$2,805,740; silver, \$5,738,060; Oregon, gold, \$1,039,125; silver, \$129,199; Washington, gold, \$204,000; silver, \$900.

AMADOR COUNTY.

GOVER.—The 700-foot level has been cleared of water for the first time since it was flooded six years ago. At that time a large bulkhead was put in the north drift, where the water came in, and for two weeks was effective in holding back the water; finally it made its appearance, however, at the rate of 75,000 gallons per 24 hours. The lower levels were flooded, and during the last six years they have never been able to get them cleared again. For the last two months they have been pumping, and now the water has been confined nearly a week, and has made its appearance half a mile north in an old tunnel, which when the mine was flooded was dry. This is most important, as the surface water can now easily be controlled, and the lower levels, where the original Gover company abandoned rich ore, will be immediately reopened. It is reported that another pay chute has been struck on the 500-foot level.

MONO COUNTY.

(From our Special Correspondent.)

BULWER CONSOLIDATED MINING COMPANY.—Since February 15th, the Bodie mill has run steadily on Bulwer ore. The stopes in the mine are looking well, and yielding ore of a good quality. The average battery assays for the week ending March 7th were \$29.90 per ton, the tailings averaging \$4.92 per ton. Owing to the severe weather ore has been hauled with the greatest difficulty. On the 5th inst. hullion valued at \$5,943 was shipped from the mine.

NEVADA COUNTY.

According to the report of the State Mineralogist for 1890, there are in this county twenty-eight stamp mills, divided among the different districts as follows: Grass Valley district, 11; number of

stamps, 231; number of tons of ore milled in 1889, 69,054; number of tons milled up to September 1st, 1890, 48,003; number of tons of sulphurets produced in 1889, 1,721½; number of tons and sulphurets produced in 1890 up to September 1st, 1,117. The estimated production in 1889 and 1890 up to September 1st is \$2,249,900. In Nevada district there are 13 mills, with a total of 172 stamps; number of tons of ore crushed in 1889, 33,000; number of tons of ore milled up to September 1st, 1890, 18,880; number of tons of sulphurets produced in 1889, 1,269; number of tons of sulphurets produced up to September 1, 1890, 632; estimated production in 1889 and 1890 up to September 1st, \$695,780. Washington district has 4 mills with 85 stamps; number of tons of ore milled in 1889, 36,300; number of tons of ore milled in 1890 up to September 1st, 24,000; estimated production of 1889 and 1890 up to September 1st, \$540,300.

PLACER COUNTY.

KING HILL MINING COMPANY.—The management of this company, whose extensive mining property is located about four miles from the town of Iowa Hill, is reported to have made careful surveys to determine the water pressure that can be obtained with a view to working the ground by the hydraulic process, and as the property is favorably situated for the safe storing or impounding of the debris without any injury to the rivers, they propose, as soon as the necessary material can be purchased and gotten on the ground, to fit up for hydraulicking. The dry process with which they intended at first to work the ground and which has been thoroughly tested and proven practicable will be put to work during the season until the other machinery is in place. This property, it is stated, embraces 610 acres of auriferous gravel. It was worked in early days with light pressure and paid fairly well. The gravel is such that it can be easily worked and a large amount handled daily.

SAN BERNARDINO COUNTY.

(From our Special Correspondent.)

CARBONATE MINING COMPANY.—Work was commenced by this company one year ago, and ore was struck at a depth of fifty feet, which ran 40% lead and 42 ounces silver. Since then work has been carried on steadily, and several carloads of ore shipped to San Francisco, which have assayed on an average \$100 per ton. Last Friday a small vein of ore was struck at a depth of 200 feet, which is reported to run \$1,000 gold per ton. The vein which has been opened in the west crosscut has been getting richer as it is followed, and the ore taken out this week has assayed on an average \$2,000 per ton. This mine is situated in the Oro Grande district, and is owned by residents of Los Angeles.

SAN JOAQUIN COUNTY.

(From our Special Correspondent.)

On Saturday last a large flow of gas was struck in a well being bored in the northern part of the city of Stockton. The well is down 1,700 feet, and the flow is at the rate of 35,000 feet per day. Boring is being continued.

SIERRA COUNTY.

A Scotch syndicate, it is said, that had been prospecting for gravel on the ridge between Gibsonville and La Port, struck rich gravel on the 15th of last month. A year ago the company gave San Francisco parties a contract to sink a three-compartment shaft to bed rock for \$40,000. Through bad management the contractors lost a part of the shaft and gave up in disgust. F. A. Gourley, one of the leading gravel miners of the state, on the 1st of last December took charge of the property. He repaired the shaft and continued the sinking, reaching bed-rock at a depth of 452 feet, and developing the famous blue lead which has been worked with such great profit at La Port, Gibsonville and other points. The gravel found in the shaft prospects is said to be rich in gold.

COLORADO.

Mineral surveys approved by the United States Surveyor-General of Colorado during the two weeks ending February 14th, 1891:

Survey No. 6,820; land district, Central City; name of claim, Eastlake; 5,552, Montrose, Dutch Boy; 6,698, Garfield, Malone Placer; 6,789, Central City, Grand Rapids; 6,776, Leadville, Fannie L. and Chiquita; 6,813, Leadville, Evening Star; 6,516, Leadville, Extension Copper King; 6,391, Leadville, A. V. B. and Valentine; 6,619, Leadville, St. Louis; 6,736, Central City, Ogallala; 6,824, Montrose, Lawn Placer; 6,730, Montrose, Placer Mining Claim No. 1; 6,750, Garfield, Glenwood.

Amended surveys: 3,992, Garfield, Celeste; 4,014, Garfield, Western Union.

CHAFFEE COUNTY.

MARY MURPHY MINING COMPANY.—The superintendent of this company has informed its St. Louis office that the tunnel that it has been at work upon for some time has cut the vein. This tunnel is 1,540 feet in length and next to the big concentrating plant is the most important improvement undertaken by this company, as it will drain the mine and economize the handling of the ores. The new dressing works which have recently been completed at a cost of over \$40,000, have started up and are said to be working and treating the ore in the most satisfactory manner. Four carloads of ore have been shipped lately, and

there are some 15 carloads of concentrates now at the mine ready to be shipped as soon as the snow blockade is cleared away. The company has increased its force largely and is now employing 75 men in the mine and at the mill.

CLEAR CREEK COUNTY.

FALCON.—This mine has now been proved to be located upon the same vein as the famous Lamartine Mining Company, which has been making such a large output during the past three years. The Falcon shaft is now down 220 feet, showing more or less ore the whole distance. The vein has been opened by two levels at 100 feet and 170 feet, respectively, for 100 feet west of the shaft, showing good breasts of ore. The shaft is to be sunk deeper immediately.

SILVER AGE MINING COMPANY.—The new air compressor plant of this company is said to be the largest in the county. The water head, at the penstock, can develop 485 horse power. Extensive developments, which the ore bodies opened apparently warrant, are now contemplated by the management of the company. The north wall of the main lode opened in this mine is an immense porphyry dyke, lying parallel with the mineral belt. The shaft is now down over 500 feet, and it is stated that the ore body in the bottom gives assay returns of from 400 to 500 ounces silver and as high as 65 ounces gold per ton.

CUSTER COUNTY.

PHOENIX LEAD COMPANY.—A representative of the ENGINEERING AND MINING JOURNAL, in an interview with the secretary of this company, learned that its property is now being worked under lease by the Bull-Domingo Mining and Leasing Company. As will be remembered, the Phoenix Lead Company was organized in 1884 with a capital of \$100,000, divided into 100,000 shares of \$1 each. The old Bull-Domingo property, consisting of two fractional mineral claims, was purchased at a sheriff's sale for \$25,000. The company took \$30,000 worth of ore out of the mine, but this sum, together with \$140,000 additional, was spent in its operation. After a series of misfortunes the stockholders became discouraged and suspended operations. The Bull-Domingo Mining and Leasing Company, composed of a number of Colorado men, commenced work a year ago, and up to March 1st 1891, had taken out ore valued in round numbers at \$85,000. The lessee pays the owners a royalty of 7% on smelter returns, or a 30-year lease. Work is now being carried on in the 550-foot level, and a good body of ore of fair grade has been opened there, although it is by no means a bonanza. The ore is dressed in the concentrating mill, and operations have been considerably hindered this winter by the cold weather.

DOLORES COUNTY.

(From an Occasional Correspondent.)

The snowstorm of February 17th and subsequent bad weather have closed all communication between Rico and the outside world. Ore shipments are at a standstill, and it is doubtful if any will be made before June. The leading mines are working as usual and are piling considerable ore in their bins. The Rio Grande Southern Railway is graded to the edge of the town, and it is likely that Rico will have a railroad by the first of July. This will aid greatly in the low-grade ore producing mines of the camp. The Newman Hill Mines are at present the largest producers of the Rico district.

EAGLE COUNTY.

The new mining camp, Nolan, located at the head of Brush Creek, in this county, is reported to be in a promising mineral district. The rock formation exposed in this vicinity is gray and blue limestone and quartzite, in the contacts of which ore has been found. Fifteen companies, the most important of which is the Aspen Belt Mining Company, are already operating in the section. The deepest working in the lime contact is 50 feet, and it is reported that it has opened an ore body six feet in thickness. The general character of the ore is argentiferous copper carbonate, changing to sulphide. Free milling gold ore has been found in the quartzite, and the Iron Edge Mining Company, of Aspen, is said to be about to erect a 20 stamp mill on its property.

GILPIN COUNTY.

RUNNING LODGE MINING COMPANY.—The manager of this company reports that during the past month an intermediate level driven east from the third-level stope has opened the largest and, what bids fair to be the richest body of ore uncovered in the mine for several years. The breast of the drift now shows two and a half feet of smelting ore. The new ore body has been discovered in ground hitherto considered barren.

GUNNISON COUNTY.

COLORADO COAL AND IRON COMPANY.—The miners and coke burners of this company, at Crested Butte, Gunnison County, have been on a strike since the first of this month. The cause of the trouble was the discharge of six coke drawers, and the assessment of \$5 apiece, upon 19 drawers, as the cost of a car hurned from being loaded with hot coke in November last. It is also complained that there is dangerous rock hanging in the mine, and that the air courses are not of proper size for safety, the mine being a fiery one. The strikers have pre-

sented the following demands to the company: All cars hurned to be charged to the party who hurned them, and not assessed to those who are innocent. All scrapers broken to be repaired free of charge. All coke laid by the side of the track to be loaded by the day men, and not by the coke drawers. That the men discharged be reinstated unless a sufficient reason be given for their discharge. That the check weighman be allowed to run a check of his own, taking each day a certain amount of coal from each man as his name appears on the roll, or stop through the office a certain amount of money from each man every month to pay the check weighing. The officials of the company claim that the six men were discharged for good and sufficient cause, and that it has always been customary to assess damages when it is impossible to discover just who caused the loss, it being against the rules of the company to load hot coke. It is admitted that the mine is not in the best shape as to ventilation, but General Superintendent Ramsey was already planning improvements in this respect. The company would undoubtedly grant the men a check weighman, and the strike is thought to have been made without good reason.

MAY-MAZEPPA MINING AND MILLING COMPANY.—The main ore chute has been cut by the 550 level, which proves to be 26 feet in width at this place. The ore is galena, and is reported to be of high grade. The company has let a contract for a new shaft, 5 x 10 feet in the clear, and 200 feet in depth. Last month a small force of men was put to work in No. 8 shaft, which has not been operated for several years. After drifting 30 feet a streak of galena ore 2½ feet in thickness, assaying \$2.50 per ton, was uncovered. Work in it has been delayed, however, by the severe weather, there being no shaft house over No. 8.

LAKE COUNTY.

HENRIETT & MAID CONSOLIDATED MINING COMPANY.—The lead carbonate ore of this company, which is now forming about three-fourths of its output, has been contracted for the current year to the four smelting companies of Leadville. The sulphide ore is to go to the Boston & Colorado Smelting Company, at Argo. A larger force of men has been put to work in the Henriett and Maid of Erin mines and production will be materially increased. The 750-foot level, which runs out into Adams' territory, is showing considerable improvement, the silver value of the ore continuing high. Sinking will be resumed soon in the Adams discovery shaft. The Adams concentrating mill is being run on full time, dressing about 40 tons of ore per day. The sulphide ore opened in the lower levels of the Maid of Erin workings is carrying a considerable amount of copper. Hitherto the Mike Starr has been the only mine in Leadville producing copper in sufficient quantity to be paid for by the smelters.

GEORGIA.

BARTOW COUNTY.

(From our Special Correspondent.)

GEORGIA FURNACE COMPANY.—The Crow ore bank has been sold to the Georgia Furnace Company, of Tallapoosa, Ga. The price paid is \$20,000.

CHEROKEE COUNTY.

(From our Special Correspondent.)

FRANKLIN.—Dressing and chlorination works for treating the large quantities of auriferous sulphides in the ore of this mine are contemplated. Some 20,000 or 30,000 tons of tailings, containing about 10% of sulphurets, which are very rich, have been settled during the past fifteen years.

IDAHO.

OWYHEE COUNTY.

DE LAMAR MINING COMPANY, LIMITED.—This company has been incorporated in London with a capital stock of \$400,000, divided into 400,000 shares of \$1 each, for the purpose of acquiring the De Lamar group of mines now owned and operated by Capt. J. R. de Lamar. According to the prospectus of the new company, 205,000 shares, fully paid, are to be allotted to the vendors of the property; 145,000 shares have been already applied for, and the remaining 50,000 are offered for subscription. The property consists of 250 acres of mining ground, a 20-stamp amalgamating mill, and other equipments. The De Lamar mine is operated by two tunnels with connecting shafts and winzes, which have developed the vein to a depth of 250 feet and for a length of 1,000 feet. The mine was acquired by Capt. de Lamar in 1886, when it was still a prospect. He developed it slowly and cautiously, and only in October, 1889, put up a small mill, which in August, 1890, he increased to its present capacity of 20 stamps. Notwithstanding this limited capacity, it is stated that to the end of October, 1890, the mine had produced in round numbers \$700,000. The ore is gold and silver, free milling in character, and from mill returns during the year ending October 31st, 1890, averaged in value \$18.17 gold and \$13.19 silver per ton. The mine also produces a class of very rich ore, which has been shipped to Denver smelters. The amount payable for the property, according to the contract, is stated to be \$205,000 in fully paid shares, \$125,000 in cash, and \$20,000 in cash or shares, at option of the company. The directors of the new company, several of whom are interested in the Elkhorn Mining Company of Montana, propose to increase

milling facilities in the near future, and have set aside \$50,000 as working capital for this purpose.

SHOSHONE COUNTY.

CALIFORNIA.—For some time past this mine has not been shipping ore on account of the had condition of the wagon roads. Since the present management took hold, sorted ore has been shipped most of the time. No mill has yet been built in that vicinity. Before much ore can be shipped a good deal of dead work will have to be done. A small force is employed there now; the men are at work in Tunnel No. 4. Drifting east and west from this level, a long chute of ore was worked. In places it had been stoped out almost to the grass-roots. It is now intended to get this ore in the lower levels, and for that reason a tunnel has already been run into the hill, and more work will be continued in the spring and summer. There is a quantity of sorted ore in the bin just below the mouth of Tunnel No. 4. Besides, the California has several thousand tons of concentrating ore on the dumps. Some of the best ore ever taken from the mine came from a shaft sunk at the discovery point.

CUSTER.—Messrs. J. M., C. D., and Peter Porter are part owners of the Custer mine and mill, with Hon. W. H. Claggett and W. H. Taylor. In the mine the lower tunnel has run about 700 feet on ore from a few inches to eight feet in width, and they now have one stope 300 feet long, and it is said that they have not yet reached the main ore chute. The mill has a capacity of from 75 to 80 tons of ore per day, and turns out from 15 to 20 tons of concentrates that assay 60% to 70% lead and 60 to 65 ounces silver. This ore is run down to the mill on a Huson tramway over two miles long. The buckets are suspended on a stationary cable and moved by a smaller one.

UNION.—This mine is located in the vicinity of the Poorman and Tiger properties, and shows an ore body 300 feet long and 14 feet wide where it has been cross-cut. The owners propose putting up a concentrating mill with a capacity of 100 tons of ore per day to work the Union ore and that of the Galena mine. These properties belong to ex-Governor Grant, of Colorado, the Omaha and Grant Smelting Company, A. B. Campbell, and J. A. Finch.

KANSAS.

A special report shows that during the week ending March 14th the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 2,188,690; zinc ore, pounds sold, 366,710; lead ore, pounds sold, 56,900. Sales aggregated a total value of \$5,100.

KENTUCKY.

BELL COUNTY.

MINGO MOUNTAIN COAL AND COKE COMPANY.—This company, headquarters of which are at Middlesborough, Ky., has a capital stock of \$150,000. The company has 75 coke ovens in operation, 50 more under contract and contemplates the addition of 100 more. It employs 300 men in the coal mine, and has nearly 10,000 feet of railway switches and mining tracks. The coal from these mines is of good quality, as the following analyses, recently made, show:

1. Top bench, 30 inches solid coal: Moisture, 1.95%; volatile, 39.94%; fixed carbon, 55.50%; ash, 3.45%; sulphur, .44%; coke, very compact; color of ash, very light brown.
2. Middle bench, 24 inches solid coal: Moisture, 2.15%; volatile combustible matter, 38.30%; fixed carbon, 57.95%; ash, 1.60%; sulphur, .41%; coke, very compact; color of ash, very light brown.
3. Lower bench, 9 inches solid coal: Moisture, 1.95%; volatile combustible matter, 40.95%; fixed carbon, 55.15%; ash, 1.95%; sulphur, .61%; coke, very compact; color of ash, very light brown.

At the two points at which this seam has been opened, the thickness is respectively 72 and 88 inches.

MAINE.

SAGADAHOC COUNTY.

PORTLAND & KENNEBEC COAL MINING COMPANY.—Mr. C. F. Trask, of this company, reports that work on the shaft at Small Point is being pushed, and that it is now down 670 feet. Three veins of coal varying from four inches to a foot in thickness have been passed at the depth of 590, 640 and 615 feet respectively. Mr. Trask shows a chunk of coal weighing 12½ pounds which he says he recently picked up on the beach within 500 feet of where they are sinking the prospecting hole. This piece is of a superior quality of light, bituminous coal. The theory is that as the trend of the ledge is upward, the vein from which this large piece was broken crops out but a short distance away.

MARYLAND.

COAL.

The joint convention of miners and operators whose product goes eastward, which was called in Cumberland, Md. on the 18th, did not materialize, Mr. Crisp, representing the Berwind-White Coal Company, being the only operator present, and in consideration of this fact he withdrew. A session of the United Mine Workers of America was held on the same date, at which the following letter from the Cumberland Coal Association was read: "We advise you that the Cumberland coal operators decline to attend the proposed convention for

the reason that there are no inequalities to adjust, or any needless or other agitations among the miners, or if there had been the companies would speedily adjust anything wrong; that the region differed in many characteristics from other regions; that they pay a much higher rate of wages than is paid in any other competitive district; that there is much that may properly require attention elsewhere that is not needed in the Cumberland coal region; that they are always ready to consider any matter that interests their employes; that they decline to take any part in any business that might properly belong to any other district."

MICHIGAN. COPPER.

CENTENNIAL MINING COMPANY.—In a letter of recent date Agent Vivian says: "The lode in the No. 3 shaft is between eight and nine feet in width, and it seems as if it would grow larger. It is still unproductive. The lode in No. 4 shaft is nine feet wide and showing copper the whole width and will doubtless pay well to stope. The lode in the 10th level south of No. 4 shaft is showing a much better class of rocks. No. 6 shaft is 10 feet below the fourth level. The lode is small and poor. The lode in the fourth level north is showing some copper and has a very much better appearance than it had in the level above the same distance from the shaft. The third level is opening up paying ground. In the second level the lode is rather lean, but as there is a good bunch of copper going down in the level above and north of this opening it will soon reach it and doubtless show copper in paying quantities. The lode in the first level is showing some copper but not enough to pay." This level is opened 410 feet north of No. 6 shaft."

KEARSARGE MINING COMPANY.—The annual report of the Kearsarge Mining Company for 1890 makes a showing as follows:

The product of mineral was 1,928,315 pounds, which at 82.9 per cent. gave 1,598,525 pounds of refined copper, for which has been realized the gross sum of.....	\$240,997.67
From sales of silver.....	275.57
From interest receipts.....	285.66
	\$241,558.90

The costs have been:	
Running expenses at mine.....	\$137,105.64
Exploratory work.....	1,064.63
Smelting, transportation and other expenses.....	29,252.60
Expended in mine plant.....	3,518.94
	170,741.21

Total net income for year.....	\$70,817.69
Balance of assets January 1st, 1890.....	\$153,939.62
Deduct dividend of January 1st, 1890.....	80,000.00
	73,939.62

Balance of assets January 1st, 1891.....	\$144,757.31
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The assets, exclusive of mine, real estate and equipment, were shown to be \$175,292.91, liabilities \$30,535.60, leaving a balance of assets January 1st, 1891, of \$144,757.31.

From the summary of running operations it appears that during the year 60,619 tons of rock were stamped, yielding 1,928,315 pounds of mineral, from which were obtained 1,598,525 pounds of fine copper. The yield of refined copper per ton of rock stamped was 26.87 pounds; per cubic fathom of ground broken, 3.87 pounds; percentage of refined copper in stamp rock, 1.32; cost per ton of rock, \$1.85; cost per ton of rock stamped, \$2.26; refined copper, cost per ton at mine, 8.64 cents; cost of smelting, freight and all other expenses of handling copper, 1.83 cents; cost per pound for the year for construction, .21 cents; total cost per pound, 10.68 cents.

The directors state that they have "carried out to a limited extent the openings on the 'Calumet Conglomerate,' but did not meet with sufficient encouragement to warrant the continuance of this additional expense. The Centennial Mining Company is actively engaged in developing this lode, and its operations may lead us to feel that, while we found nothing of value at a comparatively shallow depth, a paying lode may be found deeper, and justify us in resuming explorations in the future. From our superintendent's report it will be seen that the developments in the lower levels of the mine proper show that the lode has materially improved and gives us reason to expect that we shall open a paying mine as a depth is attained. In consequence of this, your directors feel that the earnings shown in the treasurer's report should be held to meet the expenditures for construction, which will be required to prosecute the mining operations deeper, and which is, in their opinion, fully warranted by the present encouraging outlook." The report of Captain John Daniell, superintendent, shows that the various levels have been extended a total of 2,112.9 feet during the year; No. 2 shaft was sunk from the 10th level to 30 feet below the 13th, and is sinking to the 14th, showing a quite regular and settled lode, with some promising patches of copper ground, but nothing sufficiently regular to rate the whole as valuable. "We have pushed the work of sinking to the utmost, and now feel that our chances for a permanent mine are better than since we passed the third level. Our reserves in the upper levels are less important than a year ago, and, except perhaps at the third level, we have not very good chances to add to them,

We have then to rely largely for our future on what we develop in the lower levels, and these we shall push as hard as circumstances will admit." At the annual meeting of the company, held on the 17th inst., 27,541 shares being represented out of the total of 40,000 shares, the old Board of Directors was re-elected, save that Mr. John N. Denison was chosen to fill the vacancy caused by the resignation of Mr. Joseph W. Clark. The list of officers is as follows: President, Charles Van Brunt; treasurer, A. S. Bigelow; directors, Charles Van Brunt, John N. Denison, A. S. Bigelow, of Massachusetts; Leonard Lewisohn, of New York, and John Daniell, of Michigan.

IRON.

MARQUETTE RANGE.

LAKE SUPERIOR IRON COMPANY.—The Ishpeming *Iron Ore* states that the new shaft of this company, located near Lake Angeline, has been finished. A drift is now being driven east from the 444-foot level. The ore at this point runs 62% in metallic iron and .03% in phosphorus.

LAKE ANGLINE MINING COMPANY.—The prospecting shaft located at the east end of this company's property and close to the lake has reached a depth of 160 feet. Ten feet has been left for a sump, and a drift has been commenced to the southwest. This will be run to the diorite footwall in case no ore is found before that point is reached. Branches at right angles to this drift will be put in also, so that the ground will be thoroughly tested. The shaft is ample for handling a large product, it having been sunk with such object in view.

MENOMINEE RANGE.

DUNN.—At the bottom of No. 3 shaft of this mine drifting is being carried on east and west. Many of the men are now employed in stripping work at No. 2 shaft; by the first of May hoisting from the new open pit will be in progress.

SALT.

It is reported that a meeting of Michigan salt manufacturers was held in Bay City on the 19th inst., at which it was resolved to allow the Michigan Salt Association, which for 15 years has handled the product, to expire by limitation on March 31. Strenuous efforts to effect a reorganization are said to have been made without avail. The sale of the property owned by the association in Chicago, Milwaukee, Toledo and St. Louis was authorized. There is a surplus of 1,000,000 barrels on hand, which will be thrown on the market, and this with individual and unrestrained competition will result, it is feared, in almost ruining the industry temporarily and the closing of many establishments.

MISSOURI.

JASPER COUNTY.

(From our Special Correspondent.)

JOPLIN, March 16.

Mining operations have been fairly active during the past week, notwithstanding the fact that many small operators closed down on account of cold weather and others only worked half time. There was a slight decline in the price of zinc ore, the ruling price being \$23 per ton. Lead remained strong at \$24.50 per thousand. Following are the sales from the different districts as far as reported:

Joplin mines, 1,135,330 pounds zinc ore, and 143,970 lead; value, \$16,584.
Webb City mines, 962,600 pounds zinc ore, and 44,820 lead; value, \$12,168.
Carterville mines, 1,170,210 pounds zinc ore, and 113,870 lead; value, \$16,247.
Zincite mines, 118,568 pounds zinc ore, and 1,830 lead; value, \$1,495.30.
Lehigh mines, 92,530 pounds zinc ore; value, \$1,140.

Oronogo mines, 160,600 pounds zinc ore and 12,100 lead; value, \$2,063.
Galena, (Kan.), mines, 366,700 pounds zinc ore and 56,900 lead; value, \$5,100.
All districts, total value, \$54,797.30.

Pittsburg and Weir City, Kan., smelter output: R. Lanyon, 178,000 pounds; S. H. Lanyon & Brother, 96,800; Granby Mining and Smelting Company, 96,600; W. & J. Lanyon, 96,700; Weir City Zinc Company, 146,000; total, 614,100 pounds.

The Little Nellie mine, of the Toucher land, operated by Messrs. Collins & Peterson, is now a steady producer, and last week produced 40,300 pounds of free zinc ore. They are making arrangements to put up crusher and rolls, when the output will be largely increased.

Messrs. Lowe and MacAbee are pushing development work on their land east of the city, with every indication of opening up a large body of lead and zinc ore. They are now putting up a new plant of machinery.

The old Sherwood mining district is rapidly coming to the front as a steady producer of zinc ore of a high grade. Another new company has been organized to operate there. It is called the Alamo Land and Mining Company, and has a capital stock of \$50,000. The officers are: T. K. Hanna, of Kansas City, president; O. H. Picher, vice-president; W. H. Picher, secretary, and J. H. Spencer, treasurer. The new company is made up of men of capital who have been identified with the lead and zinc mines of this district almost from its earliest history and they will push the development energetically.

HICKORY COUNTY.

PINKSTON.—This property, two miles west of Cross Timbers, was formerly known as the McQueen mine. Work is said to be progressing very slowly, although a fine body of ore is in sight. The owners have made their cut along the side of the foothill 20 x 5 feet, and have now nearly completed another which will add 15 feet more to the length of the cut. The old cut is very solidly covered with lead, dipping into the hill, and the new cut promises as well. Some of the ore has been shipped, but the owners are waiting for a rise in values, the present price hardly justifying shipment.

MONTANA.

SILENT TREASURE MINING COMPANY.—This recently developed gold mine on Lost Creek, about 10 miles north of Anaconda, promises to create something of a stir in the mining world during the year. Its development consists of an adit 100 feet on the vein, from which a winze about 50 feet in depth has been sunk and a raise has been made to the surface. All the workings are in ore, the extent of the chute being as yet unknown. The ore is said to be an iron oxide and carries about \$25 per ton in gold, which is unusually coarse and free. The owners of the property, who reside in Butte and Anaconda, are reported to have bought a Huntington mill of 15 tons capacity, which is already on the ground and will be erected as soon as the weather permits. The mill will be located on a water course 1,500 feet from the mine, and the ore will probably be conveyed from the mine to the mill by means of a wire rope tramway.

DEER LODGE COUNTY.

ANACONDA MINING COMPANY.—In Carroll everything is running full blast, and last month's output is said to have been highly satisfactory. In the way of construction comparatively little is doing at the upper works. Work will not be resumed until fair weather sets in. Local papers state that the following figures are taken from the books at the office of the smelting works, and show some of the details of last month's business: Pay roll, lower works, \$76,000; pay roll, upper works, \$51,000; freight bills paid, \$114,000; average number of men, upper works, 615; average number of men, lower works, 910; lbs. of material shipped, 15,540,000; pounds of coal used, 29,350,000; cords of wood consumed, 8,150. During the month of March a large shipment representing the product of the electrolytic plant was made. Everything at the works in Anaconda and at the mines in Butte is being put in order for the increased production which will follow when smelter No. 2 is done.

GRANITE MOUNTAIN MINING COMPANY.—According to the report of the superintendent, received recently, the ore in the thirteenth level is four feet wide, all good pay, six inches assaying 300 to 500 ounces silver, while the whole width of the vein will average 60 ounces silver to the ton. In the Sunnyside claim there is also a good showing of ore which assays from 12 to 20 ounces, while in the third level there is a large body of low-grade ore that shows every evidence of improving in quality. On the Cleveland, where development work was commenced a short time ago the water is coming in freely, and the general outlook is very much improved.

A complaint was filed against the company in the District Court at Deer Lodge recently by Brantly & Scharnikow, on behalf of James E. Durfee. The suit is brought for \$15,000 damages for turning the waste water from the Runsey mill into the Fred Burr Creek. The plaintiff alleges that he was the owner of 75 inches of water of Fred Burr Creek when the mill was built, and that the water turned in from the mill is so impregnated with sulphate of soda and common soda as to render it useless for irrigating purposes.

LEWIS AND CLARKE COUNTY.

MONTANA COMPANY, LIMITED.—The official report of the secretary shows that the total weight of ore crushed during February was 5,981 tons; yield from the mills, \$88,600; working expenses for the month, \$53,200. The estimated numbers of ounces contained in returns by assay were: Gold, 3,290; silver, 15,969.

MEAGHER COUNTY.

QUEEN OF THE HILLS.—In the breast of the 300-foot tunnel on this property, at Neihart, the ore stringers which have appeared in the vein for some distance have come together, forming a solid ore body from which, it is said, assays as high as 423 ounces have been obtained. Four stopes are now operated, all of which are in good shipping ore that varies from two to three feet in width. The ore in the stopes is oxidized and as it is taken out is divided into first and second grades and loaded into ore wagons and shipped.

SILVER BOW COUNTY.

MOULTON.—A half interest in this mine at Barker, it is reported, has been sold to Mr. McLure, of the Granite Mountain Mining Company the consideration being \$200,000. A three-compartment 500-foot shaft is to be put down in the Moulton without delay. Heavy machinery has been ordered and work will be prosecuted with all possible speed.

PARROT SILVER AND COPPER COMPANY.—The mine is about to receive its long-expected engine, the foundation for which will be of heavy masonry.

The cylinders are 22x60 inches, two larger than those of any other in the camp. As soon as these improvements are completed, it is said that sinking will be prosecuted to the 1,000-foot level. Drifts, levels and crosscuts will be run at every 100 feet.

NEVADA.

ELKO COUNTY.

(From our Special Correspondent.)

The Union Mill will start up upon Commonwealth, Belle Isle and North Belle Isle ore about April 1st.

BELLE ISLE MINING COMPANY.—Rich ore continues to be taken out from the stopes on the 350 level. The west crosscut, 450 level, has been extended 14 feet cutting a vein of medium-grade ore about 6 inches wide.

DEXTER MINING COMPANY.—At the annual meeting of this company held recently, W. J. Urton, C. McMaster, R. Battels, F. Wilson and S. Ferguson were elected directors. W. J. Urton was appointed superintendent and C. McMaster, secretary and treasurer.

NORTH COMMONWEALTH MINING COMPANY.—The east crosscut, fourth level, will reach the vein cut by Commonwealth in about 100 feet. Work at timbering has been pushed and is now about completed. During the week there were hoisted 18 cars first-class ore assaying \$268 per ton, and 43 cars, second class, assaying \$19.

ESMERALDA COUNTY.

(From our Special Correspondent.)

HOLMES MINING COMPANY.—During the last week 249 tons of ore were crushed at the Princess Mill, the battery samples averaging 36 ounces silver per ton. A shipment of 9,179 ounces bullion was made. The work of enlarging the leaching works has been commenced and is being pushed vigorously.

LINCOLN COUNTY.

(From our Special Correspondent.)

BREIVOGLE.—A telegraphic dispatch from Daggett, Cal., describes the reported re-discovery of the famous Breivogle mine in Death Valley. The lead is located in a range of mountains seventeen miles north of Winter's ranch, in Pahrumpe Valley. According to accounts the ore is a clear looking quartz, thickly studded and seamed with free gold. The discovery was made by George Montgomery, of San Francisco, who is an old and experienced prospector, and he is now on his way to this city with specimens of ore. The route of the Government expedition runs near the mine, which is in Lincoln County, Nev., a short distance from Ash Meadows.

STOREY COUNTY—COMSTOCK LODE.

(From our Special Correspondent.)

SAN FRANCISCO, March 12.

The following is a statement of Comstock ore milled during the week ended March 7th:

	Tons.	Assay value.
Con. Cal. & Virginia.....	1,645	\$29.60
Chollar.....	496	17.50
Overman.....	300	14.63
Savage.....	460	17.00

CHOLLAR MINING COMPANY.—As predicted last week, this company has paid the Comstock Tunnel Company \$15,899, that being the amount due for back royalties on ore extracted from the mine.

CROWN POINT MINING COMPANY.—The water in the incline has been reduced 42 feet vertically below the 1,600-foot level. When the 1,700 level is reached it is very probable that the Alta pumps will be started up and worked auxiliary to the Dow pumps, which have so far done all the drainage work.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—The battery assays have been steadily increasing each week for over a month past until, for the week ending Saturday, March 7, the average was \$29.60 per ton. How long ore of this profitable grade can be taken out or rather how long the management will allow the assay to be at a profitable figure is an open question. Much good milling ore is being found at points on the old levels and in some places ore which was ignored in the bonanza days is now being found of sufficient value to be extracted. On the 1650 level good ore is being taken from what in earlier days was regarded as a section of porphyry. This patch was surrounded by very rich ore, which was mined without cutting into the porphyry. It has recently been found that the ore in some instances passes in streaks through the porphyry belt and that there are many bunches of good ore left. On the 1,100 level the southerly drift is penetrating unexplored country. Between this level and the surface is room for interesting developments, and from the indications found on the 1,200 level the ground is considered promising. The bullion product of the company in January was \$99,393.56; battery assay of ore \$19.34, and yield per ton \$15.61. In February, the gross yield was \$133,134.96; battery assay, \$25.88, and yield per ton \$21.78. Officially no reason is given for the increase, which is thus shown, beyond the finding of small quantities of rich ore already alluded to and the ordinary output from the various eyes. In the absence of any definite information

on the point, the cause is looked for in San Francisco, rather than in the mine. The company paid its last dividend in April, 1890.

JUSTICE MINING COMPANY.—Connection will be made this week between the 822-foot level and the bottom of the winze from the 622-foot level, after which stoping and milling of ore will be resumed.

OVERMAN MINING COMPANY.—This company produced 1,621 tons of ore and milled 1,634 tons in February. Battery assays averaged \$15.55 per ton, and gross yield was \$21,285.92.

POTOSI SILVER MINING COMPANY.—The annual meeting of this company was held on the 11th inst., at which 104,824 out of the 112,000 shares of capital stock were represented. No changes were made in the directory, the following board being re-elected: A. K. P. Harmon, president; W. E. Sell, vice-president; C. T. Bridge, A. W. Rose, Jr., and J. Marks, trustees. C. E. Elliott was re-appointed secretary, and A. C. Hamilton, superintendent at the mine. According to the financial statement of the secretary, the disbursements of the company for the year were \$142,880.29, including an overdraft of \$13,542.62 at time of last report. Receipts were \$113,577.59, of which \$112,000 came from assessments 34 and 35, with an overdraft of \$29,322.70.

NEW MEXICO.

GRANT COUNTY.

ALPHA AND OMEGA.—These mines, at Pinos Altos, are closed down and are not likely to be started up again soon, on account of a misunderstanding between the lessees. It is said that the last shipments of ore did not return enough to pay expenses of mining, transportation, and smelting.

SANTA FE COUNTY.

SANTA FE COPPER COMPANY.—Advices from this company's mine state that the daily output of ore is 25 tons. One carload of matte running 60% is ready for shipment.

NORTH CAROLINA.

CHATHAM COUNTY.

(From our Special Correspondent.)

The output of the hituminous coal from the mines near Egypt is increasing both in quality and quantity. The Sea Board Air Line will hereafter use this coal for its shops and engines.

STANLEY COUNTY.

(From an Occasional Correspondent.)

NEW GOLD HILL MINING COMPANY.—The ore from the strike recently made in the 160-foot level, which was reported to assay 11 ounces gold per ton, is milling about \$10 per ton. As it can be mined and milled for about \$5, even this is a very important development if the ore body proves to have any considerable extent.

PARKER MINING COMPANY.—This company has been awarded the medal, at the Crystal Palace Mining Exhibit, in London, for the best display of free-gold specimens and nuggets. The mine is operated under the management of Capt. H. A. Judd.

OREGON.

LANE COUNTY.

(From our Special Correspondent.)

SAN FRANCISCO, March 5.
The proposition of the Tacoma Mining and Milling Company to build a road from the mouth of the Blue River to Gold Hill, near which point the company owns several mines, has been considered by the Eugene Board of Trade, and it is almost certain that the road will be built, thereby opening up an interesting section of mining country. A committee has been appointed to view the road as soon as the snow shall have gone. By the present survey the road must gain an elevation of 2,800 feet in going 7½ miles. The estimated cost will be about \$3,500.

PENNSYLVANIA.

COAL.

The following summary is taken from the forthcoming report of Mine Inspector John M. Lewis, of the Fourth Anthracite or Hazleton district: Total production in tons of coal, 5,776,699.08; shipments in tons of coal, 5,280,820.11; average number days worked per month, 22.15; number persons employed, 14,421; number of fatal accidents, 52; number non-fatal accidents, 135; number kegs of powder used, 96,136; number steam boilers, 1,834; number horses and mules, 1,851; number mine locomotives, 70; pounds dynamite used, 135,834.

SOUTH CAROLINA.

(From our Special Correspondent.)

In reference to the phosphate trouble in this State, it appears that the reason for it is not generally known. The facts are that the State under a recent act of the Legislature threw the Coosaw River territory, heretofore mined by the Coosaw Mining Company, open to the public, and on March 2d took possession of the property and leased it out to all who applied for a license. There has been quite a controversy between the State and the Coosaw company as to the latter's exclusive right to this territory so long as they paid the rentals. During the last year the Coosaw company paid \$107,000 royalty to the State.

SOUTH DAKOTA.

LAWRENCE COUNTY.

BLANQUILLA MINING COMPANY.—The lead and manganese ore mined at present in this company's ground is stored on the dump. The lead ore is reported to assay from \$25.70 to \$53.60 per ton in silver. The vein is now over six feet wide. No attempt is made to save anything but the first-class ore, the lower grade being allowed to go on the waste dump. The company's storage room is said to be limited.

GOLDEN SUMMIT.—This property is located on the divide between Bobtail and Poorman gulches. The owners have been working steadily for some time past, and are said now to have about 500 tons of ore on the dump, which averages probably \$30 per ton. The workings consist of several tunnels and open cuts, in all of which the same class of ore is found. The ledge is of an average thickness of 8 feet; developments to date show the ore body they are working on at present to be very large. Its character is similar to that of Ruby and Bald Mountain deposits. According to assays, which are very uniform, the lowest grade averages \$15, and from that up to \$113 gold per ton. The owners of the Summit are now sampling, and soon two carloads of ore will be shipped East for treatment.

WILKINSON MINING COMPANY.—This company owns two claims, on which the principal development consists of a 200-foot two-compartment shaft, well timbered and five by ten feet inside of the timbers. Some very good silver-lead ores are reported to have been taken out, and shipments were made to the Iron Hill smelter yielding a profit to the company. At present no work is being done, but it is generally expected that operations will be resumed in the near future.

PENNINGTON COUNTY.

CHICAGO TIN MINING AND MILLING COMPANY has been incorporated in Chicago with a capital stock of \$750,000 by Mr. C. B. Burt, Mr. G. H. Arthur and Mr. G. M. Gross. It intends to operate in this county.

TEXAS.

EL PASO.

The papers in a suit involving over \$1,000,000 are reported to have been filed in the clerk's office of the United States Court in El Paso by the towns of San Elizario and Socorro against Charles J. Canda, Simon P. Drake and Frederick Olcott for possession of land held by them in what is known as La Prieta grant.

UTAH.

JUAB COUNTY.

MAMMOTH MINING COMPANY.—This company is now employing 120 men and a great deal of development work is being done. The mine is being put in shape for working in the most economical manner. Under the new superintendent, Col. Charles Stebbins, an old Leadville miner, it is stated that operating expenses are being materially reduced, while the same amount of work is being done. The company now has a contract for 800 tons of ore per month with the Mingo Furnace Company, at Salt Lake.

SUMMIT COUNTY.

CRESCENT MINING COMPANY.—About six years ago this company put a locomotive on its tramway to haul up the empty cars, supplies, etc., from Park City to the mine, over a tramway having a grade averaging over 450 feet per mile in its five miles of length. This engine has done good service, but it has proved too small to do the amount of business desired, so the company has ordered a new engine of double the capacity, which will be received in time to put on the road in April. It will be able to haul up 25 empty cars at a load, and, with the old engine still in use, the company will be able to send down about three times as much ore per day as heretofore.

GLENCOE MINING COMPANY.—An important strike was made in this property on the 3d inst. At a distance of 700 feet from its mouth the tunnel encountered a body of ore, which rapidly widened, so that the face and both sides now show a solid breast of ore. The ore is Galena, and its grade is reported to be good. The Glencoe is located east of the Ontario.

WASHINGTON COUNTY.

DIXIE MINING COMPANY.—This company owns a copper mine about 18 miles southwest of St. George, which it is now developing with excellent prospects. It is reported this mine was years ago known as the Pen mine and produced about 300 tons of ore, which was shipped out and smelted. It is largely carbonate ore, running pretty high in copper. The company is now running a tunnel to tap the vein at a depth of 200 feet. Lately this tunnel cut the top of a big cave, which appears to be quite a wonder. A rope was let down 100 feet with a lighted candle at the end, and it showed no bottom. Then stones were dropped and these could be heard as they struck here and there in descent for fully 30 seconds. It is thought that the cave must be 400 or 500 feet deep. On the opposite side of this hill, one-half mile distant, there is a large cave which has never been fully explored, and it may be that the one lately discovered connects with the other.

VERMONT.

ORANGE COUNTY.

COPPERFIELD MINING AND SMELTING COMPANY.—Under date of March 9th Mr. O. K. Krause, president and general manager, has just issued the annual report of this company. The daily output during the last two months has been 50 tons, giving employment to 173 men on the surface and below ground. During the year the shaft has been sunk 150 feet. No detailed statement as to cost of product, expenses and receipts is given, but the president states that, notwithstanding the depressed condition of the copper market, the company can continue to turn out its product at a fair margin. Seven and one half million pounds of dressed ore averaging seven per cent. copper were produced.

VIRGINIA.

FREDERICK COUNTY.

VIRGINIA TIN MINING AND SMELTING COMPANY.—This company, with its office in Winchester, Va., issues a pamphlet announcing the formation of the company, with a capital of \$1,000,000, in 100,000 shares, three quarters of which have been assigned to the treasury of the company, and of this treasury stock 25,000 shares are offered in the market for sale at \$5 per share. It appears that no systematic development of the company's property has yet been undertaken, the deepest opening being about 40 feet, besides which there are some cuts and trenches; consequently there is absolutely no knowledge of the existence of ore in paying quantity. Yet the company is proposing to mine and dress 100 tons of ore daily. It is claimed that this ore carries from one to two per cent of tin, and that it can be mined and reduced for \$1.75. Even if the first of these statements were true, which we are inclined to doubt, the second statement is certainly erroneous. The vendors of this company's shares are asking a figure for their property which is out of all proportion with its value even on their own showing. A half million dollars is more than any undeveloped tin mine could possibly be worth, and the floating of a company upon such a basis can only lead to disappointment and disgust, which will injure mining investments in general.

WASHINGTON.

OKANOGAN COUNTY.

TRIBUNE.—The sale of a one-half interest in this mine, located in the Wanicut Lake district and owned by Charles Shepster and W. H. Townsend, of Spokane Falls, was recently made. The Messrs. Lockwood have been trying for some time to gain possession of this property. After thoroughly examining the lead they have satisfied themselves of its value, and will shortly begin systematic development. It is probably the most extensive body of ore in that district. The croppings are about 50 feet wide and have been traced for over a mile. The assays which Mr. Lockwood had made average \$15 per ton in gold. The present owners of the mine will proceed at once to open up the lead. A shaft will be sunk and then cross-cuts run the full width of the vein. If developments prove as favorable as at present expected, a ten-stamp mill will be erected.

RAGIT COUNTY.

The wonderful asbestos deposit found near Hamilton has been uncovered for a distance of 75 feet, and at the cropping is said to be eight feet in width. The asbestos is of excellent quality, the fibers, fine as silk, being in some instances as much as 18 inches in length.

STEVENS COUNTY.

DAISY.—It is reported that this mine was recently sold to a syndicate of Rochester, N. Y., capitalists, who have incorporated as the Rochester & Kettle Falls Land Company of Washington. Besides the purchase of the Daisy several other smaller properties have gone into the hands of the company. The corporation proposes putting up the necessary machinery for a reduction plant to handle all the ore taken from the mines. The plant will be centrally located with reference to the properties owned by the syndicate. The Capitol iron mine, at Springdale, is one of these.

FOREIGN MINING NEWS.

AFRICA.

The product of the Witwatersrand mines in January, from returns to the Chamber of Mines, was 53,205 ounces gold, valued at £180,355. There were 1,412 stamps dropping, for an average of 23.05 days, and 81,418 tons of ore were milled. The average yield in gold per ton of ore was 11.98 pennyweights, and the average value £2 1s. 11d.

CANADA.

PROVINCE OF NOVA SCOTIA.

CUMBERLAND RAILWAY AND COAL COMPANY.—The jury inquiring into the cause of the recent colliery disaster in the Spring Hill mine of this company has returned a verdict that the explosion was caused by a flame from a shot igniting coal dust and a certain portion of gas which might be present at the time. The jury also believes there was unusual flame from the shot owing to a slip

of the stone. The explosion was accidental, and no blame is attached to the manager, who is believed to have taken every precaution for the safety of the workmen. A number of recommendations with a view to prevent a recurrence of a similar accident are made. The verdict is favorably commented on.

PROVINCE OF QUEBEC.

TEMPLETON ASBESTOS MINING COMPANY, LIMITED.—This company has been organized in London to acquire and operate asbestos mines in this province. Its capital is £25,300, divided into 2,500 ordinary shares of £10 each, and £300 founders' shares of £1 each.

GERMANY.

A deposit of chrome iron ore has been recently opened in Silesia. This discovery is considered to be of great importance, as the inland industries of this country have hitherto been dependent on foreign supplies. The deposit of nickel ore discovered in the neighborhood of Frankenstein, not long ago, is estimated at many hundred thousand tons. According to the analysis the ore contains as high as 17% of nickel, and the average is from 2 to 3%.

MEXICO.

ZACATECAS.

(From our Special Correspondent.)

MOTOLINA CONSOLIDATED MINING COMPANY.—This company is operating the property of the La Noria Mining Company at La Noria, under lease. Mr. James N. Davis is its present manager. The main shaft is now being sunk deeper, so as to cut the vein, which it is claimed should have been done when the La Noria Mining Company was first organized, five years ago. Mr. Davis wishes the mine to become an ore producer before squandering any more money on surface improvements, and is directing his policy accordingly. He believes the 20-stamp Boss process mill, erected three years ago, to be unsuitable to the ore found in the La Noria mines. Work in the mines was resumed by the present management during November, 1890. The water was pumped from the shaft, and the debris which it still contained was removed, the hard bottom of the shaft being reached, for the first time in the history of the American companies operating the property, at a depth of 386 feet from the surface. Sinking in the limestone country rock has been energetically pushed since then, bringing the present bottom of the shaft 200 feet below the old native workings of the mines. The intention of the management as expressed by Mr. Davis, after cutting the vein in the shaft, is to sink a sump deep enough to hold the drainage of the mines, cut out an underground station for placing a balance bob for the Cornish pump, and then to drive on the vein in both directions, opening up ground as quickly as possible, so as to produce ore cheaply and in quantity. All expenses are being kept down to the lowest possible point. These mines when in the hands of the natives were famous for their output of silver; though but little ore now remains in the old stope-out workings as evidence of former richness. The cutting of the vein and its exploration will probably expose ore bodies of good grade, for at the bottom of the Mexican workings the vein is large and of fair value. The mines are at present operated by honorable business men, and it is now predicted that this property will retrieve its former unfavorable reputation and be added to the list of conservatively managed and profitable Mexican mines owned by Americans.

ASSESSMENTS.

COMPANY.	No.	When levied.	D'nq't in office.	Day of sale.	Ann't per share.
Alliance, Utah.....	12	Feb. 24	Mar. 31	Apr. 20	10
Belcher, Nev.....	41	Feb. 17	Mar. 24	Apr. 13	50
Best & Belcher, Nev.....	48	Feb. 17	Mar. 25	Apr. 15	25
Confidence, Nev.....	18	Feb. 12	Mar. 16	Apr. 9	75
Con. St. Gothard, Cal.....	2	Feb. 12	Mar. 31	Apr. 20	15
Crocker.....	16	Feb. 16	Mar. 20	Apr. 13	10
Crown Point, Nev.....	54	Feb. 19	Mar. 26	Apr. 16	50
Gould & Curry, Nev.....	66	Feb. 3	Mar. 11	Apr. 7	30
Head Center.....	2	Jan. 19	Feb. 19	Mar. 25	05
Lady Washington.....	8	Mar. 3	Apr. 7	Apr. 28	20
Martin White, Cal.....	25	Feb. 2	Mar. 6	Mar. 30	50
Mexico, Nev.....	42	Mar. 9	Apr. 14	May 5	25
Midas, Cal.....	1	Jan. 13	Feb. 23	Mar. 23	20
Northern Spy, Utah.....	1	Mar. 6	Apr. 13	May 4	20
Nevada Queen, Nev.....	7	Mar. 4	Apr. 10	Apr. 30	15
Savage, Nev.....	7	Feb. 13	Mar. 18	Apr. 7	30
Silver King, Ariz.....	5	Feb. 21	Mar. 30	Apr. 28	20
Wood River, Id.....	1	Jan. 31	Mar. 9	Apr. 6	00 1/2

DIVIDENDS.

Daly Mining Company, dividend No. 49, of 25 cents per share, \$37,500, payable March 31st, at the office of Messrs. Lounsbury & Co., Mills Building, New York. Transfer books close March 26th and reopen April 1st.

Homestake Mining Company, dividend No. 152 of 10 cents per share, \$12,500, payable March 25th, at the office of Messrs. Lounsbury & Co., Mills Building, New York.

North Banner Consolidated Tunnel Company, dividend No. 1, of five cents per share, \$5,000, pay-

able March 25th, at the office of the company, in Grass Valley, Nevada County, Cal.

Ontario Silver Mining Company, dividend No. 178, of 50 cents per share, \$75,000, payable March 31st, at the office of Messrs. Lounsbury & Co., Mills Building, New York City. Transfer books close March 25th, and reopen April 1st.

MINING STOCKS.

For complete quotations of shares listed in New York, Boston, Salt Lake City, San Francisco, Baltimore, Denver, St. Louis, Pittsburgh, Birmingham, Ala., London and Paris, see pages 369 and 370.

New York, Friday Evening, March 20.

All has been sunshine on the Mining Stock Exchange during the past few days. The start so auspiciously made last week has materialized in a way that is pleasing at least to those who had stocks to sell. More encouraging than the active market are the general tone of inquiry which seems to prevail, and the consequent establishment of the feeling on the part of the public that there may after all be something in mining stocks for it. This statement is receiving substantiation in the wide inquiry which is said to come from all parts of the country. The San Francisco Exchange, as in last week, is responsible for the steady rise in values. The New York quotations of the Comstocks follow steadily in the wake, and only few points behind those which come daily from the Golden Gate. At no time during the week have they caught up. This fact may be attributed to a lack of the decidedly speculative element which is present on the latter board. Whatever may have been the conditions which have influenced the Comstock shares, the boom has had a tendency to place other and more deserving stocks on a higher plane of valuation, and in this way may eventually be productive of good. It is with pleasure we note that the better class of stocks is being brought into the market. These stocks have been strangers for many weeks and their return is indicative that money is seeking substantial investment.

The sales for the week aggregated 17,397 shares of dividend-paying and 181,357 non-dividend-paying companies, making a total of 198,754 shares. The sales for the corresponding period of last year aggregated 103,375 shares.

Of the copper stocks three sales are to be noted. Allouez, which is almost a total stranger on the Exchange, sold at \$3 for 100 shares. Calumet and Hecla on Saturday sold 20 shares at \$255.25; its last quotation was on February 4th, being \$251.25. A lot of 30 shares of Tamarack changed hands at \$146.13; the previous quotation was \$140. Very little has been done in this class of stocks for a number of weeks, and these sales indicate that a more substantial financial element has entered the market.

Almost all the Comstocks are to be credited with a marked rise over last week's quotations. Belcher opened the week at \$2.90, having closed on Saturday at \$2.50. It reached \$2.50 on Monday, and today some very light sales were made at \$2.45. Trading in Consolidated California and Virginia has been most active throughout the week; although its sales have been far below that experienced by many of its neighbors, yet it may be called the backbone of the Comstocks and therefore the backbone of the week's market. Sales were made at the first call on Monday at \$9.88, having reacted to this figure from \$11. From this point it made a steady climb with slight rises and reactions until \$13.50 was reached on Wednesday. Reports from the San Francisco Stock Exchange to the effect that prices were a little off caused a steady decline until \$10.75 was reached to-day at 3 o'clock; 1,395 shares changed hands. Crown Point, although inactive, is to be credited with a marked rise. It opened the week at \$2.50 and closed at \$2.30, as against \$1.30 of the previous week. Gould & Curry sold on Monday at \$2.70, and on Wednesday at \$3.40, a gain over last week of 85c. Hale & Norcross lost its ground on sales of 70 shares. It opened at \$2.50 on Monday, a drop of 5c., descending to \$2.20 on Wednesday, where it remained. Navajo was in little request during the middle of the week. Its lowest and highest quotations were 27c and 35c, respectively, closing at the higher figure. Ophir opened at \$2.80 and on very moderate sales reached \$6.75 on Tuesday, the closing quotation. Savage enjoyed a single sale of 50 shares on Monday at \$2.50, as against \$2.55 during the previous week. Sierra Nevada opened at \$2.70., a gain of 20c., rose to \$3.75 on Tuesday, and dropped to \$2.90 Wednesday, on sales of 400 shares. Alpha was quoted at \$1.25 on Saturday and \$1.35 to-day, a net gain of 10c. Alta held its own at 90c. and 95c.; the sales were moderate. Chollar was quoted to-day at \$3.30, a gain of 80c. The Comstocks were most active through the week, and it is the total of sales in these shares which swells the week's transactions to the unusually large figure. Comstock Tunnel opened at 21c., making a steady climb to 36c.—the highest figure reached to-day; 81,832 shares changed hands. Comstock bonds were in heavy demand in large lots. They sold with coupon at about 40c. Sales aggregated 56,000. The scrip, which heretofore has been almost a stranger on the Exchange, was moderately active during the week. It opened on Tuesday at 43, dropped to 33 on Wednesday, and

closed at 45 to-day on sales of 2,050 shares. Consolidated Imperial opened on Monday at 31c., jumped to \$1.25 on Wednesday, which is the closing quotation. Exchequer entered the market to-day at \$1.30 as against 45c. of the previous week. Mexican was very active on small sales. It opened at \$3.15 as against \$2.75 of the previous week. It rose to \$4.35 on Tuesday, and fell to \$4 on Wednesday. Oriental & Miller experienced one sale at 7c., as against its quotation of 4c. on January 9th. Potosi opened the week at \$5.75, rose to \$6.50 on Tuesday and closed at \$5.50, a net loss of 5c. over last week's quotations. Seg. Belcher experienced one sale on Saturday at \$1.25, as against \$1.10 last week. An installment of Suro Tunnel consisting of 1,100 shares drifted into the market to-day, selling at 10c. Union Consolidated sold 50 shares at \$3.75, as against \$3 of the previous week. Commonwealth sold 200 shares at 75c. and 80c. Today's San Francisco quotations in these stocks, together with a full report of that market, will be found in another column.

Best & Belcher is to be credited with a marked rise. It closed last week at \$2.50, opened the period under review at \$4.90, gradually climbing to the quotation of \$3.75 on Wednesday, its sticking and closing point. Sales were very moderate.

The California stocks have responded in a very sympathetic manner to the boom in Comstock of 3,100 shares. Astoria sold at 1c. and 2c. This is a loss of 50% and 100% over last week's quotation. Belmont surprised even its friends by the slow and steady gain which it has made during the past few weeks. It opened at 39c., rose to 41c. on Thursday, reacting to and closing at 40c., as against 38c. of the week previous. The sales aggregated 2,700 shares.

Brunswick, always an active stock, ranged at prices between 10c. and 13c. It closed at 12c. on sales of 5,700 shares. Middlebar's ruling quotation was 4c., its highest 7c. and its closing 3c. Sales aggregated 7,600 shares. Syndicate California, a stranger on the board, sold at 10c. for 1,000 shares. Bulwer is to be credited with one sale of 100 shares on Tuesday at 40c., as against 45c. of last week.

The Colorado stocks did their full share toward maintaining the brisk condition of the market. Phenix lead, which has not been quoted in several months, sold 1,100 shares at 11c. Our news columns contain matter of much interest concerning this property. Adams sold 500 shares on Monday at \$1.70. The last quotation was on February 2d, it being at \$1.60. Bassick, which was credited with sales at 7c. during the previous week, sold on Tuesday and Thursday at 5c. Chrysolite sold as low as 18c. on Thursday; its ruling and closing price was 20c. Freeland experienced a sale of 200 shares at 18c. on Thursday, as against 16c. of the previous week. Leadville was moderately active on sales of 3,900 shares at 11c. and 12c., the latter being the closing. Little Chief sold on Wednesday at 30c. and 32c., as against 34c. of the previous week. Standard on sales of 3,900 shares made a net gain of 15c., closing at \$1.40. Its last quotation was on Monday, it being \$1.50.

None of the representative Utah stocks had more than moderate sales. Ontario, one of the most staple on the list, sold 22 shares at \$40@ \$33, as against \$40 of last week. Horn Silver opened on Thursday at \$3.30, dropping to \$3.25 to-day. The sales aggregated 600 shares.

El Cristo, of South America, sold 200 shares at 40c. and 41c.

Mutual Smelting and Mining maintained its ever steady pace, quotations ranging between \$1.40 and \$1.50, the average price being \$1.45. Its sales were 3,600 shares. Phoenix of Arizona was unsteady during the week. Trading was exceptionally active, small sales aggregating 7,000 shares. It opened on Monday at its last week's closing price, namely, 35c., dropped on the same day to 18c., between which two figures it ranged up to to-day when it closed at 37c.

Rappahannock of Virginia sold at 1c.

Santa Fe, of New Mexico, which has been out of the market for many months, sold 600 shares in three sales at 50c., 55c. and 65c. Doubtless encouraging news from the mine to the effect that production has been resumed has brought out the stock.

Shoshone, of Idaho, which was quoted in December at 2c., sold 100 shares on Monday at 1c.

Holyoke of Idaho sold 200 shares at 3c., a loss of 3c.

Silver King was quoted at an average of 7c., assessment unpaid. This assessment amounts to 20c., and is payable March 30th. It sold for 5c. last month; 2,500 shares changed hands.

The Comstock Tunnel Company gives notice that sealed offers will be received by it until April 2, 1891, for the sale to the company of any of its outstanding 30-year first-mortgage 4% non-accumulative income bonds for the purchase or redemption of which the trustees of the company have, in accordance with the provisions of the mortgage, set aside \$89,544, being one-half of surplus of its net income for the year ending September 1st, 1890.

It is claimed that the governors of the New York Stock Exchange have detected a dozen or more members violating the new rule prohibiting business relations with the Consolidated Exchange. The action of the next meeting of the Board of Governors will be awaited with a great degree of interest by all concerned.

Boston. March 19.
(From our Special Correspondent.)

The market continues to run along in the same dull channel, with now and then an occasional effort on the part of the short interest to cover, while the continued depression in the ingot market serves to help them in that direction. The transactions the past week have been principally confined to two or three specialties; and although there has been considerable stock offered, the market has taken it fairly well, and the decline is not so marked as would naturally have been expected.

A drive was made at Kearsarge on the annual report, which was not considered entirely satisfactory, and the price easily yielded, on the pressure to sell, from \$13 to \$11, with a recovery to \$11 1/2.

Butte & Boston was also freely offered, the transactions reaching about 3,000 shares resulting in a decline from \$15 1/2 to \$14, subsequently recovering to \$14 1/2.

Boston & Montana has been very quiet this week, less than 500 shares being dealt in, but the price has been fairly well maintained at \$41 1/2 @ \$42. Osceola has been steady, selling ex-dividend at \$36 1/2 @ \$35 1/2, with sales of about 800 shares. Tamarack declined to \$144, but later sales were at \$145. Very little is doing in it.

Quincy was a little inclined to weakness on account of the proposal to reopen the Pewabic sale, which has been set down for a hearing on the 24th inst. There were sales at \$98 @ \$99 in small lots. Atlantic was dull at \$15 @ \$15 1/4, and Centennial quiet at \$16.

Calumet & Hecla was steady at \$259 @ \$260 1/2; Allouez sold at 2 1/2.

Franklin has been depressed to-day on the receipt of a telegram this morning from Capt. Vivian, saying that the hoisting-engine house was burned last night, which will delay hoisting over a month; insurance was \$17,000. The stock sold down to \$15 at the morning call and later declined to \$14 1/2. Santa Fe sold at 60c., about 3,000 shares changing hands. There was a sale of 1,400 shares Bonanza at 50c., and Winthrop sold at 15c.

In the silver stock there is nothing doing at present.

3 P. M.—The market closes rather heavy. Butte & Boston sold off to \$14 again. Centennial dropped 1/4, to \$15 1/4. Franklin sold at \$14 1/2 and Allouez advanced 1/4, to \$3.

By Telegraph.—Quincy Mining, \$99; Boston & Montana, \$41 1/2; Osceola, \$36 asked; Franklin, \$15; Kearsarge, \$11 1/2, hid; Butte and Boston, \$14.

San Francisco. March 12.
(From our Special Correspondent.)

The trading during the current week has been more active than for several years past, and the market has had an old-time appearance that, after the stagnation that has existed in more or less pronounced form for two years, is encouraging. During the week the following sales were made in the regular sessions of the San Francisco Board, with quite as large dealings in the informal session: Thursday, March 5th, 15,510; Friday, March 6th, 7,605; Saturday, March 7th, 7,005; Monday, March 9th, 23,255; Tuesday, March 10th, 14,880; Wednesday, March 11th, 29,605. In the Pacific Board trading has been equally active, but sales have not been so large.

It is difficult to precisely explain the reason for this unwonted activity. Primarily it is because Consolidated California & Virginia, that in January sold for \$2.10 when the battery assays were ranging \$16 per ton, has advanced steadily each week in proportion as the assay value of the ore increased. The battery assay this week was \$29.60, and as a consequence Consolidated California & Virginia stock has bounded to the front, making in the week ending to-day an advance in price of almost 100%. Saturday the stock sold for \$6.50; opened at that figure on Monday and sold to \$7.37 1/2; on Tuesday rose to \$9.25; gained 25 cents yesterday, and to-day is selling at \$12.25.

Outside reports tell of new strikes of ore in the upper levels, but during an excited market little reliance can be placed on rumors. Insiders are reticent, and official letters tell only of a general improvement in the mine without giving any specific reason for the steady increase in the assays.

On the other hand, the scheme for draining the north end and middle groups of mines is ready to be launched on the public. It has been with the greatest difficulty that assessments have been collected, and before the drainage operations can be begun assessments must be levied—and paid. The present movement has the appearance of being engineered by the manipulators for the purpose of making a more active and stable market for assessment purposes.

Best & Belcher has been a stock that has benefited very much by the present stimulus. A week ago it sold for \$2.95 and is ruling to-day at \$4.90 with very large sales.

Overman, also, has come next to the bonanza stock in activity and has advanced from \$2.15 a week ago to \$3.55 to-day.

Of the Gold Hill stocks, which have as a rule, not sold so freely as the north end or middle stocks, Bullion, quoted this morning at \$2.60, has been the most active.

Potosi touched the \$5.75 point to-day, an advance of \$1.20 during the week, but has not been selling so freely as might have been expected, considering the large sales of Bullion.

What will be the outcome during the coming week is an open question. If the present movement is simply a "deal," such as has taken place over and over again, the probabilities are that the reaction, when it sets in, will carry prices as low as they were a month ago. But if, as seems most likely, the present movement has been inaugurated for the purpose of loading the stock on the public and inspiring holders with the courage to "pay up and look pleasant," then the chances are against any very heavy drop in values occurring in the immediate future.

By Telegraph.—San Francisco, 10 A. M., March 20th.—The opening quotations are as follows: Alta, 90c.; Best & Belcher, \$7.14; Belle Isle, 75c.; Bodie, \$1.30; Bulwer, 45c.; Consolidated California & Virginia, \$11.50; Chollar, \$5.15; Crown Point, \$2.25; Commonwealth, 80c.; Eureka Consolidated, \$3; Gould & Curry, \$3.50; Hale & Norcross, \$2.30; Mexican, \$3.95; Mono, 70c.; Navajo, 35c.; North Belle Isle, 85c.; Ophir, \$5.58; Potosi, \$4.95; Savage, \$3.25; Sierra Nevada, \$3.50; Union Consolidated, \$3.50; Utah, \$1.20; Yellow Jacket, \$3.20.

Salt Lake City.

PRICES AND SALES FOR THE WEEK ENDING MARCH 14, 1891.

Name and Location of Company.	Open-Ing.	High-est.	Low-est.	Clos-Ing.	Sales.
Alice, Mont.	1.50	1.50	1.25	1.50	....
Alliance, Utah	7.00	7.00	6.60	6.75	250
Anchor, Utah	.12	.13	.11	....	8,250
Apex, Utah	....	.01	.01	....	....
Barnes Sulphur, Utah	....	.13	.10	.10	....
Big Hole Placer, Mont.	....	55.60	55.30	....	....
Centennial Eureka, Utah	....	.13	.17	.08	15 12,000
Congo, Utah	....	.27	.28	.26	26 3,568
Crescent, Utah	18.50	18.50	18.00	....	100
Daly, Utah	....	....	....	....	....
Glencoe, Utah	....	....	....	....	....
Horn Silver, Utah	3.20	3.20	3.10	....	400
Malad Con., Idaho	.02	.02 1/2	.01	.02 1/2	15,600
Mammoth, Utah	4.25	4.30	4.20	4.20	700
Northern Spy, Utah	1.80	1.80	1.75	....	....
Ontario, Utah	....	42.50	42.50	....	25
Stanley, Utah	.21	.21	.17	.18	12,000
Utah L. & C. Co.	....	8.50	8.20	8.25	250
Utah Oil Co., Utah	....	....	....	....	....
Woodside, Utah	....	....	....	....	....
Total sales	....	....	....	....	53,143

St. Louis. March 18.

(From our Special Correspondent.)

The market this week has been much better than for some time. More business has been transacted, and better prices have prevailed.

The Aztec Mining Company held a meeting and elected a board of directors, who, in turn, elected the following officers: Nathan Frank, president; W. Einstein, vice-president; Julius Rothchild, treasurer; and C. A. McNair, secretary.

The board of directors of the Central Silver Mining Company held a meeting and elected Mr. Hillard president in place of Charles Peck, and J. H. Lewis, vice-president.

The Granite Mountain's regular weekly shipments amounted to 49 bars, containing 52,575 ounces of silver and 59 ounces of gold. The stock still remains at \$25, though the price has been fluctuating all week. Sales amounted to 205 shares, sold at from \$24.25 @ \$25.50.

Central Silver opened at 7c., but soon fell to 5c. It was very strong at this price and rose to 7c., but closes at 5 1/2c. Sales were very good, amounting up to 19,500 shares. The fact that all the money needed to pay off the indebtedness had not been subscribed and that in case it is not done soon this will lead to the sale of the mine and organization of a new company, had little effect on the market. Elizabeth declined this week and is now quoted at 5c. below its opening price. The stock opened at \$1.87 1/2, at which figure 1,700 shares were sold, but the present bid is only \$1.82 1/2.

American & Nettie was another stock to experience a drop, and from an opening sale at 31 1/2c. it is now quoted at 23 1/2c. At one time the stock was as low as 25c., though no sales were made at that bid. Sales for the week amounted to 900 shares.

Mickey Breen opened the market at 55c. and closed at 60c. with a bid, during the week of 61 1/2c. The demand was very firm, with a brisk market and 7,500 shares were sold at good prices.

Bi metallic was on the wrong side of the market and declined in price from \$33 to \$32. Sales aggregated 305 shares at from \$32.25 to \$33. The market is very steady.

Silver Age is still quoted at \$2, its opening price. The stock was only in fair demand and the market fluctuated at \$1.97 @ \$2.02 1/2. Several sales were effected, which amounted in all to 700 shares.

Montrose was one of the attractive stocks this week, and came forward somewhat. Several sales were made at prices above the opening one of 81 1/2c., though the stock closed at 80c.; 1,200 shares sold at from 81 1/2c. @ 85c. The market closed easy at 80c.

As usual, Adams was very quiet; one sale only was made. The stock opened at \$1.60 and remained inactive until Monday, when 600 shares were sold at \$1.65, the market soon afterwards rising to \$1.67 1/2, at which price it closed.

Gold King was in small favor this week and had no sales. The market opened inactive at 8c. and closed in the same condition at 10c.

Yuma advanced from 51 1/2 @ 52 1/2c., but there were no sales made, the stock being in small demand.

Four Mile was bid at 21 1/2c., with 20 1/2c. asked,

Chicago.

The members of the National Mining and Stock Exchange Company, of Chicago, met on Tuesday afternoon at the office of Mr. W. W. Watson and elected its officers and board of directors for the ensuing year. They are as follows: President, Geo. H. Harlow; Vice-President, Fernando Jones; Treasurer, T. D. Randall; Secretary, A. P. Skinner. These officers, with R. D. Aitchison, Chas. H. Weaver, and W. W. Watson, compose the board of directors. The by-laws are now being prepared and rooms are being looked up with the view of starting up as quickly as possible.

Denver.

Prices and sales for the week ending March 14th, 1891:

Company.	Open- ing.	H.	L.	Clos- ing.	Sales
Allegany.....	21a				13,700
Amity.....	02½b	04	02¼	03½	75,800
Bangkok-C-B.....	07b	13	06¾	10¾	1,900
Bates-Hunter.....	57	61	61	61	700
Brownlow.....	04½b	04¾	04½	04½	1,600
Calliope.....	16½b	29	17¾	20	14,300
Cash.....	10b				100
Clay County.....	80	150	80	100	8,300
Leavenworth.....	10½b	19	19	20	1,200
Little Rule.....	103b	109	100	105	1,100
Matchless.....	275b	285	275	285	1,100
May-Mazepa.....	123	124	123	123	400
Oro.....	100b			100	27,900
Pay Rock.....	03b	03¼	02¾	02¾	8,600
Puzzler.....	4½b	06½	05	06¼	
Reed National.....	70a				
Running Lode.....	17b	18½	17½	18	2,200
Whale.....	100	100	95		
Bal Smuggler.....	100				
Prospects.....					
Argonaut.....	20a				500
Big Indian.....	11a	10	09	08½	28,900
Big Six.....	08b	15½	08¼	14¼	10,200
Century.....	22	29	22	27	10,000
Claudia J.....	05½b	05¾	05½	05¾	15,900
Nat. G. & Oil Co.....	08½b	11¾	08½	10½	40,700
Diamond B.....	03	03½	02¾	02¾	6,400
Emmons.....	43½b	46	43½	44	300
Golden Treas.....	30b	35	30	31	38,400
Ironclad.....	03½b	07½	03½	06	12,800
John Jay.....	04½b	05	04¼	04¼	200
Justice.....	12½b	12¾	12¾	12¾	18,800
Legal Tender.....	03½b	04	04	04¼	45
Morning Glim.....	45b				100
Park Consolidated.....	18½b	20	20	18	12,000
Potosi.....	11b	12	11	11	90
Rialto.....	80	80	80	80	
Total.....					355,400

* Buyer 30. † Buyer 60. ‡ Seller 60. a Asked. b Bid.

PIPE LINE CERTIFICATES.

(Specially Reported by Messrs. Watson & Gibson.)
The oil market this week has been weaker, but it has been distressingly dull. The public hold entirely aloof, and the tendency is a drooping one from sheer force of gravity. Generally too, with the advent of spring field operations increase, and as the production is already quite large compared with the consumption, such an increase in output would undoubtedly depress prices.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 20
STATEMENT of shipments of anthracite coal (approximate) for the ten days ending March 14th, 1891, compared with corresponding period last year.

Regions.	Mar. 14, 1891.	Mar. 15, 1890.	Difference.
Wyoming Region. Tons	327,097	255,351	Inc. 71,746
Lehigh Region "	115,660	110,819	Inc. 4,841
Schuylkill Region "	224,552	158,495	Inc. 66,057
Total..... Tons	667,309	524,665	Inc. 142,644
Total for year to date Tons	6,774,484	5,189,003	Inc. 1,585,481

STATEMENT of anthracite coal shipments for the month of February, 1891, compared with the corresponding period last year. Compiled from returns furnished by the mine operators:

Regions.	Feb., 1891.	Feb., 1890.	Difference.
Wyoming Region. Tons	1,235,191	954,813	Inc. 280,378
Lehigh Region "	374,725	374,620	Inc. 105
Schuylkill Region "	767,285	528,019	Inc. 239,266
Total..... Tons	2,377,201	1,857,452	Inc. 519,749
Total for year to date Tons	5,516,162	4,139,051	Inc. 1,377,131

The stock of coal on hand at tide-water shipping points February 28th, 1891, was 841,682 tons; on January 31st, 1891, 697,772 tons; increase, 143,910 tons.

PRODUCTION OF BITUMINOUS COAL for week ending March 14th and year from January 1st:

Regions.	1891.	1890.	Difference.
Pittsburg, Pa.....	18,511	216,887	189,661
Westmoreland, Pa.....	39,736	415,891	388,984
Monongahela, Pa.....	12,151	120,845	40,317
Total.....	70,398	753,623	618,962
Grand total.....	420,241	4,236,227	3,847,742

EASTERN AND NORTHERN SHIPMENTS.

	1891.		1890.
	Week.	Year.	Year.
Phila. & Erie R.R.....	1,821	30,935	28,957
Cumberland, Md.....	80,540	759,258	777,569
Barclay, Pa.....	3,318	33,281	27,796
Broad Top, Pa.....	11,947	132,880	118,400
Clearfield, Pa.....	89,056	917,819	863,851
Allegheny, Pa.....	30,000	275,563	231,171
Beach Creek, Pa.....	44,172	488,385	386,606
Poconantas Flat Top.....	43,475	448,760	363,752
Kanawha, W. Va.....	140,234	427,623	400,674
Total.....	350,143	3,542,604	3,198,782

* Estimated
† Week ending February 28th.

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending March 14th, 1891, and year from January 1st, in tons of 2,000 lbs.: Week, 32,267 tons; year, 793,117 tons; to corresponding date in 1890—1,173,248.

Anthracite.

The output for the week ending March 14th was 667,309 tons as against 591,009 tons for the week previous. It was an increase of 142,644 tons over the corresponding period of 1890. This increase is to be compared with an increase of 149,479 tons made for the week ending March 7th, 1891, over the corresponding week of 1890. The yearly output to date has been 6,774,484 tons. The total output for the three months, being fixed at 7,500,000 tons, leaves a tonnage of 725,516 for the remainder of the month—a figure which, at the present rate of production, will be exceeded. Several important features in the trade have presented themselves for discussion this week, namely: the dull and suspended condition of the market; the evidently honest effort on the part of certain operators to restrict the outputs and maintain prices; the action on the part of some other operators in selling below the September circular rates; the opening of lake and northern river navigation, and the decision of the Interstate Commerce Commission in the case of Coxe Bros. & Co. vs. the Lehigh Valley Railroad Company. News from all quarters indicate that the companies are trying their best to limit the supply to the demand. They are suspending operations in numerous collieries, and refuse to furnish cars to shippers on stated days in the week. The claim is made that the shading of rates which is now prevalent is to be attributed to the action of individual operators, and that in consequence they are enjoying a good percentage of the few orders which are being placed. The policy of the sales agents seems to be a waiting one, and it will probably be continued up to the 31st inst., when spring prices will be fixed.

The general sentiment seems to be that a lower price will prevail, and that the reduction, if it comes, will be great or small according to the attitude of independent operators. This belief of the retailers that low prices are to prevail naturally keeps them out of the market. In consequence the current business consists of purchasers of the hand-to-mouth order. Inasmuch as stocks are kept at a minimum, a healthy trade will naturally follow as soon as a feeling of stability is established. The opening of navigation on the Great Lakes and northern rivers and the contracting for next year's supplies are going to enliven business in the coal fields, which is a condition which will affect the New York market, both directly and indirectly.

The Interstate Commerce decision already referred to, and which is considered in another column of this issue, took the trade by surprise last Saturday. It has been about the only theme of discussion in trade circles during the week. Its effect on the market of the immediate future, if any, will be expressed in a tendency of buyers to hold off until the policy of the contesting parties is known. One prominent operator says that if the new rates go into effect they will lower coal to the consumer; that this has been the experience heretofore upon the reduction of tolls. Another operator, equally as prominent in the trade, does not see why the retailer or consumer should receive the benefit of a reduction simply because the operator enjoys one; neither did he think either class would be the gainer.

Bituminous.

The soft coal trade is as dull as the anthracite. Like the latter, it is a victim of adverse circumstances, and also promises to improve after April 1st. The controlling condition which was dwelt upon in last week's report still rules, namely, the uncertainty of just what the spring price will be, and the attendant and conflicting hope on the part of both buyers and sellers that conditions will so shape the market that each will be better off financially by waiting. It must be acknowledged that the turn which affairs took last week extends but little encouragement to the buyer. As one well-posted operator stated this morning: "I have not heard of any contracts that are being let at less than seaboard prices." This fact speaks well for the stability of the Seaboard Association, a circular of whose prices was published in our issue of the 14th inst.

It seems that each party to the Seaboard Association agreement has promised to put up a cash forfeit each month based on the tonnage of the previous month; the association holding three of these forfeits in its treasury, and returning the

oldest one upon receipt of the fourth. The fact that these forfeits on the March tonnage have about all been paid in would indicate that the members are in earnest.

Almost all the operators report having made a few contracts, they being mostly with old customers. The question of railroad rates will be settled April 1st, after which those who have been holding off must come in the market.

Vessels are very scarce, and ocean rates have stiffened. We quote: From Philadelphia to Boston, Salem and Portland, \$1; to Sound ports, 90 cents; to Portsmouth, \$1.10. Freight from Baltimore are 10 cents higher than these rates.

The Connellsville strike is in statu quo. A report of operations last week showed that all but W. J. Rainey's furnaces were out of blast. Of these, 731 were in operation, producing 7,000 tons of coal. The coke market, while it feels a stringency, has not responded with higher prices. This can be explained in a measure by the fact that Virginia cokes are coming in over the Shenandoah Valley Railroad to Harrisburg. The mountain coke district is shipping about 1,000 tons per day.

NOTES OF THE WEEK.

Mr. F. A. Bassler returned from a three weeks' sojourn in Florida on Thursday last.

Mr. E. B. Ely, of Coxe, Brother & Co., left for Florida on Monday last with his family to enjoy a much needed vacation. He will return on April 5th.

The Bear Ridge, Beechwood and Reliance collieries, at St. Clair, Pa., operated by the Reading Company, have suspended operations for an indefinite period. The North Franklin is also closed.

The hoatmen of the Morris Canal have a petition present to the directors of the company at Philadelphia, praying for an increase of 13 cents per ton on coal to Jersey City, and other points in proportion.

The Reading Railroad Company is reported as having made a new deal with the New York Central, by which it receives 12 cents a ton more of coal freight rate to Buffalo. This would give the Reading a western outlet for its coal. At present the principal portion of the output is sold in the New England States and along its own line.

As a result of the stagnation in coke and iron affairs throughout the country, all the local railroads have been compelled to adopt a line of retrenchment. The Pennsylvania Railroad, the Pennsylvania Company, Baltimore & Ohio, Pittsburgh & Lake Erie, Pittsburgh & Western, and the Pittsburg, McKeesport & Youghiogheny roads are all reported to have made large reductions in their working forces.

The suit of J. C. Haddock, of No. 1 Broadway, vs. the Delaware, Lackawanna & Western Railroad Company, which was to have been called at Wilkesbarre, Pa., on the 17th inst., was settled out of court. The causes which led to the litigation are as follows: The defendant had two notes of \$15,000 each against the firm of Haddock & Steel, holding as security an admiralty mortgage on a steamer and two barges. Later the company secured judgment on this collateral security. The vessels sold for \$9,000, being bought in by the company. They then proceeded against Mr. Haddock for the balance. This he paid and then asked for the return of the boats, agreeing to pay \$9,000 therefor. The company refused. The settlement, Mr. Haddock informed an ENGINEERING AND MINING JOURNAL reporter involves the payment to him by the defendant, the sum of about \$44,000, the value of the boats, less the \$9,000, and plus interest for six years at 6%.

Boston. March 19.

(From our Special Correspondent.)

The market for anthracite coal rules very quiet. Stock is offering freely with but little movement for it. The trade appears to have plenty on hand, and buy only an occasional small lot. Orders given to piece out stock constitute the entire business. Prices are easy, and in accord with the conditions of the market. The retailers have been selling coal fairly fast, but are not buying any to speak of, taking occasional small lots only to meet their immediate requirements. Stove coal is quoted at \$4.75 on the cars here, but it would not be a difficult matter to do much better than that. The meeting of the sales agents, which is announced for the 31st inst. at New York, will, it is expected, solve the situation.

The bituminous market rules firm. Agents have commenced to skirmish in earnest for contracts. Many renewals have been made, but as yet the sharp competition has not decided any of the large contracts. Prices have a fair tone, and it is doubtful if any business is done at very much better than the present figures. In most cases the full \$2.50 f. o. b. is being obtained. Spot lots command \$3.75 on cars here.

The position of freight rates has not changed in any great degree during the past week, and they may be said to be fairly steady. Vessels continue to offer in large numbers, but there is more business noted for them. From New York 70@80c. is quoted; from Philadelphia \$1, and from Baltimore \$1.10.

The demand at retail continues good, and must

be diminishing the spot here, as dealers are not buying in any great quantities.

The receipts of coal at this port for the week ending March 14th were 20,137 tons of anthracite and 20,129 tons of bituminous, against 16,141 tons of anthracite and 19,971 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 205,439 tons of anthracite and 240,159 tons of bituminous, against 160,419 tons of anthracite and 185,402 tons of bituminous for the same time last year.

Buffalo. March 19.
(From our Special Correspondent.)

The anthracite coal trade is quiet and prices without change. The bituminous coal trade is moderately active, but quotations are unsettled. The offerings are too large for the requirements of demand, and concessions are often made to save demurrage charges. Manufacturing concerns of the city are all in full work, and it takes a large quantity of fuel to run them, so that a small reduction of price helps them considerably.

Vessel owners could not agree on a plan for delaying the departure of vessels from this and other lake ports until, say, May 1st, instead of upon the clearing away of the ice. It appears that a few contracts have been made and the parties interested would not come to terms. A general rumpus followed, and "go as you please" will be the order of the day.

The New York Central Railroad Company has purchased the Rome, Watertown & Ogdensburg road. Whether this arrangement will have any effect upon the coal trade of the territory covered by the latter is yet uncertain.

Chicago. March 18.
(From our Special Correspondent.)

Coal.—Trade continues very satisfactory in this market. The steady cold weather of the past two or three weeks has had a very beneficial effect on stocks. The merchants find their stocks reducing steadily and rapidly, and indeed many of the docks show very little remaining. The anxiety exhibited a couple of weeks ago to get rid of stocks has given place to a firmer feeling. The regular monthly meeting of the Coal Exchange will be held on Friday, the 27th inst. A number of changes in the by-laws are to be proposed, and the meeting will probably be an important one.

Prices of anthracite remain unchanged, and are as follows per ton of 2,000 pounds, f. o. b. Chicago: Lehigh lump, \$6.75; large egg, \$5; small egg, range, and chestnut, \$5.25. Retail prices per ton are: Large egg, \$6.25; small egg, range, and chestnut, \$6.50.

Prices of bituminous per ton of 2,000 pounds, f. o. b. Chicago are: Pittsburg, \$3.30; Hocking Valley, \$3; Youghiogheny, \$3.40; Indiana block, \$2.40 @ \$2.60; Illinois block, \$2 @ \$2.20.

Coke continues scarce, and, while it is to be had in small lots, the supply is very unsatisfactory. Some of our consumers are beginning to feel the stringency quite severely and are anxiously looking forward to an early settlement of the strike.

Prices are: Connellsville, 72 hours, \$5.05; gas-house coke, \$4.25; crushed, \$5.

Pittsburg. March 19.
(From our Special Correspondent.)

Coal.—The local trade continues very active. The supply of natural gas is steadily diminishing, and an increasing number of mills and furnaces are compelled to return to use of coal. Miners along the Monongahela Valley now have matters altogether in their own hands, still there is very little coal being mined; the two months' idleness seems to have demoralized them. The shipments by river so far have not exceeded 1,500,000 bushels. Pittsburg coal has been advanced at Cincinnati and Louisville half a cent per bushel. With few exceptions the coal sent out is intended for the Southern market; Cincinnati and Louisville can draw their supplies from Kanawha. Prices of Pittsburg coal are: River, \$4.50 @ \$5.00 per 100 bushels; railroad, \$5.00 @ \$5.50.

Connellsville Coke.—The strike is still on, and opinions differ as to its probable continuance. Some think that it is likely to last for some time; on the other hand, parties who profess to know say the strike in southern Fayette County is nearing its end. Superintendent Martin, of the Fairchance Coke Works, will continue to operate with non-union men. Mr. Martin is paying the old wages, but he refuses to discharge his men or recognize the union in any way. The company is determined to hire or discharge whom it pleases; report says that other works are preparing to do likewise. The large operators have not yet made any move and are still insisting on a reduction of 10% from last year's scale.

The number of active ovens now reaches 900, a gain of 100 during the week. The idle ones number 15,000. W. J. Rainey's production reaches 7,675 tons, consigned as follows: Pittsburg, none; West, 165 cars; East, 125 cars. Western shipments increased 92 cars; Eastern, 12 cars.

The old prices for coke are still quoted as follows: Furnace coke, \$1.90 per net ton, on cars at oven; foundry, \$2.30; crushed, \$2.65. Freights to all parts are unchanged.

FREIGHTS.

From Philadelphia to: Boston, \$1.00; New York, \$0.90; Norfolk, 55c; Richmond, 60c; Washington, D. C., 75c.

*And discharging.
†Alongside.

METAL MARKET.

NEW YORK, Friday Evening, March 20.
Prices of silver per ounce troy.

Mar.	Sterling Exch'ge.	London Price.	N. Y. Cts.	Mar.	Sterling Exch'ge.	London Price.	N. Y. Cts.
14	4.88	45-16	98%	18	4.88 1/4	45	98%
16	4.88	45-16	99%	19	4.88 1/4	45-16	98%
17	4.88	45 1/2	98%	20	4.88 1/4	45 3-16	99

Market continues firm on fairly good orders for London shipments.

One hundred thousand ounces were shipped to Brazil during the past week.

On Wednesday's allotment there was less demand for Council Bills, so that applicants received a larger percentage.

The United States assay office at New York reports the total receipts of silver for the week to be 102,000 ounces.

The application of Messrs. Heidelbach, Ickelheimer & Co. and Lazard Freres, for \$1,000,000 in gold bars for export, was refused by the New York Assay Office, on the 18th inst., according to instructions received from the Secretary of the Treasury, through the Director of the Mint. This step was taken under a clause in the Legislative Appropriation act, passed by the last Congress, which gives the Secretary of the Treasury right to furnish gold bullion for shipment at a small premium, or refuse applications for it altogether, at his discretion. The premium charged has been 4 cents per \$100. This shipment of gold, for which bars were refused, was made in coin. Shipment of coin is, of course, more expensive than bullion, on account of loss in abrasion, and this action of the Treasury will increase the rate at which gold can be profitably exported.

Government Silver Purchases.

The Treasury Department informs us that the amount of silver purchased by the government during the past week was as follows:

March 16	Offered ounces.	Purchased ounces.	Average price.
" 16	747,000	377,000	\$94 1/2
" 18	662,000	412,000	\$93 3/8

WASHINGTON, D. C., March 13th (By Telegraph).
—The Treasury Department purchased 250,000 ounces of silver to day.

Silver Bullion Certificates.

Date	Price.		Sales.
	H.	L.	
March 14	99 1/2	99 1/2	110,000
March 16	99 1/2	99 1/2	57,000
March 17	99 1/2	99 1/2	120,000
March 18	99 1/2	99 1/2	200,000
March 19	99 1/2	99 1/2	220,000
March 20	99 1/2	99 1/2	205,000
Total sales			912,000

Foreign Bank Statements.

The governors of the Bank of England at their weekly meeting on Thursday made no change in its minimum rate for discount, which remains at 3%. In the week the bank gained £154,000 bullion, but the proportion of reserve to liabilities was lowered from 38.50% to 38.18%, against an advance from 51.03% to 51.48% in the corresponding week last year, when its discount rate was 4%. On the 19th inst. the bank lost £88,000 bullion on balance.

Domestic and Foreign Coin.

The following are the latest market quotations for American and other coin:

	Bid.	Asked.
Trade dollars	\$.76	\$.79
Mexican dollars	.77	.78 1/4
Peruvian soles and Chilean pesos	.73 1/2	.75
English silver	4.86	4.88
Five francs	.94	.95
Victoria sovereigns	4.86	4.89
Twenty francs	3.85	3.88
Twenty marks	4.74	4.78
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.80	4.85
Mexican doubloons	15.55	15.70
Mexican 20 pesos	19.50	19.90
Ten guilders	3.96	4.00
Bar silver	99	99 1/2

Copper.—The week opened rather flattish, with little disposition on the part of buyers to operate and some of the smaller Lake companies anxious to sell, and we understand that transactions took place at 13 1/2c., and in isolated cases 13 3/4c. Since then the tendency has been firmer, and it is questionable if anything can be procured below 14c. Arizona copper remains steady at about 12 1/2 @ 13 1/4c., according to brands and delivery, and pig copper, which is scarce, is firmly held for 11 1/2 @ 11 3/4c. The weakest point in the market is casting copper. All orders are eagerly competed for from the different producers, and we have to quote 11 1/2 @ 11 3/4c., but it is quite likely that 50 to 100 ton lots might even be shaded a trifle.

The London market opened considerably better on Monday last, first of all on account of the financial difficulties being settled satisfactorily and on the publication of the statistics for the first half of this month, which show, again, a decrease in the visible supplies of 2,500 tons. This, of course, is largely due to shipments from Chili being entirely suspended, but in consideration of the heavy quantities of copper which are now arriving from this side in Europe it is nevertheless a rather astonishing fact, and clearly proves that copper is in excellent demand in Europe. The market opened in London on Monday at £52 7s. 6d., afterward reeading again to £52 cash, and is closing to-day at £52 @ £52 2s. 6d. cash, and £52 2s. 6d. @ £52 5s. three months. We quote: English tough, £54 @ £54 10s.; best selected, £56 10s. @ £57; strong sheets, £62 @ £62 10s.; India sheets, £59 @ £59 10s.; yellow metal sheets, 5 1/2 d.

In our issue of March 7, by a typographical error, we were made to quote casting copper at 14 1/2 @ 14 3/4c., instead of 11 1/2 @ 11 3/4c., as it should have been. As we desire to have our weekly reports an accurate record of the fluctuations of the metal market, we take this opportunity to correct the error.

The exports of copper during the past week were as follows:

To	Copper Matte.	Lbs.	Value
By S. S. Teutonic	2,276 bags	241,939	\$16,000
" British Queen	2,976 "	3,254	22,000
" City of Chicago	7,930 "	849,021	60,200
To Liverpool	Copper		
By S. S. Teutonic	258 pigs	40,590	4,871
" Adriatic	100 casks	125,000	17,500
To Havre	Copper		
By S. S. La Gascogne	5 casks	5,986	725
To Antwerp	Copper		
By S. S. Maringo	140 casks	175,000	24,500
To Vera Cruz	Copper		
By S. S. Yucatan	80 casks	100,000	12,250
To Rotterdam	Copper		
By S. S. Obdam	90 casks	112,500	15,000
" "	508 pigs	112,048	13,000
" "	151 slabs	30,065	3,608
" "	1,095 bars	150,360	21,049

Tin.—There has been a little more business done, but at rather depressed prices, and practically at or even below the cost of import from Europe or the East. About 400 to 500 tons have changed hands from 20c. to 20 1/2c., mostly at 20 1/2c., but sellers now ask a little more. Spot tin remains in very good demand, and we hear that most of the recent arrivals are being transhipped, only a comparatively small quantity being stored. Shipments from the Straits Settlements for the first half of March are 1,200 tons to London and 475 tons to the United States, and since the 1st of January 4,415 tons to London and 2,490 tons to the United States, against 5,555 and 875 tons respectively last year.

The London market has been steady, with hardly any fluctuations, closing about the same as last week, at £90 for spot and £90 7s. 6d. for three months.

Lead.—This is decidedly firmer, and pretty large quantities have been dealt with during the week. The market has been rather strong since, with little offered. A large share of the business was done at 4 3/8c., but nothing is now obtainable below 4 1/2 @ 4 3/4c. Consumers enter the market more freely.

London remains steady at £12 7s. 6d. for Spanish and £12 10s. for English lead.

Spelter.—The firmer tendency which we reported lately has continued, and prices are 5 1/2 @ 5 15c., delivered in New York, which have been firmly maintained. Offerings have been rather light.

In London Ordinaries are quoted at £23 10s. and Specials at £23 15s.

Antimony.—This has been quiet, with only a retail business doing. We quote: Cookson's 17 1/2 @ 17 1/2; L. X., 16 1/2; Hallett's, 16.

Quicksilver.—The London market is quite weak, and values have fallen considerably during the past fortnight. The quotation of £3 of last week remains unchanged. A slight demand has developed at this figure and some sales have been made. The market here is a little firmer, with no business of any consequence doing. Dealers are holding at from \$43 @ \$44.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 20.
The past week has been marked by no new features of importance in the iron market. Almost all branches of the trade continue dull, and dealers are gradually coming to the opinion that there is no hope for improvement as long as present conditions prevail, and that, on the contrary, all indications, as we have already pointed out, are for cheaper iron before summer. The market is, at present supported by the influence of the coke strike, and the reduction in stocks and less iron offered on account of it. It is not thought, however, that this strike can be of very long duration. With the apparent necessity at the present time for all furnaces to make reduction in cost of production in order to meet pressing Southern competition, it would seem that the coke workers had chosen an inopportune time to strike.

However, its effects, whatever they are, cannot be anything but temporary, and with their re-

movable the market will undoubtedly again fall into the rut in which it has been running for the past three months, until production and consumption are more nearly balanced. That there was great over-production in this country in 1890 there can now be no question, and, although its rate has been very much less during the first two months of 1891, the effects of general business depression have been to cause an immense falling off in consumption. The only encouraging features in the market at the present time are that stocks have been considerably reduced, and that Southern furnaces are holding for slightly higher prices and are not pushing their products quite so hard.

American Pig Iron.—The market continues to be firm, although the week has been marked by no increase in orders. Dealers, however, are making no concessions. The scarcity of Southern foundry irons is still pronounced and there is very little No. 1 to be had. The best brands of Southern irons are now commanding prices equal to the Northern. We quote prices: Northern iron, No. 1 X, \$17.50@18; No. 2 X, \$16.50@17; Southern iron No. 1 X, \$17.50@18; No. 2 X, \$16.50@17.

Scotch Pig Iron.—There has been considerable inquiry for Scotch pig iron during the week, which is attributable to the fact that the production and stocks of Ohio Scotch have fallen off. Now that Scotch furnaces have gone in blast again, or can go in blast, the men having gone back on manufacturers' terms, all of the various shipping brands are obtainable. Several orders have lately been placed. There have been no arrivals during the week, but a shipment is now due. We quote: Coltness, \$24.50; Summerlee, \$23.50; Dalmeilington, \$22; Carnbroe, \$21. About 20 of the Scotch furnaces are now in blast.

Spiegeleisen and Ferro-manganese.—The market cannot be called otherwise than dull, although there have been some what more transactions than in the previous week. The price of ferro-manganese abroad has risen 10 shillings. We quote prices, nominally: 20% spiegeleisen, \$28.50@29; 80% ferro-manganese, \$63.50@64.50, although sales of some small lots have been noted at slightly lower figures.

Steel Rails.—Rolling mills are holding steel rails firmly at \$30, and it is quite certain that this price cannot be shaded, reports to the contrary notwithstanding. The market has been very dull, and no transactions of any consequence are reported.

Rail Fastenings.—There is nothing doing. We quote prices unchanged from last week, as follows: Spikes, 2c.; angle plates, 170@180c.; bolts and square nuts, 265c.; hexagonal nuts, 285c.; complete joint, iron and steel, according to weight.

Tubes and Pipe.—Business is reported to be fair and showing a slight improvement over last week. We quote discounts on carload lots as follows: 47½% on butt, black; 40% on galvanized; 60% on lap, black; 47½% on lap, galvanized; boiler tubes: 50% on all sizes; casing, all sizes, 50%.

Structural Iron and Steel.—The market is showing some improvement, which is to be expected at this season of the year, but it is, nevertheless, still dull. We quote prices as follows: Universal plates, \$2.20; bridge plates, \$2.15; angles, \$2.20; beams, \$3.10.

Merchant Steel.—Business continues to be quite satisfactory. Prices, although no higher, are firm. We quote: Best English tool, 15c. net; American tool steel, 7@8c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3½c.; open-hearth machinery, 260c.; open-hearth spring, 260c.; tire steel, 260c.; toe calks, 260c.; flat file, 4½c.; mill file, 4½c.; taper file, 7c.; first quality sheet, 10c.; second quality sheet, 8c.

Old Rails.—Old rails are dull. We quote \$22@23 for tees and \$25 for doubles.

Wrought Iron Scrap.—The market is quite lifeless. We quote from \$21@22 at yards.

Chicago. March 18.

(From our Special Correspondent.)

The iron market continues rather inactive this week, and trade has fallen off considerably. It is supposed to be only temporary, however, and a few warm days would probably start business again, especially in the store trade. City orders are in very satisfactory numbers, but country business is slow. The railroad trade is flat.

Pig Iron.—But little business is reported. Prices are being maintained. Consumers generally seem unwilling to pay the advanced figures at which the coke furnaces, both Northern and Southern, are holding their irons. Furnaces, on the other hand, are very independent, declining for the most part to make contracts for long or scattered deliveries. Lake Superior charcoal irons show no changes in prices and continue very quiet. Furnace owners are inclined to believe the present coke trouble will last for some time yet, in which case the prices of coke irons are sure to be further advanced, while consumers seem to think that the bubble will soon be settled, in which case the existing prices cannot long be maintained. Prices gross ton f. o. b. Chicago remain unchanged at: Lake Superior charcoal, \$18@18.50; Lake Superior coke, No. 1, \$16; No. 2, \$15.50; No. 3, \$15; Lake Superior Bessemer, \$17; Lake Superior Scotch, \$17; American Scotch, \$18.50@19; Southern coke,

Foundry No. 1, \$16.25; No. 2, \$15.75; No. 3, \$15.25; Southern coke, soft, No. 1, \$15.75; No. 2, \$14.75; Ohio silveries, No. 1, \$18; No. 2, \$17; Ohio strong softeners, No. 1, \$18.25; No. 2, \$17.50; Tennessee Charcoal, No. 1, \$18; No. 2, \$17.50; Southern Standard Car Wheel, \$21@23.

Structural Iron.—Trade continues remarkably good, and dealers are showing no inclination to close many large contracts, desiring rather to take some chances on the future. Better prices are being looked forward to. Prices for car lots f. o. b. Chicago are: Angles, \$2.25@2.35; tees, \$2.75@2.85; universal plates, \$2.40@2.50; sheared plates, \$2.40@2.50; beams and channels, \$3.20.

Plates.—These are rather dull and inactive, but little business being reported. A few small orders have been received. The outlook, however, seems to be good. Prices are: Steel sheets, 10 to 14, \$2.70@2.80; iron sheets, 10 to 14, \$2.60@2.80; tank iron or steel, \$2.50@2.70; shell iron or steel, \$3.20@3.40; firebox steel, \$4.50@5.75; flange steel, \$3.25@3.40; boiler rivets, \$4.10@4.25.

Merchant Steel.—Trade has been quiet in all branches, and but little business done. Prices remain unchanged at: Tool steel, \$6.75@7; tire steel, \$2.40@2.60; toe calk, \$2.60@2.75; Bessemer machinery, \$2.20@2.30; open-hearth machinery, \$2.60@2.75; open-hearth spring, \$2.75@3; crucible spring, \$3.75@4.

Steel Rails.—A few small orders for repair work is about all that has been done in steel rails. Some good inquiries are in offices, however, although nothing has been closed. Prices are firm at \$31.50@32.50 per ton f. o. b. Chicago. Splice bars remain at \$1.95@2, and spikes at \$2@2.10 per hundred pounds.

Galvanized Sheet Iron.—Trade has fallen off considerably in store orders and inquiries and orders are not numerous. The mills report that they are still back on their orders and are well satisfied to have trade slacken up a little and give them a chance to catch up. Some large dealers are very much inconvenienced by the delays in the receipt of their orders. Discounts remain unchanged at 67% off on Juniata and 65% and 5% off on charcoal. Jobbing lots are quoted according to quantity.

Black Sheet Iron.—Black sheets show no material improvement. Some of the large trunk manufacturers are buying, but the supply is more than equal to the demand. Prices are: \$2.90@3 for No. 27 f. o. b. Chicago.

Bar Iron.—Business is quiet and unsatisfactory. Orders from store are in fair number, but small. The mills have been booked but few orders. Prices remain unchanged. Local mills quote \$1.70@1.80, half extra f. o. b. Chicago, and Valley mills, \$1.60@1.65 f. o. b. mills.

Nails.—Nails have fallen off very much and are looking weaker. The activity of last week was short-lived and little or no business is reported. Quotations are: Steel wire nails at \$2.20@2.30; steel cut nails, \$1.75@1.85 car loads f. o. b. Chicago.

Tubes.—Tubes are very quiet and no change is to be noted. Discounts are: Two inches and larger, 50%; and 45% for inch and three-quarters and smaller.

Scrap.—The scrap market shows a little more firmness this week, and trade has picked up a little. Sales, however, are not up to the standard in size or number, and the disposition to sell is still stronger than the buying feeling. The cheaper grades may be said to be in a little better demand than the higher-priced materials. Quotations per net ton f. o. b. Chicago are: No. 1 railroad, \$19.50@20; No. 1 forge, \$19; No. 1 mill, \$14.50; fish-plates, \$21.50; axles, \$24.50; horse shoes, \$18.50@19; pipes and flues, \$13@13.50; cast borings, \$8@8.50; wrought turnings, \$11; axle turnings, \$13; machinery castings, \$12; stove plates, \$8; mixed steel, \$11.25; coil steel, \$15.50; leaf steel, \$16.25; tires, \$8@17.50.

Old Rails and Wheels.—These show no change, and the market continues dull. Prices are: Old steel rails, long lengths, \$19; short lengths, \$14.50@15; old iron rails, \$23; old wheels, \$17.

Cleveland. March 18.

(From our Special Correspondent.)

No further iron-ore transactions have been reported in this market since last week. The prices of the few sales named in my last letter are now definitely ascertained to have been \$4.50 for Norrie and \$4.75 for Ashland and Aurora. It is doubtful, however, if the Ashland and Aurora can, in the future, maintain this difference in price, as compared with the Norrie. The Republic Iron Company has made a few sales of its best "fix" ore at \$5.50.

The ore men are endeavoring to get the railroads to reduce the cost of hauling ore from the mines to the lakes, but as yet have been unsuccessful. The blast-furnace men talk a great deal about the necessity of ores being lowered in price, so as to enable them to compete with Southern iron. The ore men fully realize the fact that the prosperity of the Northern furnace men is intimately connected with their own welfare, but are unwilling to bear alone the burden of this competition with the Southern iron.

I was shown a letter the other day, written by an ore man to a prominent pig-iron maker in Chicago, which touched upon the above point, and was in reply to the opinion expressed by the latter that ores should be sold at a certain figure in order

to enable them to make cheap enough iron. The ore man showed conclusively that his material could not be sold lower than the price he had quoted, and that it was unreasonable to expect him to bear the whole burden of the fight. The statement he made out showed that if the ore should be bought at the price at which it was offered, all ore iron of the very best foundry quality could be made from it in Chicago at a cost of not to exceed \$12 a ton.

In order to do this, however, reductions would also be necessary in the cost of transportation, and in the price of other raw material, for example: Railroad freight from the mine to lake port instead of 70c. should be 50c.; lake freight from Escanaba to Chicago should be 50c.; coke at the oven should be not over \$1.50; freight on coke to Chicago not over \$2.50. At these prices a fair profit would be assured for all parties, and iron could be made in Chicago at not to exceed \$12 a ton, and possibly less.

Quotations, unchanged from last week, are as follows:

Specular and Magnetic Ores.

Bessemer.....	66@69.....	\$5.50@6.25
".....	60@64.....	4.25@ 5.25
Non-Bessemer.....	66@69.....	4.75@ 5.25
".....	62@65.....	4.00@ 4.75
".....	57@60.....	3.75@ 4.00

Soft Hematites Dried at 212°

Bessemer.....	62@65.....	\$4.50@4.75
".....	58@61.....	4.00@ 4.25
Non-Bessemer.....	55@63.....	3.50@ 4.25

Above prices are for deliveries on docks at Lake Erie ports.

Louisville. March 14.

(Special Report by Hall Bros. & Co.)

The market remains unchanged, and is very unsettled. There have been some medium orders placed at full figures, but as a whole a quiet market prevails at current figures. We quote:

Hot Blast Foundry Irons.—Southern coke, No. 1, \$14.25@14.50; No. 2, \$13.75@14; No. 3, \$13.25@13.50. Southern charcoal, No. 1, \$16.50@17; No. 2, \$16@16.50. Missouri charcoal, No. 1, \$17.50@18; No. 2, \$17@17.50.

Forge Irons.—Neutral coke, \$12.50@13; cold short, \$12.50@13; mottled, \$12@12.25.

Car Wheel and Malleable Irons.—Southern, standard brands, \$21@22; other brands, \$17.50@18. Lake Superior, \$21.50@22.50.

Philadelphia. March 19.

(From our Special Correspondent.)

Pig Iron.—Brokers complain of the difficulty and well nigh impossibility, this week, of catching large orders for either forge or foundry iron. The fault, if there is any fault, perhaps is due to makers, and brokers representing makers, who decline to yield a single fraction. Standard and special brands are held quite firmly. Several round lots of No. 1 foundry have been contracted for this week at \$18 and at \$17 for No. 2. Of course a good deal of No. 1 and No. 2 can be had at 50c. below those figures. Forge iron is not very strong at \$14.50 to \$15, but it is held between those figures. The mills are not running to full capacity, by any means. One or two lots of cinder iron are booked at \$14.

Muck Bars.—Quotations must be repeated at \$26.50@27. Several sales have been made during the week. The market is devoid of any special feature.

Foreign Material.—Brokers are quoting \$29 for spiegeleisen and \$62 for ferromanganese.

Steel Billets.—Quotations are \$23@29. Prices are quite firm, and manufacturers regard the future as very favorable.

Bar Iron.—Prices are \$1.75 to \$1.85 for best. There is a probability of some mills reducing their output or coming to single turn. One mill is shut down for the present; there is not much prospect for improvement.

Skelp Iron.—Grooved is \$1.75 and sheared \$1.85.

Wrought Iron Pipe.—A shading and cutting is going on in negotiations for large orders, but even with all this, business placed this week has been insignificant.

Sheet Iron.—Best refined is quoted at from \$3 to \$3.50, according to gauge. Prices are in favor of buyers.

Plate and Tank Iron.—There has been no nullification of prices. Some new business is coming in, but not enough to assure manufacturers that they will be kept busy even at making their present output. At least this is the report given today. It is not quite so bad, however, as there is an assurance that a great deal of new work will be placed before long. Bridge plates are 2c. for iron, and 2½c. for steel.

Structural Material.—Angles are \$2.10; tees, \$2.50; beams and channels, \$3.10. Very little additional business has been placed, but there is every assurance that large orders will be before existing orders are worked off.

Old Rails.—A few small lots are selling on a basis of \$23.

Steel Rails.—Quotations are \$30, but there is some doubt as to what bottom prices are, at least buyers say there is, a hint at transactions having been made at \$29, though this fact is positively denied by those whose business it is to know.

Scrap.—All kinds of scrap have been shaded a little this week, excepting Railroad No. 1.

Pittsburg. March 19.

(From our Special Correspondent.)

Raw Iron and Steel.—Trade has not been very active during the week; buyers, generally, either purchase sparingly or are holding off, at least for a time. Generally speaking, there seems to be a want of confidence on all sides. The unsettled condition of the labor question tends to make dealers cautious.

The stock of iron in first hands is being steadily reduced. At the moment, while the outlook is by no means encouraging, there is nothing burdensome, such, for instance, as high-priced stocks. The trade is certainly in first-class condition to respond to favorable developments, and is equally well protected against anything of an opposite character. It would not take much to start a very active buying movement, as most dealers believe that present prices are safe prices and makers are still encouraging that kind of business. They are willing to protect their customers within moderate limits, but are not entering speculative orders. Neither is there any good reason for believing that prices are likely to go materially higher than they are at present.

Bessemer is weaker, with reputed sales below last week's. Grey Forge may be said to hold its own, particularly for standard and favorite brands; inferior lots are weak and sell at various prices. Muck bar holds its own, but the demand is not very active. Prices of billets and slabs are fairly maintained; demand is only moderate.

Charcoal iron shows no change in values; sales restricted. Ferro-manganese shows a slight decline. Steel wire rods, April delivery, can be obtained a shade below last week's prices. Skelp iron betrays a weaker feeling. Scrap material has undergone no quotable change. Iron men from the Shenango and Mahoning Valley report all descriptions of iron scarce and prices ruling higher than in Pittsburg.

Coke Smelted Lake and Native Ores.

1,500 Tons Grey Forge	\$15.00 cash.
1,500 Tons Bessemer	14.75 cash.
1,500 Tons Bessemer, March, April	16.75 cash.
1,000 Tons Grey Forge, March, April	16.50 cash.
1,000 Tons Bessemer, Wheeling, Delivery	15.00 cash.
1,000 Tons Bessemer, City Furnace	16.50 cash.
500 Tons Bessemer, City Furnace	17.00 cash.
500 Tons Grey Forge, Valley Furnace	14.55 cash.
500 Tons Grey Forge, all ore	16.00 cash.
500 Tons Grey Forge, Wheeling	15.25 cash.
500 Tons Grey Forge, Youngstown	15.00 cash.
500 Tons Grey Forge	14.75 cash.
500 Tons Off Bessemer	15.80 cash.
100 Tons Silvery	16.00 cash.
100 Tons Mottled and White	14.25 cash.
100 Tons Grey Forge	15.00 cash.
100 Tons No. 2 Foundry	16.00 cash.

Charcoal.

250 Tons Mill Iron, Southern	17.50 cash.
250 Tons No. 2 Foundry	22.00 cash.
100 Tons Cold Blast	26.00 cash.

Steel Slabs and Billets.

500 Tons Steel Billets	26 25 cash.
500 Tons Blooms and Slabs	26.00 cash.
100 Tons Steel Slabs	26.25 cash.
100 Tons Steel Billets	26.25 cash.
100 Tons Steel Slabs	26.25 cash.

Muck Bar.

70 Tons Neutral, April, May	27 60 cash.
500 Tons Neutral, March, April	27.50 cash.

Steel Wire Rods.

500 Tons American five, April	38.50 cash.
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Ferro-Manganese.

60 Tons 80%, Seaboard	60.25 cash.
45 Tons 80%, Baltimore	65.00 cash.

Skelp Iron.

500 Tons Sheared Iron	1.90 4 m.
200 Tons Wide Grooved	1.72 1/4 4 m.
180 Tons Narrow Grooved	1.70 4 m.

Bloom and Beam Ends.

600 Tons Bloom and Beam Ends	17.50 cash.
500 Tons Bloom and Billet Ends	18.00 cash.
250 Tons Rail Ends	18.00 cash.

Old Iron and Steel Rails.

500 Tons American T's	25.00 cash.
500 Tons American T's	25.25 cash.
500 Tons Old Steel Rails	18.00 cash.

Scrap Material.

200 Tons No. 1 W Scrap, Net	21.00 cash.
200 Tons Cast Borings, Net	11.00 cash.
250 Tons Leaf Steel, Gross	21.50 cash.

CHEMICALS AND MINERALS.

New York, Friday Evening, March 20.

The reluctance of buyers, commented upon in our report of last week, continues the dominant feature of the market, and leaves the stocks in New York rather larger than they have been in some time. It is confidently expected by dealers, however, that a radical change will result in the near future. No reliable estimate of stocks held by consumers (which is, of course, always more or less a matter of conjecture), can be formed, particularly in this case, where they all seem desirous of leaving dealers in doubt on the subject. The position of caustic soda grows steadily stronger notwithstanding influences to the contrary, and it would not be very surprising if some of the consumers, who have been holding back in the anticipation of a decline, would have to come into the market and accede to sellers' demands. We know of several out of town manufacturers who have placed orders regardless of figures at the market price and while the movement is by no means general, indications are that others will do the same shortly.

Fertilizers, in general, are meeting with a most satisfactory demand, and continued inquiry gives promise of further business. Nitrate of soda, while showing no great advance from our figures

of last week, is held very high, and business is active. Brimstone does not seem to have yet reached the high-water mark. As much as circumstances will allow it is changing hands, and the demand may fairly be said to be ahead of the supply; we look for a further rise. There is not much to be reported on the way.

Caustic Soda, 60%.—Notwithstanding liberal arrivals, the market is much higher, under cable dispatches reporting a decided advance abroad. A large part of that which came in was on contract, but the rest still remains on the market. Very little is doing; spot is held firmly at 3.50c., and sales of some size have been made for April-May shipment at 3.40@3.42 1/2c. Business could not be done, probably, below this, as everything is said to be very firm on the other side, and the market here has now become so. Without this difference in foreign figures the contrary would, doubtless, be the case. 74%.—Arrivals have continued to come in freely, and while buyers during the early part of the week were indisposed to pay what was demanded, but very few concessions have been made to them. This grade is held at 3.07 1/2c. for spot, with some small sales at lower figures. Business in the aggregate has not been large. April-May shipments could not be bought at much below 3.10c. 70%.—Stocks have been added to, but the demand has been almost nil. We quote 3.07 1/2c. 77%.—Quite a large shipment came in during the week, but as most of that which arrived had been previously contracted for, this market, in sympathy with the rest, closes rather firmer than a week ago. We quote 3.10@3.12 1/2c. Fair inquiry is noted, and some business has been done for future shipments.

Alkali, 48%.—Arrivals have been extensive and the demand has not shown any signs of increasing. As a consequence values are a little lower than at the time of our last report. The usual quota of arrivals was on contract, and went immediately into second hands, but the stocks remaining are said to be large. We quote 1.52 1/2@1.55c. Not much inquiry nor business for future shipments is noted. 58%.—This is selling at about 1.50c. The demand is not very large, and stocks here have been added to during the week. Some sales of shipments near by have been below this figure.

Caustic Soda Ash, 48%.—The stagnation of business previously noted in this line continues. There have been no arrivals to our knowledge. Stocks are small and the demand has been small also.

Carbonated Soda Ash, 48%.—Very little has arrived during the week. The demand has not been quite so active as heretofore, and business mostly of a jobbing nature is reported. Some contracts have been made for shipments and near by at from 1.57 1/2@1.62 1/2c. High test has come in rather more freely, and seems to have met with a good demand. Business for shipments has been done in a small way. We quote 1.55c.@1.60c.

Sal Soda.—Arrivals have been quite large, and as the stock already here was not small, the market is weaker than it was last week. Buyers have been making efforts to purchase at below 1.05c., but very little business has resulted. At this writing the market is a little firmer than it was earlier in the week. We quote 1.05@1.07 1/2c. Some inquiry for shipments has resulted in orders at 1.07 1/2@1.12 1/2c.

Bleaching Powder.—This has experienced a rise in value, although not much business has been reported. The greater demands of the Alkali Union doubtless constitutes an important factor in this increase. Arrivals have not been large, and some business for shipments has been done at 1.70@1.75c., at which figures for both spot and to arrive the market closes.

Acids.—While our quotations of last week have been the basis for a good deal of business, no further rise in values is yet spoken of. If, however, raw materials continue at present figures for any length of time it is most probable that manufacturers will have to increase their demands accordingly. Consumers well recognize the possibility of such a contingency, and contracts for some time ahead have therefore been placed quite liberally. Nitrate and muriatic acids have changed hands freely at our last quotations. We quote acid per 100 pounds in New York and vicinity: Acetic, \$1.55 @ \$2; muriatic, 18", 80c.@\$1; muriatic, 20", 90c.@ \$1.10; muriatic, 22", \$1@1.20; nitric, 40", could probably not be touched for less than \$4, and from that upwards, according to quantity, etc. This is at present a very important feature in the acid business. Nitric, 42", \$4.50@5; sulphuric, 60", 95c.@1.15; sulphuric, 66", \$1.12 1/2@1.175.

Fertilizers.—Business continues to be most satisfactory. The demand is said to be exceptionally good, frequent inquiry resulting in large sales. North Carolina phosphate rock, if anything, is a little firmer than it has been, with an indication of a possible rise. We quote f.o.b. Charleston, \$7.25@7.50; freights by sail from Charleston to New York, \$1.75@1.90. Ground rock is quoted at from \$8@11.50 per ton.

Sulphate of ammonia has come in quite freely but as values abroad have increased and the demand here has been good throughout the week, the market is very firm, ruling higher than it did a week ago. There is very little available for spot delivery. We quote 3.25c. for gas liquor, spot, and the same for April-May shipments. Bone goods have met with a very satisfactory demand and the

market at present is quite bare. We quote 3.15@3.20c. Contracts for future delivery have been quite extensively made. Low-grade blood has sold freely at \$1.90, with high grade about 10c. higher. Bone black is changing hands at \$19, while our last quotations hold good for potash salts and tankage, with a general good business.

Nitrate of Soda.—This article continues to be the speculative feature of the market. We quote 2.30c. for January sailing, and 2.27c.@2.30c. for spot, with extensive sales made at these figures. According to late mail advices from Chili the insurgents entirely control the district of Tarapaca. A heavy duty has been placed by them on all exports, and the government at Santiago has decreed that any officials shipping nitrate during the occupancy of the insurgents will be compelled to pay the duties again, and the establishments making such shipments will be liable to confiscation by the government. The regular export duty is said to be over \$1 in gold per 100 pounds, and as a second imposition of such a tax would mean ruin to a great many firms, it is not probable that much will be shipped until the trouble is fairly well settled one way or the other.

Brimstone.—Another increase of \$2 per ton is noted. The demand continues strong, and whatever comes in is almost immediately absorbed by the market. Arrivals have only been sufficient to partly fill wants. Best unmixed seconds are held at \$37. Due by steamer, \$36.50; future shipments, \$35. The stock of thirds is almost nil, and for shipment sales are easily made at \$34.

Muriate of Potash.—The arrivals during the week amounted to about 400 tons, and were nearly if not quite absorbed by trade. The stock in first hands is therefore almost nothing, but sales from second hands are said to have been made at a little below syndicate quotations. A fair jobbing demand is a prominent feature of the market. Shipments nearby are quite extensive, so that, if anything, this market is a little weaker than it has been. We quote \$1.82 1/2 for New York; \$1.85 for Philadelphia and Baltimore; \$1.87 1/2 for Southern ports, and \$1.90 for Gulf ports.

Liverpool. March 11.

(Special Correspondence by J. P. Brunner & Co.)
The Alkali Company have decided to alter the terms for soda ash, bleach and caustic soda, and are now quoting these articles net cash, no discount. It quotes net prices for these articles as follows: Carbonated ash, 48%, £5 7s. 6d. per ton; 58% £6 20s.

Caustic Ash, 48%, £5 2s. 6d.; 58%, £6 4s. These are minimum quotations, and special brands are held for a premium on these figures.

Caustic Soda, 60%, £9 15s.; 70%, £11; 74%, £12; 76%, £12 12s. 6d. per ton and upwards. For lines of 500 tons and for contracts extending over six months, or to the end of the year, 5s. per ton less money would be accepted on above quotations.

Bleaching powder, £7 per ton.
All the above quotations are net cash, no discount.

These prices show a slight advance on old terms, while in the case of bleach, although discount has been knocked off, price is unaltered, which means an advance of 3s. 6d. per ton on late quotations.

Soda Crystals.—We quote £3 7s. 6d. to £3 10s. per ton, less 2 1/2%, no alteration having been made in the terms for this article.

Chlorate of Potash is still quoted at 5 1/2d. per pound, less 5%, terms of this article being also unaltered. The position is very unsettled at present, and there is not much actual business going; at the same time the only article offering in second hands is caustic soda, which is obtainable at 2s. 6d. under union prices.

Bicarbonate of Soda in fair demand at £7 per ton and upwards for one hundredweight kegs, according to brand and quantity with usual allowances for larger packages. No change has been made in the terms for this article, which is still subject to 2 1/2% discount.

Sulphate of Ammonia has advanced in sympathy with nitrate of soda, and £11 2s. 6d. per ton is lowest price for good gray 24" in single bags, f.o.b. here and £11 10s. to £11 12s. 6d. per ton for 25" in double bags f.o.b. Liverpool.

BUILDING MATERIAL MARKET.

New York, Friday Evening, March 20.

The most prominent feature of this market is the large stock carried by almost all dealers, and of course prices suffer accordingly. No new activity has developed during the week, and the usual demand has easily been filled without making inroads into the quantities of materials here. Arrivals of brick have been partially stopped by some accident to the barges up river, but the relief is only of the most temporary character.

Bricks.—Pale and Jerseys have come in quite freely and dealers are well stocked. The demand is small. We quote Haverstraw, \$5@5.75 per M.; pale, \$2.25@2.75, and Jerseys, \$4@4.75.

Lime.—The supply is not very large and the demand is fair, so that dealers do not feel quite so discouraged. The arrivals have been small, and it is the intention to further restrict them. Some of the kilns which had been started have been put out again; as a consequence the tone of the market is quite healthy. Very little is doing in up-river limes. We quote for Rockland common, 90c.; finishing, \$1.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Main table with columns for Name and Location of Company, Capital Stock, Shares (No., Par), Assessments (Total levied, Date and amount of last), Dividends (Total paid, Date & amount of last), and Name and Location of Company, Capital Stock, Shares (No., Par), Assessments (Total levied, Date and amount of last).

G. Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. † This company, as the Western, up to December 10th, 1891, paid \$1,400,000. ‡ Non-assessable for three years. § The Deadwood previously paid \$275,000 in eleven dividends, and the Terra \$75,000. Previous to the consolidation in August, 1884, the California had paid \$31,330.00 in dividends, and the Con. Virginia 40,000.00. ¶ Previous to the consolidation of the Copper Queen with the Atlanta, August, 1885, the Copper Queen had paid \$1,350,000 in dividends.

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

Main table of New York Mining Stocks Quotations, divided into Dividend-paying and Non-dividend-paying mines. Columns include Name and Location of Company, dates from March 14 to March 20, and Sales figures.

*Ex dividend. †Dealt at in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 17,397. Non-dividend shares sold, 181,357. Total New York, 198,754.

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations, listing company names, dates from March 13 to March 19, and sales figures.

* Ex-dividend. Boston: Dividend shares sold, 5,236. Non-dividend shares sold, 8,379. Total Boston, 13,615.

COAL STOCKS.

Table of Coal Stocks, listing company names, par value of shares, and prices from March 14 to March 20, along with sales figures.

**Sales in New York, 14,865; in Philadelphia, 25,920. Total in Eng, 79,308.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations, listing company names and closing quotations from March 13 to March 19.

STOCK MARKET QUOTATIONS.

Baltimore, Md.

Table with columns: COMPANY, Bid, Asked. Lists various coal and tunneling companies like Atlantic Coal, Balt. & N. C., Big Vein Coal, etc.

Birmingham, Ala. March 18.

Table with columns: COMPANY, Bid, Asked. Lists various Alabama companies like Ala. Coal & I. Co., Ala. Conn. C. & C. Co., etc.

Pittsburg, Pa. March 19.

Table with columns: COMPANY, B. A. Closing. Lists various Pennsylvania companies like Allegheny Gas Co., Bridgewater Gas Co., etc.

St. Louis. March 18.

Table with columns: COMPANY, Bid, Asked. Lists various Missouri companies like Adams, Colo., American & Nettie, etc.

Table listing various goods and prices: Old Colony, Pat Murphy, Puzzle, Richmond Hill, etc.

Trust Stocks. March 20.

Table listing trust stocks and their prices: Am. Cotton Oil Com., Sugar Refineries, etc.

Trust Receipts.

Table listing trust receipts and sales at the New York Stock Exchange: American Cotton Oil, National Lead, etc.

Foreign Quotations.

Table listing foreign quotations for London and Paris: Almada, Mex., Amador, Cal., etc.

Paris. March 6.

Table listing Paris market prices: Belmez, Spain, Callao, Venez., etc.

CURRENT PRICES.

Table listing current prices for chemicals and minerals: Acid-Acetic, Muriatic, Nitric, etc.

Ammoniates-Azotine.

Table listing ammoniates and azotine prices: Blood, dried, red, unit, west, etc.

Acid phosphate, 14% per unit.

Table listing acid phosphate and other mineral prices: Arsenic-White, powdered, etc.

Barium-Nitrate.

Table listing barium nitrate and other mineral prices: Barites-Sulph., Am. prime white, etc.

Bromine.

Table listing bromine and other mineral prices: Bromine, etc.

Chalk.

Table listing chalk and other mineral prices: Chalk, etc.

China Clay-English.

Table listing china clay and other mineral prices: China Clay-English, etc.

Chromes.

Table listing chrome and other mineral prices: Chrome Yellow, etc.

Cobalt-Oxide.

Table listing cobalt oxide and other mineral prices: Cobalt-Oxide, etc.

Copper-Sulph.

Table listing copper sulphate and other mineral prices: Copper-Sulph., etc.

Copperas-Common.

Table listing copperas and other mineral prices: Copperas-Common, etc.

Best, 100 lbs.

Table listing best quality minerals and other prices: Best, 100 lbs., etc.

Litharge-Powdered.

Table listing litharge and other mineral prices: Litharge-Powdered, etc.

Manganese-Crude.

Table listing manganese and other mineral prices: Manganese-Crude, etc.

Salt-Liverpool.

Table listing salt and other mineral prices: Salt-Liverpool, etc.

Soda-Carb.

Table listing soda and other mineral prices: Soda-Carb., etc.

Stannate.

Table listing stannate and other mineral prices: Stannate, etc.

Sulphur-Roll.

Table listing sulphur and other mineral prices: Sulphur-Roll, etc.

Sylvinit.

Table listing sylvinit and other mineral prices: Sylvinit, etc.

Terra Alba-French.

Table listing terra alba and other mineral prices: Terra Alba-French, etc.

Tin-Crystals.

Table listing tin crystals and other mineral prices: Tin-Crystals, etc.

Vermillion-American.

Table listing vermilion and other mineral prices: Vermillion-American, etc.

Vitriol-Blue.

Table listing vitriol and other mineral prices: Vitriol-Blue, etc.

Zinc Oxide-Am. Dry.

Table listing zinc oxide and other mineral prices: Zinc Oxide-Am. Dry, etc.

Aluminum-Metallic.

Table listing aluminum and other mineral prices: Aluminum-Metallic, etc.

Arsenic-Metallic.

Table listing arsenic and other mineral prices: Arsenic-Metallic, etc.

Barium-Metallic.

Table listing barium and other mineral prices: Barium-Metallic, etc.

Bismuth-Metallic.

Table listing bismuth and other mineral prices: Bismuth-Metallic, etc.

Cadmium-Metallic.

Table listing cadmium and other mineral prices: Cadmium-Metallic, etc.