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VICTORY OVER THE COMSTOCK MILL RING.

It is with the utmost satisfaction that we are able to announce the greatest victory that legitimate mining has ever obtained in this country over the thieves who are its worst enemies.

Judge Hibbard yesterday handed down his decision in this suit. After reviewing the case, Judge HIBBARD announced his findings as follows:

"I find the total amount of damages caused to the Hale & Norcross Silver Mining Company and its stockholders, by reason of the unlawful conspiracy of the defendants, to be \$1,011,835.

"I find that the defendants, ALVINZA HAYWARD, W. S. HOBART, the Nevada Mill and Mining Company, and H. M. LEVY were members of the conspiracy during all of the time covered by the complaint, and they are all and each indebted to the full amount."

The judge then names 10 directors who are liable for different amounts, reckoned by tons of ore taken out during their incumbency.

The judge decrees that the charge of conspiracy was fully substantiated. He therefore ordered that the Hale & Norcross Company recover for its stockholders the amount of judgment, and that Fox get his pro-rata with costs, and that a receiver be appointed to collect judgment.

Every material allegation of the plaintiff was sustained. This courageous and upright judge has by his decision broken the infamous Comstock ring, for it will never again be able to swindle stockholders to the extent and in the unblushing manner which has characterized its past history.

The Nevada Mill and Mining Company which defrauded the Hale & Norcross stockholders is the chief member of the Comstock mill ring. On February 20th we gave in these pages the following list of the owners of this mill:

- U. S. Senator JOHN P. JONES owns 1-5th interest. W. S. HOBART 1 5th interest. ALVINZA HAYWARD 1-5th interest. SAMUEL JONES (brother of Senator Jones) 1/4th interest. EVAN WILLIAMS, 1/4th interest. A. C. HAMILTON 1/4th interest. Unknown, 1-40th interest.

The Comstock Milling Company, which has done a like service for the still patient stockholders of the Consolidated California & Virginia Company, are United States Senator JOHN P. JONES, JOHN W. MACKEY and JAMES L. FLOOD. The only reason Senator JONES was not specifically included in the indictment and verdict in the Hale & Norcross case is that he carefully kept out of reach of the Court.

As we are advised, the Nevada Mill and Mining Company is to be allowed only the actual cost of milling, and as a receiver is to be appointed (let us hope by Judge HIBBARD's court) to collect the judgment, there is a fair prospect of a dividend for Hale & Norcross stockholders, for the evidence in the case was so conclusive it is improbable that any appeal can reverse this discussion.

THE SITUATION IN THE COPPER TRADE.

The copper market has for some time past been affected by the prospects, favorable or unfavorable, of getting the European producers to join in restricting production. It is very evident that many of our American mines are able to greatly increase their output; the Anaconda, indeed, is said to be able to reach 12,000,000 pounds of copper a month, if Mr. HAGGIN were so disposed, and provided no "accidents" should occur.

The actual cost of production, which few even of the producers appear to measure accurately, we have shown by an analysis of the accounts of the principal mines to be far greater than is generally supposed, so that at the low prices which have prevailed the companies simply give away their copper. The stockholders ultimately find that instead of valuable property they possess a lot of worthless and more or less fictitious

"assets," which, by an imaginative though highly popular system of bookkeeping, go on increasing as the property becomes less valuable, and finally reach a maximum as the company goes into bankruptcy. Some of the European copper companies offer striking, though not the only, examples of this method of manufacturing fictitious assets and of "making believe" that the cost of producing the metal is far below what the final outcome shows it to have been.

It would seem to be but a simple matter for producers to unite in limiting their output to the requirements of the market under a moderate price and one that would leave a profit to the producers capable of supplying the demand. It is not now necessary to point out that these are the very rocks on which all combinations are wrecked, namely, to determine which are the producers capable of supplying the markets, and at what price they can afford to run, and how far it is wise for one producer to stop when the market becomes unprofitable and allow his rival, by supplying the market, even at a loss, to build up his output, and thereby to reduce his cost to a point where he can permanently lower the market price. It finally always comes down to the inevitable "struggle for existence and the survival of the fittest," though the painful extinction of the less fit may be, and often is, postponed, by the assistance and moderation of the strong.

We learn from the highest authority that the European copper companies, notwithstanding their traditional jealousies, have agreed upon a satisfactory basis of capacity, which practically amounts in the aggregate to the output of last year, and have, with a single exception, agreed to make a reduction of five per cent. in output from this basis. The one company which has not yet joined in this is the Tharsis, and it will probably do so next week, when the question will be submitted to a meeting of its stockholders.

As already announced in these pages some of our American companies have agreed to restrict output in a much larger proportion, the Calumet & Hecla, it is said, restricting to 60,000,000 pounds, and the Anaconda to 70,000,000 pounds, and some others to a less degree, so that the total output for the year will but little exceed 300,000,000 pounds, and the exports cannot therefore exceed 40,000 tons of 2,240 pounds. Unquestionably such a restriction would strengthen the market and would enable the copper producers to earn a profit. Since the price of copper is not to be strictly regulated the market will be free and subject only to the influences of supply and demand. Consumption in this country continues very active.

#### STEAM ENGINEERING OF ELECTRIC LIGHTING PLANTS.

It has frequently been said that electrical engineering is nine-tenths mechanical and one-tenth electrical. The approximate truth of this statement is now becoming evident in the construction of the most recent "central station" plants for the electric lighting of large cities. The difficulty of making these decisions and of completing the general design of the plant is enhanced by the fact that the mechanical engineering of electric lighting plants is now in a transition state, and there is scarcely a plant in existence which can be safely taken as a model for new designs. In the electrical part of the problem there is less difficulty, for the reason that the principal element in it, the dynamo, has already reached a remarkably high efficiency, and the electrical data as to wiring, insulation, etc., are so well known to electricians that they are not apt to make any serious mistakes in their choice of types or sizes of dynamos or in their systems of wiring.

In all branches of engineering there is a tendency toward a permanence of type and a unification of design following a period of tentative effort and variety. For instance, in marine engineering 30 years ago there were numerous types of boilers and of engines. Now in the best practice the Scotch form of boiler and the inverted vertical compound or triple expansion engine is in almost universal use. In locomotives there is remarkably little variety, what is known as the American locomotive having resisted all attempts to materially change its general character for more than 30 years. In bridges of moderate span the span-connected bridge in this country is almost universal, departures from this type being made only in cases of exceptionally long spans or for architectural reasons.

The business of electric lighting is becoming one of enormous magnitude. As the great cities increase in wealth even faster than they increase in population the former luxury of the electric light is becoming almost a necessity, and people are continually using it with greater extravagance. A central station plant therefore of necessity becomes a vast establishment, requiring an equipment of thousands of horse power of boilers and engines, and demanding the utmost skill of the mechanical engineer to make it efficient and profitable.

In chimneys, for instance, the variety ranges from the small and cheap iron stack to the vast brick pile, which has been well called a monument to the folly of its builders. In boilers every conceivable type of ordinary stationary boiler is used, and some engineers, not satisfied with the best known land boilers, are seriously considering a type which has as yet found a field of usefulness on steam yachts and torpedo boats only. In engines, the range is from the triple-expansion Reynolds-Corliss engines,

at Providence, with a record of less than 13 pounds of water per horse power per hour, to the high-speed single-valve single-cylinder engine, whose water consumption is only guessed at. In connections between the engine and dynamo we have belts, leather, rubber, cotton, and leather links, rope drives, friction clutches, friction cones, and various patented systems of transmission, with belt tighteners and other like means of wasting the power of the engines.

One of the conditions of electric lighting which makes the selection of the steam plant a matter of peculiar difficulty, is the fluctuation in the quantity of work done. The maximum work is required during only a few hours in the evening. As both boilers and engines have but a limited range of capacity in which they approximate their maximum economy, a decrease in economy taking place both when they are over-driven and when under-driven, it is a matter of fine calculation to determine what engine and what combination of boiler and engine, and what steam pressure for such combination, will give the highest economy for the whole time of running, rather than what will give the highest during the period of maximum work only. A similar calculation is also needed to determine whether, with a given cost of coal per ton it pays to put in a triple expansion engine, with its known economy of fuel for maximum loads, if it is to run at its most economical rate for only three hours out of every twenty-four.

Another difficult point to determine is for what time during the decrease of load below the maximum is it advisable to let all the engines and boilers work with a gradually decreasing load, and when to shut down one or more of the engines and boilers. Careful observation in running plants and continuous testing and recording of results will be needed before any general principle can be laid down on these points.

In the matter of steam boiler performance much dissatisfaction exists because continuous records of water and coal consumption indicate far less economy of coal than would be estimated from records of individual boiler tests during a period of 10 hours of expert testing. The reason of the apparent loss is probably that the conditions prevailing during the test of a single boiler are not the same as those prevailing in a large plant of boilers running continuously, especially as regards force of draught and its equalization among several boilers. It is frequently found that in a row of boilers some may have too much draught, causing excessive waste of heat in the chimney and others too little, causing imperfect combustion and excessive percentage of loss by radiation. Much care is needed to cause the condition under which a boiler is used in actual service to approximate those existing during a test. A pyrometer should be used with each boiler to indicate whether or not there is excessive waste of heat in the flue gases.

One of the most expensive items in the cost of an electric lighting plant in a large city is that of the land and the buildings, and the increasing cost of this item is likely to control in future to a great extent the selection of the type of boiler and engine. The water-tube boiler, giving exceptional advantages in compactness as well as in ability to carry high pressures of steam in safety, is likely to become the permanent type of boiler for all large plants. The multipolar dynamo, capable of being run at moderate speeds, is offering great advantages in the direction of economizing space by reason of its ability to be placed on the engine shaft without the intervention of pulleys, belts, friction clutches, jack-shafts and other encumbrances. The vertical type of engine is also likely to become the favorite chiefly on account of its saving of ground space. Compound and triple expansion engines are likely to be adopted almost universally on account of their economy of steam, unless in locations where coal is cheap. Their more general use should also result in reduction of their price, which now seems excessive as compared with single cylinder engines. Forced draught has not yet been adopted to any great extent in electric lighting plants, but as it has come into somewhat general use on the Atlantic steamers, where saving of space is a prime requirement, there seems to be no good reason why it should not be adopted in electric lighting plants.

Before any general change in the direction of permanency in the type of steam engineering equipment of electric lighting plants can be expected, however, there must be a more general testing of the efficiency of the various kinds of equipment now in use, covering the efficiency of the boiler, as shown by the water it evaporates per pound of coal, of the engine, as shown by its steam consumption per indicated horse power, and of the combination of the engine and the dynamos, as shown by the electrical horse power generated by the dynamo in comparison with the indicated horse power of the engine. It is to be hoped that there will be a series of tests made at the World's Fair of the efficiency of these various elements and combinations, and they should do much toward establishing that permanency of type which has been reached in many other branches of engineering.

**Peculiar Provision of the Colombian Mining Law.**—Permission is granted to work the graves of dead Indians. Many Antioquians have made a fortune in this way.

## 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.

## Maryland Mines.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: A movement toward opening mines for gold in progress near Hyattstown, Prince George's County, Md., is reported, and with that view mining rights have within the past week been purchased outright or otherwise secured by a company formed for the purpose, composed of several Western mining men and one or two small capitalists of the District of Columbia.

The information is direct and well authenticated that various parties in New England who within the past 18 months have been induced to put up and to expend considerable money upon supposed rich chrome-ferro-nickel properties near Asheville, N. C., are not likely to realize expected profits from their investments, as the ores, on extensive prospecting, have not been found in paying quantities.

All the gold mining operations which were at full work last year near Great Falls, Montgomery County, Md., have been, after a very considerable outlay of money upon machinery, sinking shafts and driving levels, brought to a complete standstill, and the properties are now on the Washington and Baltimore markets.

WASHINGTON, D. C., May 12, 1892.

CLINTON RICE.

## Dog Creek Placers.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In reply to inquiries concerning the Dog Creek Placer Mining Company, let me answer as follows:

To this company some of the most eminent men of Philadelphia belong and form its board of directors. Our treasurer was John Bardsley, the defaulting treasurer of Philadelphia. Just before his unfortunate misstep we discovered a trouble in the grade of the bedrock, which, successfully to overcome, would have needed considerable cash. Up to that time all money needed was at our disposal by simply selling treasury stock, which was in good demand; but scarcely had Bardsley's affair, and with it his resignation, occurred, when all confidence was destroyed and no stock could have been sold. Happily, we were without embarrassing debts, and after electing a new treasurer we concluded to stop further proceedings until a happier time, and matters were left thus in my hands as president of the company.

I have since tried to secure adjoining placer ground, and succeeded by paying cash for some and obtaining the refusal of others. I have also secured the opinions of practical men and of mining engineers.

"The property is valuable; its situation favorable, and all experts agree that the gold is there. But though slowly, I prefer to go surely."

PHILADELPHIA, May 24.

HUGO ENGEL, President.

An expert who examined these properties two years ago expresses the following opinion about them:

"Speaking generally the property is like dozens of other placers—it has rich spots and poor spots. If properly worked it ought not to prove unprofitable. But it is a property that will not bear anything but the cheapest kind of work. If owned by a few individuals, and worked as a legitimate business enterprise, with good machinery, it ought to yield satisfactory returns."

## What Next for Silver?

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of April 16th you publish an article by Dr. R. W. Raymond, entitled, "What Next for Silver?"

Although I am living here in a silver producing and mining region, and am much interested in its prosperity, I am nevertheless of his opinion that the production of silver should be restricted, so that it might be gradually restored to its old rank.

I also agree with him, that we should work for a larger production of gold, to reach a better equalization in the amount of both the metals produced.

Dr. Raymond asks then: "How can we increase the production of gold, unless we have the good luck to find new and rich fields?" This question was rather a surprise to me. He does not know of any other gold fields on this continent except those in California, but there the Grangers will not permit the agricultural land to be spoiled by hydraulic mining. Yes, these naughty fellows make him so angry, that he would rather go off to Africa, even into the interior, to work for a larger supply of gold. But why rove away so far? Has he never heard of the immense mineral deposits in Canada? From the north shore of Lake Superior, and along the Minnesota and Dakota boundary lies a stretch of land covering over 15,000 square miles, and consisting of a formation which contains gold in veins such as no mining camp in the States can show.

But how is it that so few people know, or still less care to know, about the immense mineral wealth of Canada?

When somebody is offering to a capitalist (in normal times), an undeveloped claim with a rich vein on it and at a very moderate price, he will hear as an answer: "I invest only in a developed and paying mine." But as soon as he hears of a boom, and if it be in the most remote corner of the country, he is storming the speculators' or promoters' offices, as we could see was the case in Ashland during the Gogebic craze, and now again in Duluth since the Mesaba boom is raging.

I do not exaggerate when I am telling Dr. Raymond that if any country on this continent will make up the deficiency of gold it will be Canada, and if that gentleman wishes information about the occurrence of gold or any other mineral or metal here, I shall be with the greatest pleasure at his service.

PORT ARTHUR, Ont., April 29, 1892.

F. HILLE, M. E.

## The Silver Question Solved at Last.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The silver question continues to agitate the minds of Senators, members of Congress and silver cranks of St. Louis and Denver.

Silver clubs are formed everywhere in the West, but no remedy has been suggested so far except the free and unlimited coinage of silver. That such a step undertaken by the United States alone would be disastrous is secretly acknowledged by the most ardent and unreasonable friends of silver.

I claim to have found a practical solution of this difficult question. It is silver buttons, sir! Are you joking, sir? No, sir, I am in dead earnest, sir!

And when you read this, madam, don't take it for a satire, if you please! My wife does not, and why should you?

The United States Government should establish a factory of silver buttons under the supervision of the Director of the Mint. It would not be safe to leave this important business to private enterprise, because of the danger of putting buttons of inferior fineness in silver on the market.

The ball is to be set in motion by providing the army and navy with silver buttons, then the employes of all departments of the civil service are to follow.

No Senator or member of Congress will be admitted to the sacred halls of the Capitol unless he wears a full set of silver buttons.

The President of the United States will decline to receive any caller unless he or she wears silver buttons. Why not? Is a man permitted now to appear before the President without a coat in shirt sleeves?

The individual States will at once perceive the necessity of taking up this important matter. The uniforms of the militia will be provided with silver buttons, and all officers of the State and of municipal governments will shine in silver buttons. But the wearing of silver buttons will not stop here. While a law forcing the people at large to adopt this custom would not be constitutional, a much more powerful agent can be brought into requisition, namely, fashion.

Would it be so difficult to gain the aid of a Mrs. Astor or Vanderbilt in this national enterprise? The dudes of New York would take up this position with delight and parade Fifth avenue in silver buttons, and every respectable dog would bark in a silver collar. How beautiful would the leader of New York's Four Hundred look in silver buttons!

The fashion once established by the leaders of society, every man, woman and child in the United States would cry for silver buttons.

To intensify this desire it would only be necessary to make a law prohibiting persons who have served a term in State prison, aldermen of New York City and Chicago, and members of the California Legislature, to appear in silver buttons. No respectable citizen would like to be taken for an ex-convict, or a boodler alderman, or for a member of the California Legislature.

It would be reasonable to assume that every man, woman and child of the sixty millions population of the United States would consume, on an average, 10 oz. of fine silver in buttons. This would require 600,000,000 oz. of fine silver until all demands for buttons were satisfied.

But my silver friends in St. Louis will say that then the consumption of silver will stop, and the old deplorable status will be re-established, because it is evident that the new generation will wear the buttons of those who have passed away to the land where dividends from silver mines are not known. This can easily be remedied.

Make it a custom, nay a law, that when a man dies all his silver buttons are buried with him. Undertakers would have to make oath that this has been done, and a violation of the law would make a man's will null and void, and the State would confiscate his property.

But we can go a step further. The government, having the monopoly of manufacturing silver buttons, could sell them, especially those of artistic design worn by the rich, at an enormous profit, and thus be in a position to abolish all other taxes. The national debt would soon become a relic of the past, and there would be plenty money to double the pensions of the noble men who upheld the integrity of the Union. This proposition, however, it seems to me, is not as reasonable as George's idea of taxing land only.

Then, indeed, would the millenium be ushered in for which we have hoped so long in vain! No more poverty! Because in a country where every man, woman and child wears silver buttons there can be no paupers.

SAN FRANCISCO, May 10, 1892.

C. A. STETEFELDT.

## Faulting in Veins.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I have read with interest an article by Albert Williams, Jr., M. E., in the ENGINEERING AND MINING JOURNAL of April 9th, entitled "Why Dip Is More Likely to Be Regular than Strike with Fissure Veins," and a criticism of a portion of this article by Mr. John A. Church in the edition of the 30th.

If a fissure vein means a vein that has been deposited in a pre-existing opening, like a crack of indefinite length and depth cutting through rock in place, it has necessarily to occur along a fault, whether the displacement of one wall with reference the other has been great or insignificant. But Mr. Williams' argument equally applies to all veins closely following a faulting plane; whether the ledge matter be the filling of a pre-existing fissure; whether it represents a partial or complete replacement of a portion of one or both walls of the fault; whether it has arisen as a result of both of these manners of deposition or whether it originates in any other way. The idea that such veins as occur along faulting planes will have a more regular dip than strike is an ingenious one. It may be disproved or confirmed by measurements of the dip and strike of faults or fault veins that have been extensively developed in mining.

But the question brought up by Mr. Church, and which is referred to by Mr. Williams as a matter settled and proved, is the origin of slickensides and selvages; in his discussion of this matter I note that Mr. Church, perhaps advisedly, uses the term vein and does not limit himself to veins that occur along faults.

The study of ore deposits has led to the advancement and overthrow of many theories. Laws governing ore deposits have been promulgated, accepted and then thrown aside because utterly unable to account for all the vein phenomena they were supposed to govern. Yet I think but few

theories have been sanely advocated that do not explain satisfactorily some of the vein phenomena with which they deal. On the other hand it is probably that there is scarcely a class of vein phenomena that cannot be caused through the agency of various forces, and while it may be shown conclusively that certain selvages and slickensides could not have arisen through fault movements it by no means follows that no selvages or slickensides could originate in this way. I believe that polished surfaces and selvages may be produced by the slow motion and pressure of the walls of a fault rubbing against each other. I believe the bootblack Mr. Church refers to, whose brush only travels an inch a century, could produce a shine if he pressed hard enough.

Clay selvages and slickensides are better developed upon the walls of a simple fault than they are along those that have received ore deposits. Some years ago I noticed a fault of slight displacement, which sheared a pipe of fine grained massive pyrites with a clean cut. The faces of the pyrites along the fault were polished like mirrors. The polished faces were not perfectly plane, but showed very slight and broad undulations of surface, having a direction parallel with the throw of the fault. The other day I noticed an outcrop of silicious reddish-brown hematite about 100 ft. wide. A fault of apparently slight displacement cut across it from one side to the other in a nearly straight line. In spite of weathering agencies of atmosphere, which have minimum intensity on the deserts of Arizona, much of the face of this fault was not corroded but showed highly polished and a similar slightly undulating surface as in the case above noted. Where undecayed and bright and polished this surface was not of reddish brown, to almost black color; it was of a brilliant red color, which, through an eighth to a quarter of an inch back from the surface, merged into the normal color of the rock. I would attribute such examples of polishing to the motion of the fault walls. Most rocks and clays along faults show examples of polished and silicated surfaces. No rock shows it more commonly than coal. This diversity in chemical composition and great difference in chemical sensitiveness, if I may use the term, is an argument in favor of a frequent occurrence of such phenomena through a common mechanical agency like motion and pressure.

I have never seen clays associated with feldspathic rocks along faults that I could assert to be caused by the grinding up of the undecomposed rock and its subsequent kaolinization. Usually feldspathic or argillaceous rocks immediately adjacent to a fault have been subjected to chemical action so intense that they resemble the original rock in few respects other than showing signs of their previous crystalline or mechanical structure. Furthermore, while bodies of clay on faults are much thicker and heavier while one or both walls are feldspathic, still clay is very commonly found between walls that are in no way argillaceous in character, and which could not, through grinding, furnish material for clay making in any large quantity. Clay selvage on a fault between limestone and quartzite are an example. While I can see nothing impossible in the idea that feldspathic adjacent to harder rock can be ground up to a powder, yet there can be but little doubt that the clay frequently rises through decomposition of rock in place; through infiltration and mechanical deposition; through chemical deposition. Of these causes I believe the former much the more common where the clay occurs in great mass, for in such cases there is almost always an aluminous rock adjacent and the clay merges into it.

But whatever the origin, the occurrence of clay along faulting plane in sheets, often bright, frequently striated, is so common as to be characteristic, and their occurrence with such surfaces where no motion and pressure is possible is so uncommon as to suggest that slow motion and great pressure has had to do with their physical appearance. The cleavage of clays along faults into irregular slabs of smooth and dull or polished surface, with their faces approximately parallel with the fault and normal to the pressure, is also suggestive.

The argument of Mr. Church that, if these phenomena are due to motion, then bedding planes should frequently show them, is, I think, scarcely tenable. In the first place, bedding planes that are very highly tilted and distorted have been comparatively but slightly developed by workings. In the second place, a bedding plane or line of stratification is by no means an open crevice like a fault; it merely represents a tendency to split along the line of deposition of the rock. In some slates this tendency is not nearly so intense on bedding as on cleavage plane. Thirdly, the motions along faults must necessarily be, in a comparative sense, very much more rapid than the motion that has produced folding of strata. Still, examples of polished surfaces on bedding planes are not altogether wanting when most work has been done on tilted strata, i. e., along the top or bottom of a coal seam.

I have said that the phenomena of slickensides and selvages were more simply exhibited and more persistent along faults uncomplicated by associated ore deposits. This is generally but not always the case, and naturally so. For it is reasonable to infer that polished rocks and clays originally on a fault should be to a very large extent obliterated during the long and intense chemical seige that vein deposition would subject them to. In fact their almost complete absence from some fault fissure deposits where displacement may often be measured, but where the walls of the fault or vein are illy defiled would, negatively, lead to the supposition that in many cases fault motion has been continued, at intervals at least, during and subsequent to the formation of the ore deposit.

But slickensides, and especially clay selvages, occur in ore deposits that have no relation to faults, and which cannot be referred in any way to faulting. But still I think they may often be legitimately referred to motion and pressure. As a rule, when they are common, the ore bodies are large, and, together with the adjacent country rock, have been subjected to chemical forces which have greatly decomposed them. Changes of this class are necessarily accompanied with changes in mass, causing a contraction which we have only to regard as unequal in order to obtain appreciable motion and pressure.

While I do not deny that cases of polished surfaces are to be met with, which are hard to explain, and while I by no means intend to assert that slickensides and selvages are universally produced by motion and pressure, I do claim that they can be usually so accounted for, and hardly think that the theory can be overthrown by showing that in some cases these phenomena have originated probably through some unknown forces.

TUCSON, ARIZONA, MAY 11, 1892.

L. D. RICKETTS.

#### THE CONSTRUCTION AND USE OF THE DIPPING NEEDLE.

Written for the Engineering and Mining Journal, by D. T. Marshall.

It may seem that so simple an instrument as the dipping needle, such as is used in the search for magnetic iron ore, would require no explanation, and that a mere inspection would enable one to learn all there is to be known about it. The writer's experience shows him however, that there are many things about the instrument that only suggest themselves after long use in the field.

The instruments used by the writer were of two kinds, differing, however, but slightly—one a light instrument for prospecting, and the other a larger instrument for the more careful surveying of a body of ore which had previously been roughly located.

The instrument for prospecting was made in the following manner: A ring of brass was cast  $\frac{3}{4}$  in.  $\times$   $1\frac{1}{2}$  in. in thickness and  $4\frac{1}{2}$  in. outside diameter. This was turned in the lathe, making a ring about  $\frac{1}{8}$  in. thick and having a rim  $\frac{1}{2}$  in. wide projecting from the inside face. This formed the compass-box, and was so made to insure symmetry and rigidity. The supports for the needle deserve special mention. It was found that with the ordinary V-shaped hangers projecting from the top of the box only, that when the compass was struck, as it frequently is when climbing over rocks, that the supports were apt to spring together and bend the pivot of the needle. To avoid this the supports were extended to the bottom of the box and were made extra thick and heavy.

The bearings for the pivot of the needle were made of sapphire and were fastened in the ends of brass thumbscrews provided with locknuts, so that there should be no possibility of their working loose.

The needle was made of steel  $\frac{1}{8}$  in. wide,  $\frac{1}{16}$  in. thick, and just long enough to clear the rim carrying the scale.

The needle was made and accurately balanced before magnetizing. After magnetizing it was nearly balanced by filing, and then a very light aluminum rider was put on to finish the balancing and to serve as an adjuster when the needle was moved into a different latitude.

The needle is adjusted in this way. The compass is hung from a light tripod at a distance from any buildings carrying machinery, iron pipes or electric light wires, and the compass made to stand in the magnetic meridian. The needle is then adjusted to read 0°. The compass is then turned through 180°. The needle should still read 0°. If it does not the rider should be moved until it reads 0° both ways around. After this adjustment is made place a bar magnet directly below the compass, so that it shall show a reading of 15° or 20°, and then reverse the compass. If it does not read the same on reversing it shows that either the bearings of the needle have been displaced or that the pivot is not at its center of gravity. In this case file off the edge of the needle.

The writer has seen a compass in use that would read 0° when held either N. or S. where there was no attraction, but would read 15° differently on reversing over a body of ore.

The handle of the compass should be provided with gimbals moving in two directions, and not, as is commonly the case, in one only. It is better to allow the needle to swing freely at all times, for when a compass needle is clamped, and is not pointing toward the magnetic north it is liable to change the distribution of its magnetism. The dipping needle for surveying out "veins" is similar to that above described, except that it is larger, being about  $5\frac{1}{2}$  in. in diameter. It is also provided with a light stick, one foot long, fastened to the handle near where it is joined on to the box. This stick is made to point in the direction of the needle. On the farther end of the stick is placed a small pocket compass to indicate the direction of the magnetic meridian. This arrangement saves a great deal of time, for when moving over a body of ore your magnetic meridian continually changes.

The method of making the magnetic survey is this: A reference line is surveyed as nearly on the line of the vein as possible. On this line stakes are set every 25, 50 or 100 ft. apart, as may be thought best. On these stakes cross lines are run out as far as the attraction extends. It is well to keep the cross lines parallel to each other if possible, even though they may not all be at right angles to the reference line. This makes a better looking map when it comes to be plotted out. On these cross lines stakes are driven every 10, 20 or 30 ft., and observations made with the needle. An easier and quicker way is to make the observations at the tags on the tape as it lies on the ground.

The readings of the needle simply indicate the presence of magnetite, but do not indicate the quantity or quality. The presumption usually is that where the attraction is strong there is either a large body of ore, or that what there is lies very near the surface.

It has been observed that when ore crops out on the surface of the ground it is apt to be strongly polarized. A piece of polarized ore as large as one's head will cause a larger deflection of the needle than many tons of non-polarized ore. If the attraction is caused by "float" ore it may usually be determined by holding the compass high above the ground. With large bodies of ore it makes little difference whether the compass be held near the ground or high above the head.

There are some curious things about the behavior of the dipping needle: At Mt. Olive, Morris County, N. J., there is a body of magnetite extending along the northerly slope of a hill for about a mile. The hill slopes at an angle of about 8°, and extends, as does the vein, N. 30° E. The vein dips into the hill from a line about half way down its slope at an angle of 45°. The attraction, extending from the top of the hill to the vein (about 500 ft.), increases pretty uniformly from + 3° to + 80° and 90° at the vein. From the vein down the hill the attraction decreases from - 89° to - 3° to 0° in a distance of 200 to 300 ft. There never has been any ore taken out below the line of positive attraction.

Inside the tunnel at Mt. Olive there is one point where if the needle be moved an inch one way or the other it would be completely reversed. At Port Oram, N. J., there is an area many acres in extent where the attraction is all negative. At other places the attraction is all positive.

It will usually be found that the attraction is negative for a short distance, at least, from the center of the vein.

Absence of attraction at any point is not always a proof of absence of magnetite.

METUCHEN, N. J., March 1st, 1892.

## THE MINES OF CRIPPLE CREEK.

Written for the Engineering and Mining Journal.

The large development in this camp during the past few months have made it especially worthy of public notice. During this time it has reached the stage of a regular producer and shipper of high grade gold ore. Six months ago it had only assays and mill runs to show. It is reached at present by three routes; the nearest one to any railroad point, that from Florissant on the line of the Colorado Midland Railroad is about 18 miles in length. As the district is situated on the headwaters of creeks running into the Arkansas, this road is obliged to cross the Divide between the waters of the Platte and the Arkansas. Consequently, while the shortest and probably easiest method of access for passengers, it has not the advantage of a down hill pull for ore, which is presented by the road to Cañon City, also the one to Florence, over which a greater tonnage can be hauled, although over a greater length. These latter roads are about ten miles longer than the Florissant road, and a record has been made by two six horse teams with trail wagons of 28,000 lbs., which may even be exceeded as the roads improve.

While there are abundant rumors of coming railroad facilities, neither the Colorado Midland nor the Denver & Rio Grande have as yet definitely announced their intention of building, although numerous surveys have been made. It is reported that one of these roads will build when a shipping tonnage of 125 tons a day is reached. As the camp is already shipping a fair proportion of this amount, and as a number of prospects seem to promise to become producers during the summer, we may look for such construction in the early future.

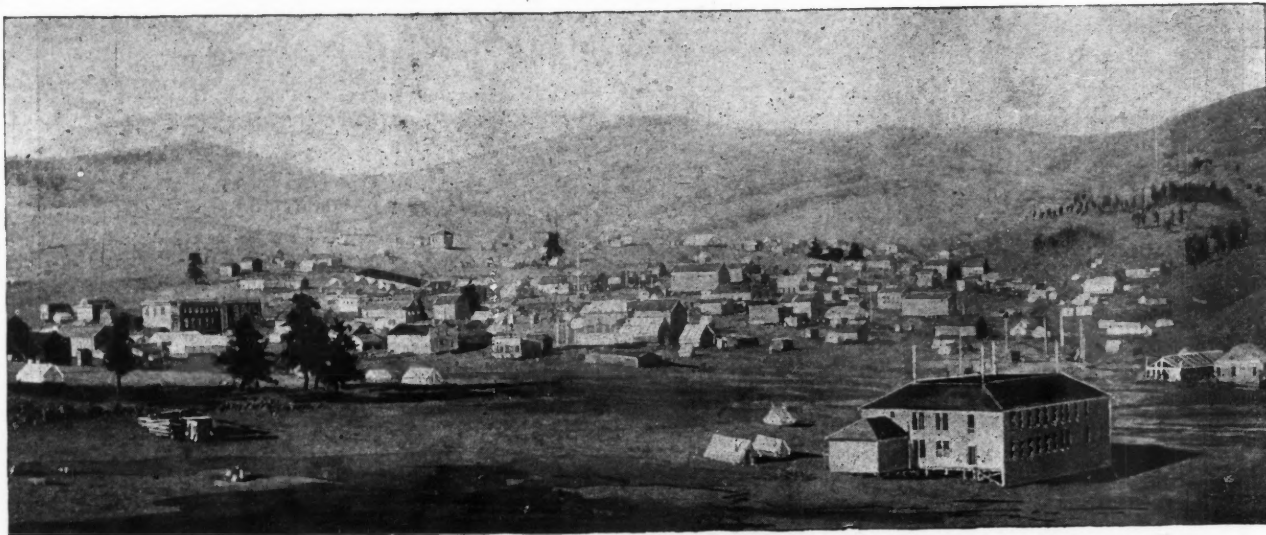
Geologically, the district seems confined to a large porphyry flow, irregularly oval in shape, extending from the northwest to the southeast and to numerous dykes, also porphyry, in this vicinity. This is about five miles in length and about two and one-half miles in greatest width, extending from Mineral Hill on the northwest to a point below the Washington mine near Lawrence, on the southeast. As there seem to be two distinct

granite upon which any amount of development has been done. Copper has also been discovered, also in what is apparently a contact vein in another part of the camp, although not enough development has been done in this instance to speak with any certainty.

**The Mines.**—The largest shipper in the camp has been the Anaconda group of mines on Gold Hill, Squaw Gulch. This property has made the remarkable record of shipping within the past two months thirty carloads of about 20 tons each, and could easily have increased this large amount had transportation facilities and the state of the roads permitted it. The smelter returns from the first 290 tons shipped yielded a net value of \$12,147.82, as shown by the books of the company. Partial returns from the more recent shipments show, as would be expected, from increased familiarity with the peculiarities of the ore on the part of the miners, a higher average value.

In addition to this amount the company has a small stamp mill of 15 tons daily capacity in which it has been treating low grade milling ore. The amount milled to date has been 125 tons, which has yielded about \$2,500. The ore shipped has been from open cuts on the vein and from shallow shafts. Three shifts are being worked, and electric drills have been ordered, which will largely increase the output. The open cut of the great vein is being changed into a tunnel along the vein.

The great size of the veins and the accessibility and richness of the croppings make it possible to ship ore from work of this character to almost any desired tonnage. The vein is apparently an enormous mineralized dyke of porphyry of a somewhat different character than the adjacent porphyry. Values run in the shapes of free gold, gold-bearing iron pyrites in disseminated particles and in thin seams of telluride. The telluride seems to exist mainly in the partings of the porphyry, the free gold in thin seams of quartz, which are more or less abundant in the vein. The iron pyrites are disseminated throughout, and do not seem to be as high a value carrier. The shipments have been made from 12 to 15 ft. of the vein, of which nearly 5 ft. is especially high grade. There is noticeable in this mine, and in the mines of Squaw Gulch in general, particles of



TOWN OF FREMONT.

classes of porphyry in the camp—one mineralized and the other non-mineralized—and as the vein matter shown by the mines, both in the porphyry and in the adjacent granite, is itself porphyry and quartz, the conclusion seems justified that the formation in the district is as follows:

First. The main porphyry flow filling the then existing valley. The fissures in this porphyry and the adjacent granite were filled by a secondary flow of porphyry, this time mineralized. Finally a subsequent mineralization of later fissures frequently following the lines of the secondary porphyry flow and accounting for the presence of the seams and veins of quartz which furnish a large proportion of the values at present extracted. This hypothesis seems to be borne out by the fact that fissures apparently extend continuously through the porphyry and adjacent granite, and that the vein matter of these fissures where opened in the granite is mainly porphyry and quartz of the same nature as that found in the fissures in porphyry. None of these fissures as yet have been developed through the point of contact of the granite and porphyry, at which point interesting developments may be expected. In the Blue Bell mine on Squaw Gulch there is a distinct contact between the porphyry and the granite, the granite dipping under the porphyry. The same peculiarity is reported to have been observed at numerous other points along the contact, although in no other case has any extensive development been carried out. The values in the ores appear to run in the seams of quartz mainly as free gold and in partings in the porphyry, both as free gold and telluride. The interior of several pieces of porphyry, which showed free gold and telluride in the cleavages and partings, while showing auriferous iron pyrites was, in no case of high value. The porphyry flow has not at any place, so far as reported, met with the Silurian limestone which exists to the southeast. Aroung the porphyry the country rock of the entire region, which is a part of the Pike's Peak system, is granite, mainly red syenitic granite. The kinds of porphyry have not been absolutely determined lithologically, but are apparently rhyolite and andesite.

The ores of the camp are almost entirely gold, free milling near the surface, but running at generally very slight depth into sulphides and tellurides, although quite an amount of gold seems to remain free in the quartz seams even with depth. The only mine in camp which shows any notable amount of silver and lead is the Blue Bell, which, peculiarly enough, is also the only vein on the contact between the porphyry and

blue fluor spar, more or less abundantly disseminated. In addition to the large open cuts from which the ore has been shipped, the development on this property consists of two shafts, respectively 40 and 45 ft. deep, on the Anaconda and Excelsior lodes of the company. At the bottom of the hill a tunnel has been started on the vein, which will, when completed, block out a considerable amount of ground, being 750 ft. below the present shipping openings. It is 5 by 6½ ft. in the clear, and is now in 100 ft., the breast being already in mineral. The possibilities of this mine are vast.

The Buena Vista property on Bull Mountain has already shipped six car loads of ore of about 20 tons each, which has averaged upward of \$100 per ton. When it is considered that this has been taken out entirely in development work, and that there is considerable ore in the ore house, the showing is remarkable. The shaft is now 160 ft. deep, and is being pushed by three shifts. The 75-ft. level has drifts 40 ft. each way on the vein and another level will soon be started at 150 ft. The vein is more purely a fissure vein than any other mine inspected, having a large, continuous vein of quartz which, at the bottom of the shaft, is 4 ft. in thickness, and at the 75-ft. level about 3 ft., the entire vein matter being shipping grade. Some ore which has been left on the dump showed by hand sampling and assaying an average of over \$50. This company is pushing development and does not contemplate much further shipment until the completion of a better wagon road than the present one. It has acquired about 20 other claims on the same mountain, including the Hope tunnel, and is incorporated for working these claims under the title of the Bull Mountain Mining Company. A diamond drill is being used in prospecting.

The Gold King mine in Poverty gulch has shipped several car loads of ore, running upward of \$100 per ton in value, some of it being very rich, the values in this as in the Anaconda being in telluride and free gold. There are about 250 ft. of development, mainly drifts. When visited considerable ore was in the ore house. The workings could not be inspected, as the company has been extremely strict in its regulations. From the similarity of the ores and the general line of the property, this has been considered by some to be the same vein as the Anaconda. Intermediate development, however, is needed to prove this fact, as the workings are over a mile apart.

The Blue Bell has pushed its development until the drift is now in 225 ft., needing 45 ft. more to get under the shaft in which work was stopped

by water when in good ore. This vein is on the contact between the granite and the porphyry, and the large amount of water flowing from the tunnel speaks well for the continuity of the vein. The tunnel is on the vein and shows ore continuously. The vein matter at the start of the tunnel was largely blue floor spar, which has been analyzed at the State School of Mines. In the latter part of the drift there has been a continuous and enlarging streak of blue amethystine quartz, accompanied by a marked increase in gold values. The vein is notable as being the only one on the contact between the granite and the porphyry on which much development has been done, and also the only one showing any large amount of lead and silver. It has widened to over 2 ft. The company has broken ground to build a concentrator close to the mouth of the tunnel and will put it up this spring. The flow of water is quite large enough to run the concentrator, which is a great advantage in this district.

Further up Squaw Gulch and in a small gulch running into Squaw Mountain, south of Gold Hill, are the Mary McKinney and Republic mines, both on the same vein, but between porphyry walls. The development consists of a short tunnel on the Republic and tunnels and winzes on both ends of the Mary McKinney. The ore streak is blue fluorspar, which has also been analyzed at the School of Mines, and a streak of quartz at present very much decomposed. The fluorspar has assayed from \$9 to \$35 in gold (free milling) and the quartz as high as \$70.

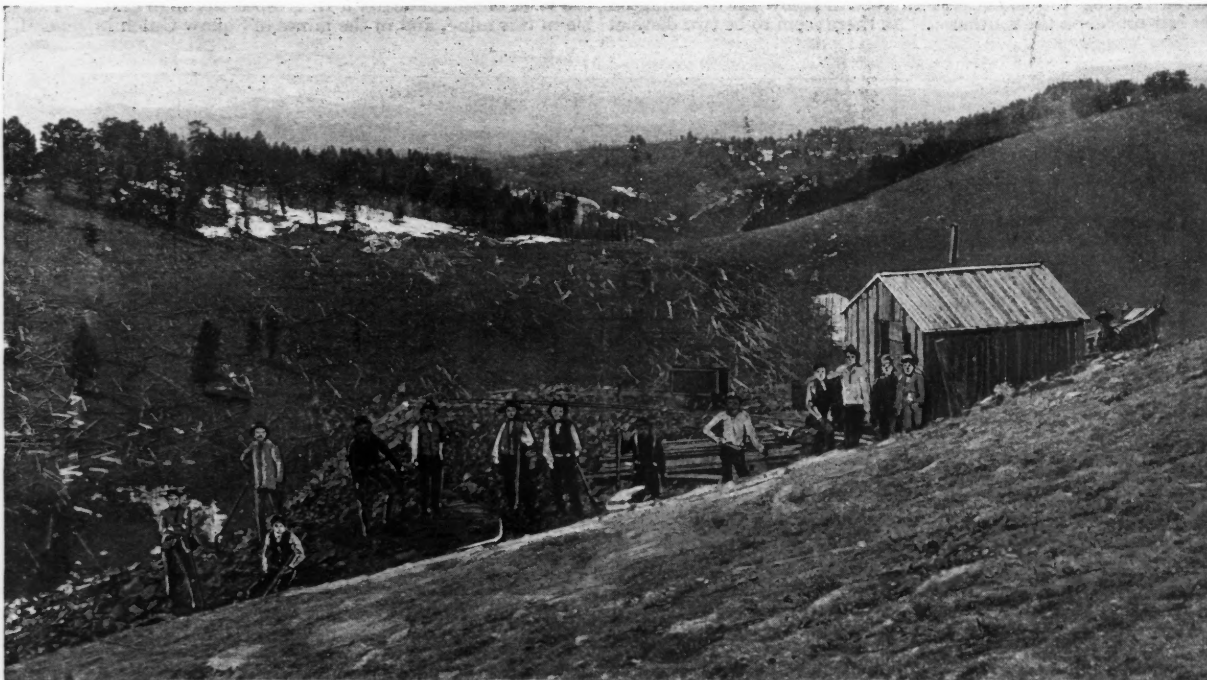
The Orphan Bell, which is near the Buena Vista on the same mountain, has shipped several car loads of good grade ore. The development work at present is being carried on steadily and the vein, which is nearly 3 ft. thick, is maintaining its value. No ore is being shipped at present from this property, as like its neighbor, the Buena Vista, it is waiting for the completion of a wagon road over which a good sized load can be hauled, the present one having too steep grades to be practicable. The Coronado Company, on Gold Hill north of the Anaconda group, has recently become a shipper and is producing from its Hub mine about a car

the granite show good assays. None as yet have become shippers. But even if they do not, the porphyry flow is so extensive that very great depth can be gotten on most of the veins before getting through it.

The placers in this district are peculiar in many respects. They are almost all of them in the head of the gulches near the mines. The gold is only partially separated from its associated gangue, which occurs throughout the placers in broken, mostly sharp-angled fragments, and while considerable of it can be saved by sluicing, it is naturally mill dirt and in no other way can a large proportion of the values be saved. This is in some respects fortunate, as there is an insufficiency of water in the district for hydraulic mining, and even stamp mills will require economy of water or its transportation from a considerable distance. In some parts of placer deposits men have made good wages by carting the dirt to a stream and working it in hand rockers,—as high as \$10 a day having been made last summer by this means.

The Anaconda Company propose erecting a large mill for the handling of their surface ores, of which the extent and accessibility of their veins gives them a large quantity. Other projects of this kind are under way, and will doubtless form an important factor in the future work of the camp.

*General Features of the Camp.*—Prospecting in this camp, as incidentally mentioned before, is somewhat hampered by the depth of the wash, which is general throughout the camp, the country porphyry being but rarely exposed. In many places the abundance of float is confusing, which, however, speaks well for the probable frequency of the vein. While the altitude of the camp is about 9,000 ft., it has been fortunate, as compared with Creede and other camps nearer the continental divide, in not having much trouble with snow, which is probably due to the fact that it is part of an outlying series of mountains nearly surrounded by a warmer lower-lying country. In population the district numbers about 8,000, about one-half of whom are concentrated in the towns of Fremont and Morland, the remainder being scattered around in numerous small



THE SUPERIOR MINE, ANACONDA MINING COMPANY, WITH SAGUACHE RANGE IN THE DISTANCE.

load a day of ore very similar to the Anaconda ore. It is presumed to be on the same vein. Over this property, which is largely owned in Pueblo, litigation has arisen, the first of any account in the camp. The legal battle will probably be fought to an issue in a short time.

The Victor mine, on Bull Mountain near the Buena Vista, has been recently sold to Pueblo parties for \$65,000. It shows an 18 in. vein running well in gold and some silver.

A new enterprise, which promises well, is the Gold Standard Mining and Tunnel Company, which has started a cross-cut tunnel from Squaw Gulch, along the line of which the Rose Maud and several other prospects have shown at the surface very high grade ore. As a large proportion of the porphyry in the district is covered by from 2 to 12 ft. of wash, and as float is often so abundant as to be confusing to the prospector, this method of work is thought very highly of as a means of prospecting for blind leads. In addition to this is the fact that it will catch the above known veins at great depth, as it cuts across the general trend of all the veins.

Near Lawrence, which is about five miles by road southeast of Fremont and near the southern end of porphyry flow, there are a number of promising prospects from which assays justify the hope of good developments after a little more work. The only property which here has had enough development to make it a shipper is the Washington. They have about three carloads of ore on the dump and have shipped one carload of good pay grade, although they are down less than 100 ft. At the time of visiting work was stopped owing to disagreement between the stockholders, which we understand has since been adjusted.

In addition to the above mentioned properties there are many prospects, a number of which show good ore, but are as yet insufficiently developed to become shippers. As the ore, as in most gold camps, runs rich to near the surface, some of these may be expected to soon swell the shipments. But as the zone of oxidation, however, does not extend to any depth, and as a great many mines are already through it, the fear that the ores will play out with depth seems groundless. Many mines in

settlements in the various gulches more adjacent to the mines, in addition to the large number of prospectors in tents and cabins which dot the hill sides. The usual features of a new mining camp are naturally present. In the main street of Fremont the number of saloons, dance halls, etc., is very considerable; but the town has been fortunate in one respect, in that the "bad man" has been conspicuous by his absence, which is probably largely due to the fact that the town government, which is already organized, is very efficient in the prevention of concealed weapons.

Gambling saloons are naturally frequent and well patronized, but as there seems to be good order preserved in most of them, this evil will probably have to be approached rather through the individual than otherwise.

In the above report mention has been confined almost entirely to mines which are producers. Mentioning those from which mill runs or good assays have been obtained would swell the list enormously. But this summer's developments will probably result in many of these becoming producers. Enough has already been shown to stamp the camp as a heavy and continuous gold producer. Very little of the ore shipped in car load lots will run as low as \$50 per ton net, and a very large proportion of it will run over \$100, with some even higher. The ore, having a silicious gangue, has naturally a high smelting charge. No fluxing ores have as yet been discovered in the camp, nor does there seem much probability of their existence, unless the porphyry is found to continue through the Silurian limestone to the southeast. Some copper ore has been brought in from this direction, and the district is being prospected with as yet nothing of importance to announce.

Independent of the advantages of the district in a mining way, it will become an attraction from a scenic standpoint, the country being well wooded, diversified with open glades along the road from Florissant, and the scenery along the cañons by the stage routes from the south being in places grand, with always the majestic mass of Pike's Peak on the east and the snow-covered range to the west as a background.

## ACCIDENTS IN MINES.

Written for the Engineering and Mining Journal by an English Mining Engineer.

In the following paper the writer will give some particulars of the chief causes of accidents in mines, with comparisons and statistics, and will endeavor to point out how they may be guarded against.

For the purpose of simplicity it will be an advantage to divide accidents into the following heads, and treat them separately: 1st. Falls of Roof and Sides. 2d. Explosions of Firedamp. 3d. Miscellaneous Underground. 4th. Shaft Accidents. 5th. Miscellaneous Surface.

## FALLS OF ROOF AND SIDES.

There is no doubt that there exists a large difference of opinion as to the best system and arrangements for insuring the proper support of the roof and sides of the working places and roadways in mines.

Some indorse the opinion that it is best to have the timbering of the workings done by special men, who are chosen and trained for the purpose, as is general in the North of England; while others contend that they have found from experience under varying conditions and circumstances that the method of training the colliers themselves to put up all necessary props in their working places insures greater protection where the seams may be thick or steep or the roof bad. Under such varying conditions as are known to exist in mining it would simply be impossible to lay down any general rule for the timbering of mines which would be suitable under all circumstances and practically applicable to the whole of the mining districts.

The conditions under which the various descriptions of mines have to be worked, the nature of the mineral, the character of the roof and floor

4. The introduction of some system of arrangement with miners which will enhance their interest not to avoid the labor and trouble of putting up the necessary timber, chocks or cogs of wood and other framings that may be necessary.

5. The employment of specially trained timbermen for the maintenance of roadways, and especially for repairing and drawing out of timber.

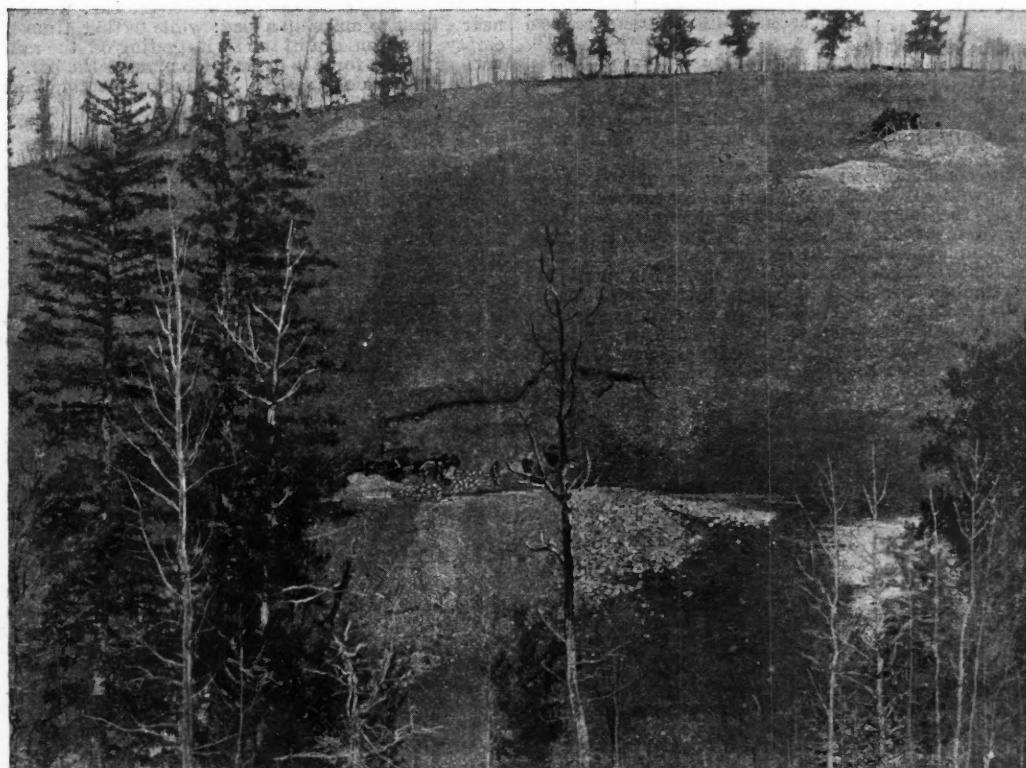
6. Preventing timber being left in the old workings or grooves of long wall districts, which would have the effect of breaking the roof instead of allowing it to gradually and regularly subside.

7. To have the working places advanced as quickly as possible, by different turns of an ample number of workmen in each face, and so reducing the risk of falls and exposing the least number of men to danger at any one time.

8. To provide the miner with a good light, both convenient and handy, which will enable him, while engaged at his work, to see and to protect himself against defects in the sides and roof of the workings.

A large number of eminent mining engineers have experimented upon the use of other material than wood in supporting the roof and sides of mines. About 30 years ago a screw prop was in use in various collieries in France, and was much advocated for its desirability for both convenience and efficiency. It is composed of a short hard wood prop bound with bands of iron, and having in its center a very strong iron screw with a square thread. By means of a nut on the top of the block which was turned by a long lever, the screw rises and is forcibly tightened against the roof. When the prop requires to be drawn out the unscrewing of the nut allows of the easy removal of the prop to another position.

Cast iron props of various sizes and patterns and capped or headed with a wedge or slip of wood have long been employed in some districts,



GOLD KING MINE, POVERTY GULCH, FORMERLY CALLED EL PASO.

of the deposit, the inclination at which the seams or beds of coal or other minerals are found, vary so much in different districts, and in different seams of the same district, and even in the same seam of a colliery, that to lay down any definite rule would be wholly impracticable.

It is occasionally found that the slips or clearings in the seams of coal or other mineral, as well as "partings" or "backs," extend up into the roof, which is also sometimes intershalified with irregular balls or nodules of ironstone. All these causes tend to break the continuity of the strata, and to render the removal of the mineral, which, in such cases supports the roof, far more dangerous, thus requiring greater care on the part of the collier. In addition to the danger from the slips running up into the roof, it often occurs where seams of coal are comparatively near together, that great pressure or thrust has to be guarded against, in some cases from the sides, in other cases from the heaving of the floor or bottom of the mineral being worked; and when these conditions do occur special care and skill in timbering are required. Owing to such a variety of conditions and circumstances it would be difficult even with statistics, which are at hand as to the result of the different methods of timbering in the different mining centers, to state anything like a reliable comparison, more especially as at one time or other much greater care has been taken in some districts than others.

The following are some indications as to how it is possible to reduce the number of accidents under this head:

1. Regular and ample supplies of timber of the requisite lengths should always be kept at a point conveniently near the workman.

2. The efficient training of every miner to the most approved and safest method of timbering and otherwise protecting himself and his working place.

3. The enforcement of increased vigilance by each miner in examining and watching the roof, sides and face of his working place and protecting himself in the mine,

but never had a very general use, though they are still occasionally found. In more recent years steel props have been tried and with more success, as well as steel rails and girders which are now coming more into use as bars or heads for supporting the roof. Some cast iron props are made in two portions of about equal length with a band of iron round the joint, the removal of which facilitates the drawing out of the prop. I do not think, however, that cast-iron will ever come into general use, and have a much greater faith in steel girders placed across the roof for its support. Wrought iron has also been pretty extensively used and perhaps more especially in South Wales in the main roads as roof supports. Of various sections, something similar to ordinary railway rails, they are placed at short intervals, and are sometimes in an elliptical shape. The space between these frames is lined with ordinary slabs of wood or lagging. It has been found that this means has often been more efficient than ordinary timbering and has even withstood a pressure that would have ruined a brick arching, and that by its capability for longer duration has been considered much more economical in the end.

On considering the total number of accidents from falls, both fatal and non-fatal, I do not think it is an exaggeration to say that more are attributable to this cause than to all other accidents added together. So far as statistics go, the number of deaths may be given as about 45% of the whole; but owing to only the more serious accidents being reported, it may fairly be assumed that another 10% may be added. Some experts go so far as to say that fewer deaths are caused under this class of accident than under any other separate class, on taking account of the number of each class, and that in a great number of cases the workmen are killed or injured through the insufficient propping and timbering of the working place or roadway. In some collieries a large number of accidents occur in dropping upper sections of the seams worked where they are thick, while in all backs, slips or cracks in the seams and roofs are a common source of danger and accident. The removal of pillars of coal or work-

ing "the broken," as it is often termed, is always attended with more danger and mishaps than the first working is subject to. Some kinds of roof are especially short, jointy and slippery in nature, and large pieces drop down without any warning whatever.

A very great advantage has, no doubt, been derived in more recent years by the introduction of the system of building cogs or chocks of timber of crossed pieces of wood, instead of or in addition to single props, and by the more complete and careful introduction of packing or building of stone in worked out places and close behind the working faces.

In coal cutting machines we have a means of greatly reducing the number of men employed in the working faces of coal mines. Were they more extensively used it would bring about a reduction of accidents, but I am afraid they cannot yet be said to be a practical success, at least to such an extent as to become generally used.

It may be said to be the general custom in this country that in mines the timbering of the main roads is attended by men specially acquainted with the art of timbering and paid directly by the management, while much of the face propping or timbering is done by the workmen themselves, at least in many districts, though perhaps not in all. The accidents here arise chiefly owing to delay in adopting precautionary measures, or from the attempt to keep open too large a space from the occurrence of unexpected planes of division in the rock masses, or again from a want of skill and practical training on the part of the men.

Most of these shortcomings may be guarded against in part by the regular and frequent visits of experienced officials, who should periodically examine the ground and at least give special directions and instructions with respect to the setting of the timber.

From statistics which I have picked out it appears that the deaths caused in the mines of Great Britain by falls of roof and sides since 1850 have been as follows:

	Per ct. of total deaths from all causes.	Deaths per 1,000 persons empl'd.
For 10 years ending 1860, =	37.6	1.531
" " 1870, =	39.1	1.304
" " 1880, =	39.2	0.935
" " 1890, =	44.8	0.867

It would therefore appear that the deaths from falls form a larger proportion of the total deaths in mines at present than they die from 30 to 40 years ago.

Taking, however, into consideration the greater number of persons now employed in our mines, whose lives are daily and hourly exposed to this risk of accident, and also the increased quantity of mineral raised, it is seen that a great improvement has taken place in the death rate from falls, per 1,000 persons, employed during the last few years.

Table showing the ratio of fatal accidents and deaths to the number of persons employed in and about the mines under the present and former coal mines acts, namely, from 1851 to 1873 of those at coal mines only, and from 1873 of those at coal, ironstone, oil shale and fire clay mines in Great Britain; and from 1874 in Ireland also. The persons and deaths on private branch railways and in washing and coking coal under the present act of 1887 not being included.

F. A. = Fatal Accidents. D = Deaths.

Years over which the average figures are given.	Fatal accidents and deaths caused by them.						Total number of persons employed both above and below ground.	Ratio of persons employed to each fatal accident and death.					
	Fire damp explosions.	Roof and sides falling.	Shafts.	Miscellaneous underground.	Miscellaneous on surface.	Totals.		Fire damp explosions.	Roof and sides falling.	Shafts.	Miscellaneous underground.	Miscellaneous on surface.	Total.
1. Act for inspection of coal mines in Great Britain.													
1851 to 1855	F. A. 93	350	205	88	45	781	229,468	2,473	655	1,127	2,602	5,145	294
	D. 231	368	236	102	48	985		993	623	970	2,254	4,821	233
2. Act for inspection of coal mines in Great Britain.													
1856 to 1860	F. A. 71	372	163	112	49	767	232,596	3,688	706	1,615	2,336	5,359	342
	D. 257	385	187	136	53	1,018		1,021	682	1,403	1,939	4,917	258
3. Act for the regulation and inspection of mines.													
1861 to 1872	F. A. 57	408	132	158	74	829	331,781	5,864	812	2,517	2,094	4,504	400
	D. 221	421	149	192	77	1,063		1,480	788	2,233	1,724	4,304	312
4. Coal mines regulation act, 1872.													
1873 to 1887	F. A. 33	445	102	188	89	857	508,968	15,300	1,145	4,990	2,707	5,719	594
	D. 230	457	115	199	91	1,092		2,215	1,113	4,403	2,657	5,393	466
5. Coal mines regulation act, 1877.													
1888	F. A. 15	454	68	202	82	821	534,945	35,663	1,178	7,867	2,618	6,523	652
	D. 49	471	75	209	84	888		10,917	1,136	7,133	2,560	6,368	602
1889	F. A. 19	460	69	221	89	848	563,735	29,670	1,253	8,170	2,551	6,334	665
	D. 138	465	74	292	95	1,064		4,085	1,212	7,618	1,931	5,934	530
1890	F. A. 22	415	85	235	101	861	613,233	27,874	1,467	7,214	2,609	6,701	712
	D. 290	434	88	245	103	1,160		2,114	1,413	6,968	2,503	5,953	528

In a work on "Accidents in Mines Arising from Falls of Roof and Sides," by A. R. Sawyer, who was until recently one of the Government Inspectors of Mines, the following are quoted as being the principal causes of this particular class of accident:

1st. From roof at face: From visible slips; from invisible (leaning) slips; from beginning to hole without previously securing the roof; from slips while pulling down an unsafe piece; from insufficiently supporting the roof when starting a long-wall drift from pillars; from not setting foreset posts as soon as there is room; from not properly posting top coal; from incautiously cutting top coal; from not supporting roof at top of jig; from not immediately supporting the roof after firing a shot; from removing a post without previously setting another; from insufficiently supporting the roof while finishing a drift near faulty ground and by the giving away of the posts; from not setting posts nearer to the face than 6 ft. while slicing an old pillar with gob on three sides; from reeling out of several posts while slicing a pillar; from not drawing the back timber, owing to the waste being too wide; while timber drawing; while robbing gob pillars in post and thurl; while incautiously entering a gob for examination or for getting stones to pack with; while setting timber.

2d. From sides at face: (a) While holding by insecure spragging, under peculiar conditions; by insufficient stamping of sprags; by improper setting of sprags in steep mines; by breaking of overhanging coal over sprags; by passing in front of the coal after having drawn the sprags; by dislocation of adjoining piece of coal through concussion produced by a shot; whilst resetting a sprag; by a fall of bottom stone while preparing to hole and neglecting to sound the face; (b) while pulling down coal or stone at a steep inclination; by injudiciously standing in front of the coal; by working at the coal when only half fallen.

3d. From roof in roads: While loosening a post in a level without previously setting a foreset post under the bar; while robbing coal in a dip near a fault to make up a load; while setting timber; while riding in an empty or upon a full tub by its getting off the rails and striking a post with sufficient force to draw it from under the bar.

4th. From side in roads: From not protecting high side of level or dips in steep mines.

The presence of gas in a seam of coal or in the roof or floor has no doubt often been the cause of accidents, by forcing out of position both coal and stone without any previous warning whatever. This gas generated from the coal sometimes finds its way into the adjacent strata, especially if the latter are at all porous, and exists in a very high state of tension; so that as the workings advance and approach this pent up gas a time arrives when it bursts out a piece of coal or stone, which falling may strike the unfortunate workman.

If anything exists to retard the escape of the gas in either the roof or floor of the seam, an accumulation may occur, when a large fall of roof or upheaval of the floor may occur, and injure any person who happens to be near at the moment. Where these outbursts of gas are known to be likely to occur it has become a safeguard to bore holes up into the roof and into the floor at stated intervals, to tap the gas and so relieve the pressure.

No doubt exists but that the atmosphere exerts influences in some seams, especially on the roof and sides, which tend to loosen the stone, and so cause it to fall. I believe this action has more effect on shallow seams than the deep ones, chiefly perhaps owing to the former having been subject to a much less pressure on account of its position, together with the fact the deeper the workings the higher the temperature.

THE POSSIBILITY OF EXTRACTING PRECIOUS METALS FROM SEA WATER.

The presence of silver and gold in sea water has long been known, but no economical method has ever been invented for extracting them. The investigations of Mr. C. A. Münster described in the *Norsk Tekniak Tidsskrift*, and his proposed method of dealing with the matter will be of interest: Sea water was taken from Kristiania Fjord, and 100 litres were evaporated to dryness, giving 1,830 grms. of residue. This was ground and divided into portions of 800 grms., each of which was mixed with 100 grms. of litharge, 100 grms. of pure  $\text{KNaCO}_3$ , and 4 grms. of carbon from starch, and the silver and gold determined. The result was: 19 mgrms. silver and 6 mgrms. gold per ton of average sea water. By check experiment this result was modified to a final result, the effect of which was that one ton of average sea water contains 20 mgrms. of silver and 5 mgrms. of gold per ton, worth respectively 0.06 and 0.38 of a cent.

Considering the extremely small amounts of precious metals present, the author considers that no method of precipitation in tanks can possibly be successful. He thinks that the precipitation must be effected in the sea itself, where the water is continuously renewed by a natural current. He proposes that a channel about 60 metres wide between two small islands, well sheltered from sea or wind, where there is a current of about 4 metres per minute, should be selected for the experiment, such rocky islets being common off the Norwegian coast; across this channel 60 plates of galvanized iron, each 2 metres  $\times$  3 metres, should be arranged at an angle of 30° to the stream, and an electric current be sent through the series to precipitate the precious metals. The power required theoretically for this purpose he calculates at only one-half h. p., and he thinks that to produce a current of such trivial potential difference in practice would only require a few horse-power, which could cheaply be obtained from water-power, wind, or even by the thermo-electric principle utilizing the difference of temperature between the sea and the air. The large anodes required could be cheaply prepared from wood, impregnated with graphite and tar, and carbonized, high conductive power not being required for such a feeble current. If all the precious metals passing these plates were precipitated, he calculates that over \$1,500,000 would be obtained per annum, and as the working expenses would be most trivial, if only  $\frac{1}{100}$ th or even  $\frac{1}{1,000}$ th of this amount were obtained, it would still pay well; he therefore thinks the experiment well worth a trial.

According to the *Colliery Guardian* M. Daubrée, professor of geology at the Ecole d'Histoire Naturelle, Paris, has found that the temperatures attained in several processes are not nearly so high as is generally supposed; for instance, that of the Bessemer converter is from 1,330 to 1,580° centigrade; molten steel from 1,580 to 1,640°; the Siemens furnace from 1,045 to 1,190°, and incandescent electric lamps from 1,800 to 2,100°.



GARVIN DIE SLOTTER.

To manufacturers and others making numbers of punches and dies, the machine shown will be of special interest, for there is an undoubted advantage in using a slotter.

The machine appears to combine the special features desired in a tool of this kind. The two cross-motions and the rotary table provide for following any outline, and the arrangement of handles is convenient and avoids mistaking one for the other. The handle for the rotary table has provisions for using dials for dividing purposes. For small numbers of divisions and for rapid work the worm-shaft can be pulled out, and a lock-pin arrangement used for indexing the table, the handle for which is shown at the left hand side. The handle for raising and lowering the knee is conveniently placed on the side of the knee (not shown in the cut). The stroke of the machine, after due consideration, has been fixed at 2½ in., which is more than sufficient for the class of work intended and affords a more solid arrangement than the usual adjustable pin. The work can be brought into proper relation to the stroke by raising the knee; and for thin work, since the cutting is done at the last or slowest part of the stroke, the number of strokes can be increased by means of the cone pulley, which thus fully compensates

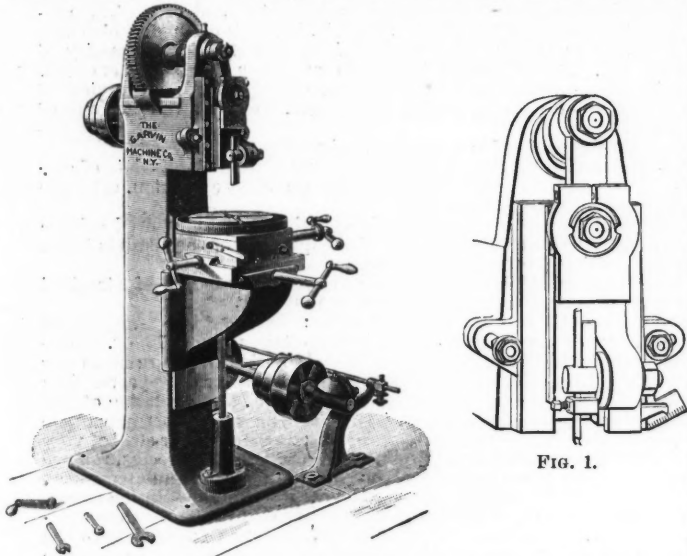


FIG. 1.

for any surplus stroke. To give the required draught to the die, the slide for the ram can be swivelled either way and set by the graduated index shown. With this arrangement the draught is the same in every part of the die. The tool block is well adapted to hold special tools, such as the one shown in Fig. 1. The tool is cleared on the return stroke by an ingenious arrangement, shown more clearly in Fig. 1. The tool block swivels on a center near the lower edge, and at the upper end, carried in a yoke, are two hardened plugs which bear on a cam, which is bushed into the lower end of the connecting rod, and derives a partial rotary movement from the action of the rod, and by this motion locks the tool block. As an instance of what can be done on the machine, it is claimed a typewriter key, 10 in. long and ½ in. wide at the narrowest part, was machine finished in six hours. A die for armature rings, 5 in. diameter, with 36 notches, ¼ in. wide, ¼ in. deep, was done in two hours. The maker is the Garvin Machine Company, New York.

**Nickel and Ferronickel.**—According to a patent of Garnier, crude nickel, with a basic flux of magnesia, calcined dolomite or chromic iron ore is melted in a water-jacket furnace with a hot blast. Silica and arsenic can be almost entirely removed by blowing air through the molten metal. For this purpose the tuyeres are arranged in series one above the other. Then the remainder is so manipulated that the nickel alloy and slag run out simultaneously into a Gore's hearth, under the influence of the blast. The flux for refining iron or copper nickel consists of coke and a mixture of 75% bases (chalk, magnesia and barytes) and 25% feldspar or salt. The resulting alloy is free from non-metallic elements. If nickel steel is required this alloy is remelted in a Siemens or Bessemer converter, or according to the crucible method. Pure nickel is prepared from the iron alloy by strong oxidizing action in a charcoal refining furnace or upon an open hearth furnace. Converters can also be used for this purpose. After the last traces of iron are blown out the nickel always contains oxygen, which must be removed by the reducing action of manganese, magnesium, aluminum or zinc, added in the form of nickel alloy.

**A Large Masonry Dam.**—A dam has lately been completed in India in connection with the new water works for the city of Bombay. It is situated 65 miles north from Bombay, and stretches across the Tansa Valley. The dam is about two miles in length, 118 ft. high, 100 ft. thick at its greatest depth, 15½ ft. at the top. The lake which will be formed when the valley is full covers an area of eight square miles, and it is expected will furnish a supply of 100,000,000 gallons per day throughout the year. The dam has been five and a half years in process of construction, and from 9,000 to 12,000 men and 800 carts and animals have been employed upon it during each working season, from October to May. The difficulties of construction were very great. The sand and cement of which it is composed had to be carted for many miles. Over 14,700,000 cu. ft. of rubble stone were used, over 2,200,000 cu. ft. of lime, and over 3,300,000 cu. ft. of washed sand. The excavations of rock amounted to over 6,700,000 cu. ft. The masonry work in all was over 11,000,000 cu. ft. The contractors were Glover & Co., of Edinburgh. The executive engineer was J. B. Clarke. The water is conducted from the dam to Bombay in iron pipes 48 in. diameter, laid above ground. Each length weighs about four tons. The aggregate weight of the pipes is 50,000 tons.

GEOLOGY OF THE IRON ORES OF CHILI.

According to *Stahl und Eisen* for April, Chili possesses a great number of iron and manganese mines. Geologically, Chili is divided into three regions by the parallel chains of the Coast and Andean Cordilleras. The first consists of crystalline rocks, granite, diorite, etc., and mica and clay slates, while the true Andes consist of sedimentary rocks of Jurassic and Triassic age, superimposed on metamorphic rocks, of eruptive rocks upheaved at the time of the diorites, and others analogous to those of the coast range. The three regions mentioned are as follows: First, between the coast and the contact line of the Jurassic. The chief rocks found in this belt are granites, syenites, diorites and green porphyry flecked with epidote. In this belt are found the most important beds of iron ore, they being richer, purer and larger than those found in the other belts. Among these deposits, which also contain manganese, are to be especially mentioned those of Mejillones, Antofogasta, Taltal, Chafaral, and those recently discovered in the south at Lebu. In this belt are also found the largest and most important deposits of copper, gold and kaolin. Second. The second belt includes the Jurassic formation, and stretches easterly to certain heights of the Andes. The country-rock consists of limestone, marl, barytes and gypsum, lying one upon the other in compact strata. Beds of iron and manganese ore are found at Sierra Gorda, Tuncal, Tierra Amarilla, and very rich deposits at Tres Puntas in Atacama. Beds of manganese are also found at different places in Coquimbo. In this belt occur the large rich deposits of silver ore at Chafarillo and Coracoles. Third. This belt extends from the last to the limit of plant growth in the Andes. The country-rock consists of conglomerates, brecciated porphyry, hardened clay, sandstone and red porphyry, and other metamorphosed rocks, all being formed during the Lias. In this belt is found the spathic deposits of Chizbla. Iron is also found associated with manganese at Challacollo. Titaniferous iron ores occur in the western part of Atacama. Until the present, proper attention has not been given to iron production, the ore having been used chiefly as a flux in the treatment of silver ores, for which purpose large quantities were mined. All the manganese ore mined is exported, no use of it being made in Chili. That shipped from Huasco contains from 45 to 54% manganese. It is sent to England by a special agent, and brings, when not containing over ½% Cu., 1s. 4d. per unit of Mn.

MINERAL PRODUCTION OF ITALY IN 1890.

	1890		1889			
	Number of mines.	No. of workmen.	Tons.	Value.	Tons.	Value.
Iron ore.....	44	2,434	220,702	\$483,203	183,489	\$377,447
Manganese ore.....	4	89	2,147	10,414	2,203	10,468
Copper ore.....	38	1,593	50,378	371,540	48,214	288,305
Zinc ore.....	34	2,797	110,926	2,430,529	97,059	1,631,555
Lead ore.....	65	2,504	32,187	1,301,539	36,891	1,412,469
Lead and zinc ore.....	27	4,004				
Silver ore.....	8	1,200	1,750	420,195	1,997	349,733
Gold ore.....	21	505	8,296	104,320	10,632	100,685
Antimony ore.....	46	329	891	65,741	563	20,014
Mercury ore.....	14	617	449	533,994	383	434,889
Iron pyrites.....	5	366	14,755	37,719	17,022	49,298
Fossil fuels.....	38	2,817	376,326	581,253	390,320	571,630
Sulphur.....	504	30,503	369,239	5,653,058	371,494	4,930,575
Rock salt.....	18	407	17,099	51,660	18,475	57,297
Salt from brines.....	2	198	9,879	67,799	10,015	54,029
Asphalt and bitumen.....	20	729	45,125	240,779	29,844	108,207
Petroleum.....	9	177	417	24,120	177	10,100
Mineral waters.....	1	7	3,580	5,941	3,500	5,700
Alum.....	1	84	5,000	5,000	5,000	23,000
Boric acid.....	11	497	2,824	301,424	2,573	249,310
Graphite.....	9	47	1,735	4,656	1,531	2,144
Totals 1890.....	919	52,104	1,273,705	\$12,765,386		
Totals 1889.....	802	48,961	1,222,187	\$10,710,851		
Increase.....				\$2,054,535		

**The Soldering of Aluminium.**—A new method of soldering aluminium has been patented. The process consists simply of sprinkling the surfaces to be soldered with chloride of silver and then melting down the solder as usual. This method gives, it is said, excellent results.

**Testing Armor Plate.**—As a result of the test of a piece of armor, the Government will at once accept 20 diagonal plates for the battle ships Indiana and Massachusetts, aggregating about 890 tons, and representing about a value of \$500,000. The piece which was tested is one of the thickest pieces of armor ever manufactured in this country, being 14-inch nickel steel diagonal plate. It was subjected to an unusually severe test, more severe, in fact, than the standard of tests adopted by foreign countries. A 10-in. gun was used, the projectile weighing 500 lbs. with a powder charge of 140 lbs., giving a striking velocity of 1,410 ft. a second. None of the three shots fired succeeded in getting far enough into the plate to show the backing. All three shots rebounded, one of them back to the muzzle. The deepest penetration was 14 in. One of the projectiles, an imported Firth, broke, while the American projectile was uninjured.

**Composition of a Meteorite.**—A meteorite weighing 10½ kilogrammes (23½ lbs.) fell recently at Lundsgarden, O-Ljungby, Scandinavia. Prof. Otto Nordenskiöld gives an analysis of it in *Neues Jahrbuch für Mineralogie*. It is a chondrite, and is inclosed in a black fused crust. The gray silicate mass contains, in addition to bright metallic grains, darker grains of sulphur-iron. The composition of the nickel iron (soluble in HgCl<sub>2</sub>) was: Iron, 80.67; nickel, 16.24; cobalt, 0.17; copper, 0.34. The residuum (soluble in hydrochloric acid), after deduction of the sulphur and phosphorus, had the following composition: SiO<sub>2</sub>, 36.38; FeO, 22.89; NiO, 0.12; CaC, 0.64; MgO, 37.97; K<sub>2</sub>O, 0.54; Na<sub>2</sub>O, 0.32; it was, therefore, nearly pure olivine. The matter insoluble in hydrochloric acid consisted of SiO<sub>2</sub>, 56.77; FeO, 9.09; Al<sub>2</sub>O<sub>3</sub>, 6.95; CaO, 2.93; MgO, 21.29; K<sub>2</sub>O, 0.54; Na<sub>2</sub>O, 3.32; it was, therefore, substantially bronzite. The whole meteorite was composed of nickel iron, 11.76; olivine, 40.98; bronzite, 38.86; troilite, 6.55; phosphorus-iron, 0.55; chrome iron, 0.87; carbon and soluble salts, 0.52.

## FAILURES IN BOOMED TOWNS; FLORENCE, ALA.

Written for the Engineering and Mining Journal by H. S. Fleming.

Florence, Ala., which lies immediately across the Tennessee River from Sheffield, is an old town with historic associations well remembered by those who were near it during the eventful years of 1863-'64-'65. After that time and until 1880 its population increased but little; from then until 1885 there appeared to be a gradual awakening, and, in 1886, stimulated by the sudden growth of its new neighbor, Sheffield, there was a strong effort made to outdo the latter place, which resulted in the formation of a number of land companies which purchased and laid off into streets and lots much of the farm land surrounding the town. They secured, also, the location there of a number of small industries and issued many circulars which prophesied in glowing language the great future in store for the place. For a short time fabulous prices were asked for property in the old town and surrounding country, but as purchasers were not plenty the figures came down, and many transfers of real estate were made.

As usual, the superiority of the place as an iron-making center was first and foremost in the list of attractions set forth, and the inevitable blast furnace was duly erected by the North Alabama Furnace, Foundry and Land Company, and the foundations of another one commenced by other parties. When, later on, the excitement of the "boom" had passed, prices fell to a low figure, and remained so for a considerable time. Attempts were made to renew interest in the place, but met with little outside encouragement until the Florence Cotton and Iron Company, an organization composed largely of Philadelphians, purchased the site and foundations of the second furnace mentioned above, also a number of "town lots," some property on which is an old-fashioned cotton mill and gin, and some land in Wayne County, Tenn., on which there is said to be excellent indications of iron ore. This company has made strenuous efforts to urge forward the flagging spirits of the citizens, and, aided by such as still believe that there is a great future in store for Florence, has advertised it widely both to benefit the town and to aid in the sale of their own stock. In the latter they have apparently been successful, as the blast furnace which they erected on the foundations referred to is nearly completed, and, it is reported, will go into operation this spring.

The advantages claimed are that the place is on the navigable portion of the Tennessee River, within the easy reach of the brown hematite deposits of Tennessee and northern Alabama, and also of the Warrior coal field in the latter state, with the additional advantage of close proximity to the "cotton belt" of the South; a healthy climate, good location for drainage and other sanitary conditions. These claims, if fully warranted and supported by the necessary railway facilities, would certainly bring the town to the front rank of Southern cities, but every place has its faults and Florence has them in common with other "boom" towns. In pleasant surroundings and general healthfulness there are few places better situated, but in manufacturing pig iron there are some difficulties to be overcome which will tax the manufacturer's ability to the utmost.

The North Alabama Furnace, Foundry and Land Company, which built and operated the first furnace, had a well equipped plant capable of turning out 100 tons of iron per day, but after running for some time in a desultory manner, it was blown out and is now on the market "for sale or lease on favorable terms." Their prospectus was as edifying as that of the Cotton and Iron Company and they certainly had as many points in their favor. The difficulties which they failed to surmount are the same that the new company must meet, and it remains to be seen if they will have any better success.

Limestone, while found in great abundance in and around the place, must be selected from certain layers in the ledges, as it is not uniform in quality; some stone taken from the same quarry which supplied the North Alabama Furnace gave as high as 8.63% silica while that which was being selected for use averaged silica, 3.74; carbonate of lime, 95.01; this necessitates extra care and consequently some extra expense, but even then it can be delivered in the stockhouse for \$0.70 per ton. It is worthy of note that with all of this limestone in the vicinity, the furnaces at Sheffield as well as that in Florence have frequently been compelled to bank, to allow their limestone stock to accumulate, and the same has been the case with regard to ore and coke.

The ore deposits of Wayne County, Tenn., are said to be quite extensive and easily mined; much similar to those in Franklin County, Ala., but with more chert in the "ore clay." It is not quite as high in iron but works as well in the furnace. A sample taken from the stock house of the Alabama furnace gave: Iron, 48.03; alumina, 4.61; silica, 10.74, and represents a fair average of the ores from that section, which cost from \$1.80 to \$2 delivered in Florence.

Coke must be brought from Pochantas, Jasper or the district around Chattanooga. The first, which is by far the most satisfactory fuel, costs \$4.15 to \$4.25 delivered; that from Jasper, which is high in ash and sulphur, besides being weak in structure, costs \$2.75 to \$3 delivered, and coke from the Chattanooga district, which is least satisfactory of all as regards composition, would cost between \$3 and \$3.50; all a little higher than at Sheffield, owing to the high toll charged to cross the Tennessee River bridge.

With these figures, and presuming that one-half Pochantas coke is used, with an equal amount from Jasper, it is possible to get a very fair idea of what it will cost to make pig iron in this place, and the figures correspond well with the results obtained by the North Alabama Furnace Company:

2 1/2 tons ore, at \$1.80.....	\$3.78
2,250 lbs. coke at \$4.15 and \$2.75.....	4.31
5 tons limestone, at 70 cents.....	.35
Cost of material.....	\$8.44
Labor and other items.....	3.25
Total.....	\$11.69

The freight to Chicago is \$3.60; to Cincinnati, \$2.50 and to Louisville, \$2.25. An examination of the current selling price at these places will show what an exceedingly small margin there will be unless the iron made is of sufficiently good quality to sell at more than the market quotations for Southern iron.

While the production of pig iron may not be a paying business when

heavy freight rates to the market are encountered, it might be so were the iron sold locally to other industries which would work it up into stoves, wrought iron or any of the multitude of small things which are required by every family. Such establishments would aid the furnace, and reap a profit for themselves, and, apart from iron; mills or factories to work wood into boxes, barrels, spokes, furniture or what-not, or cotton into cloths, will have an excellent opportunity of succeeding here; with a pleasant and healthful climate for employees, good timber and abundant cotton in the surrounding country and a market which only requires capital and patience to replace Northern made goods with those made in the South, there is a chance for investment in these lines which, under proper management, should repay those who try it.

## NEW RAPID METHOD FOR THE DETERMINATION OF PHOSPHORUS IN IRON, STEEL AND ORES.

By James O. Handy.

At the meeting of the Chemical Section of the Engineers' Society of Western Pennsylvania, held on the 24th of March, Mr. James O. Handy, chemist of the Pittsburg Testing Laboratory, described a specially rapid method of determining the phosphorus in iron, steel and ores. The process is really a simplification of Mr. C. E. Manby's method, which was first described in the *Journal of Analytical and Applied Chemistry* of February last. In our issue of April 30th we gave a short abstract of Mr. Handy's paper, together with the discussion which ensued; but in view of the interest which the new process has created we give a full account of it herewith.

The method consists of the three following steps:

First—Separation of the phosphorus as pure phospho-molybdate of ammonium, by washing with neutral potassium nitrate solution, after the regular washing with 1% nitric acid.

Second—Solution of the pure phospho-molybdate in a measured volume of a standard hydrate solution; a definite quantity of the alkali is taken up in neutralizing the phospho-molybdate.

Third—Titration of the excess of sodium hydrate by means of standard nitric acid; phenol-phthalein is used as the indicator.

The details of the process are as follows: Dissolve two grammes of steel in 75 cc of nitric acid (sp. gr. 1.13) contained in a 12 oz. Erlenmeyer flask. Add 15 c.c. of permanganate solution (five grammes per liter) to the boiling solution and boil until the pink color disappears. If a brown precipitate of oxide of manganese remains, the oxidation of the carbon and phosphorus is complete. The above amount of permanganate is usually sufficient, and need only be increased when iron or steel of very high carbon is being analyzed. Now, as in Dr. Drown's process, remove the flask from the flame and add about .03 gramme of granulated sugar.

Replace the flask on the flame and heat it until the solution clears. Then take it off again, and, after allowing it to cool for two or three minutes, add 10 cc. of ammonia (sp. gr. 90), taking care to pour it down the side of the flask, so that no loss by spattering shall occur. Agitate the contents until, in a moment, the ferric hydrate is redissolved. Insert a thermometer and bring the temperature down to 85° C. Add 50 cc. of molybdate solution, causing it to rinse off the thermometer as it flows into the flask. Then insert a rubber stopper, and after wrapping the flask in a towel or inserting it in a shaking-box, shake it well for five minutes. Afterward filter the solution, using a 9 cm. Swedish filter paper and moderate suction. The precipitation is complete, and the precipitate shows no tendency to run through the filter.

Wash out the flask, wash the filter and its contents five times with 1% nitric acid; then wash five times with .1% potassium nitric solution (1 gramme per litre). Place the filter and contents in the flask, and add from a pipette 10 to 20 cc. of standard sodium hydrate solution. Shake for a moment, until the yellow precipitate is dissolved, and then dilute with water to about 50 cc. Add three drops of phenol-phthalein solution, and filtrate with standard nitric acid until the pink color disappears. The cubic centimetres of standard sodium hydrate used in neutralizing the yellow precipitate represent the hundredths per cent. of phosphorus in the sample analyzed.

In applying the method to pig iron, it is my practice to filter off graphite as soon as the iron has been dissolved in nitric acid. The procedure after that is the same as for steel.

Iron Ores.—I dissolve 2 gm. in concentrated hydrochloric 50 cc., and concentrated HNO<sub>3</sub>, 1 cc.; evaporate the solution quickly to dryness and heat for five minutes on a hot plate. After redissolving in the minimum quantity of concentrated hydrochloric, dilute, filter and wash residue. Burn off filter-paper and treat residue in platinum crucible with a few drops of concentrated sulphuric acid and 3 cc. of hydrofluoric acid. Evaporate this quickly dry by reflected heat under the hot plate. Only a few minutes are required. Fuse the residue with 3 gm. sodium carbonate. Decompose the fusion with a small quantity of dilute hydrochloric acid, and add this solution to the hydrochloric solution. To the resultant mixture add concentrated ammonia till the liquid, after shaking, smells of ammonia. Then add concentrated nitric acid, shaking well, until the ferric hydrate redissolves and the first dark brown color of the solution disappears. Heat the solution to 85° C., and precipitate with molybdate solution. Continue as described in the analysis of steel.

Larger weights of ore are taken for analysis in the case of very pure ores. More hydrofluoric acid is required to decompose the residue from very silicious ores.

Several chemists of the Pittsburg vicinity have examined and adopted the process.

Reagents.—E. F. Woods' 1888 formula is used for preparing the molybdate solution; 1 lb. of molybdic acid is mixed with 1,200 cc. of water in a stoneware jar; 700 cc. of ammonia (sp. gr. '90) are stirred in, and the stirring is continued until all the soluble matter is dissolved; 300 c. c. of concentrated nitric acid (sp. gr. 1.42) are added to partially neutralize the ammonia in the solution. In each of four 2 1/2-litre bottles is placed a mixture of 500 cc. of concentrated nitric acid (sp. gr. 1.42) and 1,200 cc. of water. Pour 550 cc. of the molybdate solution through a funnel into each bottle, and mix the contents by giving the bottle a slight rotating motion. If the stream of molybdate solution flows quickly and continuously into the acid mixture, no separation of molybdic acid takes place. Both solutions may be hot when mixed. Little or no separation of molybdic

acid occurs afterward during storage, but it is always best to filter it just before it is used.

Pure yellow precipitate can be prepared from acidified ammonia or sodium phosphate solution by precipitating with molybdate solution. The precipitate is washed with 1% nitric acid wash, and dried at 100° C. It is kept in glass stoppered bottles ready for use. One-tenth of a gramme is used for standardizing the sodium hydrate solution for work on steels, etc., which contain from .05 to .15% of phosphorus. For high phosphorus work a quantity of phospho-molybdate is used approximately equal to the amount obtained from the analyses of 2 grammes of the metal. This precaution avoids the multiplying of the excess of nitric acid, which is added when titrating the excess of sodium hydrate.

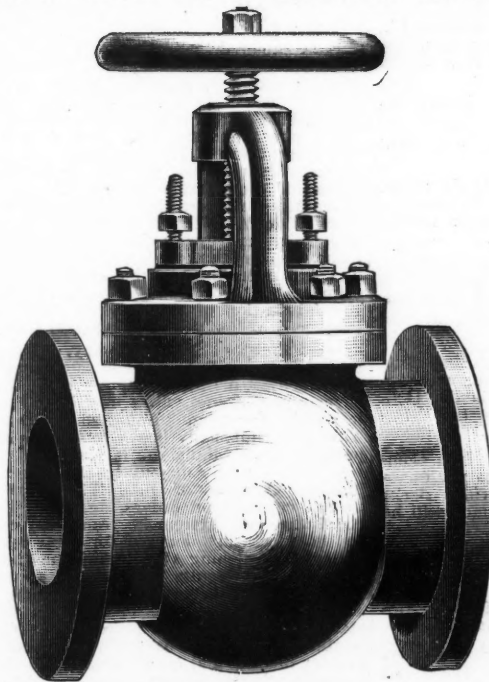
In preparing the standard sodium hydrate 15.4 grammes of it are dissolved in 100 cc. of water. Saturated barium hydrate solution is then stirred into the solution until no more precipitation occurs. The solution is immediately filtered, and the volume made up to two litres by the addition of distilled water; 200 cc. of this, made up to two litres, will make the standard approximately. For a stock solution of standard nitric acid, 200 cc. of concentrated nitric acid (sp. gr. 1.42) is made up to two litres, and 200 cc. of this stock solution is made up to two litres for the approximate standard solution. The standard acid and sodium hydrate solutions are then run against each other to ascertain their relative strengths, and sufficient water is added to the stronger to make the solutions equal in value. Next the sodium hydrate solution is run against .1 gramme of pure ammonium phospho-molybdate (this equals .00163 gramme of phosphorus). If its strength is too great add 60 cc. of water to two litres of the standard sodium hydrate solution. In order to preserve the equality of the acid and alkali solutions, add 60 cc. of water to two litres of the standard nitric acid.

In order to prepare the phenol-phthalein indicator, .5 gramme of phenol-phthalein is dissolved in 200 cc. of 95% alcohol. About three drops is the right amount for each titration.

Mr. Handy has taken great pains to prove that the results given by this process are correct, both by conducting a great number of tests with particular specimens of iron and steel, and also by comparing the results with those obtained by other methods. Without any special appliances, and without the use of suction, an analysis can easily be conducted by this method in 30 minutes, but the time will in all probability be shortened by one half.

**A HIGH PRESSURE VALVE.**

The increasing tendency toward high steam and water pressures has rendered the ordinary valve useless, as the pressure which these valves are designed to withstand does not exceed 85 lbs. The valve which is



shown in the accompanying engraving is designed for use under heavy pressure. It is similar in construction to an ordinary one, save that the bonnet is bolted on instead of being threaded. This valve is made in different forms and from 2 to 8 in. in diameter. The valve is the production of the McTab & Harlin Manufacturing Company, New York.

**Consolidating Water-Bearing Strata.**—The Neukirchen method for consolidating shifting sand in water-bearing strata consists in injecting powdered cement, by means of compressed air, steam, or water under pressure, into the ground to be consolidated. The cement is screened in order to free it from lumps and foreign substances, and the powder is taken by an injector, which forces it through a flexible pipe into a perforated tube sunk in the soil to the required depth.

**Volatile Compound of Nickel.**—In a recent number of the *Comptes Rendus*, M. Schützenberger describes experiments which apparently prove that nickel is volatile in presence of hydrochloric acid. Both when nickel chloride is reduced in a current of hydrogen and when hydrochloric acid is passed over finely divided nickel, traces of nickel chloride are found in the further part of the tube when heated to dull redness. Precautions were taken to prevent any mechanical conveyance of the nickel salt, so that the effect must be analogous to that of the action of carbon monoxide on nickel and iron.

**TEMPERED COPPER.\***

So-called tempered copper has been put upon the market by the Eureka Tempered Copper Company, samples of which were examined at the *Veruchsanstalt für Bau und Maschinen Material* with the following results, the investigation having been made by P. Kirsch :

**I.—CHEMICAL COMPOSITION.**

	Ordinary copper. Per cent.	Tempered copper. Per cent.
Silver.....	0.025	0.025
Copper.....	99.930	99.981
Zinc.....	.....	.....
Iron.....	0.082	0.088
Aluminum.....	.....	.....
Arsenic.....	0.046	0.042
Phosphorus.....	0.017	0.018
Total.....	100.101	100.154

As will be seen from the foregoing analyses, the difference of tempered copper from copper of ordinary commercial quality, as far as its composition is concerned, is but slight.

**II.—MECHANICAL PROPERTIES.**

The coppers of which the analyses are given above were mechanically tested, with the following results :

	Strength in kgs. per sq. mm.	Elastic limit in kgs. per sq. mm.	Extension. Per cent.	Contraction in area. Per cent.
Tension, tempered.....	18.14	8.05	18.0	26.7
Tension, tempered.....	19.58	7.67	23.5	36.6
Tension, untempered.....	16.30	7.13	21.0	36.6
Tension, untempered.....	17.17	7.08	22.5	35.7
Compression, tempered.....	39.38	10.42	28.0	.....
Compression, tempered.....	37.20	9.94	26.8	.....
Compression, untempered.....	33.12	9.62	27.4	.....
Compression, untempered.....	36.21	11.20	27.6	.....

\* 1 kg. per sq. mm. = 1,425.45 lbs. per sq. in.

The tests and analyses quoted above were carried out in America, and are quoted for the sake of comparison with those performed at the *Veruchsanstalt*, which were as follows :

(a) *Modulus of Elasticity.*—The modulus of elasticity determined on a specimen tested in tension was 10,050 kg. per sq. mm. The modulus determined by compression tests was 2,930 kg. per sq. mm., with a load of 2.5 kg. per sq. mm., and 1,020 kg. per sq. mm. with a load of 7.2 kg. per sq. mm.

(b) *Tensile Strength.*—Test pieces used: Sheet, 0.11 mm. in thickness, 50.2 kilos per square mm.; sheet, 0.13 mm. in thickness, 67.9; sheet, 0.55 mm. in thickness, 56.8; sheet, 0.64 mm. in thickness, 53.4; sheet, 1.19 mm. in thickness, 52.3; wire, 0.50 mm. in diameter, 31.8; wire, 0.80 mm. in diameter, 72.0; wire, 1.65 mm. in diameter, 52.0; wire, 2.60 mm. in diameter, 50.0; wire, 4.20 mm. in diameter, 47.6; rod, 87 mm. in diameter, 19.0.

The last named specimen had an elastic limit of 8.1 kilos. per sq. mm. A compression test was made in which deformation began when the load had reached 8.1 kilos. per sq. mm. The load could be increased to 219 kilos. per sq. mm. without producing cracks, although the test piece, which was originally 30 mm. in height, had been shortened to 7.8 mm.

(c) *Ductility.*—The extension given by the sheet varied between 0.2—2.0%, while that of the wire was 0.1—0.2%, and that of the rod 13.1%, while the contraction of area at the point of fracture of the latter was 33%. From these tests, as well as by winding tests with the wire, it appears that the material possesses great ductility.

The foregoing series of tests shows that tempered copper possesses properties that distinguish it from the ordinary material. Its strength in pieces of small section being noticeably high, although that of larger test pieces is by no means remarkable, as it shows the tensile strength of only 19 kilos. per sq. mm., while ordinary commercial copper gives 20—25 kilos. per sq. mm. Castings made of it are of good quality, and its electrical conductivity is high.

**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, MAY 24TH, 1892.

- 475,299. Machine for Bending Sheet Metal. Charles J. Colling, Cincinnati, O., Assignor to J. M. Robinson & Co., same place.
- 475,347. Ore Crusher. Frank A. Ross, Chicago, Ill., Assignor to Fraser & Chalmers, same place.
- 475,361. Metallurgical Furnace. Carl Siemens, St. Petersburg, Russia.
- 475,360. Amalgamator. James M. Thompson, San Francisco, Cal.
- 475,402. Process of Obtaining Metallic Zinc from Sulphite of Zinc by Electrolysis. Theodor Lange, Briesg, Germany.
- 475,433. Brick Kiln. Max A. Th. Boehneke, Centinela, Cal., and Donald D. McLean, Underwood, Canada.
- 475,454. Coated Metal Pipe and Method of Manufacturing the Same. William Lacy, Jr., Los Angeles, Cal.
- 475,471. Pulverizing Machine. Axel Sahlin, New Brighton, Assignor to the Cyclone Pulverizer Company, New York, N. Y.
- 475,483. Clay Reducer. Walfrid Burkman, San Francisco, Cal.
- 475,498. Process of Rendering Iron, Steel and Other Similar Metals Homogeneous. Joseph C. Fraley, Philadelphia, Pa.
- 475,557. Ore Sampling Device. Robert C. Hawley, Pueblo, Colo.
- 475,558. Process of Treating Mattes and Ores. Henri L. Herrenschnmidt, Petit Quevilly, near Rouen, France.
- 475,568. Apparatus for Cleaning and Grading Gravel, Ore, Etc. Nathan Jewett, Chicago, Ill.
- 475,609. Copper Smelting Furnace. Benjamin Richards, Middle Bank, Swansea, England.
- 475,647. Method of Splitting Rock. George L. Weller, Elyria, O., Assignor to Parks Foster and Eugene K. Mussey, same place.
- 475,651. Device for Heating Metal Rods. Alfred D. Williamson, London, England, Assignor to the Siemens Brothers and Company, Limited, same place.
- 475,715. Firing Apparatus for Use with Coal Dust. Carl Wegener, Berlin, Germany., Assignor of one-half to Paul Banmert, same place.
- 475,725. Process of Tempering and Hardening Metals. Joseph S. Durning, Emsworth, Pa.
- 475,741. T-Square and Drawing Board Attachment. Arthur T. Page, Minneapolis, Minn.

\* *Mithell. Techn. Gewerbe-Museums*, 1891, 261-267, through *Journ. Soc. Chem. Ind* for February, 1892.

## PERSONALS.

Mr. H. H. Schlapp, metallurgist of the Broken Hills Proprietary Company, of Australia, is at present on the Pacific coast, visiting mining districts.

Mr. Eben E. Olcott, mining engineer of this city, has been making a professional examination of the properties of the Pioche Consolidated Mining and Reduction Company, of Pioche, Nevada.

Mr. George F. Baker has been appointed first vice president of the Lehigh & Wilkes Barre Coal Company, vice Walter G. Oakman, resigned. S. M. Williams becomes second vice president.

Mr. Emil Starek has formed a partnership with Mr. C. F. Keller, electrical expert, and the firm of Keller & Starek, patent agents and attorneys, has opened an office in the Times Building, St. Louis, Mo.

Mr. T. Guilford Smith, wholesale coal merchant of Buffalo, has left his business, and now represents the iron and steel interests of Messrs. Carnegie, Bros. & Co., and Messrs. Carnegie, Phipps & Co., in that city.

Mr. James McFeggan, the general Western freight agent of the New York Central Railroad, in Buffalo, has resigned. He leaves the company after 45 years' continuous service, bearing with him a record for faithfulness, for zealous discharge of his duties, and with the esteem of all who know him.

Mr. James Clayton, of the Clayton Air Compressor Works, New York, was among the passengers on the Cunard steamer "Aurania," which sailed today for Liverpool. Mr. Clayton will spend a well earned vacation of about three months, traveling through England and France, and while in the former country will, for a time, be the guest of his brother, Mr. Thomas G. Clayton, the superintendent of the Midland Railway. Before his departure, Mr. Clayton was presented with a handsome gold watch by his employees.

## OBITUARY.

John Williams, one of the foremost citizens of the Lehigh Valley, died at Catasauqua, Pa., on the 24th inst., aged 68 years. For 47 years Mr. Williams was in the service of the Crane Iron Company. He was an officer of numerous local industrial institutions and vice president of the Catasauqua National Bank.

Charles A. Broadwater, of Helena, Mont., died on the 24th inst., aged 60 years. He was a pioneer settler of the State, and was actively identified with the financial, commercial, railroad, and political interests of this section. He was president of the Montana National Bank and president of the Montana Central Railroad.

William Van Auden died in this city on the 21st inst., aged 77. Mr. Van Auden was the inventor of many labor-saving mechanical devices. His first patent covered a machine for making railroad bolts and spikes. In 1850 he invented a railroad chair, which was the precursor of the fish plates now in common use. He produced the first machine for making spiral springs, and was seven years getting up a file-cutting machine. He invented mowing machines, locomotives, lubricators, trip hammers, sugar refiners and other machines.

James Thomson, late Professor of Civil Engineering at the University of Glasgow, died May 8th. His father was Professor of Mathematics, and his brother, Sir Wm. Thomson, Lord Kelvin, is Professor of Natural Philosophy in the same university. As a practical engineer his specialty was hydraulics. He invented the Thomson turbine and was the first to introduce this type of motor into English practice. A great public sensation was created when he undertook to replace an 80-ft. water wheel by a 6-in. turbine in a mountainous district in England. He wrote several deeply learned treatises on thermodynamics, atmospheric circulation, etc., and received most of the scientific honors in England, such as F. R. S. and LL.D.

## SOCIETIES.

On the 21st of April the chemical section of the Engineers' Society of Western Pennsylvania discussed Mr. J. O. Handy's paper, "Rapid Phosphorus Estimation in Iron and Steel." The committee appointed to check the method reported that a large number of analyses had been made and that they proved the exactness of the method when applied to pig iron and to steel of low carbon, but that it did not give good results with spiegeleisen and ferromanganese. The method has been adopted in several Pittsburg iron works, where, in the ordinary work, it gives more uniformly accurate results than the gravimetric method formerly used.

The sixty-second meeting of the American Institute of Mining Engineers at Plattsburgh, N. Y., announced in Circular No. 3, for June 21st, 1892, has been postponed for one week, and will begin on Tuesday evening, June 28th, 1892. This change of date has been made in consequence of the offer of the manager of the Hotel Champlain, situated at Bluff Point, about three miles south of Plattsburgh, to open the hotel in advance of the regular summer season, for the special entertainment of the institute, provided the date of June 28th could be substituted

for the earlier date first announced, at which time it would be impossible to have the hotel open. The superior comfort and enjoyment assured to members by this arrangement need not be argued to any one knowing, by reputation or personal experience the Hotel Champlain. Headquarters will, therefore, be established and sessions will be held in this hotel. The usual rate of \$5 per day will be reduced to \$3.50 for members and guests of the institute, and the reduced rate will be continued until July 6th, for the benefit of such as may desire to remain at Bluff Point over the Fourth of July. Communications and inquiries concerning local arrangements may be addressed to A. L. Inman, Esq., Plattsburgh, N. Y., acting chairman of the Local Committee.

The meeting of the Engineers' Club of Philadelphia, May 7th, was occupied by a continuation of the discussion of the "Trolley System." The general consensus of opinion was in favor of accumulator traction, though it was admitted to be more expensive than the trolley system or conduit systems, either cable or electric. Mr. P. G. Salom remarked that accumulator system showed an economy against horse power, as the space required for storing the batteries is so much less than the stable room of the horses. He also recommended the interposition of a resistance between the battery and the motor to take off the strain of starting. Mr. Carl Hering said that erroneous results are obtained if laboratory experiments on the discharge of accumulators are taken in estimating their life in actual practice. The strains due to stoppages and startings may be reproduced in laboratory tests, but the agitation to which the batteries are subjected in running wears away the material of the battery, due to the hurling about of the particles, and this it is impossible to reproduce in a laboratory test. Mr. T. Carpenter Smith, in speaking of city transit, stated that the erection of a surface trolley system would be an effectual barrier to the erection of an elevated road. In his opinion the overhead system and the conduit system are all faulty and inconvenient, and he hoped to see accumulator traction adopted.

## INDUSTRIAL NOTES.

The Midvale Iron & Steel Company will start in operation within a few weeks a new process for the manufacture of steel.

The Electrical Supply Company, of Chicago, Ill., has issued a pocket catalogue of 500 pages, 4½ by 3¼ ins. It is well condensed and is a useful work for ready reference.

The M. C. Bullock Manufacturing Company has opened a salesroom on the corner of Canal and Washington streets, Chicago, where they will carry a stock of their well-known specialties.

The Syracuse Steel Foundry plant, at Syracuse, N. Y., which was destroyed by fire in January, is ready to resume operations, having been rebuilt upon a modern and much improved plan.

The Warwick Iron Company's furnace at Pottstown, Pa., will be blown out about July 1st, it is said, in order to relieve the stack and make repairs. It has been in blast continuously since 1889, and has made a large iron output.

The property of the Principio Furnace, including 8,500 acres of land in Cecil County, Md., with improvements near Baltimore and New Castle, Del., was sold at auction on the 24th inst., to the Whitaker Company for \$100,000.

The Philadelphia & Reading Coal and Iron Company is reported to have issued orders to put in repair the Norway furnace at Bechtelsville, Berks County, and it is expected that the furnace will be put in blast at an early date.

The California Wire Works have made for the Omnibus Cable Company a cable 28,020 ft. long. Its diameter is 1¼ ins., and it weighs 72,830 lbs. It was inspected by the American Society of Mechanical Engineers, now in San Francisco.

The plant of the Boston Iron and Steel Company, at McKeesport, Pa., is now turning out about 115 tons of muck bar. This entire production is consumed by the National Tube Works Company, also of McKeesport, which concern is identified with the Boston Iron and Steel Company.

The Cambridge Roofing Co., with factories in Chattanooga, Tenn., and Cambridge, Ohio, makes a specialty of Crowl's patented steel roofing and they are also pushing their Sims' patent eave trough and cowgill hanger. Besides these specialties, they manufacture a full line of corrugated and V-crippled iron, standing seam iron roofing, beaded ceiling, metal weatherboards and roofing paints.

The Westinghouse Electric Company, of Pittsburg, Pa., has received the incandescent electric lighting contract for the World's Fair. The Committee on Grounds and Buildings, however, required a bond of \$1,000,000 as an evidence that the Westinghouse Electric Company would fulfill its contract, and gave it until June 10 to accept the terms. President Westinghouse will consider the terms before accepting them. He is quoted as saying that he thought the demand for \$1,000,000 was unjust.

Factory Inspector Connolly, of New York, has brought suit in Albany, N. Y., against the three prin-

cipal iron companies of the Adirondack region to recover a total penalty of \$6,000 for their persistent refusal to obey the law requiring weekly payments of wages to employees, which was enacted two years ago. The three companies and the amounts for which they are sued are: Shanley & Alfred, of Shanley, Franklin county, \$1,400; Crown Point Iron Company, of Crown Point, \$2,200, and the Chateaugay Ore and Iron Company, of Plattsburg, \$2,400.

The Berlin Iron Bridge Co., of East Berlin, Conn., will build the new power house for the Newport News Shipbuilding and Dry Dock Co., of Newport News, Va. In order to have the building absolutely fire proof, no woodwork will be used about the construction as the side walls will be of brick, the floors of iron and concrete, and the roof will be made with an iron frame covered with the Berlin Iron Bridge Company's patent anti-condensation corrugated iron covering. The steam, compressed air, hot air and electric light plant for the entire ship yard is concentrated in this one building, and it is therefore absolutely necessary that it be fire-proof in every particular.

The Passaic Rolling Mill Company have recently constructed a new templet shop at their works at Paterson, N. J. The building is 50x80 ft., two stories high, and situated in the material yard at a sufficient distance from the rolling mill and bridge shop to obviate all danger from fire. The building rests on brick piers at about 6 ft. above the ground, and therefore, instead of diminishing the yard room, provides an excellent storage place for light shapes and merchant iron. A portion of the building is devoted to a testing room, and has accommodations for inspectors representing the various railroads having contracts there.

Negotiations are under way for the removal of the greater part of the Vulcan steel plant at Carondelet, St. Louis, to Alabama, where it is expected that the basic process will be used. The St. Louis Ore and Steel Company, the corporation owning the Vulcan plant, also own one-eleventh of the basic patents. The works at Carondelet have been idle for several years, due to the facts that the company never made any money, and the mines of Missouri producing ore suitable for Bessemer pig metal are practically exhausted. The property of the company has recently been bought in by the bondholders under a foreclosure of the mortgage of \$1,000,000, which had been placed on it. They are conducting the negotiations referred to above.

It is rumored, says the Bethlehem "Times" that the Bethlehem Iron Company will soon erect another blast furnace. It is to be built on the eastern end of their works in a line with the other furnaces. It will be as large, if not larger, than any of the furnaces now standing. The work is to be started in the near future. The company use an enormous quantity of pig iron, and the probability of an increase of consumption in the ordnance department necessitates the erection of another furnace. The work of building the structure for the gun foundry is steadily progressing. It will adjoin the No. 2 machine shop on the east. It will be almost 1,000 ft. long and will make the machine shop and forge building twins as to size. It will contain the machinery for the fabrication of the finished guns, which are a large part of last year's \$4,000,000 contract.

The Frankford Steel Company, of Frankford, Philadelphia, have recently made some notable additions to their steel plant, including a new steam hammer, furnace and crane, and a new 52-in. lathe, 16 tons in weight, for rough turning shaftings and forgings. This is an unusually heavy tool of its class and capable of undertaking the largest work required. It was built for the company by the Baker Engine and Machine Company of Ohio. The works are running to full capacity on orders, and their prospects for the future are extremely promising, owing largely to the increasing demand for their specialty, Tindel's self-hardening steel, which has been found to give the best results when used for machine shop tools in heavy lathe and planer work and boring and turning mills, etc. The makers claim for this steel that by the Tindel process, in which the metal is allowed to harden naturally in the air, it acquires greater density and toughness, and is therefore particularly adapted for the above purposes.

The Pelton Water Wheel Company has recently furnished the Commercial Mining Company, of Arizona, a power plant which affords a good illustration of the extraordinary results that can be obtained from a small quantity of water under a high head, as also the estimate of value placed upon water power where so large an outlet is made for a comparatively small amount of power. This plant consists of a 4-ft. Pelton wheel, which runs under a 1,200-ft. head at 699 revolutions a minute, developing 45 H. P., using a nozzle tip 53-100 of an inch in diameter; also a 24-in. Pelton wheel running under the same head at 1,380 revolutions, developing 20 H. P., with a nozzle tip 35-100 of an inch diameter. These wheels run a concentrating and smelting plant, including rock breaker, blowers, pump, etc. The pipe line is 20,000 ft. in length, the upper end being 6 and 5-in. casing and the lower end 5-in. lapweld pipe. All the water supply that can be counted on during the dry season is a flow of about 30 cubic feet per minute. The large expenditure here made in pipe line for results obtained will indicate the advantages of the utilization of water power even under much more unfavorable conditions that generally exist.

**Powerful Turbines for Niagara.**—The new pulp and paper plant of the Cliff Paper Company, at Niagara Falls, is to be supplied with new designs of the horizontal shaft, double discharge, Leffel wheels, built by James Leffel & Co., Springfield, O. The contract for this work was signed by the Cliff Paper Company and James Leffel & Co. on the 13th of May, after the Cliff Company had made a full and careful investigation of the merits of various wheels presented during the past year for their consideration. Each of these turbines is to develop 1,100 H. P. and is to be built essentially upon the plan of their style No. 23, illustrated in the pamphlet of James Leffel & Co. These wheels will connect directly to the pulp grinder shafts at each end of the wheel shafts, without belts or gearing. This water-wheel company has celebrated its thirtieth year of continuous business in this line of work. It has added many improvements to the Leffel wheel in the past two years; and has designed a large number of new styles, incorporating in them the best ideas of its large experience. The manufacturing plant of this company has also been recently greatly extended; and various pieces of new, improved and heavy machinery added; all adapted to the heavy water-wheel work it is now manufacturing. It shipped some time since one Leffel wheel and casing weighing forty-five tons; also filled one order for nineteen large wheels for a pulp and paper company.

#### MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

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

Any one wishing to communicate with the parties whose wants are given in this column can obtain their 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 goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

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

#### GOODS WANTED AT HOME.

2,678. Four hundred and fifty yards 12 to 16-lb. T rails for tramway; also two clay cars to take clay from bank to mill. Florida.

2,679. Logging, box and flat cars, and perhaps a small locomotive for wooden rail; all 3-foot gauge. Virginia.

2,680. A light dummy engine for a street railway. Virginia.

2,681. Iron saw tables and saws; machinery for cutting and shaping soapstone for stationary laundry tubs; channelers, gadders, or rock drills for blocking out stone; gang saws; an engine from 30 to 40 H. P., and a boiler 40 to 50 H. P. Virginia.

2,682. A pair of bending rolls not less than 6 ft. 6 in. between the housing; new or second-hand. Tennessee.

2,683. A bending machine for bending ox bows; also a bolting saw for bolting small timber. Mississippi.

2,684. Eighty to one hundred tons second-hand steel rail equivalent to 60 lbs. steel when new. Connecticut.

2,685. Machinery to make soft coal into briquettes or eggettes. Texas.

2,686. A lath mill and bolter combined, capacity 25 M. to 30 M. Virginia.

2,687. An engine and boiler of about 12 or 13 H. P. South Carolina.

2,688. A 50-saw gin feeder and condenser; also a large roller gin for ginning long cotton (Sea Island). Georgia.

2,689. Forty-pound rails for broad gauge road, 35 miles long; also a 35-ton locomotive, fishplates, spikes, dump cars, logging cars, etc. Florida.

2,690. Stave mill, shingle mill and sawmill, with a capacity of 100,000 ft. per day. Florida.

2,691. Hoisting engine, screens, dryers, crushers, pulverizers, etc., for phosphate rock. Florida.

2,692. Eleven and a half miles 35, 40, 45 or 50-lb. steel or iron rail, old or new, and may be mixed lots; also nails and fastenings for above. Virginia.

2,693. A second-hand 30-ton freight locomotive and tender (if in good order), standard gauge about 14x20 in. cylinders. Virginia.

2,694. Five to ten flat cars, standard gauge. Virginia.

2,695. Sawmill, engine, locomotive and cars for logging; also working machinery, boiler, feeder, etc., either new or second-hand. Virginia.

#### GENERAL MINING NEWS.

##### ALASKA.

**Denver-Summit Gold Company.**—This company has been organized in Boston with a capitalization of 500,000 shares at a par value of \$1 to work four locations situated in the mining district of Admiralty Island, Alaska. There are said to be two veins on this property well defined and showing a good character of ore of regular value. One of these is a contact vein which is crossed by a fissure vein running north and south. The richest ore body is said to occur at the intersection of the two veins. Mr. Winthrop W. Fisk, mining engineer of Juneau, Alaska, has reported on the property. A number of shares of this company are offered at 10 cents per share in blocks of 250 shares or more. It is stated that in a few days the price will be advanced to 12½ cents. The officers of the company are: Harrison L. Fisk, president; Fred L. Gleason, secretary, and Benjamin A. Ball, George M. Bond and M. T. Burnett, trustees. The general office is in Boston.

##### ARIZONA.

###### Maricopa County.

**Phoenix.**—The announcement has been made of a strike of 2 ft. of coal on the Verde River, a short distance from that city. The vein is reported to crop out on the surface for a long distance, and the opinion is that a large deposit exists in that vicinity.

###### Pima County.

**Hermosa.**—The lessees of the Hermosa mine, owned by James Finlay, Messrs. Powers, Davis & Co., have between 500 and 600 tons of ore ready for treatment, and other men who hold leases on other mines in the neighborhood have more or less ore that will be treated during the present run of the mill. These combined lots of ore will be sufficient to keep the mill running for five or six weeks.

##### CALIFORNIA.

(From our Special Correspondent.)

The suit of Manuel Eyre against the directors of the Gould & Curry Mining Company (Nevada), is on trial in the Superior Court, and is of importance to mining men generally. The suit has been instituted to recover \$2,000 for failure on the part of the defendants to post the monthly account of receipts and disbursements of the company in its office, in accordance with the requirements of the law. It is one of nine similar actions brought by Eyre against Comstock Mining Companies, the aggregate amount claimed being \$18,000, and the present suit being a test case. In June, 1889, judgment was given the defendants in a similar action brought against the directors of the Consolidated Imperial Mining Company, which judgment was reversed on appeal to the Supreme Court with costs.

At the Democratic convention held this week at Fresno, a plank was introduced in the platform which has given the utmost satisfaction to mining men. All friction having ceased between the ranchers and the hydraulickers, the action of the convention in embodying the following resolution in its platform, is commended by business men generally irrespective of party: "Resolved, That we deem it the duty of Congress to make ample appropriations for the rectification and restoration of the navigable rivers of this State; that such appropriations should be expended in the improvement of the channels and in the construction of restraining and impounding dams; that such dams should be erected at such places and of such dimensions and capacity as will restrain the debris now in the channels and also the amount that will hereafter be deposited in the tributaries of said rivers by natural or mining washings, thereby preserving the navigability of the rectified rivers and also restoring the great industry of hydraulic mining; that we deem the passage of the mining bill introduced in the House of Representatives of the United States by Hon. A. Caminetti to be of vital importance to the people of the State. That in view of such fact we urgently request the delegation in Congress from this State to co-operate in securing the passage of said act at this session, in order that hydraulic mining may be speedily resumed.

In Michigan, Pennsylvania and other States, the mining companies are required to build their own impounding dams, and the reliance of the California farmers and miners on Congress to build dams for them is likely to be disappointed. The miners and farmers should arrange matters themselves and not look to the general Government to help them.

##### Butte County.

**Resumption.**—This mine is situated about two miles southwest of Hurlston, and is about 300 yards from the Phoenix. Some work has been done on the lode in the past, but this rich quartz was discovered about the middle of March. The ledge has been followed for a distance of about 1,000 ft. At the top the lode is only about eight inches wide; but it has widened to two feet in the bottom of the shaft.

##### Mono County.

(From our Special Correspondent.)

**Bodie Consolidated Mining Company, Official.**—The stopes above the 500-ft. level of the Jupiter shaft are yielding ore averaging about \$30 per ton.

**Mono Mining Company, Official.**—In the Mono mine the usual prospecting work is being done, and they are extracting the usual amount of ore. The mill has been kept running steadily. Average of battery samples, \$41.66 per ton; tailings, \$7.14 per ton.

**Summit Mining Company, Bodie.**—About 12 ins. of pay ore shows in the north drift, 100 level, which has been extended 10 ft.

##### Nevada County.

**Brunswick Mining Company.**—The shaft is now 600 ft. deep. A station has been cut out and is being timbered preparatory to opening levels and stopes. As soon as stopes are opened, sinking will be resumed, the ledge in the bottom of the shaft remaining of good size and the ore of excellent grade. The new drifts will give 90 ft. of backs on the pay shoot.

**Champion Mining Company.**—A dividend of 10 cts. per share, aggregating \$3,500, has been declared. Work will be commenced to put in 15 new stamps. It will then have a 25-stamp mill.

**Peabody Mining Company.**—The water is now out of this mine, the 12-in. pump handling the flow easily, doing away with the necessity of running the pump on the old shaft. Drifting and stoping have been resumed, and in a few days sinking will again be in progress. The present depth of the shaft is 430 ft. High grade milling ore is coming from the 400-levels and stopes, and rich specimens may be found at any time.

**Providence Mining Company, Nevada City.**—The mill is running ten stamps on good ore.

**Western Star Gold and Silver Mining Company.**—Articles of incorporation of this company have been filed. The capital stock of the new company consists of \$1,000,000, divided into 100,000 shares of the par value of \$10 per share, 60,000 shares having been subscribed and 40,000 being retained on the books of the company as working capital. The mine is located on the old North Star ledge, a short distance out of Grass Valley, and work will at once be begun to develop the claim. The directors and officers are: J. S. Ott, president; Emil Woenne, vice-president; A. Reed, secretary; Fred. Zeitler, Jacob Mook, Gustav Kartchoke, treasurer, and Chas. F. Horning.

##### Placer County.

(From our Special Correspondent.)

**Gray Eagle Mining Company, Forest Hill.**—The work on the company's mill is being pushed with all speed, as it is desired that crushing ore may commence on June 1st.

**Morning Star Gravel Mining Company, of Iowa Hill.**—This company has paid a dividend of \$3 per share for April. This makes close to \$30 per share paid in dividends during the last year and a half. There are 2,400 shares in the company. For 20 years the owners paid heavy assessments.

##### COLORADO.

**United Coal Company.**—According to the Denver "Republican" this company has closed a "deal" which takes in, practically, the lignite of the state. A five-years' contract has been signed, putting an end to the negotiations which have been in progress for some time. The Citizens is the only lignite company which will not sell its product to the United; its prices, however, will be the same as those fixed by the latter concern. The companies which are merged into the United are the Ajax, Acme, Simpson, Hecla, Caledonia, Excelsior, and Gladstone. The deal, it is said, will place the United company in a position to compete with the Colorado Coal and Iron Company and the Colorado Fuel Company, which recently effected a combination.

##### Boulder County.

**Chatham, Ward.**—This mine has been bought by Mr. W. H. Jacobs, of Chicago, Ill. Machinery has been purchased and taken to the property, and active development will be commenced.

**Burns Mine.**—This mine at Jamestown is producing 20 tons of gold ore a day, worth \$90 to the ton.

##### Conejos County.

**Eurydice Mining Company, Platoro.**—This company has purchased a new Cameron station pump of a capacity of 250 gallons per minute, with an 18-in. plunger and inside packing, and a 45 H. P. boiler. The machinery has been shipped and will soon be in place in the mine, when the shaft will be sunk to the 400-ft. level. The Eurydice has a fair body of ore in the drift at the 250-ft. level, and will begin shipping soon.

##### Delta County.

Some excitement prevails in the vicinity of Delta over the alleged discovery of a new and rich mineral district on the Gunnison River at the mouth of Roubideau Creek. The ore is said to run high in gold and silver. Many claims have been staked already.

##### El Paso County.

The Legal Tender and La Belle lodes and an 80-acre placer, located near Lawrence, in the Cripple Creek district, have been sold to the Moffat syndicate for \$100,000. These claims were owned by Dr. J. L. Prentiss and Sons, J. J. Phelps and H. W. Hodges of Canon City, who made the locations about the time of the Washington find, and have been developing them ever since. The claims adjoin the Victor, recently purchased by the same parties from White & Norwood, of Canon City.

**Ophir Mining Company, Cripple Creek.**—This company is reported to have made a strike of high grade ore in the Dead Pine lode at a depth of 32 ft. There are several cars of ore ready for shipment, awaiting the completion of the wagon road.

## Gilpin County.

According to the Central City "Register-Call," the following stamp mills in and above Black Hawk were running last week: Randolph, 50 stamps; New York, 75; Bobtail, 50; Polar Star, 40; Meade, 40; Hidden Treasure, 75; St. Louis-Gunnell, 15; total, 345. There were also running north of Black Hawk the 15-stamp mill of Peterson's in Lump Gulch and the Daisy 15-stamper in Gamble gulch, Independent district, making a total of 375 stamps. The mills were well supplied with ore.

## Gunnison County.

May-Mazzeppa Consolidated Mining and Milling Company, White Pine.—At the annual meeting of this company the following directors were elected: C. E. Taylor, W. R. Rathvon, Frank Church, W. H. Malone, G. H. Batchelder. Reports of the various officers were submitted and an auditing committee was appointed. At the company's property a fair sized force of men is at work and the output of ore is increasing. In the 350 level, in lime, there are a number of "feeders" shown. The drift is in 30 ft. The 265 ft. drift is now in 350 ft. on the contact, and has a new chute of ore in the breast at least 3 ft. wide, according to the White Pine "Cone." The stopes are yielding the usual amount of ore. In the stope from the 225 ft. level, on incline contact, an entirely new body of ore has been opened, which shows 1½ ft. of high grade ore. Stope from 300 ft. level shows two ft. of ore; and stope from 400 ft. level has a small streak of ore which runs high lead. The mine is at present making considerable water, but it is said to be surface water.

## Lake County.

Leadville Consolidated Mining Company.—The president of the Leadville Consolidated Mining Company in his annual report states that the property located on Carbonate Hill, at Leadville, Colo., has been worked under the present company for over 20 years, and up to the close of the fiscal year ended May 20th, 1892, has produced ore amounting to \$995,961. During the same time the company has paid in dividends \$304,000. During the past year the property has been worked entirely under a lease, which will expire on July 15, 1894. Its terms are very liberal as to royalty. The total ore product for the year, representing sales to smelters, amounted to \$68,179.80, of which \$24,957.75 was the share of the Leadville company in royalties. Other receipts were \$124.50. The Leadville expenses of the company were \$2,756.77, and the New York expenses \$2,071.85, showing a net profit for the year of \$20,253.63. Two dividends of 3 cts. per share, or \$12,000 each, have been paid. On May 20th, 1892, there was a cash balance on hand of \$10,239.53, against \$13,686.08 on May 20th, 1891.

Orion, Leadville.—This lode, situated in the California mining district, has been sold by S. B. Warren to C. Hood for \$16,000.

(From our Special Correspondent.)

Berdella Mining Company.—The Berdella mine is being supplied with a new concentrator, and active development work will be resumed on that property shortly. A third interest was sold recently to J. A. Lamping, for \$22,000.

Continental Chief Mining Company.—A continuous ore body has been disclosed in the lower incline, run to cut the upper chute at its lower margin. As this has failed to accomplish the purpose desired, a new incline will be started in a short time in order to get below the ore, but both inclines in the meantime will be constantly developed.

Eliza Mining Company.—This property is being supplied with a new plant of machinery, and in a few days development of the "chloride streak," opened up by former lessees, will be resumed.

Fanny Rawlings.—The drift run to the south for the purpose of catching the contact on its dip has succeeded in opening up several small bodies of very good ore, and preparations are now being made to ship. The drift will also be carried forward to accomplish the original purpose.

Great O'Sullivan Mining Company.—An upraise has been run in the south drift to cut the porphyry, but has not yet succeeded in that object. It is thought that when this has been done and the contact has been met with, one of the ore chutes encountered by the adjacent properties will be caught.

Holden's Smelter.—The work of erecting the furnaces and framework on the new Holden smelter has been commenced, and the plant will be in running order within the next six weeks.

Mahala Mining Company.—The Mahala mine is to be sunk 300 ft. deeper in order to place a large pumping plant at the bottom. This is being done to more expeditiously handle the water from below and keep the upper workings free of water while the ore body coming in from the Agassiz is developed.

May Queen Mining Company.—The vein followed for such a distance by the Hayden shaft has cut back into the May Queen property from the Forest City ground and a large amount of ore is being shipped from there at present.

Thespan Mining Company.—The winze sunk in the drift at the 523 ft. level in the Thespan has been temporarily abandoned owing to the large influx of water, caused by the early spring thaws, but work will be resumed in a few days. The bottom is getting softer and is still in limestone, the small pockets of mineral which were recently opened up pro-

ing that the main ore chute exists at a much lower depth.

White Cap.—From the so-called gold ore chute 50 tons of good carbonate ore are shipped daily, besides a large amount from the older workings.

Wilkes Barre.—While running a new tunnel to cut the ore chute in the former workings, a strike was made in this property. Still another tunnel was then run to catch the lower portion of the chute, where, it is thought oxydized ore will again be found. \*\*\*

## Saguache County.

The number of shipping mines in Cripple Creek has this week been increased to 15 and are as follows: Anaconda, Great View, Rose Maude, Peffer, Rustler, Poorman, Ida B., Napoleon, Sarah B., Buena Vista, Gold King, Orphan Belle, Pharmacist, Blue Bell and Washington. A number of mine owners are putting up whims for hoisting. Among the properties being thus supplied are the Orphan Belle, Reno and Victor, those already supplied being the Buena Vista, Comstock, Eldridge, Tam O'Shanter, Lon P. K. and Addie C. The Legal Tender and Washington will be supplied with steam hoists, there being sufficient water at each place to run the engines.

Amethyst Mining Company, Creede.—Articles of incorporation of this company have been filed. The company was organized under the laws of West Virginia to work the well known Amethyst mine at Creede. The capital is \$5,000,000. D. H. Moffat, Walter S. Cheesman and William H. Baker, of Denver, and Sylvester T. Smith, of Kansas City, are the directors for the first year.

Little Maid Mining and Milling Company.—This company has been organized to prospect an extension of the Amethyst and Last Chance. The vein is supposed, although it has not been determined, to have passed through the property. For this prospecting venture 500,000 shares have been set aside as a working capital, of which 200,000 shares are now offered at a minimum price of 12½ cts. The total capitalization is 2,000,000 shares at \$1 each. This is simply a venture, and if unsuccessful, should not be charged to losses in mining, but to pure gambling. The officers of the company are: William Gelder, president; J. R. Savo, secretary; Edwin S. Rogers, assistant secretary, and W. J. Miller, treasurer. The directors include the above gentlemen, with the addition of William F. Hogan, George Arthur Rice and L. L. Bailey. The general offices of the company are in Denver.

## San Miguel County.

Shipments of ore and concentrates from Telluride for the week ending May 21st were: From Sheridan Con., 22 cars; from Smuggler-Union, 31 cars; total, 53 cars; total shipped since January 1, 1,319 cars.

Belmont Consolidated Gold Mining Company.—A clean up on 150 tons of ore was made at this company's mill last week. Some changes will soon be made in the machinery at the mill, after which it will be kept running steadily at its full capacity.

Smuggler Union Mining Company, Telluride.—The annual meeting of this company was held in Denver, on the 16th inst. No change was made in the officers, who remain as follows: J. A. Porter, president; Richard Pearce, vice-president; A. H. Fowler, secretary and treasurer, and with James B. Grant, A. Eilers, William A. Bell and John H. Pullen, directors.

## IDAHO.

On the afternoon of May 21st Governor Willey received a telegram from Manager Dickinson of the Northern Pacific Railroad, stating that a mob of 500 armed and unarmed strikers had stopped a passenger train at Mullen, Idaho, and refused to let it pass. He called upon the Governor for military assistance. Immediately upon receipt of the telegram the Governor held a council with United States Marshal Pinkham, and it was thought advisable to send Adjutant General Curtis to the scene at once. The Governor, if he deems it necessary, will call out the company of State militia nearest the scene of the trouble, probably that of Moscow.

## Boise County.

Boulder Company.—Another clean-up was made at the Boulder mill at Elk Creek yesterday, amounting to \$4,200. The mill, which is a five-stamp, was completed in December last, and although the expense of opening the mine was considerable, everything is now paid for and five more stamps will be immediately added. Before another winter sets in the Moriarty Brothers, owners of the property, expect to make the mill a 20-stamp. Each day's development increases the value of the property.

## Owyhee County.

Blaine Tunnel.—The Blaine Tunnel has penetrated the mountain 1,107 ft. Here the company has encountered a large body of water. The ledge is being stripped and left on the footwall. This is said to be the largest body of water ever struck on Florida mountain.

Trade Dollar.—Working at the Trade Dollar mine is progressing finely and the mine has never looked so well. Tunnel No. 1.—The company is doing some stoping on a fine ledge of ore, 10 ins. of which will mill \$200, mixed with some fine shipping ore. Winze C is showing richer ore than has ever been seen from the Trade Dollar before. The streak where the ore comes from is 10 ins. wide. Another streak is about 15 ins. wide of \$400 ore. This rich ore comes from

the extreme north end of the stope. Back near the winze the ledge is very wide, 9 ft. between walls, with 3 ft. of \$100 ore. Tunnel No. 3 is now near Winze C. The company expects to make connections next week. A cross-cut driven through the ledge, back some 30 ft. from the present face shows the ledge to be a large one 14 ft. wide low grade ore.

## KANSAS.

## Cherokee County.

During the week ending May 21st the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 2,259,150; rough ore, pounds sold, 1,664,440; zinc ore, pounds sold, 855,682; lead ore, pounds sold, 204,440. Sales aggregated a total value of \$13,477.

## MICHIGAN.

## Copper.

Tamarack Junior.—Formal application has been made to the Boston Stock Exchange for the listing of Tamarack Junior, according to the Boston "Transcript." A letter from the Tamarack Junior mine, under date of the 19th inst., says: "Last night's work settled the question of cutting the lode in No. 2 shaft. We have it without doubt. The last blast shows something over a foot wide of fine-grained conglomerate, unmistakably. Prior to this, there was nothing we could recognize except some patches of slimy sandstone mixed with amygdaloid rock carrying fine copper. It looks now as if a few feet more of sinking would show a wider conglomerate. The material is not bad looking and carries as much copper as I would expect to see in that width of lode. The openings at No. 1 maintain their value, and the fourth level south is showing a wider copper course." The last named developments are at a depth of 2,500 ft. from surface, the mine beginning some 2,000 ft. underground, and the widening of the lode at this point is considered highly important.

Wolverine Copper Manufacturing Company.—In levying the assessment (part of principal) of 50 cents per share on Wolverine copper stock, President John Stanton reports the product in pounds of refined copper since September 1st, 1891, coming from one small head of stamps: September, 1891, 86,063; October, 77,374; November, 70,846; December, 77,829; January, 1892, 58,495; February, 53,719; March, 70,748; total, 500,074. Mr. Stanton says: "The experience we have had in working this lode during the past year shows that the product must be increased if profit is to be expected, with the current low price of copper. To carry this policy into effect, the existing stamping facilities should be doubled, and ground should be opened to such an extent as to provide an ample supply of pay rock therefor. The new shaft (No. 3) must also be equipped for hoisting rock and connected with rockhouse by elevated track. The directors have therefore suspended production, pending construction of such improvements, meanwhile continuing the work of sinking shafts and driving levels in preparation for such increased output. The financial condition of the company March 31, 1892, was as follows: Assets; cash in bank, \$3,021; copper on hand, \$14,452; due on assessment No. 1, \$300; total, \$22,774; cash at mine, \$117; fuel, \$7,866; supplies, \$1,647; total, 32,405. Liabilities; Loans, \$8,000; agent's drafts, \$13,599; indebtedness at mine, \$9,441; accounts payable, \$933; balance, of assets \$431. The above call is therefore necessary.

## Menominee Range.

Lincoln.—This mine is making daily shipments of 300 tons of ore to Escanaba.

Claire.—This mine is making daily shipments of from 400 to 500 tons of ore.

## MINNESOTA.

## Iron—Mesaba Range.

A diamond drill hole has been sunk on lot 8, section 6, 58-15, east of the town of Merritt a depth of 265 ft., and ore at that depth has been encountered. This demonstrates that the ore body pitches from 12 to 20 degrees. The drill hole was sunk a mile south of the foot wall, or green schist, and has passed 75 ft. into the ore.

## MISSOURI.

## Jasper County.

(From our Special Correspondent.)

Joplin, May 23.

The extreme wet weather continued through the entire week, so that all outdoor mining work was suspended. The underground workings of many of the mines are flooded with water, and miners are waiting for the weather to clear up. This morning has opened up bright and clear, and the indications are that this will be an active week throughout the lead and zinc belt. Zinc ore ruled at an average of \$23.50 per ton throughout the district. Some of the large operators held their output for better prices. Lead was in good demand at \$24.50 per thousand. Following are the sales as far as reported: Joplin mines, 1,216,250 lbs. zinc ore and 273,330 lead, value \$20,987.50; Webb City mines, 335,040 lbs. zinc ore and 77,450 lead, value \$9,623.25; Carterville mines, 791,260 lbs. zinc ore and 106,080 lead, value \$11,843.25; Zincite mines, \$167,290 lbs. zinc ore and 8,460 lead, value \$2,203.75; Carthage mines, 232,180 lbs. zinc ore and 72,240 lead, value \$2,163.50; Birch Center mines, 38,870 lbs. zinc ore, value \$466.45; Districts, value, \$50,081.90. No report from Galena, Kan., mines, or Aurora, Lawrence county, mines.

The McKirdy Mining Company has been incorporated, capital, \$100,000, of which \$20,000 has been paid in to work 400 acres of zinc-lead deposits near Joplin. Mr. W. H. Thomas reported on the property.

## MONTANA.

## Deer Lodge County.

**Puritan.**—This mine, in the Flint Creek District, owned by Messrs. Haynes & Lynch, has been sold to Mr. John McKechney, a capitalist of Chicago, the consideration being something over \$100,000. A. E. Barton and W. McC. White, of Butte, negotiated the sale. The Puritan is developed by an incline shaft, 148 ft. in depth and has four levels. There is considerable galena in sight. It is an extension of the Trout mine, which has produced several million dollars. It is the intention of Mr. McKechney to develop the Puritan on an extensive scale. Machinery has been ordered and the work of development will be commenced immediately. Mr. William Akers made a thorough examination of the property, and after his report Mr. McKechney purchased the mine.

**Royal Mining Company.**—This company will start up its new mill by June 1st. The Phillipsburg *Mail* says a crew of men have been working the mine all winter, and have opened up ore bodies that assure a steady run for many months.

## Jefferson County.

The Montana Central Railroad Company has leased a large body of white quartz lying near the Twoby tunnel, this side of Basin, and has some 15 or 20 men engaged in mining the quartz and loading it directly on the cars, a spur having been hauled to the quarry. The quartz is shipped to Anaconda, where it is ground fine and mixed with fireclay to make firebrick and for other uses in the smelter.

**Boulder Smelting Company.**—This company has just finished the construction of their new smelter,  $1\frac{1}{2}$  miles from Boulder, on the Elkhorn branch of the Northern Pacific. The works consist of samplers, laboratories, blast and smelting furnaces and everything required in the reduction of pyritous ores.

**Elkhorn Mining Company, Limited.**—The following cable information comes from the mines: "Bullion produced in the mill for the week ending 7th May, \$8,820."

## Lewis and Clarke County.

**Golden Leaf, Limited.**—Mr. J. Henry Longmaid, the company's general manager, on May 10th cabled the company as follows: Empire: 60 stamps ran 28 days, crushed 4,000 tons, producing in gold bullion \$11,600; store and sundries, \$600; total, \$12,200; deduct cost for month, \$9,100; estimated profit for month, \$3,100. Golden Leaf: During the month the mill crushed 1,050 tons of ore, yielding in gold bullion \$6,440; net estimated value of concentrates, \$6,000; estimated profit from store and sundries, \$800; total, \$13,200; deduct revenue cost for month, \$8,100; estimated profit for the month, \$5,100; total estimated profit, \$8,200. Expended on capital and development work: Empire, \$3,100; Golden Leaf, \$2,600. Bell Boy are crushing at the rate of 20 tons ore per day from the dump. Result is satisfactory; will be able to crush 45 to 55 tons per day by about the end of the week. The Bell Boy mine referred to is a mine which the company is working under an option for purchase with the view of supplementing the supplies of ore obtainable from the Empire mine.

## Silver Bow County.

The Butte and Boston Company, through its general manager, Captain C. H. Palmer, has negotiated the purchase of the Mountain Chief mine from Eugene D. Sullivan and Charles Nuss. The price is understood to be \$75,000. It has been under lease and bond to Sullivan and Nuss since last November. A few months ago a strike was reported on the 400-ft. level, and the vein was stated to be from 6 to 12 ft. wide, and carrying silver and copper. The lessees shipped about 400 tons of ore shortly afterward. This ore carried from 15 to 40 per cent. copper and from 10 to 200 ounces silver, making it a rich ore. The shaft was put down 100 ft. from the 450, and the same vein was again encountered. The lead was explored east and west of the shaft, and its value was determined. The Mountain Chief lies immediately north of the Modoc and is one of the oldest patented leads in Summit Valley district, being lot No. 40. The Butte and Boston company has already taken possession of the mine.

This company will rebuild its Butte works with iron in place of wood. The cost will not be much greater, and it is calculated that \$70,000 will perhaps pay for everything. The company put in a number of Bruckner furnaces because they treated more ore than the O'Hara furnace, but Mr. Palmer has so improved the latter that they do more than twice the duty of the former, and he has reduced the cost of operating. One item of large expense has been that of chains. The life of a chain costing \$80 to \$90 was about six weeks. By arranging rollers, etc., for the chain to run upon the life has been lengthened. The company has a chain that has been in use a year without showing material wear.

**Alice Mining Company.**—The strike made on the 1,400 ft. level in the Alice a few days ago, continues to grow in richness, and the ore body is gradually increasing in size. An assay made yesterday showed nearly 70 ounces in silver. In addition to this a strike has just been made on a slope from the 400-ft. level of the Magna Charta. None of the ore

runs less than 60 oz., and samples of it are shown which run 200 oz. and over. The Blue Wing, the Alice's company's smallest property, is being worked only by a day shift of eight men. The force in the Alice has been largely increased on account of the recent strike, and it will be added to again during the week. Superintendent Hall is preparing to start up the remaining 30 stamps in the 60-stamp mill at an early date. Men have been at work on them ever since the 20-stamp mill was shut down and will have them in a thorough state of repair by next Thursday, and on the following day the 60 stamps will all be dropping on ore from the Alice and Magna Charta, and possibly a little from the Blue Wing. The 20-stamp mill is also being overhauled and repaired.

**Anaconda Mining Company.**—The coroner's jury, holding for one week past upon seven of the victims of the Anaconda mine disaster, returned a verdict this evening exonerating the Anaconda company from any blame for the accident, and the consequent loss of life. The jury states that in no instance was any evidence presented showing a lack of care on the part of the management. On the contrary, every precaution had been taken for the safety of the employees, and that the accident was wholly unavoidable.

The situation at the mine is unchanged. The ground near the cave is still settling a little, and as it is considered unsafe to work in it efforts to get the remaining bodies out will not be resumed before Monday at the earliest, and not then unless the ground has become safe enough to work in without great danger. The signs of a cave on the 600 level are still partly apparent and the ground there is settling to an almost imperceptible degree. No men are at work on that level, and only a few are working above the 800 level. All the men who were working in the upper levels have nearly all been transferred to the nine and ten hundred, and the rest have taken a short lay off.

**Butte and Boston Mining Company.**—The management of this mining company, says the Boston Herald, will issue a financial statement with the circular calling a meeting to authorize \$2,500,000 bonds. This issue will add \$1,500,000 net to the capitalization of the company, which is now \$5,000,000 stock and \$1,000,000 mortgage bonds. Of new issue \$1,000,000 will be set aside to retire the old issue at maturity. This will make the securities \$7,500,000, or considerably more, it is believed, than twice the cash expenditure upon the property. At 11 per share, the stock is given a valuation of \$2,200,000. Add \$2,500,000 bonds at, say, 90, and a total valuation of \$4,450,000 results, which is a large premium upon the cash outlay. The company has never made an annual report, but it is learned that the mining profits have been \$681,000, which has gone into the plant, together with the money represented by the floating debt, \$465,000, and \$553,000 received from the sale of stocks and bonds. This makes a total of \$1,699,000, to which there should probably be further added the cost of the mines.

**Olive Branch.**—Sinking is still in progress on the west half of this mine, and the shaft is now down 75 feet. Sinking will be continued until the 200-ft. level is reached. Messrs. Hoyer & Co., who are now operating the mine, are making an effort to strike the main vein, which runs through the last half.

## NEVADA.

## Elko County.

**Belle Isle Mining Company (Official).** North drift, 350-ft. level, extended 5 ft., showing some nice ruby ore. The stope below the 350-ft. level is looking well.

**Navajo Mining Company (Official).**—Work for the week has been confined to the stopes above the 350-ft. level, which are looking about the same.

**North Belle Isle Mining Company (Official).**—No. 1, north drift, south 400-ft. level, extended 17 ft. No. 1 upraise from this drift extended 14 ft., showing some fair looking ore. West cross-cut, same level, extended 4 ft. and suspended. South intermediate drift below the north, 400-ft. level, extended 7 ft., showing a fair width of rich ore. Hoisted 24 cars of second-class ore.

(From our Special Correspondent.)

**Coptis Mining Company, Tuscarora.**—Stopping on Seam ledge continues, (the ore still being high grade. The ledge averages 8 ft. thick, with little first-class ore. The mill will start up when the weather settles.

**Nevada Queen Mining Company (Official).**—Second Level.—East drift from No. 1 chute extended 19 ft., exposing 3 ft. of ore; average assay, \$60 per ton. Going west from the same chute made 12 ft., exposing high-grade ore. East drift from No. 2 chute advanced 14 ft., 2 ft. of second-class ore, with seams of first-class mixed through. Going west from same chute there are 3 ft. of ore, 18 inches being first-class ore. East drift from No. 3 chute was driven 25 ft. in low-grade vein matter. West from same place 22 ft. seam of high-grade ore in the face of drift. South drift run 5 ft.; small seam very high-grade ore in face of drift. Raise No. 4 put up 22 ft., No. 5 up 14 ft., No. 6 extended 13 ft. Drift from No. 7 chute going east 15 ft.,  $1\frac{1}{2}$  ft. of fair-grade ore. South drift from No. 3 east cross-cut in 15 ft., showing 15 in. first-class and 2 ft. second-class ore. North side from same is 8 ft., ore 4 ft. wide, 18 in. being first-class. Third level.—South intermediate from No. 2 chute extended 16 ft., following seam of good ore; east from same, 24 ft., connecting with

south intermediate from No. 3, which has been advanced 20 ft. East drift from No. 3 advanced 24 ft. Ore produced—37 tons first-class assay value \$250 per ton and 182 cars second class, average car sample, \$32 per ton.

**Union Milling Company.**—Union mill is now crushing 25 tons per day of high grade ore from the Nevada Queen.

## Eureka County.

(From our Special Correspondent.)

**Eureka Consolidated Mining Company, Eureka.**—A new body of ore was discovered on the little tenth level of the Eureka Consolidated mine the early part of this month (May), which is said to be 8 ft. thick, and of much better quality than the average ore that has lately been mined. Three 8-hour shifts have been set to work on it. President Fries visited the mine May 16th and made a change in the management. A. S. Burt, who has acted for four years in the capacity of foreman in charge of the mine, was removed, and H. C. McTerney, who, for several years past has acted in the dual capacity of secretary and assayer, was appointed as superintendent of the company. Mr. Fries afterward proceeded to Salt Lake City to arrange with the smelting companies there for better prices than have lately been allowed for his company's ore; an extra charge of \$2.50 per ton having been added to the charges for treatment, this step became necessary.

**Diamond Mine, Eureka.**—The new hoist is being set in place in the lower tunnel.

**Ruby Mining Company, Limited.**—The chairman of this company recently stated in London, Eng., that the "common miner" in Eureka District receives wages at the rate of \$5 per day. This was an error, as the established rate has been for several years, and is now, \$3 per day. Occasionally, however, rock drillmen receive \$3.50 per day. During a few months the Eureka Consolidated Company paid their miners \$3.50 per day, but lately cut them down to the regular rate. The Ruby chairman does not appear to be well posted on various matters at Eureka as an executive officer for the benefit of his company should be. It has been learned here from private sources that the company have practically no capital, and that they do not contemplate taking steps to raise money. As far as can be ascertained, the directors of the company will henceforth be satisfied with such results as can be obtained by working their mines under the leasing or tribute system.

**Bullwhacker Mine, Eureka.**—The lease on this property has been renewed. The Dunderberg ground being practically worked out, the Bullwhacker is now considered to be the best property that is owned by the "Ruby" company.

## Lander County.

**Pittsburg Consolidated Gold Mine, Limited.**—The Pittsburg mine at Austin is running four Huntington mills night and day on free milling gold ore.

## Lincoln County.

**Pioche Consolidated Smelting and Mining Company.**—The smelter is at present running one stack, and the output of bullion has been increased to six tons per day. Some of this is being refined and litharge is being manufactured with which to reduce the old Bristol slag.

## Storey County—Comstock Lode.

**Alta Mining Company (Official).**—During the past week we have upraised above the 1,450 level 22 ft.; total height above the sill floor, 36 ft. There is a streak of ore  $2\frac{1}{2}$  or 3 feet wide of fair milling ore in the face. We have started a cross-cut west on the 1,450 level, near the Benton line, which is now in 4 ft. The face is in soft quartz yielding low assays. Making necessary repairs to the mill preparatory to starting to crush ore. Expect to commence about the middle of next week.

**Belcher Mining Company (Official).**—The west cross-cut from the bottom of the 300-ft. level north winze has been extended 16 ft. during the past week through porphyry and small streaks of low-grade quartz. Its total length is 30 ft. Work in the winze has been stopped, and a northwest drift started on the 400-ft. level station. It is out 27 ft. We are following the ore streak on the 300-ft. level north on the track floor, and the second floor of the raise. It is about 2 ft. wide of ore of good grade. The 1,300 ft. level cross-cut from the seventh floor of the raise is out 16 ft. The face is in low-grade quartz.

**Challenge Consolidated and Confidence Mining Company (Official).**—The joint Confidence and Challenge north drift on the 200-ft. level is now in 1,102 ft. The face shows quartz having no value. The joint raise from the north drift on the same level is up 92 ft. The face is in quartz having no value. We are still taking out some ore from old fillings and small streaks found on the upper levels, which is being shipped to the Brunswick mill for reduction.

**Consolidated California and Virginia Mining Company.**—The official returns of the ore worked and bullion produced for account of this mine in April were received Thursday. They show that 4,970 tons of ore were worked at the Eureka mill before it burned down, yielding bullion of the gross assay value of \$82,701.48, of which \$53,659.09 was in gold and \$29,042.39 was silver. The yield in bullion per ton was \$16.64 and the average assay value of the battery samples was \$18.83 per ton. The ore was worked up to 80% of its assay value. From the south drift on the 1,500 level, point of connection with the old stopes, we continue to extract some ore and fillings of average milling value. From the

upraise, which was carried up from the end of the cross-cut run west, 36 ft. in from the main south drift at a point 155 ft. south from the shaft station, we have continued to work upward and to extract ore of fair quality.

**Consolidated Imperial Mining Company (Official).**—We are taking out some fair ore from old fillings and small streaks found on the upper levels, which is being shipped to the Brunswick mill for reduction.

**Hale & Norcross Mining Company.**—On the 900 level are stopping ore from above this level. Winze from this level near our north line was sunk during the week 15 ft.; total depth, 100 ft. It connected with the ore slopes above 1,100 level. This connection will enable us to do considerable prospecting between the 900 and 1,100 levels. Hoisted from this level during the week 211 cars of ore. 1,100 level: We are taking out ore from above and below this level. Hoisted from this level 271 cars of ore.

**Justice Mining Company (Official).**—The west drift on the 490-foot level was advanced 14 ft. during the week, making its total length 861 ft. The face is still in hard rock. The south drift on the 722-ft. level was advanced 16 ft. the past week. Total length, 86 ft. The face is in low-grade quartz.

**Occidental Mining Company.**—The west cross-cut from south drift, 400 level, is in a total distance of 101 ft., face still showing stringers of pay ore. The south drift from said cross-cut is in 27 ft., face showing a small seam of pay ore. The north drift from same cross-cut is in 34 ft., showing fair milling ore. The south drift from west cross-cut, 100 ft. south of north line, on 550 level, is in 30 ft.; face in quartz and porphyry. West cross-cut No. 2,750 level, is in 39 ft.; face in low grade ore. The main north drift, 700 level, is in 417 ft.; formation, clay, quartz and porphyry. The drift from Sutro tunnel is in a total distance of 539 ft.

**Ophir Mining Company Official.**—1,465 level.—In working easterly from the mouth of the north drift from the drift run west from winze 122 ft. below the sill floor of the 1,300 level, we have extracted and raised to the surface during the week 25 tons of ore, the average assay value of which is \$26.62 per ton. The drift running south 101 ft. below the sill floor of the 1,465 level, from the Mexican into the Ophir ground, has been extended during the week 23 ft.; total length, 37 ft.—the last 30 ft. being in Ophir ground. Fifty tons of ore has been taken out from this drift and stored in the mine, the average assay value of which is \$19 per ton.

**Potosi Silver Mining Company (Official).**—The winze is down 281 ft. below the 1,500 level; bottom in porphyry and quartz. Extracted and sent to mill in the past week 393 1,100-2,000 tons of ore from the 930, 1,100, 1,150 and 1,250 levels. At hand at mill, 95 1,300-2,000 tons; average battery assay, \$24.65. The northwest drift from 1,800 level of the Ward shaft has been cleaned and repaired a distance of 150 ft., making a total distance from shaft of 300 ft.

**The Savage Mining Company (Official).**—The letter for the past week says that 590 cars of ore were hoisted from the 950, 1,100, 1,400 and 1,450 levels and 25 tons shipped to Nevada mill and milled, the average battery assay being \$19 per ton. Bullion yield for the week, \$7,082.25.

**Seg. Belcher Mining Company (Official).**—The east cross-cut from the south lateral drift on the 1,300-ft. level has been advanced 20 ft. since last report and is now out a total distance of 148 ft. The face is in porphyry with streaks of low-grade quartz through it.

(From our Special Correspondent.)

The following is the weekly statement of the ore extracted from Comstock mines, with the car and battery assays, bullion product, etc.:

Mine.	Tons extracted.	Car Sample assay.	Tons milled.	Average bat. assay.	Bullion for the week.	Bullion shipped.
Con., Cal. & Va.	1,086	....	980	\$24.58	....	\$14,830.90
Hale & Norcross	*482	\$23.03	431	15.36	....	....
Ophir	75	22.81	....	....	....	....
Overman	301	23.26	228	18.92	....	....
Potosi	353	....	393	24.63	....	....
Savage	*579	....	525	19.00	\$7,082.25	....
Yellow Jacket	....	....	196	....	....	....

Total to date on May account..... \$19,074.19

\* Cars.

**Hale & Norcross Mining Company.**—The petition of the Mining Stock Association demanding an investigation of the Carson Mint, was presented to Congress by T. J. Geary. A committee of investigation will be demanded that the whole matter of Federal corruption at Carson may be investigated. This petition was one of the results of the disclosures made during the hearing of the suit against the above company. W. S. Hobart, one of the millionaire defendants in the Hale & Norcross suit, is reported at the point of death at his residence in this city. His wife died about two months ago, and that grief, added to the anxiety caused by his being made a party to the mining suit, broke him completely down. He is not expected to survive the week.

White Pine County.

(From our Special Correspondence.)

**Joanna and Chainman Mines, Ely.**—Owing to the confidence that is felt by the community that Messrs. Gibson and Eckerly will purchase these mines, real estate has advanced in the town of Ely during the past two months 120 per cent. A number of experts have heretofore examined the Joanna mine in the respective interests of several capitalists, and all of them have reported it as possessing the indications and prospects of a great and valuable mine. A. R. Watson, the locator, claims to be sole owner of the "Joanna," but Mrs. Josephine Wolcott, of San Francisco, Cal., has for several years past been interested with him in several other mines and claims a half interest in the "Joanna" also, but never having had a deed from Watson, and the latter having denied that she ever had any right or interest in that mine, she commenced suit to compel him to make a conveyance. At this writing the case rests in the United States District Court, at Carson City, Nev., to come up for trial in a few days. Messrs. Eckerly and Gibson, the latter being identified with the Mollie (Gibson mine in Colorado, spent several weeks in examining and surveying that and other mines in Robinson District. The result is that they have bonded the Chainman mine for \$250,000 and the Joanna for \$100,000, the payments to be completed and the mines delivered on or before September 1st, 1892. Heretofore the cloud on the Joanna title has operated to prevent a sale, but an understanding has been arrived at by which, under the conditions of the bond, Watson would be entitled to \$50,000, and the balance of \$50,000 would be paid to either Mrs. Wolcott or Mr. Watson, according to and upon the final decision of the courts as to the ownership of the disputed one-half of the mine. The Chainman mine is owned by other parties. Both of the mines in question are essentially gold mines, that metal predominating and being found in arsenite of iron. The Chainman, however, carries more or less silver. The owners of the latter have got battery samples of from \$40 to \$50 per ton in gold and have practically demonstrated that they can save from 90 to 95% (90% sure) of that metal by the McArthur & Forest (cyanide) process. They had ordered a milling plant of ample capacity with the intention of operating under that process, but upon the execution of a bond for the sale of the mine the order was rescinded. The Joanna and Chainman claims are situated in Robinson district, about one and a half miles distant from Ely, on a hill side which forms the easterly boundary of Robinson cañon; they adjoin and run parallel with each other. The Joanna lies at the base of the hill and the Chainman above it. The footwall of the Joanna is porphyry; the ledge has never been cut through to find the hanging wall. The ore that has so far been extracted has been quarried out of the hill side and, at present, presents an immense out-look that may be compared in appearance to a block of buildings fronting on a street. The Chainman foot-wall is of limestone; and the hanging-wall of porphyry. Mr. Gibson theorizes that the limestone above referred to is a "horse," which will give out in depth, and that the surface deposits of the Joanna and Chainman mines will eventually prove to be a blow-out from a single huge fissure in the porphyry. If the Colorado parties should purchase these mines, as it appears quite probable they will do, they will erect a big mill in the flat below the town of Ely, where they can have a fall of water from Murray Creek) of 125 ft., and will put in a Pelton wheel to run a dynamo with power sufficient to run and light up the mill, as well as to furnish power for an electric tramway (to be erected over a distance of about two miles between the mill and mines), and light for the mines and the town of Ely.

**Seligman.**—The estate of the late Eugene N. Robinson, of this place, has been settled, and all of the personal and other debts that were outstanding at the time of his death against the deceased and his surviving partners, together with court fees and expenses, have been fully paid, the money coming mainly from the sale of personal property. There is yet personal property that remains unsold; this, in addition to the Seligman and Treasure Hill mines, buildings, machinery, and all other real estate that were either owned, managed or controlled, by the deceased, including the stock in the Sweetwater Mining Company, are now owned jointly by the widow and surviving partners of the deceased, the portion and property rights of the former being one-half.

PENNSYLVANIA.

Coal.

The huge culm bank at the Logan colliery, Centralia, has been discovered to be on fire, and men are fighting the flames. Fears are entertained that the fire will work into the mines below.

The arbitrators in the case of the farmers living along Shamokin Creek, Northumberland county, against the Philadelphia & Reading Coal and Iron Company, the Pennsylvania Railroad Company and others, handed down awards in ten cases on the 23d inst., that, if sustained, may involve great loss to the companies. For years the coal dirt from the mines has been washed by each recurring freshet on the lands of the farmers along the creek. In 1889 the land was rendered barren. Ten cases were prosecuted, and now, after taking testimony for three years, damages are awarded the plaintiffs. Other

suits will follow. The defendants will appeal to the courts.

A further hearing was granted on the 23d inst. to the case of Emiline H. Davis and others to compel Trustee H. C. Bughman, of the James H. Hays estate to proceed with the partitioning of the estate, which has been under way for the past eight years. The prosecutors wished the trustee to close down the large coal mines on the estate until everything had been adjusted in the settlement of the estate, which is worth several million dollars, and, according to the provisions of the will of the deceased, was to be partitioned among the heirs 10 years after his death, which was in 1876. After several witnesses had been examined both sides of the case effected a compromise, by which Mr. Bughman agreed to close the coal mines until everything was satisfactorily arranged.

**Lehigh & Wilkes Barre Coal Company.**—This company is preparing to drive two tunnels, one at South Wilkes Barre in No. 5 from the Baltimore & the Stanton vein, distance 900 ft., and the other at Wanamie in No. 18 colliery, from the Baltimore to the Cooper veins, a distance of 100 ft. It is announced that this company will soon make some important improvements at Lance, No. 11, colliery. Among the changes will be the erection of one 100 H. P. Dimmick & Smith boiler; the erection of annexes on each side of the breaker, which will increase its capacity from 40 to 75 cars per day; the erection of an additional chestnut and stove coal screen, and the remodeling of the dust fan in the breaker. The shaft will be continued to the Ross seam, a new fan 12 ft. by 35 ft. will be erected, and there will be important changes made in the ventilation of the inside workings.

It is reported that engineers of the Pennsylvania Railroad have located the route along the Little Sewickley Creek from Madison to Sewickley Station and the work of grading will begin shortly. The Baltimore & Ohio also has made several preliminary surveys, with a view to getting a line from Sewickley through to Jeannette. The new road will open up coal fields. Nearly all the coal along the line has been purchased by Greensburg and Philadelphia parties. The Westmoreland Gas Coal Company has purchased the Ralton farm at Millvale. The company's coal fields in that locality comprise an area of over 5,000 acres. The company operating the Madison mines has recently added 12,000 acres of coal to its possessions.

**Philadelphia & Reading Coal and Iron Company.**—This company on the 20th inst. ordered the starting up on the 23d inst. of three more of their heavy producing collieries: Bear Run, near Shenandoah; Suffolk, at St. Nicholas, and Glendower, at Glen Carbon. All collieries will work four days a week and nine hours a day.

This company's East Franklin colliery at Fremont, idle since March, started up on the 25th inst., employing 200 men and boys.

This company has obtained possession of the George H. Mever & Co.'s colliery at Yorktown.

**Waddell, Miners Mills.**—A cave-in of some extent occurred over the old workings of this mine on the 22d inst. A branch from Mill Creek flooded the gangways, but the actual damage done was small.

Oil.

A corps of Pittsburg surveyors is now near Susquehanna surveying a route for a pipe and telegraph line between Pittsburg and New York.

SOUTH DAKOTA.

Lawrence County.

**Golden Reward Mining Company.**—This company has announced its sixth regular monthly dividend of two cents per share, aggregating \$5,000. This makes a total to date of \$31,000, a good showing for one of the youngest producing mines of this section. Besides paying stockholders the amount above named, it has expended over \$200,000 purchasing mining properties.

TEXAS.

Cherokee County.

**New Birmingham Iron & Land Company.**—Judgment for \$536,845 has been entered against this company and the New Birmingham Iron & Improvement Company of Texas, in favor of James A. Mahony, William R. Utley and Leopold Wallach. The judgment is on 126 promissory notes made by the first named company to James A. Mahony, which he indorsed, and the plaintiffs became the owners, dated from Dec. 26, 1889, to April 4, 1892, aggregating \$489,371, on which the interest amounted to \$47,453. The plaintiffs were directors in the companies. The companies were controlled by New York men and were formed to develop the mineral property and town site of New Birmingham, Tex. The New Birmingham Iron and Land Company was organized in March, 1889, and was succeeded by the New Birmingham Iron and Improvement Company in July, 1891, and the plaintiffs claimed that the latter company assumed and agreed to pay the debts of the former company. The capital stock of the Iron and Improvement Company was \$3,500,000 and bonds \$1,000,000. The company owns 21,000 acres of land. Deputy Sheriff McGinnis has received an attachment for \$348 against the Iron and Improvement Company in favor of the New York Bank Note Company. Richard L. Coleman is president of the Iron and Improvement Company.



## UTAH.

Daly West Mining Company.—The shaft is almost completed to the depth to which the owners intend it shall go. Cross-cutting for the vein will soon be in order.

## Juab County.

Gemini Mining Company.—On Monday the men working in the new Gemini shaft broke through into the drift on the 200-ft. level, and the engines at the old works were at once fired up. From now on the waste rock will be hoisted at the old works, and Burleigh drills will be put to work sinking the new shaft down from the 200-ft. level.

## Summit County.

Warsatch.—This mine, now under lease, gives strong indications of proving to be all that has been claimed for it for many years, says the Park "Record." The property has been worked at various times by different persons, and while rich ore has been taken out, it has been in small quantities, and the mine has never paid. It begins to look different now, however, and the indications are that the long looked-for body of ore has at last been uncovered.

## WISCONSIN.

## Iron.

Statement of ore shipped from the port of Ashland for the season up to and including May 18th: Wisconsin Central Docks, Ashland, 5,596 tons; Aurora, 18,001 tons; Colby No. 2, 1,573 tons; Tilden, 11,560 tons; Palms, 2,781 tons; total, 39,514 tons.

## WYOMING.

Charles Frederick, a German geologist, and three countrymen, have been prospecting two years in a mineral belt 100 miles north of Cheyenne. He has penetrated a deposit of nickel and cobalt, says the Salt Lake "Tribune." The find is 40 ft. under the surface and beneath 30 ft. of iron gossan. Fourteen shafts have been sunk into the beds. Assays made abroad and in America are satisfactory, and the discovery shows some fine specimens.

## Weston County.

Cambria Coal Mines.—These coal mines, operated by William Job & Co., are closed down because of a strike of the teamsters and shovelers for an increase of wages. A settlement is expected to-night. There is no disorder.

## FOREIGN MINING NEWS.

## GREAT BRITAIN.

The Durham Miners' Federation has issued a manifesto, which says that the attempt to effect a settlement with the masters has failed, that the deadlock has consequently been accentuated, and that the whole responsibility for the awful struggle that is now inevitable rests upon the masters.

## MEXICO.

## Lower California.

(From our Special Correspondent.)

The Carmen Island salt mines have been sold by James Viosca, of Las Paz, the late owner, to a syndicate of capitalists headed by President Manvel, of the Atchison, Topeka & Santa Fe Railroad. Carmen Island is 122 miles north of Las Paz and is 17 miles long and between 6 and 7 miles wide. Several fine harbors afford good anchorage, and the mines have been netting to the owner \$36,000 per annum, with Yaqui Indian labor and a primitive mode of working. These mines supply nearly all of Mexico with salt, and shipments are made as far south as Peru. The salt lies immeasurably deep in an old lake bed, the central disc of this old lake being 1½ miles in diameter. As fast as the salt is quarried out of a given space the water rushes in again and is fast evaporated, leaving the space well filled again with salt. The purchase price has not been made public, but the purchasers have already taken steps to put in costly machinery, build ships, etc., when the business will be conducted on a very extensive scale.

## Hidalgo.

Compania de Pachuca y Real del Monte.—This company is working 85 mines, 55 at Pachuca and 30 at Real del Monte. Shares are quoted at \$1,400. Pachuca, according to the "Courier du Mexique," is one of the largest existing mining camps of the world, producing \$9,000,000 annually.

## SOUTH AFRICA.

The total production of the Witwatersrand companies during March was 93,244 oz. 11 dwts., valued at \$331,465. One hundred and forty-three thousand seven hundred and sixty-five tons were milled by 1,755 stamps, giving an average yield of £1 15s. 10d. per ton. The production of the Robinson Gold Mining Company was valued at £52,210.

The Johannesburg Pioneer declared a 12½% dividend; Langlaagte Royal one of 4%; New Primrose, one of 5%, and the New Chimes one of the same amount.

## TRANSVAAL.

The new cyanide works of the New Primrose Mine, Main Reef, have been completed and operations commenced at the beginning of May. There are eight vats each 20 ft. x 10 ft., and they will be capable of treating 6,000 tons of tailings per month. The South African Gold Recovery Company, who adopted the cyanide process a short time ago, have introduced the method in vogue in some parts of California of using cyanide solution instead of water during the

crushing. Beyond the general statement that "the method is found to work satisfactorily," no indications of the advantages are forthcoming. Mr. Cann, late manager of the Oriental mine De Kaap, has a scheme on hand for extracting the gold from sulphide by means of the electric arc. The finely ground tailings are allowed to fall in a spray through a row of arc carbons. The heat of the arc volatilizes the base metals and the sulphur and the vapors so generated pass up a chimney, while the gold falls in drops to the bottom of the furnace. The acid is condensed and made into commercial sulphuric acid. The advantage of the system is not quite clear, as it does not require so great a temperature as that of the electric arc to separate sulphur from its combinations.

## De Kaap.

The projected cyanide works of the Langlaagte Estate, says the *Star*, are being proceeded with rapidly, and it is considered that by June their works will be in going order. It is then expected that from 8,000 to 10,000 tons of tailings will be treated every month. This in itself ought to give a good return. The company is of opinion that the cyanide works will be sufficient for the requirements of both concentrates and tailings. From reliable information it is fully expected that the cyanide process, by the end of the year, will be carried out at a cost of 8s. per ton, in which case it would pay to deal with three dwt. tailings, which would yield a profit of 4s. a ton.

## CHEMICALS AND MINERALS.

## NEW YORK, Friday Evening, May 27.

Heavy Chemicals.—The current week in this market has been quiet and utterly devoid of features of interest. Caustic soda is entirely unchanged and bids fair to remain so for a long time to come. The appointment of agents for the sale of this chemical in the United States and Canada has had an effect similar to that produced by the appointment of agents for bleaching powder. All the business in these two must be done now through the regular channel and hence it is essentially of a routine character. Carbonated soda ash has been quiet, although some forward contracts are reported. The same may be said of alkali. In sal-soda a fairly good business was done during the week. Quotations are as follows: Caustic soda, 70 per cent., 2-95@3-10c.; 74%, 2-97½@3-12½c.; 76%, 3-12½@3-25c.; 77%, 3-12½@3-25c. Carbonated soda ash, 48%, 1-55@1-60c.; 58%, 1-47½@1-52½c. Alkali, 48%, 1-55@1-60c.; 58%, 1-47½@1-52½c. Sal soda, English, 1-05@1-10c. Bleaching powder, 2-15@2-20c. on the spot, according to quantity.

Acids.—The market for acids has quieted down, and manufacturers report a falling off in demand. Some rumors have circulated during the week to the effect that the erection of a new acid plant and the extension of a well known works were contemplated. These reports have not been verified and after a thorough canvass of everybody likely to be interested in these schemes we have no hesitation in pronouncing them mere canards. There has been no change in prices, and we continue to quote: Acid per 100 lbs. in New York and vicinity, in lots of 50 carboys or more: Acetic, \$1.00@\$.2 according to quality; muriatic, 18", \$1; 20" \$1.12½@\$.125; 22" \$1.25; nitric, 40%, \$4; 42", \$4.50@\$.475; sulphuric, 90c.@\$.110; mixed acids, according to mixture: oxalic, \$7.25@\$.775. Blue vitriol is quoted all the way from \$3.25@\$.350; alum, lump or ground, \$1.55@\$.1.80. Glycerine for nitro-glycerine, 11½@12½c., according to quality and quantity.

Brimstone.—The market for Sicilian brimstone is slightly higher owing to an advance in freights. Quotations for best unmixd seconds on the spot are \$24. Best unmixd seconds to arrive (May-June) \$24, and thirds, 75c. less.

Fertilizers.—The Northern season is at an end and business in the market for fertilizing chemicals has been very light during the week. Prices, however, are fairly well maintained owing to the light stocks available. A better demand than was anticipated is coming from the South, especially for kainit. We quote this week: Sulphate of ammonia, \$2.90 for home goods and \$2.90@\$.2.95 for gas liquor. Dried blood, \$1.95 @\$.2 per unit for high grade and \$1.85@\$.1.90 for low grade. Acidulated fish scrap, \$11@\$.12, factory. Dried scrap, \$23.50@\$.24. Azotine, \$1.90 @\$.1.95. Tankage, \$17.50@\$.21, according to grade. Bone meal, \$22.50@\$.23.50.

Double Manure Salts.—Quotations are as follows from lots of from 10 to 50 tons ex-vessel New York: 48-53%, \$1.13½@\$.1.23½, 50-55%, \$2.13@\$.2.23½.

Kainit.—A good demand for kainit is reported. This comes almost entirely from the South and it is a very good sign of returning activity in that region. All the kainit now on the way to this port or to Philadelphia has been sold and dealers report that business probably will be somewhat greater than was anticipated. Prices remain unchanged at \$8.75 invoice weight and \$9 for actual weight, New York and Philadelphia.

Muriate of Potash.—This market continues very quiet. There has been no change in prices.

Phosphates.—Nothing of any interest can be reported of phosphates. At Charleston, S. C., a depressed market is still reported with prices nominally at \$5 for dried and \$4 for undried, free alongside. The production of phosphate rock is being curtailed, and this doubtless will prove beneficial to the market.

Nitrate of Soda.—This market continues quiet. Quotations are \$1.62½@\$.1.65 for spot, according to quantity, and \$1.65@\$.1.67½ for shipments to arrive, according to position of vessel.

## Liverpool.

May 18.

(Special Report by Joseph P. Brunner & Co.)

The demand for heavy chemicals generally is anything but active, while at the same time prices continue to be well maintained. The colliers' strike in the Durham district is not yet at an end, the men still holding out against any reduction in wages, and although several attempts have been made at a settlement, these have been without result so far.

Some surprise has been occasioned among members of the trade at the recent advance in Alkali Company's stock, the ordinary shares (£10 paid) running up on 12th inst. about 20s. per share, touching in one case £7½, then fell away about 10s., but have since recovered somewhat, closing to-day at £7½. There is apparently nothing in the position to warrant the advance, caustic soda being almost a drug on the market, while on this account saltcake has been piling up at the works for a long time past. There may be circumstances, however, of which the trade are in the dark, which may warrant the advance in the stock, but it seems rather peculiar at present.

Soda Ash.—The "Union" will not quote for earlier delivery than July, for which the nominal quotations for the commoner descriptions are as follows: Caustic ash, 48%, £5 6s. 3d. per ton; 57@58%, £6 7s. 6d. per ton; carb ash, 48%, £5 9s. 9d. per ton; 58%, £6 12s. 9d. per ton; ammonia ash, 58%, £6 7s. 6d. per ton, net cash. Prime brands are held for a considerable premium over above figures.

Soda Crystals are in fair request at £3 7s. 6d. per ton to £3 10s., less 5%.

Caustic Soda is very flat, orders being very scarce, and it is expected prices will shortly be reduced. For certain markets the "Union" is prepared to make concessions, but for most quarters the nominal quotations are: 60%, £9 7s. 6d. per ton; 70%, £10 10s. per ton; 74%, £11 10s. per ton; 76%, £12 7s. 6d. @ £12 15s. per ton, net cash. For parcels under 10 tons 5s. per ton extra is charged. Shipments to the United States are "harred" by the "Union."

Bleaching powder quiet at £7 15s. to £8 per ton, net cash, for hardwood packages for all quarters except United States and Canada.

Chlorate of potash inactive, and resellers at 6½d. per lb. for May and June, while syndicate quote 7d. for July and Dec, 6½d. to 6¾d., are about nominal quotations.

Sulphate of ammonia is in fair request, but prices keep low. Nearest spot values are about £10 5s. per ton for good grey 24% and £10 7s. 6d. for 25%, both in double bags, less 2½% f.o.b. Liverpool.

## MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Deadwood, Dak., Pittsburg, St. Louis, London and Paris, see pages 584 and 586.]

## NEW YORK, Friday Evening, May 27, 1892.

At the Consolidated Stock and Petroleum Exchange the trading in mining stocks has been of the same desultory nature. It may be doubted whether any significance should be attached to any of the sales which have been made for many months past. No interest in this market is manifested by the public, and the group of brokers which hitherto has devoted itself almost exclusively to mining stocks is growing smaller owing to the protracted inactivity.

The event of the week took place to-day when the news was received that the suit of M. W. Fox and others against the Hale & Norcross Mining Company had been decided in favor of the plaintiffs, and an award of more than \$1,000,000 decreed by the judge in favor of the stockholders. The effect of this action on the Hale & Norcross stock here was but small, but although there was a slightly better demand, and \$1.60 was bid. Nevertheless, the moral effect of this decision will be very great, it is an earnest of the return of public confidence in the much mismanaged Comstock mining companies.

In this city, where the attitude of the ENGINEERING AND MINING JOURNAL against the infamous "mill ring" has ever been commended, the news of the victory was received with universal approbation. That a favorable reaction in the mining market will now set in seems more than probable.

During the week there were sales of 200 shares of Consolidated California & Virginia at \$4.50@\$.4.60; 120 shares of Ophir at \$3.15, and 200 shares of Yellow Jacket at 80c. Other sales were: 100 shares of Julia at 20c.; 100 shares of Justice at 40c., and 100 shares of Mexican at \$2.10. Comstock Tunnel stock shows transactions of 500 shares at 14c. The bonds were in some demand; \$30,000 were sold on a basis of 18@19c.

Of the Tuscarora stocks there were sales of 400 shares of Belle Isle at 18@20c. and 200 shares of Navajo at 15c.

Among the California stocks there were sales of 500 shares of Bodie Consolidated at 18@20c. and 100 shares of Bulwer at 45c. Plymouth was in little request, only 100 shares being sold at 90c. Of Belmont, according to the official lists of the exchange, 2,100 shares were sold at 34@36c.

Brunswick Consolidated continues to show heavy transactions. This week 14,400 shares are reported to have been sold at 17@20c. A telegram dated May 24th has been received from the superintendent,

saying: "The shaft is in good ore in the bottom. The east and west drifts are also in good ore. The east ledge is 1 1/2 ft., and the west ledge 2 ft."

Among the Colorado stocks we note sales of 500 shares of Leadville Consolidated at 15@16c., and 500 shares of Little Chief at 27c. An equal number of shares of Silver Cord was sold this week at \$30@35.

Among the Black Hills' stocks there were sales of 1,800 shares of Father de Smet at 37c. to 45c., the latter being the closing price. Of Caledonia there was a sale of 100 shares at 80c.

Sullivan Consolidated, which had not been dealt in for a long time past, shows up this week with sales of 400 shares at 50@54c.

Horn Silver was very quiet, only 100 shares being sold at \$3.35.

Moulton, which at one time was a favorite, but which for several months past has been utterly neglected, was dealt in during the week; a sale of 100 shares at 35c. was reported.

Phoenix of Arizona shows unexpected activity. transactions aggregating 1,600 shares at 37c. to 45c.

**Boston.** May 26.

(From our Special Correspondent.)

The market for copper stocks the past week up to to-day has been very dull and quiet, with prices tending to a lower level, although no material change is noted. There seemed to be fresh orders in the market to-day, especially for the Montana stocks, which gave an impetus to prices and caused an advance to the highest prices for the week. Boston & Montana sold in a small way in the early dealing at \$43 1/2 to \$44. Under the stimulus of good buying orders to-day the price was advanced to \$46 1/2 on liberal sales and closed quite strong at \$45 1/2 bid, \$45 1/2 asked. The product for April was reported to-day as 2,200,000 lbs. of refined copper against 2,000,000 for the same period last year, which, with the firmer quotation for ingot to-day accounts for the advance. Butte & Boston was steady at \$12 with a more active demand to-day, which advanced price to \$12 1/2, closing firm.

Calumet & Hecla sold off to \$266 early in the week, but advanced with the rest of the market to-day to \$274.

Tamarack sold up to \$170, but did not hold its prices, declining to \$166 for a small lot.

Centennial has not shown any strength this week, but declined from \$11 1/2 to \$11. There is not much pressure to sell it just now, and buyers prefer to await further developments at the mine before loading up.

Franklin sold off to \$14 1/2 but recovered to \$15, which was bid for it to-day, and none offered under \$15 1/2.

Kearsarge advanced from \$13 to \$13 1/4 on good buying to-day.

Osceola advanced also from \$32 to \$33 1/4, with a very fair demand for it from investors.

Atlantic was firm at \$11 1/2. Allouez sold at \$1, Arnold at \$1 1/2 @ \$1.

Santa Fe, which took such a tumble last week, recovered in part and sold up to 25c., but a good deal of stock was offered at this price, resulting in a decline to 19c., closing at 20c. bid.

We have heard of no quotations for Quincy during the week and until the stock is reinstated on the Stock Exchange it will be difficult to get at the transactions in this stock. The reports from the mine are of a very satisfactory character and holders are not anxious to part with their stock. The Tamarack, Jr., has applied to be placed on the regular list of the Stock Exchange and a better opportunity will then be offered to get reliable quotations. Private sales of the stock are reported all the way from \$42 to \$47.

Silver stocks continue neglected. Sales of Catalpa quoted at 20c. Dunkin is offered at 30c. with no buyers. Napa Quicksilver is offered at \$6.

**Chicago.** May 25.

(Special Report by Horace M. Johnson, Chicago, Ill.)

I inclose quotations of iron mining stocks. There is comparatively little special news from the Mesaba mines. Development work is progressing favorably at many of them, but owing to the very bad condition of the roads at present, work is somewhat impeded.

**Chicago Iron Company.**—The developments on this property during the past two weeks has been exceedingly gratifying to its owners. About twenty pits have been sunk, all of which are now in ore from 4 to 18 ft.

An analysis of ore taken from pit No. 4 (east end) shows Fe, 67.77; Si O<sub>2</sub>, 3.31; P, .073, and from pit No. 7 (west end) Fe, 67.23; Si O<sub>2</sub>, 3.33; P, .033.

**Birmingham and Aurora Mines.**—These properties are owned principally by the owners of the Chicago, and they are now preparing to work them. The Birmingham is based upon something like ten or twelve thousand acres on the Mesaba range. The supplies are all on the ground, and the camps established. Test pitting will begin at once. Aurora has from twelve to fourteen hundred acres, and ore has already been uncovered on a portion of the property.

**Duluth Stock Exchange.**—The Duluth Mining Stock Exchange had quite a stormy meeting last week, and the continuance of the Exchange is somewhat doubtful. The statement was made that some of the companies listed had not complied with the by-laws of the Exchange; had not paid the required fees, or done sufficient development work to entitle them to the indorsement of the Exchange as legiti-

mate and their stocks as good investments. At the close of the meeting the following resolution was adopted: "Resolved, That a committee of three be appointed from members of the board of directors to investigate and ascertain what companies of those assuming to have been listed upon the Exchange have complied with the constitution and by-laws of the Duluth Stock Exchange, and to report to this board at its regular or special meeting." Messrs. H. B. Moore, Lon Merritt and W. B. Wells were appointed as the committee in accordance with the resolution.

**Quotations of Iron Mining Stocks.**

**Mesaba Range Mines.**—Present cash value of shares May 25th: Boston, \$12; Buckeye, \$31; Biwabik, \$30; Cincinnati, \$5; Champion, \$10; Charleston, \$10; Clark, \$10; Cosmopolitan, \$20; Chicago, \$12; Columbus (fee), \$7.50; Great Northern L. & S. Company, \$1.40; Great Northern Mining Company, \$11; Horton, \$15; Keystone, \$10.50; Kanawha, \$18; Lincoln, \$10; Lake Superior, \$3.50; Licking, \$7.50; Mesaba M.L., \$18; Mallman, \$1.40; Mountain Iron, \$59; Mesaba Chief, \$6; Minneapolis, \$10; New England, \$15; Shaw, \$9; Twin City, \$20; Virginia, \$12; Washington, \$7.

**Gogebic Range Mines.** Aurora, \$8; Ashland \$50; Anvil, \$3.75; Brotherton, \$2.70; Germania, \$7.50; Gogebic L. Synd., 25c.; Iron Belt, \$1.75; Montreal River, \$8.50; Metropolitan, \$75; Minnewawa, 75c.; Odanah, \$15; Pence, \$1; Section "33," \$9.

**Marquette Range.**—Champion, \$60; Cleveland, \$18; Jackson, \$100; Lake Superior, \$45; Pittsburgh & Lake Angeline, \$160; Republic, \$18.

**Vermillion Range.**—Chandler, \$45; Minnesota Iron, \$80.

**San Francisco.** May 20.

(From our Special Correspondent.)

The prices of mining stocks during the week ending to-day have fluctuated very narrowly, and the North End Comstocks have monopolized attention. The reported improvement in the Consolidated California & Virginia mine has been the means of creating a demand for North End stocks that otherwise would probably have drooped when the reported strike in the Ophir proved a miserable fizzle. The leader to-day sold to \$4.45, Ophir for \$3.05 Mexican, \$1.95; Union Consolidated, \$1.35; Sierra Nevada, \$1.35, and Utah, 30 cents.

Before the close these prices shaded off to the extent of an average of 10c. per share.

The middle groups of Comstocks were fairly active to-day, but with little change in price. Savage has been the chosen stock for speculators, but the ruling price has been \$1.35, and as no important news has been received from the mines there is no reason to suppose that, on its own merits, any advance will immediately result. Best & Belcher at \$2.30, Chollar at 85c., Gould & Curry at \$1.30, and Hale & Norcross at \$1.40 have sold freely.

The South End and Gold Hill stocks have been very quiet. The ore streak followed in the Belcher mine did not turn out well and the news being received from the others has been often of the "cut and dried to order" kind. This being so the dealings have naturally been light. Alpha at 35 cents; Belcher at \$1.05; Caledonia at 25 cents; Consolidated New York at 40 cents; Crown Point at \$1.20; Exchequer at 30 cents; Justice at 15 cents; Lady Washington at 15 cents; Overman at 45 cents; Occidental at 50 cents; Segregated Belcher at 35 cents and Yellow Jacket at 75 cents have all sold steady with light sales.

The Tuscarora stocks have been moving this week after a long period of stagnation. These stocks have very generally been regarded by the street as rather dangerous for investment, and if they are being forced on the public it is only because a good showing is being made in Nevada Queen, and the "ring" have allowed prices to drop down to bottom figures. To-day 1,900 shares Commonwealth sold for 25c.; Belle Isle for 25c.; 1,600 shares Del Monte for 25c.; 800 Nevada Queen for \$1.40 to \$1.75, and North Belle Isle for 30c.

Of other outside stocks nothing has been heard, and while the prospects in several of the Comstock mines may result in developments of importance at present the only thing certain is the levying of assessments with the most precise regularity.

**SAN FRANCISCO, May 27th—(By Telegraph).**—The opening quotations to-day are as follows: Best & Belcher, \$2.45; Bodie, 30c.; Belle Isle, 20c.; Bulwer, 40c.; Chollar, 70c.; Consolidated California & Virginia, \$4.30; Eureka Consolidated, \$2; Gould & Curry, \$1.25; Hale & Norcross, \$1.60; Mexican, \$2; Mono, 55c.; North Belle Isle, 20c.; Navajo, 10c.; Ophir, \$3; Savage, \$1.40; Sierra Nevada, \$1.40; Union Consolidated, \$1.30; Yellow Jacket, \$1.70.

**St. Louis.** May 25.

(From our Special Correspondent.)

Mining stocks were decidedly dull this week, and the amount of trading carried on was very small. All business was confined to two or three principal stocks, the majority of those listed being entirely neglected. Prices remained very nearly stationary.

Granite Mountain was dealt in somewhat, opening at \$13.25; 25 shares sold at that figure; for the rest of the week, however, it remained quiet at \$13.

Elizabeth opened at 43 1/2c. and closes at 51 1/2c. On the opening 100 shares sold at 50c. and 1,000 shares sold the following day at 52c. On Saturday 200 shares brought 52 1/2c. It closes quiet at 51 1/2c.

American & Nettie sold on the opening at 57 1/2c @

55c., 400 shares selling. During the rest of the week it varied from 55@56c.; closing dull at 55c.

Hope sold at \$3.40@3.75, 103 shares selling. It opened at \$3 and closes at \$3.20.

One sale of Pat Murphy of 500 shares at 2 1/2c. was made.

Thirty-two hundred shares of Central Silver brought 1/2c. on Tuesday. There is some talk of reorganizing this company.

Closing quotations are: Silver Bell, 12 1/2c., Bi-metallic, \$20, Eureka, 5c., Small Hopes, 70c.

**MEETINGS.**

Brownlow Mining Company, at the office of the company, room 44 Jacobson Building, Denver, Colo., June 13th at 4 P. M.

**DIVIDENDS.**

Lexington Mining and Milling Company, dividend No. 6 of one cent per share \$3,000, payable June 1st at the office of the company No. 1624 Curtis Street, Denver, Colo. Transfer books close May 25th and reopen June 2d.

Mollie Gibson Consolidated Mining and Milling Company, dividend No. 23 of 15 cents per share, \$150,000, payable June 15th at the office of the company in Colorado Springs, Colo. Transfer books close June 8th and reopen June 15th.

**ASSESSMENTS.**

COMPANY.	No.	When levied.	D't'nt'q' in office.	Day of sale.	Amt. per share.
Alpha Cons., Nev...	8	Apr. 14	May 18	June 8	.15
Brunswick Con. G.					
Cal.....	3	Apr. 15	May 18	June 3	.02
Justice, Nev.....	50	Apr. 2	June 6	June 27	.15
Lone Star, Cal.....	4	Apr. 2	May 14	June 6	.004
Modoc Chief, Idaho.....	Jan. 28	May 21	June 13	.02 1/2	
Norway, Utah.....	Dec. 24	Feb. 1	July 21	.02	
Occidental, Nev.....	10	Apr. 6	May 9	May 31	.25
Seg. Belcher & Mides, Nev.....	10	Apr. 8	May 11	May 31	.25

**PIPE LINE CERTIFICATES.**

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

Opening.	Highest.	Lowest.	Closing.	Sales.
May 21.....	57	57 1/4	57	14,000
23.....	56 1/2	56 1/4	56 1/2	5,000
24.....	56 1/2	56 1/4	56 1/2	5,000
25.....	56 1/2	56 1/4	56 1/2	9,000
26.....	56 1/2	56 1/4	56 1/2	6,000
27.....	56 1/2	56 1/4	56	6,000
Total sales in barrels.....				39,000

NEW YORK STOCK EXCHANGE.

Opening.	Highest.	Lowest.	Closing.	Sales.
May 21.....				
23.....				
24.....				
25.....				
26.....				10,000
27.....				4,000
Total sales in barrels.....				14,000

**COAL TRADE REVIEW.**

NEW YORK, Friday Evening, May 27th. Statement of shipments of anthracite coal (approximated), for week ending May 21st, 1892, compared with the corresponding period last year:

Regions.	May 21, 1892.	May 23, 1891.	Difference.
	Tons.	Tons.	Tons.
Wyoming Region.....	497,702	430,031	Inc. 77,671
Lehigh Region.....	124,156	111,601	Inc. 12,555
Schuylkill Region.....	234,937	229,164	Inc. 5,773
Total.....	856,795	769,796	Inc. 86,999
Total for year to date.....	14,445,521	13,383,210	Inc. 1,062,311

PRODUCTION OF BITUMINOUS COAL for week ending May 21st, and year from January 1st.

**EASTERN AND NORTHERN SHIPMENTS.**

	1892.	1891.
	Week.	Year.
Phila. & Erie R. R.....	2,906	36,516
Cumberland, Md.....	74,105	1,362,715
Barclay, Pa.....	4,013	79,448
Broad Top, Pa.....	12,176	231,038
Clearfield, Pa.....	80,469	1,490,217
Allegheny, Pa.....	24,913	469,915
Beach Creek, Pa.....	43,172	1,020,422
Pocahontas Flat Top.....	60,153	964,971
Kanawha, W. Va.....	43,375	947,764
Total.....	345,312	6,602,996

**WESTERN SHIPMENTS.**

	1892.	1891.
	Week.	Year.
Pittsburg, Pa.....	26,596	513,249
Westmoreland, Pa.....	40,666	614,930
Monongahela, Pa.....	13,980	210,529
Total.....	81,242	1,338,698
Grand total.....	426,554	7,941,694

PRODUCTION OF COKE on line of Pennsylvania R. R. for the year ending May 21st, 1892, and year from January 1st, in tons of 2,000 lbs.: Week, 100,941 tons; year, 2,206,063 tons; to corresponding date in 1891, 1,135,433 tons.

**Anthracite.**

Local trade in anthracite coal is quiet, as it is natural at this time, but there is a tone of firmness in the market which speaks well for its stability. The event of the week was the advance of 15 cents per ton in chestnut. During the week considerable talk was heard concerning the probable action of the sales agents. On Thursday morning the Western agents met and advanced the price of anthracite coal for Western points 25 cents per net ton on egg, stove and chestnut sizes. No change was made in broken.

At Western Lake points coal will be \$5.75 per ton, and \$4.75 at Buffalo. All the companies were represented. This action was taken in order to "equalize" the price of coal for Western and Eastern points; hitherto the West has had the advantage of the East in prices, but now the net price at the mines will be nearly equal for both sections.

In the afternoon of the same day the Eastern sales agents held their meeting, with the result, as previously mentioned, of raising the price of chestnut 15 cents. We are in a position to state that this meeting was not as harmonious as certain people would have us believe, nor was the advance accepted unanimously and without dissent. A strong conservative element opposed the step on the ground that it would be impolitic at this time, following so closely the protestation of the "combine" that prices would not be raised. However, Reading carried the day.

To judge from the sensational reports published in the daily newspaper press of this city, one would think that this step would seriously affect the existing conditions of the anthracite trade in this city. As a matter of fact, the advance in the price of chestnut means next to nothing in so far as the city consumers are concerned. It has long been a mooted question why chestnut should be sold for less than the other sizes. All that can be said against the action of the sales agents is that there is danger to the combination in showing indifference to public feeling, and this was the tenor of the opposing arguments at the meeting itself.

The allotment for June was fixed at 3,000,000 tons, an increase of 250,000 tons.

A dispatch from Washington, D. C., states that the sub committee of the House of Representatives Commerce Committee, which has been looking into the Reading Railroad coal combination, will report progress to the full committee to-morrow and state that there is probably a case demanding a Congressional investigation. The representatives in Washington of the Reading Railroad Company offered to furnish copies of all contracts, leases, etc., but these have not yet been produced, owing, the railroad men say, to a misunderstanding as to what was wanted.

The Philadelphia & Reading Railroad statement for April shows gross traffic receipts, \$1,701,440.83; traffic expenses, \$1,012,674.02; profit in operating, \$688,766.81, and profit for the month, \$739,252.88. Against this is charged \$3,760.52; expenses for permanent improvements and \$625,000 as one-twelfth of the current year's fixed charges, leaving a surplus for the month of \$105,762.06. For the corresponding month last year there was a surplus of \$50,738.76. The surplus for the first five months of the current fiscal year is \$841,487.88, an increase of \$662,439.73 compared with the same period last year.

The statement of the Philadelphia & Reading Coal and Iron Company for April shows gross receipts, \$1,630,303.79; gross expenses, \$1,653,808.43, including operating expenses, \$1,567,664.97; colliery improvements, \$77,176, and permanent improvements, \$3,966.76, leaving a loss from mining of \$23,504.64. To this is added \$68,000, one-twelfth of the current year's fixed charges, showing a deficit for the month of \$91,504.64. The deficit for April, 1891, was \$148,433.92. The deficit for the first five months of the current fiscal year is \$306,985.06, a decrease of \$314,135.12, as compared with the same period last year.

**Bituminous.**

The local trade in soft coal is quiet. Consumers are taking fair quantities on their contracts and the blockade on the Pennsylvania Railroad, which still exists, has had no appreciable effect. Not much is doing by way of the Baltimore & Ohio, owing to the slow transportation to Baltimore and the lack of vessels at that port. There is lack of orders rather than a lack of transportation facilities for the coal which goes by the way of Norfolk and Newport News. There seems to be an abundance of cars on all the roads, although the transportation companies are limiting the supply given to the miners. The rumored reduction of freights on coal shipped via the Baltimore & Ohio for shipment at Baltimore will go into effect on June 1st. We understand that the reduction will amount to 10c. per ton.

Ocean freights from Baltimore, Newport News and Norfolk are: 80c. to Boston, Salem and Portland; 70c. to Sound ports; 85c. to Portsmouth and Bangor. From Philadelphia freights are 5c. lower. Prices for the best grades of soft coal are as follows: At Newport News and Norfolk, \$2.50; at Baltimore, \$2.50; at Philadelphia, \$2.50; at the Amboys, \$3.10 f. o. b., and \$3.35@3.40 alongside New York. The above prices are for the best grades of coal. Poorer grades may be obtained for less according to their quality.

**NOTES OF THE WEEK.**

Every one connected with the coal trade of this city will regret to hear of the death of Mr. Theodors

S. Mize, Eastern representative of the Chicago *Black Diamond*, which occurred on the 21st. Mr. Mize had made many friends in coal circles by his never-failing courtesy. Few men have been so faithful to their duties, and few have achieved such personal popularity.

What is said to be the largest cargo of coke ever exported from the United States, left Norfolk, Va., on the 20th inst. The British steamship "Aeon" cleared with 1,847 tons, of 2,000 lbs., of Pocahontas coke, for Tampico, Mexico, to be forwarded for use in the smelters at Monterey. The shipment was made for New York parties by Castner & Curran, of Philadelphia, through their agents at Norfolk.

The Philadelphia & Reading Railroad Company has acquired control of the entire product of the Mt. Hope Colliery, at St. Clair, Pa., operated by Garret B. Linderman & Co., and the Oak Hill Colliery, near Minersville, Pa., operated by Leisenring & Co. These were the only individual collieries in the vicinity of Pottsville by which the local retail trade got their supplies.

In the case of the State against the Philadelphia & Reading Railroad "combine," Judge McPherson, sitting in chambers at Harrisburg, Pa., by agreement of all the parties to the suit, appointed Charles H. Bergner and Joseph C. McAlarney, of Harrisburg, examiners in the case to take testimony. Later Attorney-General Hensel filed a replication to the answers of the defendants, joining the issue in so far as they dispute the statements made in the answer to the bill of equity filed by the State. A meeting of the examiners and attorneys was held on the 25th inst., the examiners were qualified and immediately proceeded to take testimony. The map prepared by the defendants, showing the lines of the Philadelphia & Reading and of the Lehigh Valley railroads for the purpose of establishing the claim that they are neither parallel nor competing, which map had been made part of the answer of the defendants, was formally placed in possession of the examiners by the Attorney-General, as also were copies of agreements or leases between the defendant companies and certain branch lines, which leases and agreements had also been made part of the defendants' answer. The next hearing was fixed for June 1.

**Boston.**

May 26.

(From our Special Correspondent.)

The advance of 15 cents per ton on chestnut coal by the combination has set the dealers here at ease for the time being at least. Like all such advances they are not for any specified period and may be annulled at any time if the combination sees fit. It is felt that present prices will remain as they are throughout June. It is apropos in connection with this advance to note where the pledges of the combination come in. It was going to increase its earnings by practicing economies, yet it has advanced prices all along the line, and on nut coal 40 cents per ton. And yet another advance is anticipated by July, and where these advances will end no one can surmise.

As for the local demand very little can be said. There has been very little buying during the past week, notwithstanding an advance of some sort was expected shortly, though not quite so soon as this. Prices are very strong however.

We quote f. o. b. prices net at New York: Stove, \$4.15; egg, \$3.00; free burning broken, \$3.75; chestnut, \$4.05; Lykens Valley broken, \$4.50; egg, \$4.00; stove, \$5.40; chestnut, \$4.50. Prices on Lykens Valley are net at Philadelphia. In soft coal there is nothing new to note. Trade is light but prices are firm. We quote on cars here: Clearfield, \$3.15; George's Creek from \$3.60@3.65.

The recent bad storms have delayed the voyages of vessels, so that tonnage available is rather light. Consequently rates are higher and firmer than they were a week ago.

We quote: From New York to Boston, 65c.@70c. from Philadelphia to Boston, 75c.; from Philadelphia to Portland, 75c.; to Bath, 80c.; to Providence, 70c.@75c.; from Baltimore to Boston, 80c.; Newport News to Boston, 70c.@75c.; Sound points, 70c.

The yards here are all very busy. Those who are going to close their city houses for the summer are stocking up now so as to be ready for the fall when they return. There has also been an extra demand as quite a number of consumers have heard of an anticipated advance for several weeks, and consequently purchased more than otherwise. Prices are firm all along the line. The dealers have not as yet advanced their prices on nut, in fact, it is not known whether they will or not.

We quote: Stove, \$6; nut, \$6; egg, \$5.75; furnace, \$5.50; Franklin, \$7.25; Lehigh egg, \$6; Lehigh furnace, \$6; wharf prices 50 cents less than the foregoing.

The receipts of coal at this port for the week ending May 21st were 51,793 tons of anthracite and 20,395 tons of bituminous, against 54,772 tons of anthracite and 40,543 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 716,433 tons of anthracite and 262,591 tons of bituminous, against 606,215 tons of anthracite and 428,407 tons of bituminous for the same time last year.

**Buffalo.**

May 26.

(From our Special Correspondent.)

The anthracite coal trade is without any facts worth recording. Prices are without change. Trade moderate for home consumption and light for the wants of near-by towns and villages. Stocks here

only adequate for the requirements of shippers and local dealers, and at times the former have been but inadequately supplied.

Bituminous coal moderately active at about previous quotations. Manufacturers are busy and the demand for steam vessel purposes up to full average at this season of the year. Stocks ample, and at times much too large for the needs of consumers. Coke quite and steady. The buying price here is \$4.55 for foundry and \$4.90 for crushed per short ton by the car load on track.

The Lake Carriers' Association has taken action in regard to the proposed reduction by the Senate of the appropriation for the 20 ft. channel through all the rivers and lakes between Buffalo and Chicago and Duluth by presenting a strong memorial. The reduction is from \$500,000 to \$375,000 in the Harbor and River Appropriation Bill.

Fresh natural gas fields are being developed near Buffalo. A new well at East Buffalo was struck on Monday last, the gas lighted and a flame shot upward 40 ft. The contractor says that the gas comes from white sand formation, 18 in. thick and similar to that found in the Canadian gas fields a few miles from our city.

The receipts of coal by canal at Buffalo for the third week in May, none; the shipments, 2,215 net tons.

Lake shipments of coal for several days light, partly on account of short supply on docks. Rates of freight firm but unchanged. The shipments from this port from May 18th to 25th, both days inclusive, 68,100 net tons distributed about as follows: 34,950 to Chicago, 14,340 to Milwaukee, 1,800 to Duluth, 640 to Marine City, 3,870 to Toledo, 650 to Detroit, 4,700 to Superior, 1,200 to Gladstone, 450 to Bay City, 1,000 to Marquette, 700 to Kenosha, and 1,800 to Saginaw. The rates of freight were 60c. to Racine, 50c. to Chicago and Milwaukee, 65c. to Kenosha, 45c. to Marquette, 40c. to Saginaw, 30c. to Duluth, Superior and Bay City, 35c. to Marine City, and 25c. to Toledo, Detroit and St. Clair. Soft coal to Port Arthur at 40c. per net ton, closing with shippers wanting tonnage for Chicago, but not hadly enough to offer higher rates. But few vessels in port.

**Chicago.**

May 26.

(From our Special Correspondent.)

The fuel contract for the Federal Building was let May 24, and as it is the first one made this season since the consolidation, the figures are significant. The offers asked for were on 5,000 tons large egg, 20 tons small egg, 40 tons Erie soft coal and 5 cords slabs white pine. The highest bid was \$6.80, which was for Lehigh, and the lowest was \$6.48; Erie varied somewhat; the highest figures per ton being \$5.72, and the lowest \$4.85. The highest bid as a whole was \$34,424, and the lowest \$32,774.50, which was made by Boyd, Stickney & Co., to whom the contract was awarded. Last year's supply cost \$29,000. There were nine or ten bidders, and importance is attached to the figures quoted as they are within a few cents of the retail price delivered to domestic consumers, the highest being 23c. above present quotation. It is self-evident that, as the consolidation companies and the individual concerns made bids, there was no collusion. It is also deduced from the prices handed in that there will be no fear of a drop in the market, but that they manifestly point the other way.

Country trade is extremely light. To be sure there is some inquiry, but calls even for small quantities in a wholesale way are scarce. A strong impression prevails that the June circular will be advanced another 25c. for dock and yard coal, but it is only surmise, as agents here profess they know nothing about it. Retail coal is active, domestic consumers buying freely, the supplies taken being for next winter's use. Some retailers have more business than they can comfortably handle. There is much disquietude among the larger trade, as the situation so far as hard coal is concerned is the most unsatisfactory known for years. There will be a meeting of the Coal Dealers' Association to discuss the situation, which is conceded to be "a hard row of stumps" for the jobbing trade, who argue that it would be folly to stock up, as prices might go down, in which case wholesalers would be seriously affected, if not ruined. The regular circular remains firm as quoted.

Bituminous coal is in rather irregular demand, as reported by different operators. Some state it is dull, others say it is good. Indiana hock coal has been in good demand, and one of the Brazil operators states that his sales have been not less than 10% greater than for the same period in 1891. Indications point to a still larger business in June, as there are a number of railroad contracts running out in that month. There is also a fair demand for Illinois coal, though not as heavy as for the Indiana varieties. Circulars on all classes of coal are shaded according to circumstances.

Coke is somewhat quieter, and the foundry trade is now menaced by the strike of the mechanical mlders. Should this be protracted it will cause a serious decline in sales.

Quotations are: \$4.65 furnace; \$5.05 foundry, crushed; \$5.40 Connellsville; West Virginia, \$3.90 furnace, \$2.10 foundry; New River foundry, \$4.90; Walston, \$4.65 furnace, \$5 foundry.

Circular prices are unchanged at the following rates: Lehigh lump, \$6.35; large egg, \$5.35; small egg, range and chestnut, \$5.35. Retail prices per ton are: Large egg, \$6.50; small egg, range and chestnut, \$6.50.

Prices of bituminous per ton of 2,000 lbs., f. o. b. Chicago, are: Pittsburg, \$3.15; Hocking Valley, \$3;

Youghiogheny, \$3.25; Illinois block, \$1.90@2; Brazil block, \$2.35.

**Pittsburg.** May 26.  
(From our Special Correspondent.)

**Coal.**—The market since our last shows no particular change as regards prices or demands. The Ohio River being in good navigable order coal was shipped as fast as loaded. The miners have all the work they want at satisfactory prices for mining. River shipments for the week; Cincinnati, 1,114,000 bushels; Louisville, 1,583,000 bushels; total, 2,700,000 bushels. It will be perceived that river operators are taking advantage of the May rise to place all the coal they can at lower prices.

The year's run has been a steady one. The Southern markets are well stocked with coal, sufficient to last for many months. Prices South and West are down to very low figures. For some days fears were entertained that the floods in the Mississippi and other streams would prove destructive to the coal interest, but so far coal men have sustained no serious loss; we hope it will so continue to the end. Prices in this market are unchanged. Railroad operators are busy, but complain of being retarded in their shipments by shortage of cars.

**Connellsville Coke.**—Trade since our last shows slight signs of improvement in production and shipment, which are more than holding their own. The increase, however, is not very large and does not alter the opinion of coke producers that the trade shows little promise of getting out of the present rut. The best feature of the situation is that prices are being better sustained, showing a little more faith in the future. The time made at the various plants was about the same as last week.

The plants of the Frick Coke Company made a fair average, and, taking the district in general, the running order was better than the preceding week. The shipments for the week aggregate 117,324 tons, distributed in cars as follows: To Pittsburg, 1,975 cars; points west of Pittsburg, 3,250; east of Pittsburg, 1,292; total, 6,517 cars, being an increase of 143 cars. Freights unchanged except to Boston, which was reduced 50 cents per ton. Prices unchanged.

**METAL MARKET.**

NEW YORK, Friday Evening, May 27, 1892.  
Prices of Silver Per Ounce Troy.

May.	Stirling Exchange.	London.	N. Y. Cents.	Value of sil. in \$1.	May.	Stirling Exchange.	London.	N. Y. Cents.	Value of sil. in \$1.
21	4.87½	40½	88½	.681	25	4.87½	40½	87½	.676
23	4.87½	40½	87½	.679	26	4.87½	40½	87½	.675
24	4.87½	40½	87½	.676	27	4.87½	40½	87½	.675

Market has been quiet, with no special feature. On account of the scarcity of lead ores and temporary suspension in work of one of the large refineries, silver during the last few days has not been coming forward so freely. The government, however, succeeded in getting their quota for the month without difficulty, and the hullion houses, owing to the uncertainty in the course of silver, are shippers rather than holders.

The United States Assay Office at New York reports the total receipts of silver for the week to be 77,000 ounces.

**Silver Bullion Certificates.**

	Prices.		Sales.
	H.	L.	
May 21	88½	.....	10,000
May 23	88½	.....	10,000
May 24	88	.....	.....
May 25	88	87½	40,000
May 26	87½	.....	.....
May 27	87½	87½	20,000
Total sales	.....	.....	80,000

**Domestic and Foreign Coin.**

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

	Bid.	Asked.
Trade dollars	68	75
Mexican dollars	68½	69
Peruvian soles and Chilean pesos	65½	67
English silver	4.88	.....
Five francs	4.83	.....
Victoria sovereigns	4.86	4.90
Twenty francs	3.88	3.90
Twenty marks	4.74	4.76
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.79	4.83
Mexican doubloons	15.50	15.70
Mexican 20 pesos	19.50	19.60
Ten guilders	3.96	4.00
Fine silver bars	87½	88½

**Copper.**—The market for copper has been quiet but steady. A fair business has been doing in Lake at about 12c., with a few odd lots a trifle easier, but cakes and wirebars still command a premium, though small, and some transactions are reported at 12½c. About half a million pounds of Calumet & Hecla wirebars were sold at 12½c., but this was an exceptional transaction, where nothing but Calumet & Hecla copper could be used.

We have for some time reported that this company has practically been out of the market, and no second hand copper of that brand being obtainable, whatever price they asked had to be paid, but this transaction is no criterion of the market in general. Casting copper is about the same at 11½@11¾. We have not heard of any business in Arizona pig copper, which is still held for 10½, but this is above the ideas of buyers.

In Europe the market has been rather irregular. In the beginning of the week prices were fairly well maintained, but afterwards there were heavier realizations, and prices for G. M. B.'s declined to £46 12s. 6d.@15s. for spot and £47@2s. 6d. for three months prompt, and these are the closing quotations. For manufactured we quote:

English tough, £48 10s.@£49; best selected, £50@£50 10s.; strong sheets, £50 10s.@£57; India sheets, £54@£54 10s.; yellow metal sheets, 5½d.

The negotiations regarding the production are still pending, and, it is said, are now near completion, both the American and foreign producers having made slight concessions. The Tharsis company has so far not given its adherence, but is expected to do so before many days. On repeated occasions we have given it as our opinion that no material assistance would be rendered to the copper industry by such an agreement, particularly as the probabilities are that before very long it will suit one party or another to go their own way, and we are still of opinion that the course of the prices will entirely depend on the consumption, which, so far this year, has been very satisfactory, and the chances are that this state of affairs will continue and render unnecessary any artificial assistance.

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

To	Copper Matte.	Lbs.	Value
S. S. Gallia	2,204 bags	240,586	\$12,000
S. S. Coltonia	2,828 bags	358,773	18,000
S. S. Wisconsin	Ore and copper (in transit)	2,300	6,000
S. S. Servia	1,132 bags	120,619	6,000
To London	Copper	Lbs.	5,625
S. S. Richmond Hill	36 bbls.	45,000	2,000
To Hamburg	Copper Bullion	Lbs.	2,000
S. S. Augusta Victoria	10 bars	632	2,938
To Vera Cruz	Copper	Lbs.	155
S. S. Yumuri	103 boxes	25,000	1,250
S. S. Orizaba	1 cask	1,250	155
To Havre	Copper	Lbs.	22,200
S. S. La Gascogne	784 pigs	224,310	22,200

Tin continues exceedingly strong and the upward movement is still under way. Shipments from the East are yet small, in spite of the higher prices, and stocks in London are coming down to a rather dangerous point. We quote for spot, June and July, \$21.55, and for August-December there are buyers at \$21.65@21.70. London has been rather active, with large transactions, prices advancing from day to day and closing at £97 17s. 6d.@£98 for spot and £97 12s. 6d.@£97 15s. for futures.

Lead is quiet and dull, with prices steady at 4.225@25.

The foreign market is reported stronger, and values have advanced to £10 15s. for Spanish and £10 17s. 6d. for English lead.

**Chicago Lead Market.**—The Post, Boynton, Strong Company telegraph us as follows: "The market remains quiet, though considerable lead has changed hands in the neighborhood of 4.12½c., principally future deliveries. June lead is in demand with more buyers than sellers."

**St. Louis Lead Market.**—The John Wahl Commission Company telegraph us as follows: "Lead is very quiet, and trading is only of a retail character. Prices, nominally, 4.07½c. for either common or refined. The under current at close is slightly top heavy."

Spelter is very irregular; in the East there has been a scarcity of spot metal, and high prices have been paid for prompt delivery, but futures are neglected and obtainable at a considerable discount as compared with spot. We have to quote for May delivery 4.85@4.87½ and futures 4.70@4.75. In London good ordinaries are quoted at £22 7s. 6d. and specials at £22 10s.

**Antimony** is rather firmer, Cookson's being quoted at 14½@15, L. X., 12½@13, and Hallett's, 11½@12.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, May 27.

**Pig Iron.**—The condition of the pig iron market is anything but encouraging. Those features which have characterized it for some time past show no change whatever. There is no sign of an increase in the demand, all reports to the contrary notwithstanding. Whatever iron is bought now is always in small lots, running from 50 to 100 tons; it is seldom that a greater quantity is sold. This week the trade was stirred by the report that a 3,000-ton lot of Northern Iron was sold. Definite or specific information concerning this transaction was impossible to obtain.

There has been much inquiry for iron during the week, consumers apparently having become convinced that bottom prices have been reached. Although dealers profess ignorance of any sales made at lower figures than the nominal "market" price, it is reasonable to believe that sales have been made at concessions. It is impossible to ascertain exactly how low iron is selling for, inasmuch as it always

depends on the seller's financial condition and his ability to hold out for better prices. But certain it is that full figures are difficult to obtain. We quote: Northern No. 1 X, \$16; No. 2 X, \$15; Southern No. 1 X, \$15.50@16; No. 2 X, \$14.50@15.

**Spiegeleisen and Ferro-Manganese.**—There is nothing of interest to report in this market. No sales of any consequence have occurred during the week. Quotations remain nominally as follows: 20% spiegeleisen, \$26@27, and 80% ferro-manganese, \$61@62.

**Steel Rails.**—The dullness in this market just now is extreme. We do not hear of any sales of standard sections, but some sales of light rails at \$30 at mill are reported. Billets are still quoted at \$7.50 below the quotation for steel rails, and this fact will show clearly in what condition the rail market is. There has been no change in prices, and we continue to quote \$30 at mill and \$30.75 tide-water.

**Rail Fastenings.**—In sympathy with the rail market fastenings are almost absolutely neglected. Not for many years has there been such stagnation in this market. No sales are reported this week. Nominal quotations are as follows: Fish and angle plates, 1.65@1.70c.; spikes, 1.95@2c.; bolt and square nuts, 2.70@2.80c.; hexagonal nuts, 2.80c.

**Merchant Steel.**—Business in merchant steel has been light and devoid of significant features. Prices reached bottom some time ago, and show no change from week to week. Quotations are as follows: Mushet's special, 48c.; English tool, 15c. net; American tool steel, 6½@7½c.; special grades, 13@18c.; crucible machinery steel, 4.75c.; crucible spring, 3.75c.; open hearth machinery, 2.25c.; open hearth spring, 2.50c.; tire steel, 2.25c.; toe calks, 2.25@2.50c.; first quality sheet, 10c.; second quality sheet, 8c.

**Tubes and Pipes.**—A quiet though steady business is doing in tubes and pipe. Nothing of special interest can be reported. Prices remain unchanged: We quote ruling discounts as follows: Butt, black, 57½%; butt, galvanized, 47%; lap, black, 67%; lap, galvanized, 55%; boiler tubes, under 3 in. and over 6 in., 55%; 3 in. to 6 in., 60%.

**Structural Material.**—The promised improvement in this market has not materialized. Business has continued moderate in volume and, according to manufacturers, unsatisfactory as to price. We quote this week: Beams, 2.30@2.50c.; angles, 2@2.10c.; sheared plates, 1.90@2c.; tees, 2.40@2.60c.; channels, 2.40@2.50c. Universal plates, 2@2.10c.; bridge plates, 2@2.10c. on dock.

**Old Material.**—This market is lifeless. Sales are so infrequent that it is impossible to base quotations upon them.

**NOTES OF THE WEEK.**

The Phoenix iron ore mines at Boyertown, Berks County, Pa., operated by the Phoenix Iron Company, and among the oldest in eastern Pennsylvania, will close down for three months on the 30th inst.

A conference of furnace men and prominent representatives of the Pennsylvania Railroad, Baltimore & Ohio, Lake Shore, Lake Erie & New York, Lake Erie & Western Railway companies, was held in Pittsburg, Pa., on the 25th inst., to consider a cut in rates from the Connellsville coke regions to the Mahoning and Shenango Valleys and the Wheeling and Cleveland districts. The furnace men claimed that owing to the depressed condition of the iron market and the competition from the Southern iron markets, a reduction in rates was necessary. It was decided to reduce the rate to the Mahoning and Shenango Valleys and Wheeling district from \$1.35 to \$1.25 per ton, and to Cleveland from \$1.70 to \$1.65 per ton.

**Buffalo.** May 26.

(Special report, by Rogers, Brown & Co.)

We note more activity in the market without change in prices. There is more of a disposition to buy and to contract for periods running into the future. Several of the large orders which have been hanging fire were placed during the past week, although under strong competition from all leading districts. The large stocks accumulated in first hands seem to deprive the market of any buoyancy which a better demand would otherwise give it.

We quote, f.o.b. Buffalo, on the cash basis, as follows: No. 1 X, Foundry Strong Coke Iron Lake Superior ore, \$15.75; No. 2 X Foundry Strong Lake Superior ore, \$14.75; Ohio Strong Softener No. 1, \$15.75; Ohio Strong Softener No. 2, \$14.75; Jackson County Silvery No. 1, \$18; Jackson County Silvery No. 2, \$17; Lake Superior Charcoal, \$16.50 to \$17.50; Tennessee Charcoal, \$17.50; Southern Soft No. 1, \$14.65; Alabama Car Wheel, \$19; Hanging Rock Charcoal, \$20.50.

**Chicago.** May 26.

(From our Special Correspondent.)

Transactions in crude iron during the past week have not been so large as the week previous. Quite a number of negotiations are still pending, and this week may bring about larger sales of coke iron. Altogether a considerable tonnage has been contracted during the past 30 days, and some of the local furnaces are in a more independent position, and disinclined to hold options based on prevailing prices open for any length of time. On Lake Superior charcoal iron the situation continues to be as outlined in our report of last week. The boiler maker's strike is still unsettled, no overtures having been made by either side, hence the plate trade for local business is at a standstill. A number of sheet

metal employers (comprising tin, iron, copper and brass) have signified their willingness to accede to the demands of the men, but most of them are on the fence and want time to consider. There are some 1,500 skilled mechanics, more or less, employed at the large shops.

Bars and sheets have gained some degree of firmness, as the low priced mills are getting well filled up, having taken business at figures refused by well equipped mills. New York architects are now at work on plans for the new terminal depot of the Illinois Central, to cost a million dollars, ground for which was broken this week. Demand for structural for elevated roads, new office buildings, etc., is very active. A number of agricultural implement makers have placed season's contracts for merchant steels; in some specialties the tonnage is larger than last year. Old material is distressingly dull.

**Pig Iron.**—The recent wet weather has had a depressing effect on consumers at outside points, and orders from thence have been few and the tone light. The larger smelters of coke iron are buying steadily, though for small amounts and mostly to cover contracts already secured. The position of the local furnaces is, in view of the large sales consummated and the prospective contracts to be placed within a few days, one of comparative ease. Some consumers who have had options are preparing to close them, as agents are cancelling many which had been given at current quotations. While prices remain unchanged, there appears to be an undertone of firmness among the agents of local coke furnaces. On Lake Superior charcoal iron there have been no transactions of any magnitude; actual sales have been confined chiefly to small lots ranging from 50 to 300 tons at from \$16.50 to \$17 and higher, according to specifications and deliveries. The position taken by leading furnaces is strong at \$16.50 for round lots for extended deliveries. Southern No. 2 soft is selling in moderate quantities at close to our quotations.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$16.50@17; Lake Superior coke, No. 1, \$14.50@15; No. 2, \$14@14.25; No. 3, \$13.75@14; Lake Superior Bessemer, \$16.50; Lake Superior Scotch, \$15.50@16; American Scotch, \$17@17.50; Southern coke, foundry No. 1, \$14.75; No. 2, \$14.25; No. 3, \$13.75; Southern coke, soft, No. 1, \$14; No. 2, \$13.25; Ohio silveries, No. 1, \$17.50; No. 2, \$17; Ohio strong softeners, No. 1, \$17.50; No. 2, \$16.50; Tennessee charcoal, No. 1, \$17.50; No. 2, \$17; Southern standard car wheel, \$20@21.

**Structural Iron and Steel.**—There is a heavy amount of work to be placed, locally and from outside points, but prices continue to rub along the bottom, and ordinary sizes of beams have dropped another notch. Regular quotations, car lots f. o. b. Chicago, are as follows: Angles, \$1.95@2; tees, \$2.20@2.30; universal plates, \$1.95@2; sheared plates, \$1.95@2; beams and channels, \$2.05@2.25.

**Plates.**—Local business is, of course, at a standstill, as the strike is still unsettled. Demand for heavy sheets and plates from other points is only fair. Steel sheets, 10 to 14, \$2.30@2.40; iron sheets, 10 to 14, \$2.20@2.30; tank iron or steel, \$2.10@2.15; shell iron or steel, \$2.75@3; firebox steel, \$4.25@5.50; flange steel, \$2.75@3.00; boiler rivets, \$4.00@4.15; boiler tubes, 2 1/2 in. and smaller, 55%; 7 in. and upward, 65%.

**Merchant Steel.**—Several contracts for specialties in harrow teeth, O. H. spring steels, etc., were placed during the week, and two of the large implement works in this vicinity are in the market for supplies. Current month so far is the heaviest on record for tool steel. We quote: Tool steel, \$6.50@6.75 and upward; tire steel, \$2.25@2.30; toe calk, \$2.40@2.50; Bessemer machinery, \$2.10@2.20; Bessemer bars, \$1.75@1.80; open hearth machinery, \$2.40@2.60; open hearth carriage spring, \$2.25@2.30; crucible spring, \$3.75@4.

**Galvanized Sheet Iron.**—Despite the strike of the sheet metal makers there is at present quite a good demand for galvanized sheets. Two shops employing several hundred men were idle on Tuesday. Unchanged at 70 and 10% on Mill lots and 67 1/2 and 5% off on Juniata and 67 1/2 and 10% off on charcoal from warehouse. An extra 2 1/2 to 5% is given on large orders.

**Black Sheet Iron.**—Several mills have "passed" orders ranging from 2,000 to 3,000 bundles of No. 2 common iron for late summer deliveries at current rates, others decline contracts for sheets lighter than No. 14. Quotations are firm at 2 85@2 90c. basis of No. 27 Chicago, for delivery before July 1st. Dealers quote 3@3 10c. from stock.

**Bar Iron.**—There is more firmness in tone for forward delivery, as many of the low-priced mills are becoming well filled up. There is a moderate volume of orders, but no active demand. Ordinary quotations are 1 57 1/2@1 62 1/2c. with half extras added, and 1 65c. for all muck bar. On fancy specifications these figures could probably be shaded. Jobbing orders are quoted at 1 75@1 85c., rates according to quality.

**Nails.**—Some irregularity is noted in wire nails, and prices are decidedly weaker, though some mills will not meet the figures made by others. Prices range from \$1.60@1.65 in car loads, and \$1.70 from stock. Steel cut are also less strong at practically the same price as for wire, and demand light.

**Steel Rails.**—There is a steady run of small orders from 500 to 2,000 tons for early delivery, and a fair amount of inquiry for round lots for late summer delivery, though some of the latter will largely de-

pend on crop prospects. Quotations remain steady at \$31@32.50. Other track supplies are on a par, with demand for steel rails at \$1.70 for iron or steel splice bars; spikes, \$2.05@2.15 per 100 lbs.; track bolts, hexagonal nuts, \$2.65@2.70; square, \$2.55.

**Scrap.**—As no sales of any moment have been made to test the market, quotations are merely nominal: No. 1 railroad, \$16; No. 1 forge, \$15; No. 1 mill, \$10.50; fish plates, \$18; axles, \$21; horseshoes, \$16.50; pipes and flues, \$7; cast borings, \$6.50; wrought turnings, \$9; axle turnings, \$10.50; machinery castings, \$10; stove plates, \$8.50; mixed steel, \$10.50; coil steel, \$14; leaf steel, \$15; tires, \$15.

**Old Material.**—Iron rails are heavy on the market at \$18.50, with a sale of 500 tons at a Southern point in State at equal to \$19 Chicago. Steel rails are very dull at \$12 for mixed lengths and \$13.50 for selected. Car wheels, are stagnant at \$15 nominally.

**Louisville.** May 21.

(Special Report by Hall Brothers & Co.)

Quietness has been the main feature of the market for the past week. Orders have been for light quantities, and at lowest prices ruling. Consumers are letting stock run low, and are not disposed to contract largely for future delivery, fearing prices may yet go lower.

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

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

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

**Philadelphia.** May 26.

(From our Special Correspondent.)

Increased apprehension is manifest in many quarters in Middle and Eastern Pennsylvania, and it looks this week as though there would be a rather sudden blowing out of a few blast furnaces; at least that is the talk, and the policy may be forced upon several companies. The reason for this course is that prices are still pointing downward, demand is irregular, and while a good deal of iron has been bought within the past two or three days for summer consumption, there is a good deal more iron offered than can possibly be taken. Forge and Foundry iron have sold at less prices during the past few days than for several years. Strange to say, these exceptional opportunities are very grudgingly taken advantage of. Quotations are, nominally, \$15.75@16.25 for No. 1, \$13.50@14 for No. 2. No. 1 Foundry has sold at less than \$15, and No. 2 at less than \$14. Southern No. 2 has been offered at \$13.50. Forge ranges all the way from \$13 to \$14. Cold blast charcoal has also dropped.

**Steel Billets.**—Several thousand tons have been sold within the past 48 hours. Quotations \$24.50 at this point. The lowest price offered was \$24 delivered here, and it is said to-day that this offer is likely to be taken.

**Muck Bars.**—Prices range from \$24.50 to \$25.50, with offers at 50c. less, which will probably be taken.

**Merchant Iron.**—Quotations range from 1 60 to 1 75 as usual. A few mills are running full, but the majority are scrambling for work which they do not get.

**Sheet Iron.**—The week has been unexpectedly dull all around. Stocks are accumulating at stores and mills. Prices range for best refined from 2 30 @3 40; soft steel sheets are 3@4c. Discount on galvanized ranges from 70 to 75% from car.

**Nails.**—Despite some unfavorable rumors there has been a good week's business done in nails, and quotations have been renewed at this week's meeting.

**Merchant Steel.**—There is an exceptionally good demand for merchant steel. The activity is due to the placing of several large orders, and manufacturers speak quite hopefully.

**Plate and Tank Iron.**—Another drop of one-tenth has just been made. Tank plate sold this week at 1 70. It is rumored that lower quotations have been made. Boiler steel is also weak, and it is impossible to say anything encouraging.

**Structural Material.**—Further weakness has developed within the past 24 hours, due to the submission of specifications for a good deal of material for the summer, for which there is, of course, considerable competition. Prices are nominally 1 80 for bridge plate and angles. Beams, channels and tees range from 2 10@2 25.

**Steel Rails.**—Quotations, \$30. No news.

**Old Rails.**—Iron are quoted at \$20; steel, \$16; two or three trifling sales.

**Scrap.**—Railroad is wanted badly, but stocks are low, and new supplies are not easily picked up.

**Pittsburg.** May 26.

(From our Special Correspondent.)

**Iron and Steel.**—Trade since the date of our last report has exhibited only slight improvement and that only in regard to certain kinds of iron. The improvement so long and anxiously expected has not

yet put in an appearance; there are many parties of the opinion that it will be some time yet before that important event will be a matter of fact. There is one fact that may as well be taken into consideration at once. The first of July is the usual time for stock taking and making necessary repairs, also for signing the Amalgamated scale.

There are various rumors in regard to what action the iron men will take in regard to next year's prices. The opinion is very general that a material reduction in wages in certain departments will be demanded; that under existing circumstances it will be impossible to pay last year's wages; that few firms have made any money; that many have barely made expenses, and others have failed to make the year's account show a balance on the right side of the ledger. From certain leading iron manufacturing centers there has been reports of an increase in sales of standard Bessemer pig and of soft steel. Prices, however, have been low and far from satisfactory to most sellers, being more or less irregular. The usual mid-summer holiday is near at hand and will doubtless be taken advantage of for a suspension of work, which, in the opinion of certain well-informed parties, may possibly be protracted longer than usual as there are various matters that will require a satisfactory adjustment before manufacturers will be disposed to start their mills, unless the outlook is better than it is at present. The Charlotte furnace at Stockdale, Pa., has changed owners and is now owned by Messrs. John W. Chalfant of the Isabella furnaces Nos. 1 and 2, James J. Dirmell and Alex. Nimick, trustees of Nimick & Co. The furnace is now out of blast, but will be started up as soon as the outlook will justify. Pittsburg furnaces are still running and turning out the usual amount of iron, which at all times commands the highest current prices, having a reputation second to none in the United States.

**Southern Pig Iron.**—Railroads are doing all they can to assist the iron makers of the South. Since our last roads from Birmingham, Ala., have made a reduction of iron rates of 50 cents per ton to Pittsburg and Pittsburg points. The reduction went into effect on Tuesday, May 24, but lasts for only one week. Why it should have been made for one week only is a puzzle to iron men generally. The Southern railroads are doing all they can to build up the iron trade of the South, for which they deserve credit.

Here is an example that the Northern roads would do well to follow, at least until the present "dark outlook" in the iron trade of the North is removed. A leading dealer has this to say: A fair business was transacted and, in the majority of cases, at about the same figures as last week. On the whole it is probable that buyers have had some slight advantage as regards terms and deliveries, although no actual concession in prices can be noted. But certain sellers have extended their dates for deliveries, which is one of the conditions buyers have been contending for. It may be said that sales the past week have been at easy prices and easier terms.

**Coke Smelted Lake and Native Ores.**

4,500 Tons Bessemer, June, July	\$14.25 cash.
2,000 Tons Bessemer, June, July	14.20 cash.
1,000 Tons Grey Forge, June, July	12.85 cash.
1,000 Tons Bessemer, August	14.25 cash.
1,000 Tons Bessemer, June, July	14.20 cash.
1,000 Tons Bessemer, June	14.30 cash.
750 Tons Grey Forge	12.85 cash.
700 Tons Grey Forge, August	12.90 cash.
700 Tons Grey Forge, City Furnace	13.00 cash.
500 Tons Grey Forge, June, July	12.85 cash.
500 Tons Grey Forge, City Furnace	13.00 cash.
500 Tons No. 2 Foundry, City Furnace	14.25 cash.
250 Tons Southern Foundry	13.50 cash.
200 Tons Foundry	13.75 cash.
150 Tons No. 1 Foundry	15.25 cash.
100 Tons Southern Foundry, Soft	13.50 cash.

**Charcoal.**

125 Tons Cold Blast	\$26.00 cash.
75 Tons Cold Blast	26.50 cash.
75 Tons Warm Blast	17.25 cash.
75 Tons Warm Blast	17.50 cash.
50 Tons No. 2 Foundry	24.50 cash.

**Steel Slabs and Billets.**

3,200 Tons Steel Billets, June, July	22.40 cash.
1,000 Tons Steel Slabs, June at Mill	22.35 cash.
1,000 Steel Billets, at Mill	22.45 cash.
500 Tons Steel Billets, prompt shipment	23.00 cash.

**Muck Bar.**

600 Tons Neutral	24.75 cash.
500 Tons Neutral, May and June	24.75 cash.
500 Tons Neutral, June	25.00 cash.

**Skelep Iron.**

1,000 Tons Narrow Grooved	1.55 4m.
700 Tons Wide Grooved	1.57 1/2 4m.
500 Tons Sheared Iron	1.82 1/2 4m.

**Steel Skelep.**

400 Tons Wide Grooved	1.50 4m.
300 Tons Narrow Grooved	1.45 4m.
280 Tons Sheared Steel	1.80 4m.
150 Tons Wide Grooved	1.50 4m.

**Ferro-Manganese.**

100 Tons 80%, seaboard	59.25 cash.
50 Tons 80%, domestic Pittsburg	62.50 cash.

**Steel Wire Rods.**

500 Tons American Fives at mill	31.75 cash.
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**Bloom, Beam, R. & C. Ends.**

1,000 Tons Bloom and Rail Ends	16.50 cash.
500 Tons Rail Ends	10.50 cash.

**Old Iron and Steel Rails.**

1,000 Tons Old Iron Rails	20.50 cash.
1,000 Tons Old Steel Rails mixed lengths	15.50 cash.
500 Tons Old Iron Rails	20.75 cash.
500 Tons Old Steel Rails mixed	15.25 cash.

**Scrap Material.**

200 Tons No. 1 R. R. W. Scrap, net	17.00 cash.
200 Tons Wrought Scrap, net	12.00 cash.
150 Tons Light Scrap Turnings, gross	12.00 cash.
100 Tons Cast Borings, gross	8.00 cash.
50 Tons Tires, net	16.00 cash.

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

NAME AND LOCATION OF COMPANY.	May 21.		May 23.		May 24.		May 25.		May 27.		SALES.	NAME AND LOCATION OF COMPANY.	May 21.		May 23.		May 24.		May 25.		May 27.		SALES.	
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.			H.	L.	H.	L.	H.	L.	H.	L.	H.	L.		
Adams.....												Alpha.....												
Alice, Mont.....												Alta.....												
Almaden.....												American Flag, Colo.....												
Atlantic, Mich.....												Andes, Cal.....												
Belcher, Nev.....												Astoria, Cal.....												
Belle Isle, Nev.....												Augusta, Ga.....												
Bodie Cons., Cal.....												Barcelona, Nev.....												
Bos. & Mont., Mont.....												Belmont, Cal.....	.86		.34		.35			.34		.34	2,100	
Breece, Colo.....												Best & Belcher, Nev.....												
Bulwer, Cal.....												Bonanza King, Cal.....												
Caledonia, S. Dak.....												Brunswick, Cal.....	.17		.20	.17	.19	.18	.20	.18	.19	.19	.18	14,400
Catalpa.....												Bullion, Nev.....												
Chrysolite, Colo.....												Butte & Bost., Mont.....												
Colorado Central, Colo.....												Castle Creek, Idaho.....												
Commonwealth, Nev.....												Chollar, Nev.....												
Comstock T. bonds, Nev.....												Comstock T. bonds, Nev.....											30,000	
Cons. Cal. & Va., Nev.....	4.50											Con. Imperial, Nev.....												
Crown Point, Nev.....												Con. Pacific, Cal.....												
Daly.....												Crecent, Colo.....												
Deadwood, Dak.....												Del Monte, Nev.....												
Eureka, Cons.....												El Cristo, Rep. of Col.....												
Father de Smet.....	.38	.37			.40	.36			.40	.45	1,800	Emmett.....												
Freeland, Colo.....												Exchequer, Nev.....												
Gould & Curry, Nev.....												Hollywood, Cal.....												
Grand Erie.....												Justice.....			.30								100	
Hale & Norcross, Nev.....												King & Pembroke.....			.40								100	
Homestake, Dak.....												Lacrosse, Colo.....												
Horn Silver, Utah.....	3.35											Lee Basin, Colo.....	2.10										100	
Independence, Nev.....												Lexan, Nev.....												
Iron Hill.....												Middle Bar, Cal.....												
Iron Silver.....												Monitor, Colo.....												
Leadville Cons., Colo.....			.16				.15		.15		500	Mutual S. & M. Co., Wash.....												
Little Chief, Colo.....	.27										500	Nevada Queen, Nev.....												
Martin White.....												N. Standard, Cal.....												
Moulton scrip, Nev.....	.35											N. Commonwealth, Nev.....												
Mt. Diablo, Nev.....												Occidental, Nev.....												
Navajo, Nev.....	.45		.15									Oriental & Miller.....												
N. Belle Isle, Nev.....												Phoenix Lead, Colo.....												
Ontario, Utah.....	3.15											Phoenix of Ariz.....			.45	.37							1,600	
Ophir, Nev.....												Potosi, Colo.....												
Overman.....												Rappahannock, Va.....												
Plymouth, Cal.....												S. Sebastian, S. Sal.....												
Quicksilver, Pref., Cal.....												Santa Fe, Nev.....												
Quincy, Mich.....												Scorpion, Nev.....												
Robinson Cons., Colo.....												Seg. Belcher, Nev.....												
Savage, Nev.....												Shoshone, Idaho.....												
Sierra Nevada, Nev.....												Silver Queen.....											400	
Silver Cord, Colo.....							.30		.35		500	Sullivan Cons., Dak.....	.50		.51		.52		.53		.54			
Silver King, Ariz.....												Sutro Tunnel, Nev.....												
Small Hopes.....												Syndicate.....												
Standard.....												Tornado Cons., Nev.....												
Ward Con.....	.80											Union Cons., Nev.....												
Yellow Jacket, Nev.....	.80											Utah, Nev.....												

\*Ex-dividend. †Dealt at in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 35,420. Non-dividend shares sold, 19,300. Total shares sold 54,720.

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY.	May 20.	May 21.	May 23.	May 24.	May 25.	May 26.	SALES.	NAME OF COMPANY.	May 20.	May 21.	May 23.	May 24.	May 25.	May 26.	SALES.		
	Atlantic, Mich.....			11.50	11.50					100	Allouez, Mich.....			1.00		1.00	1.00
Bodie, Cal.....								Arnold, Mich.....	1.18		1.00				250		
Bonanza Development.....								Artes, Mich.....									
Bost. & Mont., Mont.....	44.00	43.50	44.00	43.25	43.50	44.00	43.75	46.25	44.00	4,345	Brunswick, Cal.....						
Breece, Colo.....								Butte & Boston, Mont.....									
Calumet & Hecla, Mich.....	267	266		270	257		274	200	Centennial, Mich.....	11.75	11.25	11.50	11.00	11.75	11.25	11.00	860
Catalpa, Colo.....							.20	200	Chollar, Nev.....							498	
Central, Mich.....									Copper Falls, Mich.....								
Coeur d'Alene, Id.....									Crecent, Colo.....								
Con. Cal. & Va., Nev.....									Dana, Mich.....								
Dunkin, Colo.....									Don Enrique, N. M.....								
Eureka, Nev.....									Geyer.....								
Franklin, Mich.....	15.00		14.50				15.00	410	Hanover, Mich.....								
Honorine, Utah.....									Humboldt, Mich.....								
Horn Silver, Utah.....									Hungarian, Mich.....								
Kearsarge, Mich.....	13.00		13.00				13.75	13.00	Huron, Mich.....								
Lake Superior, Iron.....									Mesnard, Mich.....								
Little Pittsburg, Colo.....									National, Mich.....								
Minnesota Iron.....									Native, Mich.....								
Napa, Cal.....									Oriental & M., Nev.....								
Ontario, Utah.....									Phoenix, Ariz.....								
Osgood, Mich.....	32.00		32.50				32.75	33.25	32.75	1,050	Pontiac, Mich.....						
Quincy, Mich.....									Rappahannock, Va.....								
Ridge, Mich.....									Santa Fe, N. Mex.....	.23	.18	.25	.23	.19	.20	.19	18,100
Sierra Nevada, Nev.....									Shoshone, Idaho.....								
Silver King, Ariz.....									South Side, Mich.....								
Stormont, Utah.....									Star, Mich.....								
Tamarack, Mich.....	170	169					166	165	166	30	Washington, Mich.....						
Tecumseh, Mich.....									Wolverine.....								

Dividend shares sold, 6,473. Non-dividend shares sold, 20,508. Total shares sold, 26,981.

COAL STOCKS.

NAME OF COMPANY.	May 21.		May 23.		May 24.		May 25.		May 26.		May 27.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Cambria Iron.....													20
Cameron Coal & I. Co.....													

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Main table with columns: 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 the Terra \$75,000. Previous to the consolidation the Terra \$75,000. Previous to the consolidation the Terra \$75,000.

STOCK MARKET QUOTATIONS.

The closing quotations were as follows:

Table with columns for company names and prices. Includes Aspen, Helena, Mont., and Deadwood.

Table with columns for company names and prices. Includes Baltimore, Md., and Pittsburgh, Pa.

Prices highest and lowest for the week ending May 26:

Table with columns for company names and prices. Includes Allegheny Gas Co., Bridgewater Gas Co., etc.

CLOSING PRICES.

Table with columns for company names and prices. Includes Adams, Colo., American & Nettie, Colo., etc.

Deadwood, May 21.

Table with columns for company names and prices. Includes Bullion, Caledonia, Calumet, etc.

Helena, Mont.

(Special report by SAMUEL K. DAVIS.) Prices highest and lowest for week ending May 21, 1892:

Table with columns for company names and prices. Includes Bald Butte (Mont.), Benton Group, etc.

Trust Stocks.

Special report by C. I. Hudson & Co., members New York Stock Exchange. The following are the closing quotations May 27:

Table with columns for company names and prices. Includes Am. Cotton Oil, Am. Sugar Refineries, etc.

Foreign Quotations.

London, May 14.

Table with columns for company names and prices. Includes Alaska Treadwell, Amador Cal., etc.

Paris, May 12.

Table with columns for company names and prices. Includes East Oregon, Forest Hill Divide, etc.

CURRENT PRICES.

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

Table with columns for chemical and material names and prices. Includes Acid-Acetic, Alcohol, Alum, Ammonia, etc.

Powdered, # lb.

Table with columns for material names and prices. Includes Marble Dust, Metallic Paint, Mineral Wool, etc.

THE RARER METALS.

Table with columns for metal names and prices. Includes Aluminum, Arsenic, Barium, etc.