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THE annual job called "The River and Harbor Bill" has passed the House of Representatives, appropriating between \$21,000,000 and \$26,000,000 to be expended, in great part, for utterly useless engineering work. The reason given for its passage in a House that was committed to "economy" is stated by some of the Southern members to be that the South has to contribute to the still more shameful pension appropriation, from which it receives nothing; and that the only way it can get even is by having extravagant expenditures on Southern harbors, rivers and creeks of all kinds, whether the work be needed or even useful or not. It is evident, therefore, that the worst "job" of all, the pension "grab," costs the taxpayers of the country not alone the \$130,000,000 or \$140,000,000 a year actually paid out in pensions, for the most part to a lot of "patriots for revenue only" who neither deserve nor need the money; but it induces corruption and extravagance in other directions. Why should the wage earners, who ultimately pay most of the taxes, have to pay this enormous sum annually to men who can earn their own living and who entered the army because it was the best paying occupation they could get at the time. No one objects to paying liberal pensions to soldiers who were disabled in the service of their country, but to pay pensions to those who can earn their living, and to those in particular who never did anything for their country, is an outrage that is rapidly bringing the title "pensioner" or "old soldier" to a significance that should be felt as a shame by every honorable or honest man. Let the honest men in Congress, without regard to party, cut off \$100,000,000 a year from the pension "grab," and give the workmen, the wage earners, the taxpayers of the country a chance.

PROPOSED CHANGES IN THE MEXICAN MINING LAW.

The changes proposed in the Mexican mining laws have met with criticism, adverse and favorable. The existing regulations evolved from those of Spain, but modified according to local conditions, have been remarkable in the age of enigmatical mining laws, for their simplicity and clarity and for the well nigh impossibility for a controversy on purely technical grounds. It would, therefore, seem almost reprehensible for the legislators of that country to propose to do away with their law of the side line and virtually adopt our law of the apex with its perplexity and endless litigation.

Under the existing Mexican law the length of the end lines varied with the dip, in order to allow the miner in every case to exploit the vein for 400 meters on its inclination; when the workings had reached this distance, however, they must stop unless the owners are fortunate enough to own the side and parallel claim, which could not be located without the evidence of a vein upon the surface. In practice this law works very satisfactorily.

In regard to the other important change proposed, the granting of absolute title on the payment of certain fixed fees or taxes, opinion is again divided. At present the title rests on the working of the property. If a mine has not been worked at least six months continuously during the year the concession is annulled, and the mine is open to denouncement or relocation.

The object of a government in granting any title to mining property is obviously to promote its own welfare and to develop its otherwise latent resources. This development is accomplished by work only, and if the mine owner neglects the development of his mine, he does not carry out his agreement with the government, and consequently forfeits his rights. A hardship it may be in certain cases, but it is a clearly understood condition and prevents the interminable law suits that our law and practice produce. The hardship indeed is only in case where the miner has expended large sums and through a temporary stoppage loses his property. There should be some way found for the protection of the investor in such cases, for these undoubtedly discourage the investment of capital in Mexican mines.

It is freely stated in the Mexican newspapers that the proposed change in the mining law is with the object of raising a large annual of revenue from a monthly tax on mines. This would unquestionably discourage investment there and will probably retard the development of Mexico's greatest industry. The proposed changes in the Mexican law are, in our opinion, for the most part, injurious to the industry, and its good features are outweighed by its mischievous ones, and it will tend to retard the development of Mexican mines. Were we influenced by narrow views we might say that this would benefit American mining, but we believe firmly that the prosperity of our neighbors is to our advantage also, and we would gladly see the marvelous mineral resources of Mexico developed to their utmost limit.

MR. FELL'S WAY OF GETTING GOLD FROM WHEAT.

Exactly on what principles the British Patent Office is conducted, it might be difficult to say. Certainly it is not necessary that the applicant for a patent shall be the inventor or his assignee. I suppose it is required, however, that the invention shall be new in Great Britain, the patent being granted in part, at least, as a reward for the introduction into that kingdom of a new industry. But to what extent the reasonableness of

the alleged discovery is considered, before honoring it by the grant of a monopoly, does not appear, and cannot easily be inferred from the patents actually issued. Would the British office, for instance, issue upon application a patent for a process of extracting sunbeams from cucumbers? It is hard to say, especially in view of patent No. 14,204, dated October 27th, 1884, the blue-covered printed specifications of which, in the usual edition published and sold at the Patent Office Sale Branch, 38 Cursitor street, Chancery Lane, London, E. C., now lies before me.

This patent protects "Fell's New Method for Getting Gold from Wheat." The "complete specification," a gem of English style, as well of chemical science, is as follows, punctuation, mysterious quotation marks and all:

I, Harry Fell, of "Fairlight," Avenue Road, South Norwood Park, in the County of Surrey, Mercantile Clerk, do hereby declare the nature of my invention for "New Method for Getting Gold from Wheat" to be particularly described and ascertained in and by the following statement:

That in the steeping of the mixture of half measure, "the whole wheat straw cut into fine square snips the width of the straw and half" the grains in a jar of ordinary cold water "I let the steep remain still for ten hours at a temperature of fifty-nine degrees Fahrenheit varying with temperature, and then straining off the liquor into a shallow pan of some such cool substance as china or earthenware, I leave this liquor to stand in this pan for yet twenty-four hours at sixty degrees, also varying with temperature; these durations of times of ten hours and twenty-four hours, speaking for a very inferior brown straw much knocked about and the grains those of a very good quality, of red wheat; and then catch up the skim on a cylinder of some such cool substance as china or earthenware" and then let this skim dry, so getting some results of films of gold.

Having now particularly described and ascertained the nature of my said Invention, and in what manner the same is to be performed, I declare that what I claim is: the "New Method for getting Gold from Wheat," comprising the following features:—"The letting the steep remain still for ten hours at a temperature of fifty-nine degrees Fahrenheit, varying with temperature, and then straining off the liquor into a shallow pan of some such cool substance as china or earthenware, the leaving this liquor to stand in this pan for yet twenty-four hours at sixty degrees, also varying with temperature; these durations of time of ten hours and twenty-four hours speaking for a very inferior brown straw much knocked about and the grains those of a very good quality, of red wheat; and then the catching up the skim on some such cool substance as china or earthenware."

Evidently this specification, to the last detail, is Mr. FELL'S own. The British examiners, realizing the delicacy of the operation of getting gold out of wheat, have not dared to fool with such features of the description as verbs or commas, any alteration of which, in the supposed interests of English grammar, might defeat the object of the specification, which is to enable any skilled workman to practice the invention. The operation will require close attention and much dexterity. To keep the liquid 10 hours at 59 degrees and then 24 hours at 60, yet all the time "varying with temperature," is no small feat; and, in prescribing it, one should not be hampered by any pedantic notions of the Civil Service as to the English language.

Now, why should not Mr. FELL, or some other bold inventor, get a patent for extracting sunbeams from cucumbers? The idea has this sound basis, that we know sunbeams have gone into cucumbers, and therefore it is reasonable to conclude that if we hit on the precise arrangement of punctuation and degrees Fahrenheit and cool pans varying with temperature, we might induce them to come out again; whereas, in the case of getting gold out of wheat, there is a disagreeable uncertainty whether the gold is at home when we call.

Skepticism on this point, by the way, seems to have been developed long ago. My friend, Prof. H. CARRINGTON BOLTON, who has called my attention to Mr. FELL'S patent, refers me in this connection to the following passage in the English translation by WILLIAM LEWIS of the Chemical Works of CASPAR NEUMANN published at London in 1759.

Some have pretended to find perfect gold in vegetables, particularly in the vine-tree, but on examining those gold-like specks or granules by fire, by quicksilver, or other trials, they soon discover themselves to be no gold.

There is a cruel positiveness about this remark of old CASPAR'S. It is cooler than china or earthenware, and it produces a frigid conviction, which does not vary with temperature, that gold in wheat is one of those things which no FELL can find out, even with the aid of the British Patent Office.

The American method, which, of course, CASPAR NEUMANN did not foresee, is likely to remain the only one. It cannot be patented in the United States, because our examiners have an awkward habit of really examining; but it might be worth while to apply for a patent upon it in London. The specification would be very short and very simple—"SHIP the wheat, and draw the gold!" It is a little strange that Mr. HARRY FELL, who is a "mercantile clerk," has not thought of "inventing" this.

R. W. R.

THE FREE COINAGE QUESTION.

The BLAND free silver coinage bill is undoubtedly dead, but the question of free coinage is still being agitated and advocated, though by a rapidly lessening number of persons, throughout the country. The wage earners and those drones in the hive, the vast army of pensioners, who take, whether they need it and could work for it or not, \$130,000,000 a year of the earnings of the non-pensioned workmen of the country, are coming to see that accepting sixty cents worth of silver for a dollar's worth of work, or bounty, is not exactly an advantage to them. They should know by universal experience that the rich can take care of themselves under all circumstances. Thus the great high priest of free coinage, Senator Wm. M. STEWART, of Nevada, makes his loans to the needy, payable principal and 8% interest in *gold coin*, each dollar of which, under free coinage, would cost those borrowers from \$1.75 to \$2 of silver, or of labor which

would be paid in silver. It is quite evident that the poor, the debtor classes, are always at the mercy of the rich and their salvation is to see that the dollar they receive for their labor is just as good and will buy just as much anywhere as the rich man's dollar.

It has just been announced that "Great Britain will accept our invitation to take part in an international conference to discuss the silver question," with the view of examining into what measures can be taken to increase the use of silver in the currency systems of the nations," but the Chancellor of the Exchequer adds, "The government would not commit itself in any way to any actual principle."

While we have but little hope that any practical advantage will come from the conference, except in making still clearer the views of other nations on this question, it is certain that the only means by which the value of silver can be maintained at even its present low figure is by an international agreement, fixing a ratio between silver and gold, at which each of the nations will accept either metal as offered. It is quite certain that the old standard of 16 to 1 or 15½ to 1 will not be accepted, but if we could induce European nations to adopt for a period of say 20 years a ratio of 20 to 1 it would still be a great advantage to us, for without such agreement the value of silver is certain to decline to a much lower point. This, of course, would involve a loss on all our silver coinage of a little over 20 per cent., and a still heavier loss on coinage based on the ratio of 15½ to 1, but this loss would fall upon the Government, that is, on the whole people, and would be merely nominal in so far as the token value of silver coins exceeds the actual cost to the Government of the metal contained in them.

For this country single-handed to endeavor to support the price of silver at its present ratio with gold would be pure folly and financial madness. Every other country would dump its silver on us, as Mr. E. O. LEECH, Director of the United States Mint, has clearly demonstrated they would do, regardless of an apparent loss in so doing. Once we were loaded down and had riveted on the chains of our commercial bondage to the gold-standard countries, we could never get an international agreement on any such advantageous basis. Possibly even a ratio of 40 to 1 would not then be acceptable to those who would naturally make our return to the world's standard, and to our commercial independence, as difficult as possible.

The single silver standard, with silver worth, perhaps, 50 cents in gold per ounce, with a corresponding tribute to be paid on all foreign transactions, and the chief loss coming on the wage earners and the debtor classes of this country, would be the inevitable results of free coinage here without the co-operation of foreign nations.

A very different course should be adopted to induce European countries to join in a bimetallic standard agreement. Let us rather notify them that unless such an agreement is made we intend to accumulate large quantities of gold, and to stop buying silver, and make them understand that this country will never adopt free coinage unless other countries join it. Then England's enormous interests in India, and the heavy stocks of silver held by European countries will lead them all to unite on some common ratio which would maintain, for some years at least, the market value of silver. Just so long as European statesmen think we may commit the almost incredible folly of buying with our gold the silver which every other country is anxious to get rid of just so long there will be no possibility of bringing about an international agreement for bimetallicism.

BOOK RECEIVED.

Kentucky Geological Survey. Report on the Progress of the Survey from January 1890 to January 1892. By John R. Procter, Director. Published by the State, Frankfort, Ky., 1892. Pages 26. Illustrated.

NEW PUBLICATIONS.

PRACTICAL CARRIAGE BUILDING, a collection of articles compiled from those contributed to the columns of *The Blacksmith and Wheelwright* during the past few years. Edited by M. T. Richardson, editor of *The Blacksmith and Wheelwright*. Illustrated. Vol. 1. Pp. 222. Cloth, \$1. M. T. Richardson Co., Publishers, New York.

This handy work compiled by the author of that successful volume "Practical Blacksmithing" would seem destined to as much popularity as its predecessor. Aside from its value to the working wheelwright it will prove, showing as it does the construction of each part of the vehicle and the method of repairing the same, of great value to any one using wagons or carriages, particularly in mining regions where loads are heavy, roads rough and wheelwrights scarce.

German Imports of Swedish Iron Ore.—In 1891, says *Stahl und Eisen*. Germany imported from Sweden and Norway 148,630 tons of iron ore, of which 62,689 tons went to Westphalia and 85,941 tons to upper Schleswig.

Nickel-Copper Coins Proposed in France.—The French Government, says M. Lavat in *Annals des Mines*, has under consideration the question of replacing its copper coins, of which 75,000,000 francs are actually in circulation, by an alloy of nickel and copper containing 20% of the former. The resemblance of the coin made from this alloy to silver coin is urged as an obstacle to its use, but M. Lavat justly says that no confusion has arisen in the countries using nickel coin. The replacement of the copper coin would necessitate the purchase of 600 tons of pure nickel.

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.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Will you be kind enough to furnish us with any information that you may have regarding the Barcelona gold mine, in Nevada. Such as to age of company, officers, standing and earnings. A. C. NEW YORK, May 9th. [Will any of our readers who have the desired information kindly furnish it?—Ed. E. & M. J.]

What Next for Silver?

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Nothing is more refreshing than to see a gold monometallist exhibit evidences of sanity. Dr. Raymond in an article on "What Next for Silver?" published in your journal of April 16th, admits that the low price of silver is at least in part caused by the appreciation in value of gold, and he advises as a remedy that an attempt be made to increase the output of gold. Dr. Raymond would be doing good service in the cause of honest money if he would make a careful investigation a little further in this direction and give your readers the benefit of the investigation. No one has yet shown what would be the probable result if gold monometallists had their own way. If our silver dollar is dishonest, as they say it is, there is but one course for an honest people to pursue and maintain their self respect, and that is to at once buy gold and redeem all outstanding silver coins and certificates and in future coin no more silver.

Would the success of such a policy be beneficial or disastrous? Would gold remain stationary in value or would it rapidly appreciate? This is the silver question. The contest cannot continue forever. It would be well to consider the result of allowing the policy of the gold bugs to succeed. The output of gold is known, the consumption of gold in the arts can be nearly ascertained, the amount needed for coinage can be approximated, and if some well informed gold bug would hunt up a pot of gold big enough to take the place of our silver coins, we would then have the facts in shape. I would be glad to assist, but I confess that I am unable to point out where the gold is to come from to take the place of silver, and this is really the vital point in the question. H. W. REED.

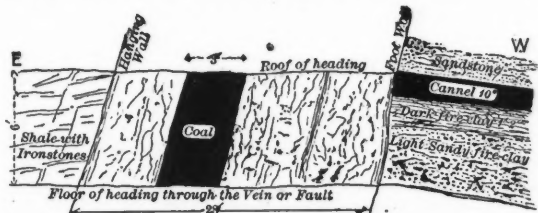
OURAY, Colo., April 23d, 1892. [Since no one who opposes free silver coinage opposes the use of silver in subsidiary coinage, and as all the gold standard countries circulate large amounts of silver, the assumption and suggestions of Mr. Reed seem to us absurd. What the gold standard advocates want is to use both metals and not to be reduced to silver only, which free coinage would certainly bring about.—Ed. E. & M. J.]

Faulting in Veins

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I do not quite clearly see what Mr. John A. Church asks for evidence of, unless it is, *What does vein-material show that proves movement of the walls inclosing it?* Possibly the following fact may be a case in point, and afford an instance of what he seeks information. In driving a rock heading or "cross measures drift" through a fault (having a throw of 350 ft.) to reach a certain coal seam on the down cast side of it, at a colliery in England in 1870, the material of the fault, *i. e.*, inclosed between the two walls forming the fractured edges of the strata, was found to be 28 ft. in thickness, measured nearly at right angles to the dip or *hade* of the fracture. Now, this 28 ft. of stuff was of the character of a brecciated vein, consisting as it did of a rudely stratified series of jumbled up rocks of various kinds, much mixed or cemented with pyrites, calcite, etc., and (what seemed at the time most singular (a three-foot vein of coal at a high angle, right in this mass of disturbed conglomeration. The inclosed sketch is from a longitudinal section taken across or through this vein.

Now the 3 ft. of coal was no doubt a detached fragment of one of the many seams occurring over the cannel seam, which run from 3 ft. to 13 ft. in thickness, the 13 ft. seam being the next coal below the "shale



with ironstones" shown in sketch, and in search of which the heading in question was driven across this fault.

Although the bulk of the material inclosed between the walls of this fracture were certainly dragged down from above, as the fault formed, still, I think the amount of metallic deposit met with (pyrite, etc.) entitled this fault to be termed a *mineral vein* at all events, at this particular point; but not carrying a "pay streak," it is true! unless it would have paid to have mined the 3 ft. seam for its coal.

Here, then, it seems to me we have a clear case of the vein walls having rubbed the inclosed vein material; for how did that coal get there if it was not dragged down from a high elevation some time during the period in which the 13-ft. seam of coal was raised or moved more than 350 ft. vertically on the west side of the *throw*, which actual mining operations proved was the case? Besides the coal in the fault, numerous angular fragments of rocks whose character and geological horizon in the series was well known, were detected, and proved to have come down from the broken edges of the beds higher up the *walls*. A study of this particular fault, both here and at other places in the district where it has been cut, leads me to think that the displacement it now marks was not produced at *one period only*, but that its history relates to *pre-* as well as *post-Pemian* age; in other words, it exhibits signs of having *moved* more

than once, which probably accounts for the extraordinary *width* and *character* of the vein material as compared with ordinary displacement faults.

ERIE, Pa., May, 1892.

W. S. GRESLEY, F. G. S.

The Failure of Boomed Towns.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I have been very much interested in Mr. Fleming's papers on Southern "boom" towns, although I could wish that the term "Southern" had been omitted from the title. The towns spoken of are Southern in the sense of being situated in the Southern part of the United States, but the methods that have been used to advance their prosperity are no more Southern than Western, or Northern, or Eastern. It seems to me that the dubious statements made in respect of their resources and the roseate hues that have been so liberally and even extravagantly diffused over the landscape are not especially characteristic of Southern men or Southern paint boxes. And, unless I am greatly mistaken, the promoters of these schemes have not been able to claim the South as a place of nativity any more than the impetuous financiers of reconstruction days were "to the manor born." We have suffered much at the hands of these gentlemen who have been, so to speak, engrafted upon the Southern stock and who for a time gave promise of bringing forth good fruit only to embitter the knotty crab-apples of the final crop.

In common with all who desire the prosperity of the country at large and the South in particular, I have to thank Mr. Fleming for the temperate and just manner in which he has treated a subject daily increasing in malodorousness, but I cannot refrain from reminding him that the natural ingredients of the odor are of Southern origin, the skill that has been displayed in the blending is far beyond the reach of the natives. Faustus was really a pretty good sort of fellow until Mephisto appeared to becloud his vision with glimpses of infernal power.

If he will allow a further illustration, it could be said that the South furnished the potassium acetate and arsenious oxide, but the production of cacodyl was in the hands of "experts," who did not hail from Dixie. We have the burned paw, the monkey has the chestnuts, although it is strongly suspected that more than half of them are worm-eaten.

I do not mean to claim for Southern people that they are more honest than their neighbors, taking the country over I suppose that morality dwells quite as much in one part as in another, but I do mean to say that the wretched failures chronicled in the South during the last few years have been brought about quite as much by the machinations of evil-minded men from elsewhere as by our own people. No one can condemn these things more strongly than I do, for I get an inside view of them and can appreciate their true effect more keenly than he who looks from a distance. With the exception already noted I would not alter anything that Mr. Fleming has said. The story is disgraceful and the sad moral it points will not soon lose its pungency.

There is, however, another side, and I have taken the trouble to collect in tabular form some statistics relating to Southern matters for the past thirty or forty years. They have been gathered mostly from census reports and other reliable sources, and, while subject to the rules of caution usually observed in regard to statistics obtained under difficulties, they are mainly correct. So far as I know, these figures are for the first time thus thrown together, enabling one to see at a glance just how the matter stands. I hope that they will prove acceptable for publication in the ENGINEERING AND MINING JOURNAL, recognized throughout the world as a fearless and reliable paper, disposed to look at all sides of a case, and given neither to exaggeration nor suppression of facts.

GRAND RIVERS, Ky., April 23, 1892.

WM. B. PHILLIPS.

[The extremely interesting article of Professor Phillips on the statistics of the industrial development of the South here referred to will appear in an early issue of the ENGINEERING AND MINING JOURNAL.—Ed. E. & M. J.]

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: If this place has been included in your recent accounts of "Failures of Southern Boom Towns," it has escaped my notice, and I take this occasion, marked by the blowing in this week of our first furnace, to forestall, if possible, any more adverse description of Big Stone Gap which may be contemplated, by giving my own view of its condition.

It is certainly true that the development and growth of the last two years is far, very far, short of the anticipations of the early speculators, who flocked in here with pockets full of money, much of it made in the Middlesborough boom, and who expected only a repetition of that wonderful growth by inflation.

Our boom of February, 1890, when lots staked off in a cornfield across the river were sold in a three-days' auction for over \$300,000, and complaints were made only because there were not more lots ready for sale, that boom has thoroughly collapsed. Lots anywhere can be bought for one-half to one-third their former prices, and the cornfield stripped of its usefulness is now growing dog fennel and sage grass, while suits are brought on past due notes of a large proportion of purchasers of that time, and a countersuit is also in court charging the "Improvement Company" with fraud in false representations of improvements to be made and of manufactures to be introduced.

For the last year the Improvement Company, many of the speculators (there are few in town who have not speculated) and town merchants have survived bankruptcy only through a general unwillingness to press suits where payments could not be made, while the chance remained that improved conditions might give the debtors opportunity to clear themselves and maintain the credit of the town.

Meantime, money from various outside sources has continued to come in in small amounts, giving some temporary and some final relief, enabling us to hold our population about constant at 900 to 1,000, or even to increase it a little, while it has been slowly changing from a nomadic to a more stable type. Compared with former expectations and the rise of various other boom towns, it has been disappointing, but actually the growth in three years from a population of 50 to about 1,000 is not at all discreditable. And this in face of no help from what is the chief inducement for building a town here—the coking coal.

Barring a small mine operating to supply local consumption and the needs of a short railroad, the coking coal field of this region remains untouched, but not now unexplored. Speaking with the confidence due to

over two years in the development of this field, I can state that, while its magnitude has been exaggerated in booming circulars, it still stands unexcelled in area, thickness and quality of its coking coal.

Railroads have been in contact with the fields for one and two years, but mining is still delayed for various reasons, defective titles and disagreement between coal owners and the railroads as to rates being the chief, and the result is that our furnace, having the finest of coking coal 6 ft. thick, without parting, within 2 miles of it, is obliged to get its coke from Pocahontas, 90 miles distant.

The iron ore supply of the Big Stone Gap region is still undetermined. The extravagant early claims for it have been altogether abandoned; but recent developments have been rather encouraging. On the tract now supplying the furnace, one to two miles from it, the managers claim enough to last 10 or 12 years of red fossil ore, which will run 45 to 48% iron and but 0.2 to 0.3% phosphorus. This ore, about 3 ft. thick, lies parallel to the face of Wallen's ridge covered by earth rarely more than 5 ft. deep, so that paying a royalty of 10c. per ton, it is delivered at the furnace at a very low cost.

Elsewhere this ore, though covering large areas, has not been found so favorably situated. It varies in thickness from a minimum of perhaps 18 ins. (in the principal bed) up to, it is said, 30 ft., but a large proportion in the latter case is nothing but red sandstone, and I have nowhere seen more than 3 1/2 ft. of first-class ore. As the thickness increases the percentage of iron seems to diminish almost proportionately.

Work is now resumed at several points in developing the brown ore of the region, but no important discovery has been made yet. In general it also proves excessively lean in its thick deposits (running into a ferruginous sandstone) and where rich it is in very small quantity. Indications so far go to show that the cost of prospecting over the region will probably exceed the value of any exceptional pockets of ore which may be found workable.

The main dependence here must finally become the magnetic ores of North Carolina, for which railroad facilities are still unprovided.

Limestone for the furnace just started is obtained from a quarry about 200 yds. distant from it. The furnace is one of a pair (the Myers furnaces) moved from East St. Louis. The work of dismantling and moving them was begun immediately on the opening of the first railroad to this place, and has continued without interruption for the two years. Only one stack is in working order, but efforts are now being made to obtain funds for the completion of the second stack.

Without going into the details of cost, it is evident that material is obtained here now at extremely low rates, so that the furnaces here may well hold their own against other Southern furnaces. More than this, our furnaces were bought for little more than their value as scrap, and their erection was skillfully and economically accomplished, so that interest on the plant is remarkably light.

It is yet too soon to judge of the product by the iron made, but the character of the ore gives sufficient warrant for assuming that it will prove satisfactory, and the four charges drawn still further indicate it. Besides the furnaces, Big Stone Gap is equipped with a dummy street railroad, electric lights, a fine water supply (with a head of 400 ft.) and various small industries, all struggling on together in adversity, but built and run in confidence that though booms may fail this town must thrive.

BIG STONE GAP, Va., May 7, 1892.

JAMES M. HODGE.

NATIVE INDIAN IRON SMELTING.

Herr Cecil Ritter von Schwarz has in the *Zeitschrift des Oesterr. Ingenieur und Arch. Vereines* of March 18 a most interesting article on the Iron and Steel Industry of India.

Speaking of native methods he says: In Kerawli, in Rajputana, a kind of reverberatory furnace is used; it is narrow, long and horizontal and its fireplace, hearth, flue and chimney occur in proper succession. The fireplace has two openings intended to admit the nozzles of the bellows. The blast acting on the glowing charcoal produces a reducing flame in the hearth, upon which the ore has been so arranged in little heaps that every part comes into contact with the flame as equally and completely as possible. The hearth has at its end a number of small disk-shaped recesses which are filled with charcoal.

The ore is also covered with a protecting layer of fine wood charcoal. The entire quantity charged amounts to 90.7 kg., and the blast continues six to eight hours. Cinder holes are cut into the fireplace as well as in the flue. The bloom so obtained is submitted to a refining process, and finally cut in two or more pieces. The workmen claim that the cool, moist winds from the east produce a larger bloom in shorter time than the warm winds from the west, and superstitiously account for the difference by saying that the iron is like a human being, and enjoys the cool east wind.

In the Khassia Mountains, in Assam, iron is made from the fine magnetic iron-sand found in the mountain brooks. The sand is washed clean and dried. Then small moist sticks of wood or leaves are dipped in the dried sand, and, when covered with the fine ore, dried in the sun. They are then charged in the furnace.

The blast is as wonderful in construction as is the process of preparing the ore. It consists of two bellows so arranged that their nozzles turn downward. The workman stands with outspread feet upon the bellows and causes a continuous blast by swaying from side to side.

In Palamow, conical shaft furnaces built of clay are used in the reduction of iron. The blast is worked by the feet. When necessary the wife assists her husband, grasping him around the hips, and by additional weight getting a higher wind pressure.

Mineral Production of Russia.—The following report, supplementary to that contained in our statistical number, January 2d, 1892, is from the official report of the mineral industries of Russia:

	1887.	1888.	1889.
	Kilos.	Kilos.	Kilos.
Cobalt ore.....	1,245	950	13,268
Cobalt matte.....	.....	.....	3,079
Antimony.....	.....	.....	8,190
Chromic iron ore.....	7,221,418	.....	4,156,130
Kaolin.....	6,087,905	7,609,296	4,592,870
Sulphur.....	1,446,223	360,360	94,857
Platinum crude.....	4,406	2,717	2,635
Phosphorites.....	7,053,392	12,776,400	9,991,800

MINERAL PRODUCTION OF CANADA.

The preliminary summary of the mineral production of Canada for the year 1891 has just been issued by the Geological Survey. It is given below with the figures for 1890 taken from the statistical number of the *ENGINEERING AND MINING JOURNAL*. The value of the output has been the largest in her history, the most notable increase in output and value being in nickel, coal and copper in the order named. Canada now produces more nickel than all other countries, its mining having received a great impetus through the adoption by the United States of nickel steel armor plate, and subsequent purchases of large quantities of the metal. The output of copper increased within a fraction of 50%.

The gold output continues to decrease year by year, owing to the giving out of the old mines and failure to discover new ones.

Bricks, building stone and lime also show a considerable falling off, but all the returns are not in yet, and these figures may be yet changed. As they stand Canadian building trades would not seem prosperous.

Altogether, the value of the production of 1891 is \$2,306,019 more than that of 1890.

SUMMARY OF THE MINERAL PRODUCTION OF CANADA. (Subject to Revision.)

PRODUCT,	1891.		1890.	
	Quantity (a)	Value.	Quantity.	Value.
Metallic.				
Antimony ore..... tons	10	\$60	.....	.....
Copper (b)..... lbs.	9,520,076	1,238,780	6,354,913	\$698,241
Gold (c)..... oz.	51,040	925,486	65,014	1,166,227
Iron ore (d)..... tons	68,979	152,005	76,511	155,388
Iron, pig (value \$368,901)..... "	23,891	.....	21,772	331,688
Lead (e)..... lbs.	588,665	25,607	113,000	5,085
Nickel (f)..... "	4,626,627	2,775,976	1,136,627	1,002,470
Platinum..... "	.....	10,000	1,000	4,500
Silver (g)..... oz.	415,493	407,183	400,687	420,662
Total metallic.....	.....	\$5,535,097	.....	4,054,261
Non-Metallic.				
Arsenic..... tons	20	\$1,000	None.	.....
Asbestos..... "	9,000	1,000,000	8,000	1,039,661
*Bricks..... thousands	173,808	1,047,311	208,587	1,247,607
*Building stone..... cu. yds.	187,685	708,702	360,001	936,168
Cement..... bbls.	93,779	109,086	102,216	92,405
*Coal..... tons	3,400,479	7,792,175	3,117,661	6,396,910
Coke (h)..... tons	57,084	175,592	56,540	166,298
*Feldspar..... "	685	3,425	710	3,500
Fire clay..... "	250	750	None.	None.
Flagstones..... sq. ft.	27,300	2,721	17,865	1,643
Granite..... tons	10,995	65,105	13,307	65,985
Graphite..... "	260	1,560	175	5,200
Grindstones..... "	74,479	42,587	4,884	42,346
Gypsum (i)..... "	203,545	192,096	226,806	196,327
*Lime..... bush.	1,829,804	251,215	2,234,413	394,425
Limestone, for flux..... tons	11,376	11,547	18,824	17,913
Manganese (k)..... "	274	6,951	1,328	32,550
Mica..... "	71,510	.....	.....	68,074
Mineral paints..... tons	900	17,750	325	5,500
Mineral water..... galls	427,485	54,068	417,165	35,231
Molding sand..... tons	230	1,000	170	750
Petroleum (l)..... bbis	755,298	1,004,546	765,029	902,734
Phosphate..... tons	23,588	161,693	31,753	361,045
*Pottery..... "	.....	258,844	.....	190,242
*Pyrites..... tons	65,362	196,068	49,227	123,068
Roofing cement..... "	900	2,700	None.	None.
Salt..... "	45,021	161,179	43,754	185,382
Sand and gravel (exports)..... "	243,724	55,501	None.	None.
Sewer pipe..... "	.....	227,300	.....	384,000
Soapstone..... tons	575	863	917	1,239
Terra cotta (m)..... "	113,103	.....	.....	50,000
*Tiles..... thousands	11,779	140,799	10,267	140,177
Total non-metallic.....	.....	\$13,882,765	.....	\$17,110,843
Total metallic.....	.....	5,535,097	.....	.....
Estimated value of mineral products not returned, principally structural materials.....	.....	582,138	.....	.....
Total.....	.....	\$20,000,000	.....	.....

* Some returns yet to be received.

Steel Works in China.—The Viceroy of China is establishing steel works at Han-yang at the confluence of the Han and Yang-Tse-Kiang Rivers, for the manufacture of cannon. A railroad, part of which is already in operation, will connect the works with coal mines but 25 miles distant. The works will cost \$3,000,000, England supplying nearly all the material.

Cement for Anchorage.—Tests of the relative value of lead, sulphur and Portland cement for anchoring bolts in stone have been published in the *Troy Polytechnic*, which says that "fourteen holes were drilled in a ledge of limestone rock; all 42 in. deep, and bolts, some three-quarters and others one inch, were set in the holes; around four of these bolts, sulphur was then poured, lead was put in around four more, and Portland cement, well mixed, around the others. Two weeks later the bolts were pulled by a powerful lever, and, out of those run with sulphur, one was drawn out under a strain of 12,000 lbs., with the others the iron yielded before the sulphur gave way; three of the bolts calked with lead also broke in place, one pulling out; but of those set in cement one yielded slightly and one broke."

Mineral Production of France in 1891.—According to tables published by Minister of Public Works, France produced, in 1891, 25,676,463 tons of anthracite and bituminous coal, an increase of 84,918 tons over 1890. There was also produced 523,282 tons of lignite, against 491,573 tons in 1890, an increase of 31,709 tons; 1,919,185 tons of cast iron were produced, a decrease of 43,011 tons from 1890. Iron products to the extent of 811,621 tons were manufactured, of which 514 tons were rails, 696,799 tons general merchandise, and 114,308 tons sheet iron. Steel products to the extent of 792,569 tons were manufactured, of which 461,104 tons was made by Bessemer process and 266,907 tons Siemens-Martins process; 194,162 tons of steel rails were made, 298,551 tons of general steel merchandise and 111,754 tons of sheet steel.

THE LATE EUGENE H. COWLES.

Eugene H. Cowles, of Lockport, N. Y., the president of the Cowles Electric Smelting & Aluminum Company, and the inventor in connection with his brother of the Cowles process of electric smelting, as well as the original inventor of the overhead conduction system of electric railroads, died of consumption in El Paso, Tex., on the 21st ult. Mr. Cowles was born in Cleveland, O., in 1855, where his father, the late Edwin Cowles, was the editor and proprietor of the *Leader*. At the age of 19 Mr. Cowles made his first effort as a writer. The success met with by this venture was such that he was offered a place on the *Leader* by his father, and during the next seven years he at one time or another filled every position on the paper from reporter to that of managing editor.

Naturally of a scientific and inventive turn of mind, while in Washington he spent much time in the Patent Office and various scientific bureaus of the Government, especially in the study of metallurgy in the Patent Office. At this time the subject of making steel castings had been brought to his attention by a relative who was perfecting a process for casting mild steel.

These studies in metallurgy and electricity and the constant work of writing descriptions of new inventions and engineering subjects had so interested him in technical work that in 1881 he resigned his position on the *Leader* and undertook the organization of the Brush Electric Light and Power Company, of Cleveland, and in the course of 60 days he raised the necessary capital, \$150,000, and launched out for the first time in a technical pursuit as secretary and manager of the new company.

It was while connected with the Electric Lighting Company that Mr. Cowles applied for the first patent granted anywhere in the world, it is said, for a system of electric railways which could be operated by elec-

ject. It was true that from the day that the electric arc was first produced that people had inserted all manner of substances into it out of idle curiosity to see them burn or become disassociated, and Sir Humphry Davy had taken advantage of this phenomena in certain laboratory experiments on the alkaline salts.

In the absence of any data on the subject at that time, buoyed up by the faith that the virginity of the field of work into which they had entered was such that whatever patents they obtained would be completely novel, the Messrs. Cowles proceeded with their experiments with redoubled vigor. A partnership was formed under the name of Eugene H. Cowles & Co., money was raised, patents were applied for, and the experiments repeated without number. These embraced scores of forms of electrical furnaces, apparatus for operating the same, the trying of special forms of dynamos, production of peculiar carbons, preparing of various ores, production and investigation of the physical properties of alloys, etc.

It was discovered that by the electrical process every common metal that could be reduced by heat and carbon alone could also be reduced by the electrical furnace, while many of the rarer elements, like aluminum, silicon, boron, potassium, sodium and phosphorus, were also obtainable by the use of the electrical heat and energy. On many occasions it has been asserted that the operation of the Cowles electrical furnace is simply that of the combined action of heat and carbon. Mr. Cowles asserted that there was nothing in the Cowles process, specifications or patent claims to justify any such limitation. The process combined heating and electrolytic action. It also covered both the principle of incandescent and arc heating action when applied to the reduction of ores.

In 1885 the partnership of Eugene H. Cowles & Company was converted into the stock company called the Cowles Electric Smelting and Aluminum Company. The first company ever organized for this purpose has since been the owner of all the patents taken out



THE LATE EUGENE H. COWLES.

tricity conducted to a moving car from a station by an overhead conductor.

In the early winter of 1882, just as Mr. Cowles had perfected plans to apply this system of electric propulsion to a street railroad running out to the suburb of Cleveland called Glenville, he was taken down with acute pneumonia, and was forced to drop all business and go to Colorado for his health. From the effects of this attack he never recovered, and it was this trouble which eventually carried him off.

After four months of convalescence at Colorado Springs, Cowles took up mining as a pursuit to engage his mind. With this in view he, in company with E. W. Nelson, the Siberian and Alaskan explorer, laid out a systematic tour of inspection of the mining camps of Colorado, New Mexico and Arizona. The result of two years of this sort of work was that Cowles and his younger brother Alfred H. Cowles, together with his father, became interested in a mine on the Pecos River, whose ore, like Pandora's box, contained a little of everything that was evil. It was in an apparently hopeless effort to devise some scheme to work these ores that the idea of applying electrical heat to the reduction of ores, which had long been Mr. Cowles' mind, was taken up, and he and his brother set earnestly to work to reduce it to practice.

The two brothers thereupon returned to Cleveland in the summer of 1884 and began an exhaustive series of experiments on the electrolysis and in the electric smelting of ores. Concomitant with these experiments an expensive and extensive research was made under their direction through the patent offices and great scientific libraries of the world for information as to the exact amount of work that had been done and thought which had been recorded on the use of electricity in the reduction of metals from their ores and compounds.

The result of this study of literature of the subject was most discouraging so far as giving the would-be inventors any light or assistance in the use of the current as proposed. There was not a single proposition to be found anywhere for application of internal electrical heat for the reduction of ores. The idea of doing this did not even appear to have been suggested and of course there were no experiments recorded on the sub-

ject in American and in Europe, with the exception of the English patents which are owned and operated by the Cowles Syndicate Company first, with works at Milton, near Stoke-on-Trent. When this company was first organized aluminum in its pure state could only be had at about \$16 per pound, and it is now to be had at 50 cents per pound, f. o. b. in Lockport in ton lots, and that of the highest purity.

Mr. Cowles was a frequent contributor to various scientific societies, and was a member of the American Institute of Mining Engineers, the Naval Institute at Annapolis, the Franklin Institute of Philadelphia, the American Association for the Advancement of Science and the Royal Institution of Great Britain. He, together with his brother, was the recipient of the Elliot Cresson gold medal, awarded by the Franklin Institute, the John Scott Legacy medal from the City of Philadelphia, and a gold medal from the Paris Exposition of 1889 for improvements in the production of aluminum and the application of electricity to the reduction of ores.

Depth of Collieries.—While the average depth of French collieries is 1,073 ft., that of the coal mines in the Ha'nault district of Belgium is 1,800 ft., according to *Iron*. In the Mons coal basin the mineral is at present being obtained 3,036 ft. beneath the surface, and another colliery in the same basin, now abandoned, was worked to a depth of 3,860 ft. In April last year, in a mine in the Flénu district, called "St. Henriette des produits," a rich vein of coal was struck at the extraordinary depth of 4,486 ft. The honor of possessing the deepest absolutely vertical shaft has been claimed by the now disused Kuttenberg mine, in Bohemia, which was exploited to a depth of 3,778 ft. The deepest British mine, it is known, is the Ashton Moss Colliery, 3,150 ft.

The Vase Process in Mexico.—In many parts of the interior rich, and at times poor ores, are worked by charging them on a lead bath on a rudely constructed cupelling hearth. The results, as far as extraction of silver, are said to be good.

THE LECHESNE NICKEL-STEEL PROCESS.

The Société du Ferro-Nickel, of France, has succeeded, according to *l'Éclair*, in obtaining nickel iron and steel containing a large percentage of nickel, and participating in the remarkable properties of this metal (non-oxidizability, brightness, etc.), and susceptible of being substituted for it in a large number of uses from which it has hitherto been excluded by the high price of pure nickel. In continuing the series of ferro-nickels, the lowering the percentage of nickel below 25% forms a category of metals, the new properties of which constitute a special class of altogether peculiar interest. We have here no longer alloys of a somewhat high price, capable, on account of their richness in nickel, of replacing the pure metal, but metals comparable to iron and steel, and in which the intervention of even a small proportion of nickel modifies the constitution of the metal without (in low percentages) materially increasing its cost, and gives to the iron and steel employed an improvement of quality which is very remarkable.

The process consists in the simultaneous employment of manganese and aluminum with or without the addition of carbon, under the form of charcoal, or metallic or ferro-cyanides. In the case of manganese, either pure manganese is used or oxides mixed with a reducer, or ferro-manganese. In like manner for aluminum, either the pure aluminum is used or a mixture of iron and aluminum. The nickel itself is introduced either in the form of pure metal or in the form of malleabilized metal, or crude metal more or less rich in nickel, proceeding either from the treatment of nickel ore up to the point of elimination of the iron or from previous fusions of cast iron, wrought iron or steel with nickel. With regard to the carrying out of the process, current experience has indicated the following method as the most suitable for obtaining a good result. It is preferable to take the pure nickel or mixed with iron at the outset of the operation. The manganese, under whatever form it is employed, mixed or not with the chosen carbonizer, is added in one or two additions in the course of fusion. The quantity of aluminum necessary is projected at the close of the operation in the bath of metal or in the casting ladle. With regard to fusing apparatus use is made of that which is ordinarily employed in metallurgy—crucibles, reverberatory furnaces, converters, Siemens furnaces, cupolas, etc. Experience has shown that in the quantities of the intermediary agents the best results are obtained, with proportions of aluminum varying from a ten-thousandth to about one-thousandth, and of manganese varying from one-thousandth to about two hundredths per kilogramme of alloy to be produced according to the quantity of nickel and the quality of the metal to be attained.

From the point of view of the carbonizing agents it has been ascertained that according as it is wished to obtain metal soft or hard, carburized or not, with the same percentage of nickel, carbon or cyanide must be used in variable proportions. In this way it is possible, by the employment of ferro-cyanide with manganese and aluminum, without even the addition of nickel, to transform the iron into a tempered steel naturally susceptible of furnishing turning tools without tempering and by direct forging. We shall give for instance the best quantities for obtaining on the hearth a ferro-nickel with 5% of nickel, starting with a nickeliferous pig. The work is proceeded with as for the manufacture of steel, and after partial or complete decarbonization, according to the quality of the metal to be obtained, metallic manganese or ferro cyanide of manganese is added, and at the moment of tapping the aluminum is added either in the furnace or in the casting ladle. For 500 kilogrammes of alloy the proportions are as follows:

	Kilos.
Pig with 25% nickel.....	100
Soft iron or steel.....	400
Ferro-manganese with 75% of manganese.....	3
Aluminum.....	0.25
Total.....	503.25

The character of these various alloys is as follows: These metals possess a much more perfect homogeneity than that of iron or steel obtained by the usual processes, and consequently they have the qualities of malleability, ductility, tenacity, elasticity, etc., to an altogether superior degree. The coagulation of the ingots is very rapid and bubbles are avoided. Ferro-nickel, with 25 per cent. of nickel, whatever the quantity of carbon, does not take tempering, but according as the proportion of nickel diminishes, the property of being tempered reappears and goes on asserting itself until with proportions of 7, 5 and 3 per cent. and below, we obtain alloys capable of being tempered according to laws analogous to those which govern the tempering of ordinary kinds of steel. The proportion of carbon, the distribution and special forms of the carbon in the cement and the metallic core (modification due to the presence of the nickel), the fall of temperature between the heating and the cooling, and the rapidity of the cooling, combine to produce various degrees of hardness, as could be predicted by the complete analysis made according to the very exact methods recently discovered, and by the remarkable investigations into the constitution of steel which have appeared of recent years. The influence of the agents of malleabilization in the application of these processes is demonstrated by the fact that, when these agents are employed without the intervention of nickel, the products obtained present much superior qualities to those of iron and steel treated by the ordinary process.

Coal Production of Prussia in 1891.—Prussia produced in 1891, according to *Stahl und Eisen*, 67,528,311 tons of stone coal and 16,818,845 tons of lignite, giving employment to 233,308 and 26,536 miners respectively.

German Patents in 1891.—According to the *Chemiker Zeitung*, the number of patents applied for in 1891 were 12,775, an increase of 7.52% over 1890; the number granted, 5,550, or 43.5%, against 39.5% granted in 1890. Since 1887 there has been, in fact, not only a yearly increase in patents applied for but in patents granted; while from 1883 to 1887 the number granted decreased yearly. The number of those applied for in chemical and related industries, were 5,554; the number granted, 2,506, or 43.5 and 45.2% of the whole number applied for and granted. The United States led among the foreign states in number of patents granted (509); Great Britain came next with 497; Austria, 313; France, 237; Switzerland, 93; Belgium, 56; Russia, 53, and Sweden and Norway, 47. The greatest number applied for and granted under one class, was for electrical invention, not including lighting.

THE COAL FIELDS OF MONTANA.—I.

Written for the Engineering and Mining Journal by Walter Harvey Wood, E. M.

In the rapid development of mining in Montana, which has placed her in the front rank as a producer of the precious metals, but small account has been taken of her great wealth of coal; yet the permanent future of a country is so largely determined by the full supply of the region and its accessibility that no emphasis is needed to show its importance to this State. The treeless prairies of the eastern half of the State, the limited area of forest land, and the rapidly increasing consumption of fuel by the growing industries of the State form a combination of conditions analogous to those that have brought about the rapid development of the coal fields of Colorado.

Although the existence of coal at numerous localities within the State has been known for many years, but few mines are worked, and the great extent of the coal land, and the quality of the coal is very generally a matter of mere conjecture. As the writer has visited the fields from which the present output is obtained, and is familiar with those areas that promise to be of importance in the near future, an attempt will be made to show what is at present known of the coal fields of Montana.

Throughout the eastern part of Montana, a somewhat broken plains country, monotonous in topography, dry and treeless, but of great value as farming land when irrigable, and for grazing purposes, the cut banks of the rivers and creeks, and the bluffs of bad land buttes, show the black outcrops of lignite beds. These lignite measures underlie a large part of the great plains country. The rocks consist of coarse sandstones with interbedded shale holding brown coal seams often burnt out or still burning along the outcrop. This fuel is only locally mined, its rapid crumbling when exposed to the air rendering it unfit for transportation or consumption when a large stock is required on hand. These seams are worked at a few places to supply the local demand for a cheap fuel and are available where the long haul of coal from the bituminous region makes it too expensive for ordinary use. Yet, with the great amount of excellent bituminous coal available farther west and nearer the points of greatest consumption, these lignites must await the development of the surrounding region before the seams will be extensively mined. Approaching the mountains, the low relief of this plains country is broken by outliers of the Rocky Mountain ranges, and it is along the footslopes of these chains that the great coal fields of the State are found. There is good reason to believe that an almost continuous stretch of coal-bearing strata will be found along the footslopes of this, the eastern front of the Rocky Mountain Cordillera.

The southernmost portion of this belt is the Rocky Fork coal field, at the base of the Bear Tooth Mountains, some 50 miles south of Billings. This extending westward is continued by the Bozeman coal fields, and this by less extensive fields and detached basins along the front of the range to the Judith Basin and the Great Falls coal field. From the Missouri River northward to the Canadian line coal-bearing rocks have been found, and working begun at the Birch Creek basin. This belt of coal land, forming an almost continuous coal field, is 400 miles long to 1½ to 5 miles wide. Besides this extensive and almost continuous area of coal land fronting the mountains there are a large number of valuable fields within the mountains, more or less isolated basins, of which practically nothing is yet known, although it is within these intermountain coal basins that we may expect the very best coals of the State to be found. Recent explorations of the country tributary to Flathead Lake shows the existence of a field whose coal is equal to the best yet discovered, and the little isolated coal field of Cinnabar, just outside the Yellowstone Park, yields a coal in many respects the finest yet obtained within the State. The accompanying map shows the known distribution of bituminous coals throughout the State.

GEOLOGICAL OCCURRENCE OF THE COAL.

The coals of Montana are all of Cretaceous age. Approaching the Rocky Mountains from the great plains to the eastward, the nearly horizontal sandstones and shales of the plains are found to rise upward quite rapidly to the mountain slopes, and the eroded edges of the strata are soon exposed, forming sharp combed ridges and "hog backs." Continuing the ascent the strata are very sharply upturned, and the sandstones are soon replaced by the underlying shales and limestones of the Marine Cretaceous, and these by the massive white "mountain limestone" of the Carboniferous. It is in the rocks covering these limestones that the coal is always found, either immediately and at the base of the Cretaceous sandstones, as is the case in the Great Falls coal field, or in the higher rocks of Laramie age, as is the case in the Bozeman, Cinnabar and Rocky Fork fields. In the descriptions given of these fields, necessarily brief in an article of this kind, the thickness of the strata between the easily recognizable massive white limestones of the Carboniferous and the coal seams will be given.

COAL PRODUCTION OF MONTANA.

Although so large an extent of Montana is underlain by a workable thickness of coal, the actual acreage of coal land worked is quite small. A list of the producing coal mines of Montana, prepared in 1890 for the Census Office, shows the total number of 31,040 acres of land claimed and held as coal land. The accompanying table shows the distribution of the land so held, and the number of mines actually worked, with the output for each county for 1889:

County.	Average.	No. of mines worked.	Tons-total output.	County.	Average.	No. of mines worked.	Tons-total output.
Cascade.....	7,800	4	166,480	Gallatin.....	2,000	1	43,838
Choteau.....	2,240	4	1,220	Meagher.....	320	1	150
Custer.....	1,280*	4	2,870	Lewis & Clarke	800	1	147,300
Deer Lodge..	1,680	..	..	Park.....	7,280	3	..
Dawson.....	480*	3	733	Totals.....	31,040	23	362,180
Fergus.....	1,600	3	240				

* Lignite.

The production for 1890 was 517,477 tons, valued at \$1,252,492.

The statistics of the acreage of coal land are very imperfect. This is largely due to the fact that at very few of the smaller mines is the land patented. The usual method of holding coal land is to post a notice that the land is claimed by John-Doe. It is then worked usually to the extent of \$100 a year, and if no purchaser can be found, nor capital obtained to develop, is relocated for the ensuing year. Very few of the claimants are able to pay the Government price of \$10 to \$20 an acre for coal land,

or care to do so for land that is unproved, and the laws permit claimants to hold coal lands but one year before making payment. The custom is, therefore, that continuous working alone gives legal possession of unpatented land, where the limit of a year has expired.

At present the production of coal in Montana is practically from a half-dozen mines, viz.: Rocky Fork Coal Company, the various mines of the Bozeman field at Cokedale, Timberline and Chesnut, the Horr mine of the Cinnabar field and the Sand Coulee mines of the Great Falls coal field. Several smaller mines swell the total but slightly, and need not be considered in this connection.

THE ROCKY FORK COAL FIELD.

Some 75 miles south of the Yellowstone River, and lying at the base of the Bear Tooth Mountains, the highest peaks in Montana, there is an extensive area of coal land known as the Rocky Fork coal field. The productive mines are on the east side of the Rocky Fork Creek, at the town of Red Lodge, accessible by a branch line of railroad 43 miles long, leaving the main line of the Northern Pacific 14 miles west of Billings, Mont. The total extent of the field can only be rudely estimated, but as the coal-bearing strata are continuous along the base of the mountains in both directions from Red Lodge, the field is undoubtedly large. The country is an open bench land, sloping gently away from the steep mountain sides and cut by numerous coulees.

The seams are exposed on both sides of the creek at Red Lodge, there being some 18 seams uncovered or exposed in natural sections, of which 11 are over 6 ft. in thickness. The strata dip at 18° to the south, toward the mountains, and consist of rather massive and coarse sandstones, with intervening shaley beds and fossil sandstones. The plateau summits on either side of the valley are 200 ft. above the town, and present a nearly level surface of gravel and alluvial wash. This gravel covers the edges of the coal-bearing strata to a depth of 20 to 100 ft., so that it is only in the stream cuttings, and then but rarely, that the coal rocks are seen.

The mines are in the bluff east of the town, in closely adjacent seams, the most southerly seam worked being known as No. 1, and the seams mined being numbered consecutively northward. Six seams in all have been exploited. The early workings were in No. 1, formerly

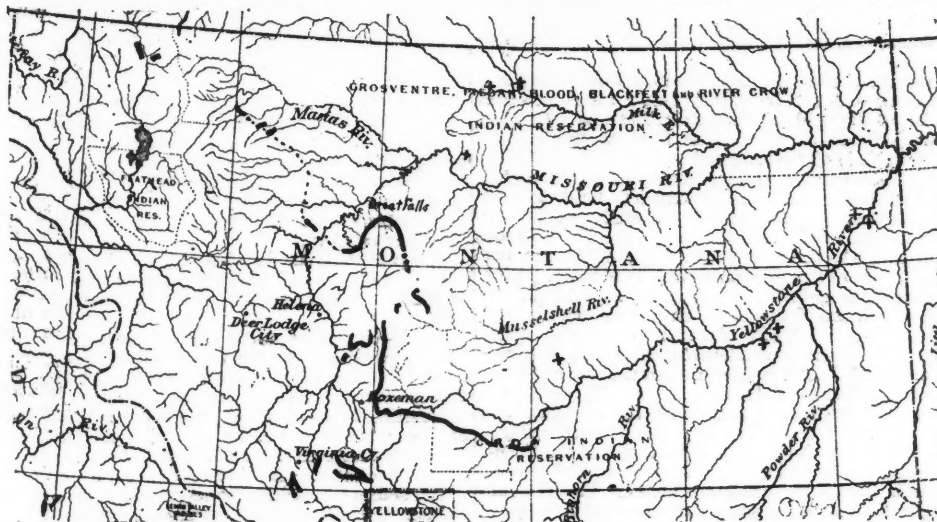
No. 6 is a seam of 5 to 6 ft. of clear coal, with but one parting of 1 in. by 1½ in. of clay shale in the middle. The coal from No. 6 seam is considered the best for metallurgical purposes. That from seams Nos. 2 and 4 is used for domestic fuel and as a steam coal for locomotives. The coal is all a bright firm, free, burning lump coal well adapted to steam and domestic purposes. Analyses of the coal from No. 4 seam shows the coal to be rather higher in moisture than the coals of the Great Falls field, but also higher in volatile carbon and exceedingly low in ash. The analysis is as follows:

Moisture.....	8.11	Fixed carbon.....	46.56
Vol. carbon.....	43.29	Ash.....	2.04

To the east of Red Lodge, the strata holding the coal seams flatten out and the branches of Bear Creek drain a broken country trenched by deep cuts, exposing sections of the nearly horizontal coal seams. While undoubtedly destined to be worked in the near future, this part of the field presents difficulties of working and transportation which counterbalance the flatness of the seams, and the difficulty of access by railroad, demanding the expenditure of a large amount of capital in railway construction, is a detriment to the development of this coal. West of Red Lodge the coals extend beneath the gravel capping indefinitely. No prospecting has been done, and therefore it is impossible to judge of the character of the coals, but the coal-bearing strata have been traced by the writer for many miles westward, and there is every reason to expect that the coal seams will continue.

The field presents a difficulty in prospecting that is seldom encountered; the coal bearing rock dips at 15° to 18° to the south, the sandstone being faulted against carboniferous limestone dipping steeply northward, away from the mountain. In consequence of this structure, the seams cannot be located by direct measurement of the rocks from the white limestone, and a familiarity with the character of the coal rocks, must be relied upon in hunting for the extension of the strata.

Both at the Red Lodge mines and the Bear Creek openings the seams are of very uniform thickness and vary but little in the number and thickness of partings. The roof is generally firm and solid, demanding very little timbering, and in most of the seams being quite uniform. In one



DRAINAGE MAP OF MONTANA, SHOWING OUTCROPS OF BITUMINOUS COAL, 1892; LIGNITE MINES INDICATED BY A CROSS.

known as the Yankee Jim mine; but this seam, with Nos. 3 and 5, have not been worked of late, owing to the number of partings and the better quality and more economical working of the other seams.

The average thickness of these six seams is as follows: No. 1 seam is 6-7 ft. thick; No. 2, 7-10 ft.; No. 3, 6-7 ft.; No. 4, 12-13 ft.; No. 5, 12 ft., and No. 6, 5 ft.

North of the mine the bluff shows numerous other seams outcropping, nine veins being exposed, five of which are over 6 ft. thick.

The following sections show the character of the seams mined:

Seam No. 2.		Seam No. 3.		Seam No. 4.		Seam No. 5.	
Slate roof*	6 in. to 12 in.	Sandstone r. of.	36 in.	Roof.	10 in.	Clay	10 in.
Coal	6 in.	Soapstone	3 in.	Coal	1½ in.	Clay parting	4 in.
Slate	2 in.	Coal	2 in.	Coal	4 in.	Coal	4 in.
Coal	24 in.	Parting	7 in.	Parting	1 in.	Coal	2 in.
Parting	2 in.	Coal	1½ in.	Coal	2 in.	Coal parting	1 in.
Coal	18 in.	Clay	5 in.	Coal	12 in.	Coal	1 in.
Parting	6 in.	Coal and bone	6 in.	Coal	4 in.	Coal	4 in.
Coal	40 in.	Coal	24 in.	Coal parting	1 in.	Coal	4 in.
Parting	1 in.	Fireclay	18 in.	Coal	1½ in.	Coal	17 in.
Coal	4 in.	Coal	48 in.	Coal	17 in.	Clay	1 in.
Fireclay	6 in.	Floor.		Coal	24 in.	Parting	¼ in.
Sandstone floor.				Coal	12 in.	Coal	12 in.

* Occasionally cut out by sandstone. † This is left to form roof in the rooms. Clean, prismatic fracturing coal. ‡ Sandstone, soft.

seam it rolls, however, in a succession of waves that produce a varying thickness of coal. The floor is always constant so far as present explorations show.

On the whole, the Rocky Fork field shows a large number of seams, of which eleven are workable, with a total thickness of coal of about 95 ft. The coal from the six seams thus far worked is of good quality, thoroughly tested, and the mines are of sufficient extent to prove the seams to be constant. The seams are easily worked, with good roof and floor, and the altitude of the strata is such that there is little trouble with water or gas. Fossil leaf remains and *unios* show the coal to be of Laramie or Fort Union age.

West of the Rocky Fork coal field, which includes the western part of the Crow Indian reservation within its limits, the continuity of the coal-bearing strata is interrupted by the rugged and rough, though not lofty, mountains of the Boulder formed of an extensive accumulation of volcanic ejecta, making rudely bedded agglomerates. West of the Boulder River the coal-bearing rocks are again exposed and the strata can be easily traced to the westward, following the folds of the older strata of themountains to the Gallatin Valley, thence along the eastern flanks or the Bridger range northward. To this extensive field the name of Bozeman coal field was first applied, though the name is especially appropriate, inasmuch as the city of that name lies wholly outside of the field and on the western side of the Yellowstone-Missouri divide.

BOZEMAN COAL FIELD.

The Bozeman coal field, occupies the great angle between the northerly trending Bridger range and the east and west range of the Snowy and Boulder mountains and lies partly in Park and partly in Gallatin County. Its mines furnish about half the total coal output of the State; but as yet only a very small part of the field has been worked, and the present production could be increased tenfold from the present mines if the demand were sufficient.

Between Livingston and Big Timber the field is wholly unproductive, indeed the greater portion of it has not even been prospected, but natural exposures warrant the belief that the thickness and number of the seams will make this a valuable part of the field if the quality of the coal is maintained. Along the Yellowstone River, where local folds in the rocks

bring up the coal-bearing series, there are several openings on various seams, but the indications are that the fuel afforded by these little disturbed beds is inferior to that from the highly flexed strata farther west, though as yet no fair test has been made of these coals, the openings being but a few feet deep.

The most important part of the field lies along the line of the railroad, west of Livingston. Eight miles beyond that city a branch of the Northern Pacific leaves the main line and follows up the valley of Coke Creek to the town of Cokedale. At this point the coal-bearing rocks form a ridge north of the town, the outcropping ledges of sandstone running nearly east and west, and the beds dipping at 30° to the north, or into the slope. The mines are operated by the Livingston Coal and Coke Company. At present but one seam is worked, but there are a number of other seams of good coal underlying the one worked that await a demand warranting their development. The company controls the most accessible and less disturbed parts of the local field, but there are several individual claims in the warped beds, forming the divide between the waters of the Yellowstone and Missouri rivers. Careful prospecting has been done along the outcrop of the seam now worked, but no drilling has been done and the nature and value of the other seams is largely a matter of conjecture. Mining is at present prosecuted at but one opening. The incline driven on the seam is 650 ft. deep, and working is done on three levels running westward, the longest being about a mile in length. The coal is hauled on a tramway about a quarter mile to the railroad, where it is screened and weighed and the slack sent to the coking ovens, of which there are 78. The coal dips into the hill at 43° to 50°, so that the limit of economic mining will be reached comparatively quickly. Sections of the seam show three or four variable but persistent partings of sandstone and shale dividing the seam into benches of 4 ft. to 7 ft. of clear fuel.

West of Cokedale the rocks are warped and twisted, but yield a fuel largely used on the locomotives of the Northern Pacific Railroad and for a steam coal. The most extensive workings are at Timberline—just west of the divide. The measures are here steeply upturned and the coal somewhat broken. The coal will not coke, but is of fair quality and easily mined. The openings are made in a steep hillside that forms the south side of a narrow gulch, in which the town has been built. A narrow guage road conveys the coal in the mine cars to the loading house, some two miles distant, where it is screened and loaded into the cars of the Northern Pacific system.

Beyond Timberline the seams have been opened at Mountain Siding and Chesnut, on the line of the railroad, and by several lesser mines of small production, on an extension of the field southward, on Meadow and Trail creeks. The only mine worked on that part of the field at the eastern base of the Bridger Mountains is in the overturned beds of Bridger Cañon.

The coal measures of the Bozeman field hold several seams, of which three are known to have a workable thickness (at least 5 ft.) and to be of fair quality. The coal is inclosed by sandstones, generally white and crumbly, yet forming picturesque crags and ledges where the slope is steep. The relation of the seams to the older rocks is readily made out in the vicinity of Cokedale, where the Carboniferous limestones, white, massive rocks, that are readily recognizable, are seen forming the mountain to the south, through which the Yellowstone River has cut its way out of the mountains. Overlying the white limestones and the white quartzites which cap them, there is a considerable thickness of earthy gray shales and impure thin bedded dark-colored limestones, that contain great quantities of shells, recognized as of Jurassic types. These in turn are overlaid by sandstones also fossiliferous, capped by the conglomerate of quartz pebbles, firmly cemented and generally weathering out at a prominent ledge, so characteristic of the Dakota in this part of the State.

Between this Dakota conglomerate and the coal there is a thickness of several thousand feet of shale beds and sandstone layers. Careful sections, measured by pacing and by tapeline, show a thickness of 3,600 ft. of rocks between the Jurassic shales and the coal, or some 3,400 ft. between the easily recognizable Dakota conglomerate and the coal; but, inasmuch as there are several beds of conglomerate above the Dakota that might be mistaken for it, the white massive mountain making carboniferous limestones should be looked for. Throughout the Bozeman field, the coal can be readily located by such measurements, as the strata are not faulted. Along the eastern slopes of the Bridger Mountains this would be the only ready means of finding the coal measures, as glacial drift and mountain detritus dislodged by frost covers the lower slopes and hides the underlying beds from view.

(To be Concluded.)

Indian Railways.—India, with an area of 3,600,000 square kilometres and a population, according to the census of 1891, of 275,000,000, possesses but 21,000 kilometres of railroads. The greater part of the materials for the roads came from England, only the cast iron sleepers and wrought iron fastenings have been in great part produced in India.

India imported in 1890 iron and steel, chiefly railroad materials, to the value of \$13,120,000. The revenue in the same year amounted to \$254,200,000, the greater part of which was derived from the land and revenue taxes, customs duties, and from the monopolies of opium and salt.

Petroleum Refining at the Kolomea District, Galicia—At the Peczenyzen refinery in the Kolomea district, according to the *Journal of the Society of Chemical Industry*, the crude petroleum is distilled in horizontal cylindrical stills, the lower plates of which are of steel and the upper of iron. These stills take a charge of 200 barrels and 12 charges a month are worked off. In this operation only the benzine and kerosene are distilled off, and a portion of the residuum thus obtained is used as fuel for the stills, being burned partly with a steam-jet spray-producer, and partly in admixture with sawdust. The kerosene distillate is treated with 3 to 4% of sulphuric acid in lead-lined agitators holding 500 barrels. The crude oil, which is obtained from the neighboring Sloboda-Rungurska field, is stated to yield from 4 to 8% of benzine (according to the length of time that it has been above ground), 53% of "standard oil" (sp. gr. 0.813 to 0.816, and flashing point 22° C.), 4% of "inflammable oil," and 2½ to 2¾% of solid paraffin. The paraffin oil, which is distilled from the residuum of the kerosene stills is small (40 barrel) stills with steel bottoms, is "chilled" by mixing it with crushed ice, and the paraffin is obtained by subjecting the semi-solid mass to pressure in Canadian presses, which are wooden lever presses of simple construction.

A HAND-TELESCOPE FOR STADIA-WORK.*

By Robert H. Richards.

If one holds up a prism or wedge of glass with narrow angle, say 1° to 2°, and compares the transmitted image with the image seen above or below the prism, the former will be found to be thrown to one side by an amount varying with the angle of the wedge. Speaking of the two rays as the direct ray and the bent ray, we may say that when the bisecting plane of the prism is at right angles to the line of sight the angle between the direct ray and the bent ray will be constant for any given prism.

If now we place a prism or wedge of glass in such a position that it half-covers the objective of a telescope, we shall obtain on looking through it two images of every object seen—one image by the direct ray, which comes through the uncovered half of the objective, the other which comes through the prism, and is the image by the bent ray. The angle of divergence of these two rays will be constant and unalterable, whether the telescope is directed to a near object, with its eye-piece at increased distance from its objective, or upon a distant object, with eye-piece nearer to the objective. That is to say, if the "throw" or apparent dislocation of the images is one foot in one hundred feet it will be two feet in two hundred, ten feet in a thousand, and so on.

The usual form of stadia telescope has at the focal point of the objective two spider lines, placed at a definite distance apart, and intended, let us say, to represent a throw of foot in one hundred feet. But as the distance between lines remains the same, while the distance from the objective to the webs differs with every variation in the distance of observed objects, it follows that the angle between the lines of sight which these two spider lines define cannot be constant, but must vary with every increase or decrease of distance between the instrument and the object viewed.

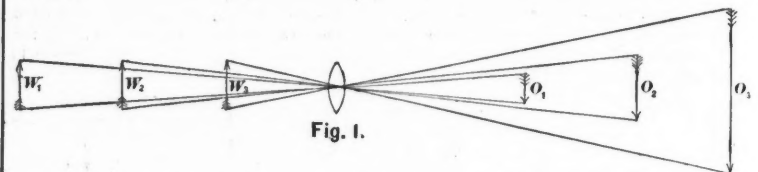


Fig. 1.

If in Fig. 1 we represent three positions of the spider lines by W_1 , W_2 , W_3 , and three objects corresponding to those positions by O_1 , O_2 , O_3 ; at near, medium and distant positions we see at a glance from the figure that there is no constant angle represented by the spider-lines, and that the only way to graduate a rod for the practice of stadia measurement by this method is to determine values for one foot at a sufficient number of distances, and to provide the rod with a graded scale accordingly.

The prismatic stadia-telescope, on the other hand, has a constant angle for all distances and all focal lengths; and when the factor has once been obtained it may be used to graduate a rod with uniform scale from end to end.

Again, the usual stadia instrument involves two points of observation. The operator adjusts the lower spider line on the zero of the rod and then observes the reading of the upper line on the rod. There are, therefore, two personal equations in the operation of taking readings. With the prismatic stadia-telescope, on the other hand, both observations are made at once, just as the sailor, in taking the altitude of the sun at sea, brings the sun's image to the horizon and observes the contact. Only one personal equation is thus involved.

The spider-line stadia-telescope cannot be used by simply holding it in the hand, but requires a firm support; for, if it were used in the hand, the first line would wander from the zero on the rod before the reading of the second line had been taken. The prismatic stadia-telescope, on the contrary, can be used in the hand, just as a sextant is. Nevertheless, as the readings to be made with it are much finer than those of the sextant, a support will be preferred for most purposes.

The one great advantage of the spider line over the prismatic telescope is, that it uses the full light of the whole objective at all times, while the prismatic has only half light. This objection to the latter is completely removed when the spacing target-rod is used; and it is fairly well met by the employment of self-reading rods, to which reference will be made below.

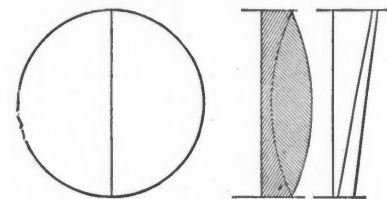


Fig. 2.

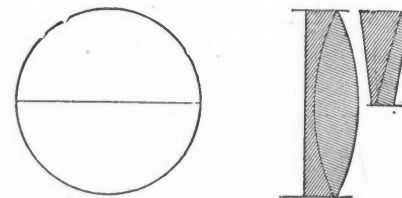


Fig. 3.

In adapting the prismatic stadia-telescope to the needs of the surveyor, several important matters have to be determined, relating to the prism and also to the telescope and the rod.

In my experiments I have combined a telescope of 30 diameters mag-

*A paper read at the Glen Summit meeting of the A. I. M. E., October, 1891.

nifying power with a prism of 1 ft. throw to 100 ft., and also with a prism of 1 ft. throw to 150 ft. I shall speak of these two combinations respectively as 30 d:100 and 30 d:150. I have also combined a telescope of 20 diameters magnifying power with three prisms, throwing respectively 1 ft. in 50 ft., 1 ft. in 100 ft., and 1 ft. in 250 ft., and I shall speak of these combinations as 20 d:50, 20 d:100 and 20 d:150. Finally, I have combined a telescope of 10 diameters magnifying power with prisms of 1 ft. to 50 and 1 ft. to 100, and I shall call these combinations 10 d:50 and 10 d:100.

The first fact I encountered in these experiments was that 10 d:50 and 10 d:100 can be used with uncorrected prisms, since the amount of color does not seriously injure the observation, while no prism not thoroughly achromatic was found satisfactory for either the 20 d or the 30 d telescope.

Fig. 2 represents what appears to me to be the rational and proper mode of combining the prism and the objective; while Fig. 3 shows an improper combination. In Fig. 2 the bent rays are exact counterpart of the direct rays, while in the adjustment of Fig. 3 this is not the case.

and lower images by the direct ray, and *ub*, *lb* are the upper and lower images by the bent ray. The observer of course neglects *ud* and *lb*, and uses for his contact *ub* and *ld*. The important advantages of this form of contact are shown in the subsequent figures.

Fig. 7 represents the targets approaching contact; Fig. 9 shows the images lapping, in which case there is a bright lens-shaped image, indicating the amount of lap. Upon its appearance the assistant is signaled to draw the targets slowly apart; and the instant the white lens becomes invisible the reading, Fig. 8, is taken. The disappearance of this white lens gives a close and positive reading. The results stated below were obtained with this reading.

A target of the size shown in Fig. 4 can be read easily at 2,000 feet distance with a 20 d telescope, in an even atmosphere. A much smaller target will suffice for short sights. The design of Fig. 4 has more strong points in its favor than any other yet tried by me.

The spacing-targets, Figs. 4 to 9, may be used on a steel tape if the following conditions are observed: The tape must be held at right angles to the line of sight. If the right angle is at one of the targets, it will be

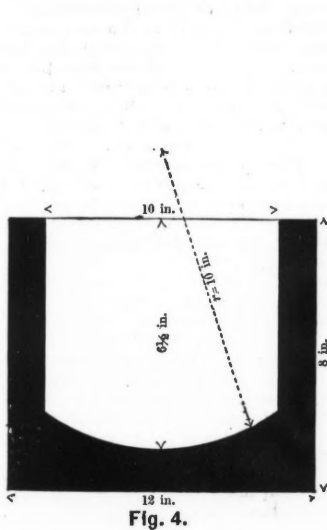


Fig. 4.

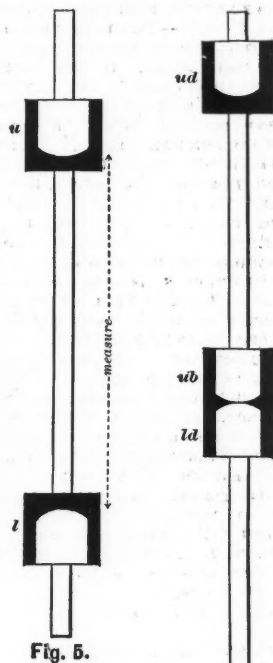


Fig. 5.

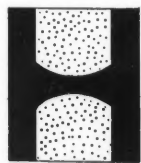


Fig. 7.

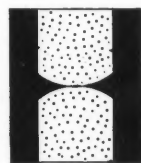


Fig. 8.

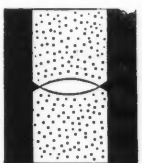


Fig. 9.



Fig. 6.

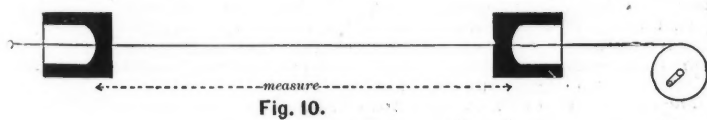


Fig. 10.



Fig. 11.

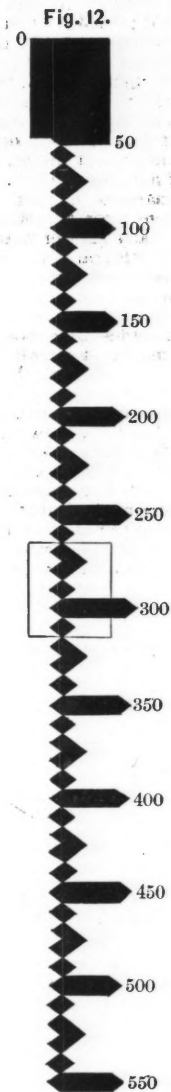


Fig. 12.

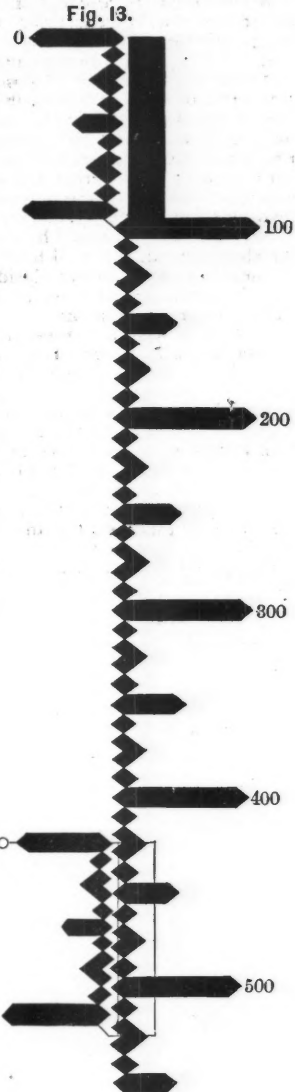


Fig. 13.

Choice of a Prism.—For hand use a wide prism is preferred, say 1 ft. displacement in 50 ft. distance. For a fixed telescope 1 : 100 or 1 : 150 would be preferred, according to the distances to be sighted and the length of the rod to be used. A prism throwing 1 : 150 will permit readings at 1,500 ft. on an 11-ft. rod, while a 1 : 100 prism will read only to 1,000 ft. on the same rod. On the other hand, where a standard steel tape with sliding targets is used instead of a rod, we may say that the wider angle prism will give more accurate work than the narrower.

Choice of a Telescope.—Since a large field is not needed, we have to deal with two considerations only—the lightness of the instrument and its power. If the former consideration governs the choice, I would recommend a light 10 d or a light 20 d telescope; if the latter, I would recommend a 20 d or a 30 d telescope.

Choice of Rods.—In this direction I believe I have settled the question as regards the choice of a spacing rod with sliding targets; but I do not feel so sure with respect to the self-reading rods.

The spacing rod represented in Figs. 4 to 9 is so pre-eminently superior to every other which I have tried that I strongly recommend it.

This target stands out strong and bright under any circumstances. It can be read against a dark background in the woods and also against a light sky background on a hilltop.

In Fig. 5 the rod is represented as seen by the eye. Fig. 6 shows it as seen by the prismatic stadia-telescope. In this figure *ud*, *ld* are the upper

found easier to reproduce than at a point half-way between the targets. For distances much greater than 2,000 feet a larger target or a higher power telescope, or both, will be needed.

Fig. 10 represents a tape, as used by me on a 1,970-foot sight with the above targets and a 20 d telescope.

Self-reading Targets.—Three forms which have been experimented upon are represented in Figs. 11, 12 and 13.

Fig. 11 gives good results with 10 d : 50 combination for short distances. It may be graduated, as shown, with 2-ft. unit or with 5-ft. or 10-ft. unit. In the latter case, it would be used for long distances with a 20 d : 100 combination up to 30 d : 150 combination; but the individual feet would have to be divided by the eye. The skeleton second image on it reads 68 ft.

Fig. 12 may be graduated with 1-ft., 2-ft., 5-ft. or 10-ft. units, according as a short-distance or a long-distance rod is wanted. The skeleton reading of the second image upon it indicates 265-ft. Possibly, for certain distances, this graduation may be found easier to read than that of Fig. 11.

Fig. 13 represents a target-rod with an optical vernier. The space from 0 to 100 ft. on the rod is graduated into 11 parts, while the spaces from 100 to 200, also from 200 to 300, and so on down, are graduated into 10 parts. Moreover, the space from 0 to 100, which we may call the vernier, is graduated on the opposite side to the other readings, so that the second

image can bring it down and give a vernier reading between the two images. The partial skeleton second image gives a reading of 423 ft., no dividing by the eye being required. By this system an 11-ft. rod may be made for a 30 *d* : 100 combination, which will actually give readings of individual feet at 1,000 ft. distance.

The vernier reading is the most fascinating idea I have met in my investigations. Whether it is really practical, can only be decided in the field. The images which are important for the reading are half-light images, and therefore dim, while with the other two forms of target a full-light reading is obtained.

Limits of Error.—Partly by reason of the limited time at my command for experiments, and partly because every time I went out to get definite records of practice, I made some discovery which led to an improvement in the apparatus, I can only promise at this time to give detailed figures at an early day as a supplement to this paper. The figures I am now prepared to publish were taken with a curved spacing-target of the design shown in Figs. 5 to 9.

With a 20 *d* 1150 combination, holding the rod at 100 ft. distance, I obtained five separate readings of the distance in feet between the targets, which were 0.653; 0.654; 0.653; 0.653; 0.653. With a 30 *d* : 150 combination I made these four successive readings at 100 ft. distance: 0.675; 0.675; 0.675; 0.675; all with the spacing-target described in Figs 4 to 9.

If I had made an error of 0.001 ft. upon the rod, this would correspond to an error of 0.15% or 0.15 ft. in 100 ft. But I did not make this error in four readings with 30 *d* : 150, and only made it once in five successive readings by the 20 *d* : 150 combination. If the prism had been a 1 : 100 prism, the error referred to would have been 0.1 ft. in 100. If a prism had been a 1 : 50, the error would have been .05 ft. in 100 ft. I cannot imagine a reason why the percentage-error at 1,000 ft. or 2,000 ft., when the atmosphere is steady, should be any greater than it is at 100 ft. From the above considerations, I believe I am safe in saying that the error of the prismatic stadia is well inside of 0.1%.

I hope to present, in the near future, some figures actually obtained for both short and long distances.

If one desires to determine the distance to a point without the trouble of sending an assistant there, it may be done with a pair of Wollaston camera-lucidas, as shown in Fig. 14, in which W_1 , W_2 are the two cameras.

If the Wollastons both give 90°, then the requisite deviation from 90° may be obtained by inserting a prism, *P*, as shown. If, however, the two Wollaston angles add up to say 177° to 178°, then the apex-angle will be 2° or 3°, and I will answer without the addition of another prism. After the two observers E_1 , E_2 have found their places, so that their respective images coincide, then they can measure the base-line between them by a prismatic stadia-telescope; and knowing the factor of the Wollastons, 3 ft. or 4 ft. to the hundred, the distance to the unknown point may be determined approximately by multiplying the observed distance between E_1 and E_2 by the factor, 3 ft. to 100; 30 ft. to 1,000; 300 ft. to 10,000, and so on.

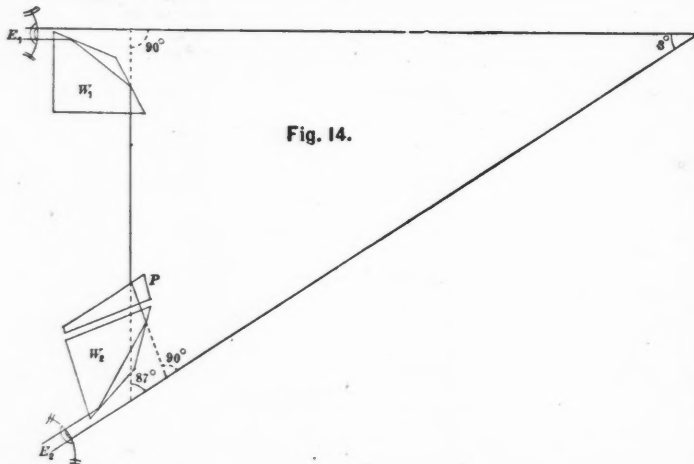


Fig. 14.

In making my designs and in testing my instruments, I have been helped materially by Capt. A. H. Russell and Messrs. J. Hays Gardiner, W. H. Weston, Franklin Knight, Louis T. Verges and W. S. Hutchinson, friends to whom I wish to make acknowledgment.

Mining in Burmah.—Under British rule in Burmah numerous applications for mining concessions are being made to the officials of the local government. Coal exists in great quantity, and in the Shwebo district is being successfully worked. The advent of capitalists from the Straits settlements has given a stimulus to tin mining. The jade and rubber districts are being explored with satisfactory results. Lead is being worked at good profit, and silver and gold are reported to have been found in workable places and quantities.

A Thermo Electric Motor.—A curious apparatus was recently exhibited at a meeting of the Royal Society, according to *Iron*. It is a heat engine, based upon the principle that nickel, magnetic at ordinary temperatures, becomes non-magnetic at a temperature of 572° Fahr. A disk of copper is suspended by two strings so that it can swing like a pendulum. Mounted on the copper disk is a magnet which holds up a piece of nickel. An alcohol lamp placed below the disk heats the nickel until it becomes demagnetized and drops away, when the copper pendulum makes an oscillation. During this oscillation the nickel cools sufficiently to regain its magnetic character, and is caught up by the swinging magnet only to be passed again over the lamp, which causes it again to drop, and so on, the pendulum being thus kept in motion.

ACCURACY OF BATEA-WASHING.

Written for the Engineering and Mining Journal, by Charles Bullman, M. E.

The batea in one form or another is used for washing gold-bearing alluvium throughout South and Central America, Mexico and the West Indies. The word is of Spanish origin and means tray or trough.

Those used in the Island of Santo Domingo are often oval and rudely constructed, while all that I have seen in South America are circular and show a large amount of mechanical skill.

The use of the batea is confined almost entirely to women, the men rather priding themselves on their inability to use them.

In 1-88, while examining a very large placer mine in South America, I had to rely entirely upon batea washers in finding out the gold contents of the gravel. This gravel contained both gold and platinum of the leaf or flaky variety. The flakes were quite fine, averaging $\frac{1}{16}$ in. square and $\frac{1}{16}$ in. thick. All possible means were adopted to insure a correct determination of the gold and platinum contents of the gravel. Subsequently, two questions were raised: first, with the moderately fine gold, ought there not to have been a far larger quantity than was shown by the samples? Second, if any fine gold were lost, would such loss have been prevented by placing mercury in the batea? Four experiments were made under varying conditions to determine the value of the points raised.

First Test.—Two men were employed to bring earth to the bateadoras (washers), the bateas being manipulated in a large box constantly supplied with fresh water. It was assumed that the tailings with the metals lost remained in the box, but the water running from the box was always discolored, and part of the fine clayey material of the caliche or gravel always escaped. When the box was filled, its contents were concentrated, and the box again filled. This was repeated several times in order to get a weighable sample from the tailings. Finally the concentrated tailings were re-washed in bateas, five grammes of mercury being well stirred into each bateafull of material, and extreme care was taken to prevent further loss. Still, it is but fair to assume that the same percentage of platinum would be lost in the second washing as in the first, as native platinum does not amalgamate with mercury.

The following results were obtained:

Metals (gold and platinum), 1st washing, 2.790 grains.

Metals (gold and platinum), 2d washing, 0.1298 grains.

Percentage of loss, 4.65%.

Second Test.—Condition same as in test 1st; metals, 1st washing, 1.947 grains; metals, 2d washing, 0.162 grains; 1st percentage of loss, 8.327%. At the conclusion of these two experiments the tailing from the second washings had accumulated in the creek, and it was thought well to rewash them. Upon doing so small grains of platinum, small grains of gold with mercury attached and floured mercury were found. Total weight after retorting, 0.0323 grains. This amount was divided in the ratio of the quantities obtained from the first washings, and added to the amount lost in each case, making the loss in 1st test, 0.1488 grains; percentage of total loss, 5.3%; 2d test, 0.1752 grains; percentage of total loss, 8.88%.

Third Test.—Was made under the following changed conditions to insure if possible greater accuracy. Two water-tight boxes were used instead of one. In the first box the caliche as it came from the bank was washed. In the second box the tailings contained in number one were washed, mercury being added to each batea; the tailings in number two were re-washed in number one, and finally those in number one were again re-washed in number two.

To make sure that the material contained no more metal, 10 batea were carefully concentrated and then washed, and as neither gold platinum nor mercury was found it was concluded that all the metals had been extracted. Metal, 1st washing, 1.606 grains; metals, 2d, 3d and 4th washings, 0.243 grains; percentage of loss, 15.13%. In this test a piece of gold $\frac{1}{16}$ in. \times $\frac{1}{16}$ in., the largest single piece seen in all the tests, escaped washing number one and two.

Fourth Test.—As tests 1 and 2 did not agree with test 3 a fourth was made to find if possible the cause of the discrepancy. Experiment 3 differed from experiments 1 and 2 in that the tailings from the first washing were re-washed three times instead of once with the result that a larger percentage of loss was found. The deduction then inevitably follows that part of the metals contained in the ore escaped not only during washing 1, but also during washing 2, and tests 1 and 2.

Then again in tests 1 and 2 the tailings from the second washings, which had been thrown in the creek, were re-washed with the result that some gold, some platinum and some floured mercury, which probably contained some gold amalgam, were found.

The question that then presented itself: was might not the mercury by lowering the specific gravity of the gold cause a partial loss?

As in the first three tests, the earth was washed in a tight box, fresh water being constantly supplied. The tailings were re-washed in number 2 without mercury and the metals found kept separate.

Finally the tailings were re-washed for a third time with mercury. The results of the different washings were: Metal, 1st washing, 0.727 grains; metal, 2d washing, 0.0655 grains; metal, 3d washing, 0.0375 grains; metal, 4th washing, 0.0075 grains; total loss, 0.110 grains; percentage of loss, 15.13%; percentage of loss recovered by washings 2 and 3, without the use of mercury, 93.2.

Resumé:

	TESTS.			
	Metals recovered, in grains.			
	1	2	3	4
Washing 1.....	2.79	1.947	1.606	0.727
Washing 2.....	0.1298	0.162	0.243	0.0655
Washing 3.....	0.019	0.0132	0.0375	0.037
Washing 4.....	.....	.....	.....	0.0075
Percentage of loss....	5.33	8.88	15.13	15.13

In experiments 3 and 4 the same percentage of loss was found, although in one case mercury was used in washing the tailings, while not in the other. This, taken in connection with the fact that as much platinum as gold is saved by continuous washing, shows that mercury played but an insignificant part in the saving effected. Nor was the metal saved particularly fine, and, as has been already stated, a piece or flake of gold, the largest individual piece seen during the experiments, escaped two washings in test 3. The cause of the loss in washing by batea is due to the manner of its use, and is, to a certain extent, unavoidable. The

batea being filled, and it is generally heaped, it is tipped so that the lower edge is under the water, the upper edge resting against the person using it.

The earth washed, or caliche, is a mixture of large and small pebbles, sand and clay. Lumps are roughly crushed in the hands, and as the batea is tipped up, pieces of this clay very often fall out, and are lost with their gold contents.

As soon as the lumps are broken the large stones are removed; but although they are always washed, they are never perfectly cleaned, and it can readily be seen that from time to time a grain of metal hidden in a crack or crevice is consequently lost. In fact in no other way is it possible to explain the loss of the large piece of gold in test 3.

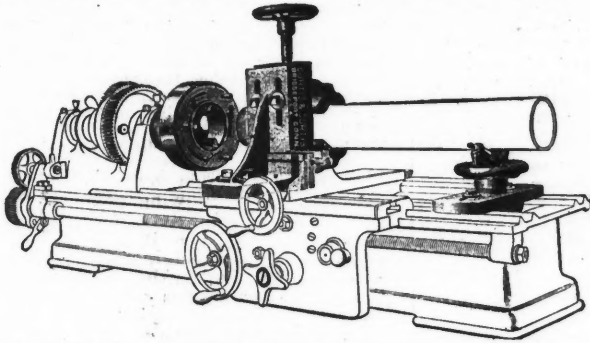
As soon as all lumps are broken, and all large stones removed, the mass remaining is kneaded with water until it is quite fluid. Then a quick rotary motion is given to the fluid mass which throws off water and light material from the lower edge, the stones, sand and metals meanwhile accumulating at the centre.

When the mass is reduced about two-thirds in bulk, the rotary motion is stopped, and the stones on top raked off with the bent fingers. The remaining sand and metals are then carefully separated by the slow rotary motion. In this last operation the roughened surface of the batea tends to catch the gold, in the same manner as would riffle blocks in a sluice.

CURTIS PIPE-THREADING ATTACHMENT FOR LATHES.

Pipe-threading is a common operation in all shops, factories, etc., where steam or water are used. Special machines for this work are expensive, and, in most shops, the amount of this work does not justify the purchase of a pipe-threading tool. In the majority of shops the ordinary lathe is equipped with the usual chasing tool, and the threading is thus done, but such work is never entirely satisfactory, as a good joint can seldom be made on account of the taper of the thread. To meet this want for a thorough machine at a minimum cost, Curtis & Curtis, of Bridgeport, Conn., have patented a device for attaching to the ordinary lathe, within certain limits of size, virtually making the lathe a pipe-threading machine capable of threading a pipe of any length.

This attachment consists of a die carrying head attached to the lathe-spindle like a chuck, an adjustable self-centering vise attached to the lathe-carriage, and an adjustable pipe rest, attached to the bed of the



lathe, to support long lengths of pipe, as shown by the heavy engraving in the accompanying illustration. The pipe is held securely by the vise on the carriage and fed to the revolving dies by moving the carriage by hand, or this can be done automatically by using the lead screw of the lathe, set to the number of threads corresponding to the standard of thread to be cut. When the thread is cut to the length required, the dies can be opened by turning the face-plate and the pipe taken out without running back. All the dies are made adjustable to any variation of the fittings, and they adjust from one size of pipe to another so that each set of dies threads several sizes of pipe without changing. To fit this attachment to any make or size of lathe, no machine work is necessary except on the flange connecting the die-head to the spindle. For this flange a rough casting is furnished, and it is necessary for the customer to cut the thread to fit his particular make of lathe. The attachment shown in cut has a range from 1 to 4 in., right hand inclusive, and is attachable to lathes of any make of size from 14 to 24 in. swing.

DECISIONS OF THE COURTS AFFECTING THE MINING INDUSTRY.

Supreme Court (U. S.) Decisions (October Term, 1891).

UTE INDIAN TREATY, MARCH, 1868—MINERAL PATENT—ADVERSE CLAIM—JUNIOR LOCATION—COLORADO MINING LAW.

1. The effect of the Ute Indian treaty of March 2d, 1868, was to exclude all intrusion for mining or other private pursuits upon the territory reserved thereby. Not until the withdrawal of the land from the reservation by a new treaty which would throw open the lands could a mining location thereon be initiated. *Kendall, Shackelford et al., plaintiffs in error, v. The San Juan Silver Mining Company, of Colorado.*

2. Had the plaintiffs immediately after withdrawal of the reservation relocated the lode in controversy, their position would have been that of original locators, and have then been within the rule of *Noonan v. Caldonia Mining Company* (121 U. S., 393), which is to the effect that where a party is in possession of a mining claim on the withdrawal of a reservation made in an Indian treaty, with the requisite discovery with surface boundaries sufficiently marked, with notice of location posted, and with a disclosed vein of ore, he could, by adopting what had been done and causing a proper record to be made, and performing the amount of labor, or making the improvements necessary to hold the claim, date his rights from that day.

3. The Act of Colorado, February 13th, 1874, requires the discoverer of a lode to record his claim within three months from date of discovery in the office of the recorder of the county in which the lode is situated, by a location certificate. It also provides that a location certificate of a lode claim shall contain the name of the locator date of location, number of

lineal feet claimed on each side of the discovery shaft, the general course of the lode, and such description of the whole as shall identify the claim with reasonable certainty. Otherwise it shall be void. Judgment for company affirmed.—*Error to Supreme Court from State of Colorado. [Decision April 25th, 1892.]*

Petroleum in Persia.—The petroleum of Kend-e-Chirin, Persia, says *Annales des Mines*, is of considerable importance in that country, and is expected to be a source of considerable revenue to the government. At present, all the oil burnt in Asia comes from either Baku or America. The Persian field has the advantage of location, and will compete for the trade of India and China.

Proposed New Irrigation Reservoir in Arizona.—A company was organized May 12th for the construction of a large artificial reservoir near Phoenix, Ariz. The site taken is the Box Canyon, 400 yards below the junction of Tonto Creek and Salt River. The height of the dam is to be 200 ft., and the backwater will extend 16 miles to Sierra Ancho Mountains, making a capacity, according to reports of the County Surveyor, of 103,058,040,800 cu. ft. of water. Owing to the abundance of lime rock, timber and other building material on the ground, the cost of the building is not expected to exceed \$1,500,000. The new reservoir will have a capacity to irrigate all lands of the Gila, Verde and Salt valleys from the point where the water is taken out to the Colorado River at Yuma.

Mining in the Argentine Republic.—In a paper read by Mr. H. D. Hoskold before the North of England Institute of Mining Engineers, on April 9th, the author after a historical review of Argentine mines, dating beyond the time of the Spanish conquest, describes the geographical position, and refers to the federal and provincial territories into which the republic is divided. The former comprising seven mining provinces and the latter nine. After reviewing the mining laws of the republic, the paper deals with the metallurgical aspect. The chief copper districts are situated at least 17,000 ft. above the sea level. One of the foremost of these is Mejicana, in the province of Rio Oja. The veins contain the usual varieties of copper ores, such as carbonates, sulphides, monoxides, mixed in variable proportions. At a depth of 100 yards enargite predominates, with 48% of copper and traces of silver and gold. Famatinita is also mixed in the general mass, containing about 44% of copper, with arsenic, antimony and silver. The copper-bearing veins in this district have a thickness of from 8 in. to 4 ft., with an average thickness of about 2 ft. The results of the treatment of a considerable bulk of the mineral ore show 3 cwt. of copper, 70 oz. of silver and 1½ oz. of gold per ton. The chief silver mines are found in the mountainous districts of Cerro Negro, Tigre, Caldera Vieja, Caldera Nueva, etc., the ores being native sulphide, chloride, bromide, iodide, chloro-iodide, antimonide and arsenide of silver. Since 1873 the result of working the Peregina mine, in the Cerro Negro district, shows a yield of 2.481% of silver from the whole body of the vein; San Pedro del Puerto mine shows an average yield of 1.009% of silver, and the Puerto mine shows 2.005% of silver. In the province of Mendoza, borings have been prosecuted to a depth of 200 yards, resulting in the discovery of petroleum, which is utilized as fuel on one of the railways, a 4½-inch pipe-main having been laid from the petroleum wells to the railway. A coal field has been found near San Rafael, and it is reported that six seams of coal exist, the chief being more than 3 ft. thick; and in one of the mines the thickness of the seam is stated to be 6 ft. The ash of one of these coal seams is interesting, as it contains 38.22% of pentoxide of vanadium. Another coal field exists in the province of Neugen. Extensive deposits of lignite are found in Terra del Fuego.

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 3d, 1892.

- 473,901. Manufacture of Contour Relief Maps. Joseph E. Blancher, Chicago, Ill.
 473,907. Drilling Apparatus. Milan C. Bullock and Samuel W. Douglass, Chicago, Ill., said Douglass Assignor to said Bullock.
 473,908, 473,909, 473,910. Art of Rock Core Drilling. Milan C. Bullock, Chicago, Ill.
 473,913. Water Swivel for Drilling Apparatus. Samuel W. Douglass, Chicago, Ill., Assignor to Milan C. Bullock, same place.
 473,957. Coal Washing and Separating Machine. James Pollock, Wilkes-Barre, Pa.
 474,014. Gold Concentrator. William H. Hill, Atlanta, Ga.
 474,019. Apparatus for Roasting and Smelting. Robert H. Lanyon, Nevada, Mo., and William Lanyon, Pittsburg, Kan.
 474,022. Process of Separating and Cleaning Coal and Other Minerals. Carl Lührig Dresden, Germany, Assignor to the Lühring Coal and Ore Dressing Appliances, Limited, of England.
 474,023. Apparatus for Washing, Separating and Concentrating Ores of Different Specific Gravity. Carl Lührig, Dresden, Germany, Assignor to the Lühring Coal and Ore Dressing Appliances, Limited, of England.
 474,034. Air Compressor. Benjamin F. Teal, Chicago, Ill.
 474,045. Coal Cleaner. Addison K. Hills, Erie, Pa.
 474,047. Conveying Apparatus. Thomas S. Miller, New York, N. Y.
 474,069. Rock Drill. Jean Sprenger, Vevay, Switzerland, Assignor to the Ateliers de Construction Mécaniques, same place.
 474,080. Rock Drilling Apparatus. Milan C. Bullock and Samuel W. Douglass, Chicago, Ill.; said Douglass Assignor to said Bullock.
 474,095. Ore Pulverizer. William L. Morris, Cleveland, O.
 474,110. Mining Machine. Amanda J. White, Wilkes Barre, Pa.
 474,134. Pneumatic Tool. Frank A. Bagoasco, Long Island City, N. Y.
 474,182. Safety Miner's Lamp. Andrew L. Nelson, Joseph Knapper and Isaac Taylor, Dunbar, Pa.
 474,201, 474,202. Apparatus for Making Gas. Paul A. N. Winand, Philadelphia, Pa., Assignor to Schleicher, Schumm & Co., same place.
 474,206. Rock Drill Support. John B. Rubin, Durango, Colo.
 474,272. Ore Concentrator. Crighton R. Townsend, Idaho Springs, Colo.
 474,337. Core Barrel for Rock Drill. Samuel W. Douglass, Fort Collins, Colo., Assignor to the M. C. Bullock Manufacturing Company, Chicago, Ill.

TUESDAY, MAY 10, 1892.

- 474,412. Machine for Forming Fuel Bricks. Johann P. Schmidt, Jersey City, N. J.
 474,413. Art of and Apparatus for Aerating Liquids. Joseph Schneible, Brooklyn, and Carl A. Schneible, New York, N. Y.
 474,494. Hoisting and Conveying Machine. Alexander E. Brown, Cleveland, O.
 474,527. Sulphuric Acid Pan and Process of Making the Same. Richard Kuch, Hanau-on-the-Main, Germany, Assignor to Wilhelm Carl Heraeus, Wilhelm Heraeus and Heinrich Heraeus, same place.
 474,539. Process of and Apparatus for Making Silicates and Hydrochloric Acid. Walter Walker, London, England.
 474,573. Ore Roasting Furnace. Horace F. Brown, Butte City, Mont., Assignor to Mary C. Brown, same place.
 474,592. Ore Conveying Apparatus. Thomas A. Edison, Llewellyn Park, N. J.
 474,778. Process of Making Nitro-Cellulose. Hudson Maxim, New York, N. Y., Assignor to the Columbia Powder Manufacturing Company, same place.

PERSONALS.

Prof. Wm. P. Blake, mining engineer, of Shellsburg, Wis., is at present traveling in Colorado, but is expecting to return shortly.

Mr. J. C. Hart has resigned the position of treasurer of the Delaware & Hudson Canal Company, which he had filled with great ability for many years.

Mr. W. R. Kunhardt, mining engineer of this city, has left for Michigan, where he will assume charge of the affairs of the Osceola Mining Company during the summer.

Mr. W. J. Rattle, of the firm of Rattle, Nye & Hollis, chemists and iron ore contractors of Cleveland, O., is at present in Minnesota investigating the Mesaba mines.

Mr. R. A. Penrose, Jr., mining engineer, of Philadelphia, in company with Mr. D. M. Barringer, has returned from an examination of the coal and iron fields of New Mexico.

Mr. D. G. Sutfin has been appointed superintendent of the western division of the Lake Shore Railroad. He has been the Buffalo agent for some years. His successor is Mr. John F. Lane.

Mr. George K. Fisher, mining engineer of Denver, is engaged in furnishing plans for the new refinery of the Globe Smelter at Denver, the construction of which will be under his supervision.

Mr. J. G. Searles, who became General Coal Freight Agent of the Pennsylvania on May 1st, will have special charge of the coal and coke business. He has been in the railroad service since 1864.

Mr. William Pickett, for many years superintendent of the Peerless Mining Company, Quijotoa, Ariz., and other of the adjacent mines, resigned his position owing to ill-health. Mr. D. C. Pickett will now take charge.

Dr. F. A. C. Perrine, who for several years past has been chief electrician for the John A. Roebing's Sons Company, Trenton, N. J., has resigned and accepted a position with the Germania Electric Company, of Boston.

Mr. James Colquhoun, formerly superintendent of the Mining and Smelting Department of the Arizona Copper Company, Limited, at Clifton, Ariz., was appointed general superintendent and agent of that company on May 1st.

Mr. Julius Ropes, of Ishpeming, Mich., has been appointed by the Michigan directors of the World's Fair to supervise Marquette County's mineral exhibit. He will classify and arrange the ores and will accompany the exhibit to Chicago.

Mr. H. B. Crandall has been appointed coal freight agent of the Erie lines east of Buffalo and Salamanca. He has been chief clerk of the coal department at New York for several years, and the appointment is a recognition of efficient services.

Mr. George E. Merchant is the successor to Mr. William A. Baldwin, of the Buffalo, Rochester & Pittsburg Railroad. He will be called the assistant to the president, and be retained as president of the Rochester & Pittsburg Coal and Iron Company.

Mr. R. M. Haseltine, Chief Inspector of Mines for Ohio, has assumed the responsibility of collecting Ohio's mineral exhibit at the World's Fair. Mr. Haseltine has had the matter under advisement for some time, and formally accepted the undertaking at the hands of the board on the 7th inst. He is now considering the plan of making the exhibit and the amount of space required.

OBITUARY.

John T. Gilmer, well known throughout the West as a member of the firm of Saulsbury & Gilmer, stage line owners and mining operators, died in Salt Lake City, May 8th, aged 61. His stage lines ran from the various points on the Union Pacific and Central Pacific railroads to all mining camps in early days. Latterly he became interested in mining, and among the properties in which he invested were the Kentuck, in Idaho; the Stewart, in Utah; the Trench, in Arizona, and a number of Black Hills properties, not to mention the smelter at Benson, Ariz.

Prof. August Wilhelm Hofmann, the distinguished German chemist, is dead. Prof. Hofmann was born at Giessen in 1818, and was a pupil of Liebig. In 1845 he was appointed professor at Bonn, and in 1848 he followed a call to the newly founded Royal College of Chemistry in London, where he was so successful in his investigations that the Government in 1853 adopted this school as the chemical section of the Royal School of Mines. Subsequently he held a professorship at Berlin, where he has, since 1865, presided over the chemical laboratory of the University. The most important of his chemical discoveries was that of the aniline colors derived from coal tar, which has such a great effect in various industries. At the Paris Exposition of 1867 he received a first prize for his industrial discoveries. Among his literary works are a "Handbook of Organic Analysis," "Annals of Chemistry," "Reminiscences of Old Berlin," etc. After Liebig's death he became editor of the "Annalen der Chemie."

He was a member of many societies, including the Royal Society of London. He was a corresponding member of the Institute of France and an officer of the French Legion of Honor.

Lester L. Robinson, of San Francisco, died in Los Medanos, Cal., on the 6th inst., aged 68. He was born at Oxford, Chenango County, N. Y., on Feb. 4th, 1824, and received a common school education. After graduating from the Newburg Academy, New York, he accepted a position on the New York & Erie railroad, on the Eastern and Delaware division. From 1844 he was engaged upon the preliminary surveys and work of construction of the Atlantic & St. Lawrence Railroad, from Portland, Me., to Montreal. After doing more railroad work and surveying in Canada he went to Kentucky in 1849 to become chief engineer of the Maysville & Lexington Railroad. He also made the preliminary surveys of the Louisville & Nashville Railroad and of the road from Bowling Green, Ky., to Memphis. About the close of the year 1854 he went to California as a member of the firm of Seymour, Morton & Co., to construct the Sacramento Valley Railroad, from Sacramento to Folsom, which was the first railroad completed on the coast, and which was opened for traffic on Feb. 22d, 1856. He was also connected with the Freeport and the Sacramento, Placer & Nevada Railroad. He had been president of a great many mining companies of all kinds in California, Nevada, Utah and Oregon, president of the Miners' Association, and one of the promoters of the Riverside Land & Irrigating Company. He was president of the North Bloomfield Gravel Mining Company and other hydraulic mines.

SOCIETIES.

The American Geographical Society of this city held a meeting on the evening of May 21 at Columbia College in the interest of the proposed survey of the north magnetic pole. The speakers were Prof. W. T. Trowbridge, of Columbia College; Prof. Meyer, of Stevens Institute; Gen. Greeley, of the Signal Service, and Col. W. H. Gilder. The subject is one of general interest to the scientific world, and the practical importance of such a survey has long been recognized. The neighborhood of King William Land, off the northern coast of this continent, where the work is expected to be carried on, can be reached with comparative ease and little danger. A thorough study of all the magnetic phenomena observable in the neighborhood of the magnetic pole will be made, with special reference to whether the pole is moving and at what rate and in what direction. Many prominent men of science are interested in the matter. Col. W. H. Gilder, who with Lieut. Schwatka won fame in bringing back information as to the Franklin expedition, expects to go in charge, and is confident of success.

INDUSTRIAL NOTES.

Durham furnace, at Riegelsville, Pa., owned by Cooper, Hewitt & Co., is being blown out.

Pennsylvania capitalists are contemplating the erection of a zinc furnace at Ivanhoe, Va.

The Stewart Wire Company has been incorporated at South Easton, Pa., with a capital of \$400,000.

The Carnegie Iron Company, Johnson City, Tenn., will blow in its new furnaces in the course of a few weeks.

The Colorado Coal and Iron Company of Pueblo, Colo., is shipping one order of 1,500 tons of rails to Utah.

The salt works of the Butlers & Peters Salt and Lumber Company, Ludington, Mich., was burned on the 8th inst.; estimated loss, \$500,000.

The Coronet Steel Company of Baltimore, Md., will soon establish in the vicinity of that city an open-hearth steel works. The capital is \$500,000.

The Midland Virginia Steel and Iron Company has been organized at Lynchburg, Va., to develop magnetic ore deposits found near there. R. H. T. Adams is president.

Cheney & Hewlett's Architectural Iron Works, situated on Newton Creek and Setauket street, Brooklyn, N. Y., will be sold at public sale on the morning of May 17th.

The Upper Carnegie Mills, at Pittsburg, Pa., were compelled to shut down on the 9th inst., owing to the shortage in the natural gas supply from the Philadelphia Company.

The Ingersoll-Sergeant Drill Company, of 10 Park Place, New York, have opened a branch office under the firm Parker, Melcher & Ingraham, 100 to 104 West Washington street, Chicago.

The "Manufacturers' Record" of Baltimore is erecting a new seven-story building, which, when completed, will be one of the handsomest architectural adornments in that already beautiful city.

G. S. Woodman, 116 Fulton street, New York, is introducing a new tracing paper especially adapted for engineers' use. It is of exceptional toughness, and can be furnished in lengths of 20 yds. by 40 ins. wide.

The Stewart Wire Company was organized in Easton, Pa., on the 7th inst., with a capital of \$400,000, to succeed Stewart & Co., owners of the extensive wire mills located there. The plant will be enlarged and the number of hands increased to 500.

The H. C. Frick Coke Company has made several experiments, in the last few months, with electric lights in its mines, and, it is said, the company is now considering the advisability of erecting an electric light plant at each of its shaft and slope plants.

Rosena furnace, at New Castle, Pa., operated by the Oliver Iron and Steel Company, blew out on the 21st ult., having made 196,587 gross tons forge iron on the present lining and bosh which still are in good condition. The lease, it is said, will not be renewed.

The W. L. Scott Company has been incorporated with a capital stock of \$1,000,000, fully paid up. The officers are John S. Richards, president; L. M. Little, secretary, and John William Little, treasurer. The head offices are at Erie, Pa., with a branch house at Chicago.

The Lidgerwood Manufacturing Company, of New York, has recently issued another sketch book, being one of a series of illustrated pamphlets descriptive of its improved system of telergraph. The book is entitled "Open Pit Mining." It contains much instructive matter.

Hooven's rolling-mill, at Norristown, Pa., which has been idle several months as a result of the puddlers' refusal to accept a reduction from \$4 to \$3.50 per ton, will resume operations soon, the puddlers and the management having come to an understanding by which the former will return to work at the \$3.50 basis.

The St. Louis Steam Forge and Iron Works is putting in operation a new plant at Centralia, Ill., starting with 70 or 80 men. It is a three-high mill and will be started on bar iron. Chas. L. McDonald will be the manager of the new concern, which will be known as the Centralia Iron and Steel Company.

The Electrical Engineering Company of San Francisco has recently equipped for the Taylor Mining Company, Eldorado County, Cal., a 25 H.P. pumping plant, power being furnished by Pelton water wheels. A separate dynamo furnishes power for two drills. A 100-light incandescent dynamo has also been installed, which is to furnish light for the mills, lodging houses, underdrifts, etc.

We have received from the B. F. Sturtevant Company, Boston, Mass., an illustrated book of 130 pages, tastily bound and entitled "Five Hundred Representative Buildings Heated and Ventilated by the Sturtevant System." Most of the illustrations are from specially prepared pen and ink sketches, printed in colors, and forming, with their excellent accompanying testimonials set in carefully chosen type, a succession of pleasing pages. The entire work is indicative of the scope and success of the Sturtevant system, which by means of a fan acts positively to force air to all parts of a building.

The Pelton Water Wheel Company, of San Francisco, is constructing a water wheel 36 ins. diameter, to operate under a head of 2,100 ft., or a pressure of more than 900 lbs. per sq. in. The wheel is to run at 1,150 revolutions per minute, and have a speed at its periphery of 10,805 ft. per minute, which is at least one-third faster than circular saws are driven. The wheel is to be placed in one of the Comstock mines, and, in addition to the depth of the mine, is to be fed from the Virginia water mains, which have a pressure of 198 lbs. to begin with. The diameter of the jet will be only 0.15 in., or about 5-32 in. The wheel will be of solid steel, a tempered plate 3/8-in. thick.

The Springfield Steel Casting Company, of Springfield, O., manufacturers of crucible steel castings, has decided to remove its plant to Lima, O. With this object in view it has applied for a charter of incorporation under the name of the Lima Steel Casting Company, with a capital stock of \$50,000. Preparations are now being made to remove the works of the company to Lima, where a 10-ton open-hearth steel plant will be built. The business of the firm will be conducted at Sharpville until the new plant at Lima is ready for operation. The officers of the Springfield Steel Casting Company are J. W. Maxwell, president; Joseph Langan, treasurer, and G. H. Vincett, superintendent.

The recent announcement by the Commissioners of Patents that printed copies of patents cannot be furnished for want of room to store them, is, says the San Francisco "Industry," the most remarkable bulletin that has ever emanated from that bureau, and is a disgrace to Congress and the country. If there is not room it should long ago have been provided. The Patent Office has a balance of earnings exceeding \$3,000,000, and to have no room for storing copies of patents is preposterous and provoking. Printed copies are an essential feature of modern procedure, and if the Government cannot print and store patents they can contract with some firm to do so, permitting them to sell copies to those who require them. The Patent Office is a national institution, but there are no "national" congressmen. They all "represent" some section, including themselves and their friends, but seldom the country at large or its interests.

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.

2,671. A 7 in. four-side molding machine, a 16-in wood turning lathe, a scroll sawing machine, and 3 wood split pulleys, 12x30, 8x24, 6x16. Georgia.

2,672. Lathes, planers and machinists' tools. Texas.

2,673. A machine to manufacture conveyor flights. Pennsylvania.

2,674. A second-hand steam feed for an 8-in. saw mill. Virginia.

2,675. An engine, a boiler and a drier for drying soft phosphate. Florida.

2,676. Prices of machinery for manufacturing sash, doors, spokes, buckets, etc. Mississippi.

2,677. A general outfit for distilling, including boiler, pumps, pipes, etc. Arkansas.

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; channellers, 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.

GENERAL MINING NEWS.

ALASKA.

Alaska Treadwell Gold.—The official statement of the company for the month of March is at hand showing receipts: Free gold from 19,080 tons crushed, \$1.75 per ton of ore, equal \$33,446.86. Chlorination, treating 457 tons concentrates, 67 cts. per ton of ore, equal \$12,834.73. Interest, 1 ct. per ton of ore, \$83.80. Total, \$2.43 per ton of ore. Total receipts, \$46,365.39. Expenditures: Mining, 19,080 tons of ore, 63 cts. per ton, equal \$11,933.83. Milling, crushing 19,080 tons (377 tons concentrates saved), 63 cts. per ton, equal \$11,931.40. Chlorination, 457 tons concentrates treated, 20 cts. per ton, equal \$3,755.81. General expenses at mine, 5 cts. per ton, equal \$1,044.34. General expenses at San Francisco, 2 cts. per ton, equal \$400.30. Bullion charges, freights, insurance and refining, 3 cts. per ton, equal \$638.12. Total expenses, \$1.56 per ton, equal \$29,753.80; mining profit per month, 87 cts. per ton, equal \$16,611.59. The company had on hand March 31st \$93,963.34 in cash. The net profits available for dividends for the last 10 months of the company's current financial year (up to March 31st, 1892) have been \$289,143.10; for the same period of the last financial year they were \$320,010.90.

ARIZONA.

Pima County.

The Crocker Mining Company reports cash on hand May 2d amounting to \$3,584.48; the Peer Mining Company, \$2,137.63; the Peerless Mining Company, \$2,446.83, and the Weldon Mining Company, \$64.78.

Crocker Mining Company, Quijotoa.—On the 300 level, at a point 100 ft. south from tunnel 4 in the main south drift west cross-cut 1, which is being extended to get under ore showing on the level above, has been advanced 7 ft., making 37, with the face in soft iron-stained porphyry.

Peer Mining Company, Quijotoa.—All arrangements are about completed for starting work in the east side tunnel, which is to cut and explore the vein under ore bodies, showing on levels above, as soon as word to start work is received.

Peerless Mining Company, Quijotoa.—On the 300 level near the main working shaft fair progress has been made during the week in the north drift, with the face continuing for width in favorable-looking unstained quartz.

(From our Special Correspondent.)

Prince Rupert Mine, Crittenden.—Some very fine specimens of horn and wire silver are being taken out. This ore gives a smelting return of from 150 to 320 oz. per ton. **

Yavapai County.

Free gold properties are being developed about 12 miles below the Upper Walnut Grove dam site. There are three claims in the group, two of them being on one ledge, which can be traced right up to the almost perpendicular sides of a high mountain, along the top of the ground, for over a mile. The ledge has been prospected by several small shafts, and developed by a main shaft 100 ft. in depth. There are now 150 tons of ore.

CALIFORNIA.

Amarador County.

Gover Mining Company.—A cave occurred in the Gover mine during the night of April 17. Some rich ore was being taken from the 700 level, when the cave occurred between the 700 and 600 levels. No one was injured.

Hardenburg, Middle Bar.—This mine is reported to be looking exceedingly well. The ore-chute north of the shaft in the lowest level is 8 ft. wide and of good average character. It is the regular ribbon-rook formation, the quartz being identical with that of the Kennedy, Keystone, Pacific and other mines on the mother lode.

Plymouth Consolidated Mining Company.—It is reported that the control of this company has passed out of the hands of Hayward & Hobart to the New York stockholders.

Butte County.

(From our Special Correspondent.)

A stratum of coal has been found on the Nash ranch, while sinking an artesian well. The coal is 5 ft. in thickness and is said to be of good quality. Machinery will be put in to pump the surface water found 20 ft. down, after which a shaft will be sunk on the coal-bed. **

Eldorado County.

Dalmatia Mining Company, Limited. It is reported that a strike has been made in this low grade mine. Extensive improvements are under way.

(From our Special Correspondent.)

Dalmatia Mining Company, Kelsey.—This corporation continues to maintain its reputation for economical working, and in that respect is in marked contrast to some of the other English companies. From July, 1890, to August, 1891, 43,000 tons of rock were handled, and between the 1st of August and Dec. 31st, 19,000 tons of ore were run through the mill. The bullion product was obtained at a cost for mining and milling of 50 cts. per ton.

Vandalia, Shingle Springs.—A large quantity of the ore from this mine is honeycombed quartz, heavily charged with sulphurets. Fifteen per cent. of the free gold is recovered in the battery and 85 per cent. on the outside plates. The tailings are being now worked by the cyanide process, it is said with successful results.

Mono County.

Bulwer Consolidated Mining Company (official).—"The south drift from No. 6 upraise was extended 17 ft.; the drift continues in vein matter, showing some fair ore. South drift from No. 5 upraise was extended 21 ft. Cleaned out 40 ft. of north drift 100 level and started a cross-cut east; the same was extended 7 ft."

This company had cash on hand May 2d amounting to \$14,194.19.

Bodie Mining Company (official).—"The east cross-cut 1 on the 550 level was extended 11 ft.; in this cross-cut 3½ ft. of quartz and clay giving low assays was passed through. The ore stopes above the 500 Jupiter shaft level are yielding \$30 ore.

On May 2d this company had \$4,516.48 on hand. \$12,970.61 in unsold bullion is reported on hand to meet overdraft of \$1,432.26.

Mono Mining Company (official).—"We are stoping out ore north and south from winze 1 south drift 700 level. The ore is very rich, but mostly silver. The mill was kept running steadily. Average battery samples, \$40.59; tailings, \$6.34."

Standard Consolidated Mining Company.—Following is the official report of the mill operations: Tons of ore crushed, 333; daily average, 47 4-7 tons; average assay Vanner tailings, \$7.16; average assay pan pulp, \$6.18; average assay settler tailings, \$5.41. Concentrates produced 2 tons 640 lbs. at average assay value of \$32.28. Plate amalgam produced 68½ tons. The mine is said to look well.

(From our Special Correspondent.)

Summit Mining Company, Bodie.—About 45 tons of ore is on the dump saved from the north drift, 100 level. **

Nevada County.

Centennial Gravel Gold Mining Company.—The annual meeting of this company took place recently at the office of the company in Gold Hill, Nev. The following officers were chosen for the ensuing year: Directors, Evan Williams, H. M. Gorham, M. Kinzie, Alf. Doten, W. S. James; president, Evan Williams; vice-president, M. Kinzie; secretary, W. S. James; superintendent, Henry Richards. The official report show the mining and financial status of the company to be in a very healthy state—all bills paid to date and money enough in the treasury to defray running expenses for two or three months, or perhaps until dividends take the place of assessments. The main tunnel of the mine is in about 2,200 ft., the hard streak of bedrock recently encountered changing to a more favorable formation,

with the top of the drift in softer and more moist material, evidently showing closer approximation to the gravel bed developed at that point by short upraises, another of which is now probably being made. This development work will be continued for the present until definite and decisive gravel-washing arrangements can be made and practically entered upon. The main incline upraise, 310 ft. to the surface, above the tunnel, recently completed, gives a splendid draught of air throughout the mine, furnishing all desired facility for full gravel extraction.

Placer County.

Hanlon Drift Gravel Mine.—This mine, three miles south of Loomis, is employing about 30 men. It is working two shifts and running its mill constantly, with an average crushing of 45 tons per day. The clean-ups average \$2,400 per week. The gravel is taken entirely from drifts and laterals for development of the mine, no breasting being done.

Siskiyou County.

(From our Special Correspondent.)

Humpback Mine.—This mine, situated about 1,000 ft. west of the Klamath River in Eddy Gulch, continues to yield more prolifically as depth is attained. The ore ranges from \$50 to \$100 per ton, and up to the opening of the current year was worked by arrastra. The mine developments necessitated the erection of a stamp mill, and now 10 tons of rock are crushed daily that averages about \$95 per ton. This means a clean-up totalling something like \$70,000.

Indian Creek Hydraulic Mines.—A decision has been handed down by the Supreme Court in a contest between J. A. Fritts against J. Camp and 16 Chinamen. The plaintiff possessed a quarter section of land upon which the debris from the claims of the defendants, 10 miles above, found a lodgment. The plaintiff went over to the adjacent county of Del Norte and obtained from the County Judge an injunction against the defendants and \$2,700 for damages. On appeal the Supreme Court reversed the decision on the grounds that Del Norte County had no jurisdiction. Since the earliest days Indian Creek has been used as a dumping ground for debris in hydraulic mining. **

Spencer Mine.—Under new management good results are being obtained. The main shaft is down 240 ft., and the lowest level runs 200 ft. north and the same distance south in good ore. The ore is shipped to the 4-stamp mill on Humberg Creek, and recently from a 12-days' run \$2,500 was cleared, and later a 14-days' run cleared \$1,500. The average yield varies between these amounts.

COLORADO.

Official list of mineral surveys approved by the United States Surveyor-General of Colorado during the week ending May 7th, 1892: Survey No. 7,336, land district, Del Norte, name of claim, Maggie, Wandering Jew, Bobtail, Mammoth No. 2 and Rio Grande lodes; 7,424, Central City, Rob Roy and Little Wallace K. lodes; 7,382, Del Norte, Clarence and Twin lodes; 7,381, Del Norte, Swede Girl, Dutch Girl, Old Maid and B. B. & M. lodes; 7,365, Durango, Big Blue, Crown Point and Barnum lodes; 7,366, Garfield, Calumet No. 2, Calumet and Elwood lodes; 7,343, Leadville, Wellington lode; 7,384, Garfield, First Chance lode; 7,383, Del Norte, Pueblo Chief lode; 7,346, Central City, Crown Point and Homestake lodes; 7,367, Gunnison, Oracle and Oracle No. 2 lodes. Amended surveys: 4,452, Leadville, Widow McCree and Peerless lodes; 5,819, Garfield, No. 7 lode.

The Globe Smelting and Refining Company of Denver will add to its extensive plant a large refinery for the separation of gold, silver and lead. The refinery has been planned for a daily capacity of 80 tons of lead and 20,000 oz. of silver, allowance having been made to double this output in the near future. The buildings are to be of brick throughout, the interior columns and floors of cast iron, and will cover an area of 120x180 ft. The furnaces and machinery will be of the latest improved type. The works will be under the supervision of Mr. W. L. Hoyt. Estimates for the work are being considered by the company and the plant will be pushed rapidly forward. The complete plant will cost \$75,000.

At the meeting of the Board of Directors of the Colorado Mining Exchange the financial report of the past year was submitted. On May 1st, 1891, there were 222 members. Since that time two new memberships were sold and 15 members admitted by transfer; 14 memberships were forfeited and 15 cancelled, leaving 210 members in good standing. Receipts were as follows: Dues, \$8,128.85; fees, \$3,950; transfer fees, \$15; sale memberships, \$1,000. The expense of maintenance was \$8,356.13. W. B. Root is vice-president of the new board and Dennis Sheedy treasurer.

Colorado Gas and Petroleum Company.—This company, which has been operating 10 miles north of Denver, on Dry Creek, for the past two years, is said to have struck oil and gas in quantities recently. The strike was made in the sand stratum. The members of the company are D. C. Dodge, Job A. Cooper, J. W. Gillully, J. B. Grant, B. W. Bredin, E. W. Smith, W. J. Lamberton, George S. Griswold and Cassius C. Smith.

Boulder County.

Free Gold Hill Consolidated Mining and Milling Company.—This company has been incorporated, with a capital of \$1,000,000. The operations will be at Copper Rock. The business office will be in

Denver. The directors are W. H. Betts, Richard Linthicum, J. E. Sackett, James A. Tedford, Louis Chopin. The company held a meeting on the 7th inst and elected the following officers: Dr. W. H. Betts, president; J. E. Sackett, vice-president; James A. Tedford, treasurer; Richard Linthicum, secretary and general manager. A plant of machinery has been purchased, and a force of men will be put immediately to work. The company owns three mines, the Silver Friend, Iron Mask and Miser's Dream, and holds options on adjoining properties.

White Crow, Sunshine.—A strike is reported at this mine, from which good ore has been taken for some time past. The present strike is reported to be the biggest yet made in the mine. The pay streak is fully 2½ ft. wide and is rich. In this streak is said to be another good streak varying from 2 to 4 ins. in width which will run from \$10 to \$20 per lb.

Clear Creek County.

During April ore shipments from Idaho Springs to the various smelting points aggregated 1,186,840 lbs. carried in 46 cars. Forty-two cars were shipped to Denver, three to Argo and one to Pueblo. The above figures, says the Idaho Springs "News," show a decrease of 457,960 lbs. and 19 cars as compared with the shipments for March.

Dolores County.

Uncle Ned, Rico.—A strike of 4 ft. of ore is reported from this mine on Nigger Baby Hill. The ore is lead and iron, and is said to run high in silver and lead.

Gunnison County.

May-Mazepa Consolidated Mining and Milling Company, White Pine.—According to the White Pine "Cone," the May-Mazepa mine is improving in its showing of ore. All the drifts, ore bins and platforms are filled with ore, which, owing to bad roads, cannot be removed. The 265 level has just passed through 40 ft. of barren rock, and is now in another good chute of ore. Good ore is also reported in the bottom drift, and in the bottom of Dividend shaft, and all the stopes are holding their own. After the annual meeting of the stockholders it is said that the force will be increased, as will the shipments of ore.

Lake County.

(From our Special Correspondent.)

Bunker Hill.—This claim has also on Prospect Mountain a shaft already down about 200 ft., in which the iron and lead contact has been disclosed, and which has a vein that possibly may prove of considerable value. ***

Sunny South, Leadville.—This mine is located on the southern slope of Prospect Mountain, where the outcroppings of lead and argentiferous iron ore are frequent, and where lately a great deal of work has been done.

Ouray County.

Advices from Ouray report that the Bright Diamond and Badger mills are running day and night on Bright Diamond ore. The Bright Diamond, American-Nettie, Memphis, Slide, Black Girl, Senorita and others on the gold belt are in fine ore.

Pitkin County.

Mollie Gibson Consolidated Mining and Milling Company, Aspen.—In the suit of Jerome B. Wheeler against J. J. Hagerman and this company for \$1,960,000, the defendants have filed in the District Court of Pitkin County, where the case is now pending, a demurrer to the complaint and a motion for a change of venue to El Paso County. The principal ground alleged for hearing the case in El Paso is that the principal office of the mine is located there and that the plaintiff is a non-resident of the county.

Pueblo County.

Colorado Coal and Iron Company.—Blast Furnaces Nos. 1 and 2 of this company were put in operation during April. Furnace No. 3 has just been completed, and it is expected to go into blast in the very near future. The steel plant started on orders for about 15,000 tons. Inspection of the last run of rails shows them to be as fine, it is said, as any rolled in the East, less than 5 per cent. being seconds. An official report on the durability of their steel rails has been made by the proper officers of the Denver & Rio Grande Railroad. On the double track between Colorado Springs and Kilkee, one track was laid in December last with Pueblo rails, the other with Chicago rails, both of equal weight, in December, 1888. On a 6° reverse curve, with no intervening tangent, the Chicago rail is worn a half an inch, while the Colorado rail shows a highly polished surface not worn one-sixteenth of an inch. The old 40-lb. rails made in Pueblo a dozen years ago for the D. & R. G. R. R. were in service on the heavy curves in the canyon between Pueblo and Salida during the years of the heavy Leadville traffic. When the broad-gauge was introduced these rails were relied on the Durango line, where they still give satisfaction.

Saguache County.

We extract the following from our Creede exchanges: "A rich lead on Bachelor Hill has been opened up, and it is said that its course and direction can be traced for 1½ miles. A vein of galena ore has been discovered near Wason on Mammoth Mountain. A shaft 50 ft. deep is sinking on the Ruth mine, the latest location made on the west end of Mammoth Mountain, near the Little Gem mine,

which has a vein of iron ore carrying 30 oz. silver. A 5-ft. vein has been cut on the Buck Horn mine, located about one mile north of the Holy Moses. In the Winchester mine two shafts are at work; the strike at this property holds good and shipments will be commenced shortly. A find is reported from the Red Mountain district and assays made from various specimens run high. The gold strike in Antelope Park is causing some excitement; samples assay well in gold."

Amethyst Mining Company.—At this property 70 men are at work. A larger force will be engaged as soon as the shaft is in order.

San Miguel County.

Shipments of ore and concentrates from Telluride for the week ending April 30th were: From Sheridan Consolidated, 33 cars; from Smuggler-Union, 36 cars; from Hector Mining Company (Cimarron), 1 car; from Crown Jewel, 1 car; total, 71 cars; total shipped since Jan. 1st, 1,144 cars.

Summit County.

The shipments of ore and concentrates from Breckenridge during the month of April amounted to 469 tons, making for the year since Jan. 1st a total of 1,958 tons, against 1,684 tons for the same time last year, a gain of 274 for 1892.

CONNECTICUT.

Owing to the strike among quarrymen in the New England States, in Connecticut alone from 1,000 to 1,500 stone workers are idle, and there are several thousand strikers in Massachusetts. At the Stony Creek quarries 1,000 men are on strike. The story of their grievance is thus narrated by one of the strikers: "The quarrymen have been paid at the rate of 22 cts. an hour for nine hours' work a day and eight hours on Saturday. A month ago they asked 23 cts. an hour for the same number of hours' work daily. 'We will wait till May 1st,' the quarrymen's committee said to the bosses, 'then, if the demand is not acceded to, we will go out.'" At the Brooklyn quarry in Stony Creek the bosses agreed to the demand, and the 500 men employed there are still at work. The strikers are men employed by the Norcross Brothers and in the red granite and John Beattie's quarries. Norcross's men, who were paid at the rate of \$1.98 a day for quarrymen and \$3.06 for stonecutters, had no grievance, but went out through sympathy with the men in the other quarries. At Westerly, R. I., on the eastern boundary of Connecticut, where are some of the largest granite quarries in America, 150 quarrymen have been on strike since April 1st.

IDAHO.

Alturas County.

Silver King.—During the past winter the main shaft at this mine at Sawtooth has been sunk 300 ft. deeper, making 600 ft. in all. All the way down, it is said, the ore is high grade in silver, and machinery for concentrating it has been ordered. Heretofore that shipped gave returns of from \$200 to \$250 per ton.

Shoshone County.

The labor difficulties in the Coeur d'Alene mines are nearing a dangerous crisis. The mine owners are determined to import non-union men to work their mines, and the sentiment of the community is hostile to this resort. It is known that the miners have been shipping rifles and ammunition, and when the mine owners send the Pinkerton men trouble is feared. The constitution of Idaho forbids the importation of deputy marshals from other States, but the owners are avoiding this by recruiting forces in the farming country around Moscow. A car-load of these recruits were brought into Spokane May 11th on the Palouse train, and were sent up to Hauser Junction, presumably to be dispatched into the mines by the lake route of the Northern Pacific. Reports from Coeur d'Alene state that the excitement is intense.

A dispatch from Wallace, Idaho, dated May 13th, says 500 non-union miners left Duluth, Minn., today for the Coeur d'Alene mines. The men will be met at Bozeman, Mont., by 100 armed deputies, who will escort them into the mines. Both mine owners and miners are determined, and serious trouble is apprehended.

Helena & Frisco Mining Company.—It is asserted positively that the Badger Mine in the Coeur d'Alenes, belonging to this company, has been sold to an English syndicate for, it is stated, \$1,100,000, part cash and part stock. Ex-Gov. Samuel T. Hauser was one of the owners. Captain Prideaux, of the Jay Hawk and Lone Pine, represents the purchasers.

ILLINOIS.

Madison County.

The coal miners' strike at Collinsville has been ended, the men having accepted the company's terms.

KANSAS.

Cherokee County.

During the week ending May 7th the output of ore from the mining districts of Galena and Empire City was: Rough ore, 2,069,400; zinc ore, pounds sold, 981,530; lead ore, pounds sold, 118,220. Sales aggregated a total value of \$14,124.

MICHIGAN.

Copper.

Atlantic Mining Company.—In April the com-

pany produced 231 tons of mineral, as against 235 tons for March and 219½ tons for April, 1891. Total this year, 804 tons, against 857½ tons for the same period of 1891, a decrease of 53½ tons.

Franklin Mining Company.—This company produced 191 tons of mineral in April, as against 201½ tons for March and 201 tons for April, 1891. For four months the product has been 800½ tons, as against 807½ tons in 1891.

Huron Mining Company.—All the personal property of this company was sold at public auction on the 4th inst., at the instance of the local creditors. It is expected that a force of 50 men will be put at work at the mine on tribute.

Osceola Mining Company.—According to the Torch Lake "Times" this company, now drifting north and south on the 22d level, has difficulty in advancing, the lode is so filled with metallic copper.

Tamarack Mining Company.—The product of this mine for April was 930 tons of mineral, against 922 tons for March and 887 tons for April, 1891. This makes the product for four months since Jan. 1, 3,690 tons, against 3,267 tons in 1891, an increase of 423 tons. Since July 1, or 10 months of the fiscal year, the product foots up 9,285 tons, against 7,555 tons the previous year, an increase of 1,730 tons.

No. 1 shaft of this mine is being sunk to the 16th level. Cross-cutting is progressing on the same level. No. 2 shaft is down to the 16th level and will cross-cut through shortly. The drifting now being done shows up a rich lode, it is said.

Tamarack, Jr., Mining Company.—Rich ore is said to have been struck on the 4th level.

Wendigo Copper Company.—This company, operating on Isle Royale for two years, has decided to abandon the field and go out of existence. The Wendigo Copper Company was organized three years ago to explore and mine for copper at sites on several parts of Isle Royale, where there were indications of mining by pre-historic races. The company has spent two years sinking pits, exploring with diamond drills and uncovering and continuing the drifts made by the mound builders, but all to no avail, not enough copper being found to warrant further operations. This ends the last attempt to find a mine on Isle Royale. It is probable that a million dollars have been spent on this island in fruitless explorations made by practical men with their own money, and not by stock companies. It may safely be asserted that there are no paying deposits on the island.

Wolverine.—Development work is going on rapidly at this mine, but no stamping is being done. Many improvements are said to be noticeable as shafts Nos. 2 and 3 are being lowered.

Menominee Range—Iron.

Hope.—Shipping from this mine has been resumed. The output amounts to about 150 tons per day, which is sent to Escanaba. About 8,500 tons are stocked. The only new feature of the underground workings of the mine is several raises from the second to the first level, which show the width of the deposit and the quality of the ore to be the same as that of the first level.

Wagner.—At this mine cross-cutting from the bottom of the 103-ft. shaft has begun. The ore thus far encountered is in a desirable quantity, says the "Diamond Drill," but the quality is not first-class.

MISSOURI.

The following statement of the operations of the geological survey of Missouri has been submitted to Governor David R. Francis: Early in the month field work was actively resumed. The examination of the zinc and lead deposits was taken up in Jasper and Newton counties, and detailed mapping is now in progress there. Examinations of iron ores have been made in Stoddard, Dent, Callaway, Cooper, Saline, St. Clair, Butler and Wayne counties. Field work on the clay deposits has been continued in St. Charles and St. Louis counties. In the office the proofs of the engraved Higginsville sheet and of the accompanying report have been corrected, and good progress has been made in the preparation and revision of the report on the mineral waters, the report on the iron ores and the report on the paleontology of the State.

MONTANA.

Beaver Head County.

Jay Hawk & Lone Pine Consolidated.—The manager reports as follows under date of April 14: Since my last report we have sunk the shaft 15 ft. below the 850 ft. level; the vein is 4 ft. wide of rich ore. The 850 ft. west level is driven 40 ft. from the shaft; the vein for this distance is 5 ft. thick of good ore. The 700 ft. east level has been driven 20 ft. We are driving this level to cut the ore chute on the east side of the break. The tunnel under the hill has been extended 20 ft.; the vein is 2½ ft. thick of good ore. The stopes at the 700 ft. level and at the upper tunnel is producing good ore sufficient to keep the mill fully employed. The mine altogether is looking well.

Polaris Mining Company.—This mine is developed by a working shaft, now 350 ft. deep, with levels run every 50 ft. The mine has produced, it is said, about \$200,000 worth of shipping ore, besides between 4,000 and 5,000 tons of from 30 to 50 oz. milling ore now on dumps. At the present time there are over 1,500 sacks of ore sacked at the mine ahead of the three large teams kept constantly hauling. A tunnel is being run that will cut the

vein at the depth of about 600 ft., when the company intend building a mill to treat their ore.

Deer Lodge County.

Bland Mining and Tunnel Company.—This company has been organized with a capital stock of 600,000 shares with a par value of \$2 per share. The incorporators are William Noble, T. H. Noble, Charles C. Collins and H. L. Scott. The mine is situated in Brown's gulch, about 1½ miles from Phillipsburg, and the ore body is said to be large and easy of access.

Granite Mountain Mining Company.—The miners have returned to work, everything at the new hoist being in running order. The company, it is said, is going to push things to the utmost, notwithstanding the low price of silver. The Rumsey and Granite mills are running full force. A telegram received in St. Louis May 3d from Superintendent Weir stated that the new hoist had been completed and work on the mine resumed with a full force. The semi-weekly bullion shipment was also received and consisted of 21 bars, containing 25,714 oz. silver and 25 oz. gold.

Jefferson County.

Elkhorn Mining Company, Limited.—The manager's report for the month ending March, 1892, has been issued. The mines are said to be in excellent condition. 1,150 ft. level north: The ore in this place is 7 ft. wide and assays 35 to 40 oz. South of the shaft the ore is 6 ft. wide and assays 54 oz. This ground has now been worked from the back of the level. At the south end of the stope the streak is 7 ft. wide and assays 60 oz. and 12 per cent. lead. In the center of the stope, on the foot-wall side, ore assaying 35 oz. is being broken for the mill. The ore body in this stope is 28 ft. at the center of the main chute. The foot-wall has been exposed at either end. On the 1,200 ft. level, south of the shaft, ore is being extracted from a streak 8 ft. wide, assaying 100 oz. and 12 per cent. lead. At the south end the ore is 8 ft. wide and assays 70 oz., but carries no lead. On the 1,350-ft. level in the south drift the ore has been met with at a point 398 ft. from the shaft. The average value of it for a width of 4 ft. was 54 oz., no lead being present. From the point at which the ore was struck the value of the ore kept increasing as the drift advanced, and the character changed from dry silicious to high grade smelting ore, assaying from 175 to 200 oz. per ton and carrying from 10 to 25 per cent. lead. The widest place in the drift is 8 ft. and no foot-wall in sight. On April 7th the drift was in 434 ft., the breast showing a fine body of milling ore assaying 106 oz. and 2½ per cent. lead. During the month 1,181,7432 tons of ore of an average value of 43.64 oz. were worked in the mill, 92.9 per cent. being saved, the tailings assaying 3.51 oz. Forty-one bars carrying 43,250.65 oz. of silver and 39,792 oz. of gold were produced, the estimated value of which was \$38,480, which, added to the returns from shipping ore of \$20,308.43, indicated a production of \$58,788.43. The expenses for this period were \$25,529.43, leaving an estimated profit of \$33,259 for the month of March.

Silver Bow County.

Boston & Montana Consolidated Copper and Silver Mining Company.—The gas producers at the new reduction works at Great Falls are said to be working nicely now. For some time past Superintendent Klepetko has been experimenting with various grades of coal to discover the best and cheapest gas producer. The first trial was with Sand Coulee lump coal and proved to be a failure. The gas could not be produced fast enough to be of any use as a fuel. He then turned his attention to Lethbridge coal, but this, too, was useless as a gas producer. Finally slack from the Sand Coulee coal was tried. The result was successful, the slack affording a large volume of excellent gas, and its successful production is now merely a matter of detail. In view of the fact that this slack is sold at the mine for only 25 cts. per ton to private consumers, it can readily be seen that in large quantities its cost would be cheaper than any other fuel.

Boston & Montana Consolidated Copper and Silver Mining Company.—\$600,000 in bonds has been issued for the construction of an electrolytic refining plant at Great Falls.

Goldsmith.—The news of the sale of this mine has been confirmed. The Milwaukee people who purchased it will go to work at once, it is said.

Moulton Mining Company.—A strike has been made at the 500-ft. level of this mine. The ledge is about 3 ft. in width and will assay, it is said, 50 oz. in silver to the ton. The 14-ft. ledge discovered at the 200 level some time ago petered out after working it a short time.

NEVADA.

Elko County.

Diana Mining Company.—At the annual meeting of this company of Tuscarora district 84,935 shares were represented and the following officers elected for the ensuing year: W. C. Raiston, president; Thomas Cole, vice-president, and M. A. Jackson, William Bowers and George C. Hickox, directors. R. R. Grayson was re-elected secretary and H. W. Coffin superintendent. An assessment of 5 cts. a share was levied.

(From our Special Correspondent.)

The Diana Mining Company reports an indebtedness May 2d of \$421.02. The Grand Prize Mining

Company an indebtedness of \$6,351.32; the Nevada Queen Mining Company an overdraft of \$34,019.68, less \$5,990.12 cash on hand, and the Commonwealth Mining Company reports an indebtedness of \$27,326.82.

Nevada Queen Mining Company, Tuscarora.—During the week the stopes produced 12 tons first-class, assay value \$309 per ton, and 78 cars second-class ore, averaging \$42 per ton. The Union mill will devote one-half of its crushing capacity from now on to crushing ore from this mine. On the second level the raises are all connected on ore, but work is suspended on account of ventilation until connections are made, when the extraction of ore will commence. The south gangway from raise No. 3, third level, has been extended 20 ft., exposing some high grade ore.

North Belle Isle Mining Company, Tuscarora.—There were hoisted last week 46 cars second-class ore. The south intermediate from raise 1 south 500 has been extended and stope raised.

Tuscarora Water Company.—A dividend of 15 cts. per share has been declared, payable on the 12th of the current month.

Eureka County.

(From our Special Correspondent.)

The Lord Byron mine is not looking well at present and the outlook is not encouraging. The El Dorado and Tacoma mines have not been productive for several years and have for some time past been lying idle.

There has been no ore shipped from the Dunderberg mine since last fall, and the little that has been mined by the company during the winter is said to be of low grade. One set of tributaries have worked out some old pillars and have about 25 or 30 tons of fair quality ore, but most of the tributaries complain that they can find no ore in sufficient quantities to pay them and are quitting the mine.

Cortez Mines, Limited, Cortez.—The mill was closed down early in April on account of the wood supply for fuel having given out. There is now plenty of wood on hand, but there is no sign of the mill starting up. A number of men have been discharged from the mines, and the company have quit for the time being breaking down ore. Work at these mines is now confined to a single Burleigh drill, which is being driven on the 500-ft. level.

Diamond Mine, Eureka.—The ore shipments for April were light on account of heavy snowstorms and consequently bad roads. There is a large quantity of ore broken down and sacked which is being hauled to the railroad at the rate of 30 tons per day. In order to meet contingencies and delays in hauling, a new ore house is in course of construction. The shaft from the lower tunnel is down over 250 ft., and a new and powerful engine is now in transit which will be used for the purpose of sinking deeper.

Eureka Consolidated Mining Company, Eureka.—Seven men were drafted the last week in April from the mine. The lessees at the reduction works are making good wages by jiggling furnace products. They are well equipped for the work, and every dollar of royalty they pay is as good to the company as a dollar found.

Eureka District, Eureka.—During the month of April the Eureka & Palisade Railroad Company received for shipment to Salt Lake City for treatment 1,615 tons of ore, as follows: From the Eureka Consolidated mine, 600 tons; Diamond mine, 359 tons; Bullwhacker mine, 270 tons; Richmond mine, 150 tons; Jackson mine, 110 tons; Phenix mine, 60 tons; Williamsburg mine, 35 tons, and Mynheer mine, 21 tons. From Hamilton, White Pine County, 10 tons.

Eureka Tunnel, Eureka.—Two lessees here have about 10 tons of high grade ore ready for shipment.

Ruby Mining Company, Limited, Eureka.—Eleven miners were lately discharged at the Bullwhacker mine. The lessees have made several thousand dollars during the past four or five months, having found in a deposit of low grade ore a bunch of unusually high grade material for that mine, but there is now very little ore in sight. It is believed that the company will hereafter work this mine on their own account or set it on tribute. A considerable outlay will be required for repairing the incline shaft and for necessary exploration.

Storey County—Comstock Lode.

The following mining companies report having cash on hand May 2d, 1892: Andes, \$22,517.12; Alta, \$27,641.35; Belcher, \$5,831.65; Best & Belcher, \$19,260.25; Crown Point, \$28,290; Con. Imperial, \$530.15; Consolidated California & Virginia, \$5,400.18 in cash and unsold bullion of the assay value of \$34,748.17, with further shipments to arrive. The monthly expenses of the mine have yet to be paid. Caledonia, \$8,306.33; Exchequer, \$14,034.17; Gould & Curry, \$5,385.57; Hale & Norcross, \$21,928.68 in cash and \$6,673.50 to be collected on the pending assessment; Julia Con., \$7,303.70; Lady Washington, \$7,295.31; Mexican, \$6,228.94; Savage, \$14,434.72; Silver Hill, \$432.72; Sierra Nevada, \$13,981.44; Utah Con., \$6,825.25. The following mining companies report having an indebtedness May 2d, 1892: Bullion, \$2,065.30; Challenge Consolidated, \$3,290.44; Chollar, \$13,262.35; Confidence, \$11,787.11, with a balance of \$14,431.35 to be collected on the pending assessment; Occidental Consolidated, \$6,381.48; Ophir, \$12,005.02; Over-

man, \$10,986.07; Potosi, \$20,295.65; Segregated Belcher, \$4,595.24.

Belcher Mining Company.—The 1,300 level 7th floor west cross-cut having reached the foot-wall, a raise was started from the mouth of the north drift, and is now up vertically 27 ft. It has passed through quartz assaying from \$5 to \$20 per ton, and the top is in the same character of material.

Comstock Mill and Mining Company.—The 60-stamp Eureka quartz mill on the Carson River, belonging to this company, which was employed in the crushing of Consolidated Virginia ore, has been totally destroyed by fire. The wooden structure and everything combustible about the mill was reduced to ashes. Superintendent Lyman, of the California & Virginia Mining Company, who visited the scene of the fire shortly after the occurrence, said that when he arrived at the spot there was a dense cloud of smoke and vapor from vaporized quicksilver hanging over the mill site which obscured the view of the ruins. He stated that the loss was not less than \$100,000. The mill cost when constructed over \$200,000, and although used for some while, could not be replaced for the sum named. The mill was crushing daily 200 tons of Con. Virginia ore. The destruction of it will suspend this shipment of ore by the mine for a couple of days until the Morgan mill is got in readiness to receive it. It is not likely that the owners of the mill will rebuild it, but a tailings mill will in all likelihood be erected.

Consolidated California & Virginia Mining Company.—1,800 level: Along the south end of the drift running south from the cross-cut run east from the winze No. 1 sunk from the 1,750 level we have continued to extract out ore from the sill floor upward of milling value. There has been extracted from all parts of the mine during the week 1,284 1660-2000 tons of ore, which were shipped to the Eureka mill. The average assay value of the ore worked at the Eureka mill during the week, 1,525 tons, was \$10.10.

Occidental Mining Company.—The west cross-cut from the south drift, 400 level, is in 84 ft., still showing stringers of pay ore. Have started to drift north on one of the seams showing in same cross-cut. Have extracted about 40 tons of good ore from the drift started north from bottom of winze on 450 level. The drift started south from west cross-cut on 550 level is in 14 ft., showing bunches of pay ore. West cross-cut No. 2 on 750 level is in 25 ft.; face in low grade quartz. The main north drift, 750 level, is in 388 ft.; face in quartz and porphyry.

Ophir Mining Company.—There have been raised to the surface during the week 26 tons of ore, the average assay value of which is \$22.50 per ton.

Potosi Mining Company.—The winze is down 215 ft. below the 1,500 level; bottom in quartz which gives low assays. Potosi and Bullion west cross-cut on south line, 1,500 level, is out 162 ft.; face in porphyry. Extracted and sent to mill in the past week 372 600-2000 tons of ore from the 930, 1,100, 1,150 and 1,200 levels. Milled during the week 405 tons; on hand at mill, 100 500-2000 tons; average battery assay, \$21.82.

Savage Mining Company.—During the week we have hoisted 592 cars of ore from the 500, 950, 1,100 and 1,400 levels, and have shipped to the Nevada mill 525 tons; milled 525 tons, with an average battery assay of \$19. Bullion yield for the week, \$7,000.

(From our Special Correspondent.)

The following is the weekly statement of ore extracted from Comstock mines, milled, the car and battery assay values of the ore, and the bullion product for the week ending April 31st, all of which information is required, under the law, to be furnished weekly to the stockholders, but which law is only being partially complied with:

Mine.	Tons extracted.	Par Sample assay val.	Tons milled.	Battery assay value.	Bullion product.	Bullion shipped.	Bullion retained.
Con., Cal. & Va.	1,284	.....	1,525	\$20.10	.....	\$29,508.16	..
Hale & Norcross	40	\$19.45	433	14.71	.....	.....	..
Occidental	26	.....	.....	22.50	.....	.....	..
Ophir	272	24.41	301	20.69	.....	5,715.49	..
Overman	372	.....	405	21.82	.....	.....	..
Potosi	1592	.....	525	19.00	\$7,000	.....	..
Savage	.....	.....	196	.....	.....	.....	..
Yellow Jacket	.....	.....	.....	.....	.....	.....	..

* Total for month to date, \$32,701.48. † Cars.

The dull monotony of mine manipulation has been broken this week by the burning of the Eureka mill, on the Carson River. It has been completely destroyed, but the bullion production of the Consolidated California & Virginia mine will suffer no diminution, as the Mexican mill is idle, and neither the Occidental, Brunswick or Nevada mills are running to their full capacity.

Consolidated Imperial Mining Company.—The annual meeting of stockholders was held this week, there being 282,590 shares represented, when the following officers and directors were elected: A. K. P. Harmon, president; J. Newlands, vice-president, and J. P. Martin, M. Schmidt and J. H. Dobinson, directors. O. L. McCoy was reappointed secretary, his statement showing a cash credit of \$530.15.

Each week the report from this mine states that fair ore is being taken from the old fillings and small streaks are being found in the upper levels, which is being saved and shipped to the Brunswick mill. For months this has been the parrot-like statement each week, and it seems as if the time was now ripe for a more explicit statement of the tonnage shipment and bullion product.

Hale & Norcross Silver Mining Company.—Last week the bullion product of the 100 tons of ore sent for a test run to the Occidental mill was given, and it was stated that the concentrates were shipped to the Selby Smelting Works. Full particulars of the latter are now to hand. There were 4,500 lbs. of concentrates saved from the 100 tons of ore worked, and their value was \$353 per ton, making a total value for the 4,500 lbs. of \$794. As the 100 tons of ore worked was \$15 rock, the above figures shed a curious light upon the manipulations of the Levy "gang" of thieves when they were in control. It was proven during the celebrated Hale & Norcross trial that 90,000 tons of ore had been worked; it was stated by Levy's employees that the orders were that ore running less than \$14 per ton should not be sent up from the mine, and it was shown and allowed that very much of the ore was \$50 as per battery pulp assay. Now, taking the \$90,000 tons as only averaging \$15 per ton, similar to the 100 tons recently worked as a test, and what is the result?

Tons ore	Tons concentrates	
100 produced	2 1/2	having a value of \$794
90,000 "	2,025 "	" " " \$714,825

And thus the lie direct is given to Evan Williams et al, who asserted that the concentrates were of merely nominal value and the wholesale robbery by the mill ring by means of the little joker is practically illustrated. When the systematic stealing that went on for years, and is going on at present in connection with other of the bullion producing mines, is thus made palpably plain on a basis of ore assaying only \$15 per ton, the actual aggregate sum that must have been stolen through the long series of years when the mill ring had control is absolutely appalling. During the Hale & Norcross trial the defendants' attorneys exhausted all legal expedients for delay. Plaintiff's attorneys, as soon as the trial was concluded, filed a typewritten copy of argument, but the attorneys for the defense saw another opportunity for delay, and had their various arguments printed. This was a work of time, as the windy verbiage has made a bulky volume. This week this volume was submitted, and now at last the case in its entirety is before Judge Hebbard, who stated, upon receiving it, that he considered the case only now submitted. It will take at least three months for him to wade through the evidence, which makes five volumes of typewritten matter, and the lengthy arguments.

Justice Silver Mining Company.—The annual meeting was held on Wednesday, there being 102,595 shares represented, the following officers and directors being elected: F. Anderson, president; P. Amersaux, vice-president; and E. P. Barrett, J. O'Connell and J. Deutch, directors. R. E. Kelly was reappointed secretary and C. Lyons, superintendent. There is a cash credit to the company of \$967.84.

The west drift, 490 level, is now out 823 ft.; the face is in hard rock. The south winze from No. 2 cross-cut, 622 level, is now down 25 ft. There is a streak of ore in the bottom 18 ins. wide assaying from \$20 to \$25 per ton.

White Pine County.

(From our Special Correspondent.)

Bay State Mine, Newark.—There is a considerable quantity of ore on the dumps, but the mill will not be started up until next spring.

Robinson District, Ely.—Messrs. Eckerson and Gibson, of Denver, Colo., have examined and bonded the Joanna and Chainman gold mines. The consideration named in the bonds has not yet been made public, but if the mines are sold it will mean an outlay of a half-million dollars for buildings, machinery, electric lights, etc.

NEW MEXICO.

The expedition to explore the mineral deposits on the Carrizo Mountains, on the Navajo Reservation, started from Fort Wingate yesterday under escort of Company D, Second Cavalry, and one company of Indian soldiers.

Grant County.

Consolidated.—This mine is on the Queen lead, and the ore now being taken out is from the bottom of the shaft, down 165 ft. The best ore runs a little over \$4,000 per ton in gold and silver. At a depth of 60 ft. a cross-cut was run 18 ft. from the shaft, and the ore, it is said, from the first 7 ft. ran \$178 in gold and silver. The remaining 11 ft. ran \$63. A cross-cut has been started from the bottom of the shaft, and will be run to the foot wall of the vein. It is not expected that the entire vein will be pay ore, but on the surface there are 15 ft. of pay ore in three streaks through the vein, which is 40 ft. wide. The mine is in litigation.

Maud S. Mining Company.—The new mill of this company is well under way at Silver Creek. A pipe line is to be laid 2 1/2 miles from the head of Silver Creek to the mill to furnish water. The point from which the water is to be taken is about 400 ft. above the mill, and the pipe can be laid so that no pumping will be necessary. The mill will be completed about the 1st of July, and will have a daily capacity of 35 tons of ore.

Old Swansea.—Ore is said to have been struck in the new shaft now being sunk on the south end of this mine. Rich ore is also reported as being taken from the old workings.

Pacific Gold Mining Company.—This company is considering a plan to remove the Pacific mill from Silver City to Pinos Altos and lay a pipe line from Whiskey Creek to the mill through which to obtain a water supply. The cost of hauling ore from the mine at Pinos Altos to the mill is \$1.60 per ton. The mill has a capacity of 50 tons per day. This would much more than pay the expense of maintaining a pumping plant and pipe line.

Sierra County.

Cumberland, Kingston.—It is reported that this mine has been sold by Coffey & Fraker to James Edwards, of New York, for \$65,000 cash. The mine with 23 ft. of development is said to have produced \$18,000.

NORTH CAROLINA.

Montgomery County.

Russell Gold, Limited.—All of the real estate and plant of the Russell mine (70 stamps) has been sold by the Sheriff under executions, for debts contracted for supplies and work, and was bought in by the creditors for the amount of the claims, which amounted to about \$10,000.

Stanley County.

(From an Occasional Correspondent.)

Crowell.—It is reported that a rich find has been made on Kimball Hill at this mine, and that considerable gold is being taken out by means of the Rocker and Long Tom.

Parker.—At the Parker mines hydraulicizing is being carried on by tributaries, they bearing all expenses and paying a certain part of the gold found as royalty. This company has spent thousands of dollars in washing the top soil, with poor results, and have spent scarcely anything in the way of looking for the source from which the gold came. No mine in the State up to a few years ago had a better record, taking all things into consideration, than the Parker, and the sooner this company gets to sinking the sooner they will know what they have. Numerous small veins, all gold bearing and some of them rich, run through the hill, and they nearly all dip to a central point, which probably would be reached at a depth of something like 200 ft.

OHIO.

Wayne County.

New Pittsburg Coal Company.—A remarkable run was made at the mines of this company on the 27th ult. 169 cars, equivalent to 3,350 tons, were produced that day, using the Jeffrey coal cutters.

OREGON.

Lane County.

Myrtle Creek Gold Mining Company, Eugene.—The meeting of stockholders of the Myrtle Creek Gold Mining Company was held in Eugene on the 30th ult. The directors elected for the ensuing year are: Dr. S. W. Brown, Eugene; Judge Rodney Scott, Eugene; John Neusen, Salem; G. R. Chrisman, Eugene, and J. F. Robinson, Eugene. Officers: Dr. S. W. Brown, president; G. R. Chrisman, vice-president; T. G. Hendricks, treasurer, and J. F. Robinson, secretary. Dr. S. W. Brown is also superintendent and manager. On account of the scarcity of water, very little mining was done up to March, the clean-up made at that time amounting only to \$393.40.

PENNSYLVANIA.

Coal.

It is rumored that the collieries near Luthersburg, Pa., will soon resume operations after an idleness of ten years.

The Staunton colliery, at Wilkesbarre, Pa., which has been idle for the past two years, will resume operations, it is said, giving employment to 1,500 men and boys.

The Good Spring Colliery, near Tremont, which has been idle since March, resumed operations on the 9th inst., giving employment to 300 men and boys.

It is announced that a deal was consummated on the 10th inst. by which the Spring Mountain Colliery, at Yorktown, Carbon County, operated by G. H. Myers & Co., passes into the hands of the Philadelphia & Reading Company. This colliery has a capacity of 600 tons a day, the product of which has for years been handled by the Lehigh Valley Company.

Delaware & Hudson Canal Company.—At the annual meeting of this company, held in this city on the 10th inst., the following new board of directors was elected: LeGrand B. Cannon, James Roosevelt, Robert M. Olyphant, Benjamin H. Bristow, R. Snydam Grant, W. H. Tillingham, Alfred Van Santwood, James A. Roosevelt, Alex. E. Orr, O. P. C. Billings, Samuel Spencer, Cornelius Vanderbilt and Chauncey M. Depew. The annual report submitted to the stockholders shows that the net profits for the year have been \$2,204,049, or about 7.35 per cent. on the capital stock. Of the total coal mined the company produced 3,973,286 tons; transported for others 1,529,527; gross receipts were \$19,103,202, expenses \$13,511,776; less taxes, interest and rentals, \$3,393,377; net earnings \$2,204,049. The general balance shows a surplus of \$5,822,768.

Delaware & Hudson Canal Company.—The bore hole at No. 2 colliery at Scranton is now driven to

a depth of 450 ft. Within four weeks it will be driven the required distance of 600 ft., striking the Bennet vein. It is expected that the work of hoisting coal out of the new slope will begin in about three months. The works are in charge of Robert Moyles, who has been foreman of this colliery for many years.

Pennsylvania Coal Company.—This company has a force of men at work renewing the cribbing in their No. 7 shaft at Scranton. The old timbers had rotted so badly that they were considered unsafe. The colliery is idle while the repairs are being made.

Philadelphia & Reading Coal and Iron Company.—Eagle Hill Colliery, of this company, employing 600 men and boys, has started work, after a suspension of four weeks.

Stoddart Coal Company, Gilberton.—This company has been granted a charter. The officers are: Charles E. Breckous, St. Clair, president; Guy C. Irish, secretary and treasurer; directors, J. B. Irish, Ned Irish, Daniel Duffy, Dr. T. J. Birch and Charles E. Breckous. The new company has purchased and is now operating the Stoddart colliery at Gilberton, formerly owned by Beddall Bros. & Co. W. J. McCarthy, of St. Clair, is superintendent. The breaker is located on the lands of the estate of the late P. W. Sheaffer, and is washing the banks from the Draper colliery. The breaker has a capacity of from 50 to 75 cars per day.

Oil.

The Chief of the Bureau of Statistics reports the total values of the exports of mineral oils from the United States for the month of April, 1892, and during the ten months ending April 30th, 1892, as compared with exports during the corresponding periods of the preceding year, as follows: April, 1892, \$3,856,289; April, 1891, \$3,805,008; ten months ending April 30th, 1892, \$37,546,314; ten months ending April 30th, 1891, \$43,688,654.

Oakdale Oil Company.—This company has about 2,000 acres of land at McDonald, and has drilled 50 wells, and will finish their Gormley No. 2 to-day. This is the last well it will drill in the new field, having drawn all other tools. Greenlee & Forst put off a 16-quart shot in their McMurray No. 1 well at Noblestown on the 4th inst., and it started off at 80 barrels per hour, but last night was down to 65 barrels. This is the well which was shot up to 100 barrels per hour about two weeks since, but soon dropped out of sight. The 16 wells owned by Greenlee & Forst on the Mevay lease are producing about 700 barrels per day, of which the old record-breaking No. 1 is running out 100 barrels with the aid of a pump, and No. 4 is making 150 barrels.

Stone.

Knauer's granite quarries, at Falls of French Creek, closed down on the 10th inst. because of impending difficulties about wages with the Paving Cutters' Union. The quarries employed 200 hands.

Westmoreland County.

Westmoreland Coal Company.—This company has recently bought a tract of 1,500 acres of coal land situated in Versailles and North Huntingdon townships, Westmoreland County, Pa. A large shaft will be sunk to develop the property. The coal will be transported over a lateral railroad, which is to be constructed from the Sewickley branch of the Pennsylvania Railroad at Fulton Post-office.

SOUTH DAKOTA.

Lawrence County.

Big Missouri Mining Company.—Superintendent Delano of the Big Missouri mine states, according to the "Black Hills Times," that a thorough investigation has been made of the Homestake tunnel recently discovered beneath his company's property, and he finds that the tunnel was merely a prospect tunnel and that his company's property sustained no damage whatever, and that the matter had been satisfactorily settled. The reports were too specific to have no better foundation than a "prospect tunnel." No doubt it has been "satisfactorily settled."

Cheyenne Consolidated Mining Company.—This property, situated at the confluence of Poorman and Deadwood creeks, has been lately examined for the owner, Geo. E. Marvin, of Delhi, N. Y. The property consists of a group of six claims. A large amount of work has been done, showing good prospects. One prospecting tunnel on the Hoodlebug location is now in 380 ft., which the management propose to extend 200 ft. further, a sufficient distance to demonstrate the size and value of an ore body thought to exist beyond the present face of the tunnel. On the Cheyenne location there are three tunnels, in all of which an arsenical iron ore has been discovered, assays on which give returns running from \$52 to \$171 in gold and silver.

Deadwood & Delaware Mining and Reduction Company.—Resumption of operations at the works is still indefinite, the new stacks ordered in February last, from Fraser & Chalmers, Chicago, not having yet arrived. The concentrates from the Homestake mills, produced by the Perfection concentrator, are being regularly delivered in two and three car-load lots at a time. Dr. Carpenter has made arrangements with the Aurora, Ill., smelter for the treatment of the matte (about 200 tons) now on his hands.

Golden Reward Mining Company.—At the annual meeting of the stockholders of this company, held recently, the former board of directors and officers were unanimously re-elected. The board of directors consist of the following: Samuel Allerton, Harris

Franklin, C. W. Carpenter, Ben Baer, S. V. Noble, Robert Graham and J. C. Spencer, who immediately went into meeting and elected Harris Franklin president; S. V. Noble, vice-president; C. W. Carpenter, secretary, and Ben Baer, treasurer. The clean-up at the chlorination works of the company for the last 15 days of April amounted to \$17,000, and was shipped east on the 2d inst. The usual number of men are employed in the mines of the company. The works treat on an average 80 tons of ore per day.

Mark Twain.—This property, which had been bonded to Robert H. Thorburn, superintendent of the Welcome chlorination plant of Rapid City, has passed into that gentleman's hands. The purchase price could not be learned. The property consists of one full claim and a fraction.

TENNESSEE.

Cumberland County.

Phillipsburg Coal Company, Crossville.—This company is preparing to erect coke ovens at its mines near Alhany.

Lawrence County.

Smith & Sharp Mining Company, Iron City.—This company will erect an ore-washer at their plant.

Morgan County.

Advices from Sunbright, near the Kentucky boundary, report the discovery of petroleum fields. Companies from Pennsylvania and other parts of the country are said to be sinking wells.

UTAH.

Millard County.

Dickert & Meyers Sulphur Mining Company, Cove Creek.—This company is now enlarging its plant and is erecting subliming chambers preparatory to an increased and steady output of refined sulphur. Owing to high freight charges and the distance to the railway, crude sulphur for acid manufacture cannot be shipped.

Washington County.

Woolley, Lund & Judd Copper Company, St. George.—It is said that the smelter, erected last summer and ran for a while, will be started up again in a short time. Two hundred tons of ore are at the smelter and about as much at the mine. Twelve miners are employed. The smelter is 18 miles distant from the mine, and a large number of teams are engaged in hauling ore from the mine to the smelter. The company smelt ore which runs 25 per cent. copper, while they ship their first-class ore. The first-class ore carries 50 per cent.

WASHINGTON.

Kittitas County.

Northern Pacific Coal Company.—An explosion occurred in the slope of mine No. 2 of this company May 10th at Roslyn. The exact nature of the explosion or circumstances that led to it will probably never be known, since it is believed that every miner who was at work in the slope at the time has perished. It is not definitely known how many men were in the vicinity of the disaster, but it is believed that between 45 and 50 were on the three levels that were affected by the explosion. The Roslyn mine is one of the largest in the State, supplying the western divisions of the Northern Pacific and Union Pacific railroads with coal, and has a capacity of 20,000 tons a day. The explosion occurred just as the two gangs were shifting at 1:30 o'clock.

At 11:30 p. m. May 12th the remaining bodies of miners were taken from the slope, making a total of 43 men who perished in the terrible explosion on Tuesday, says a dispatch dated May 13th. About 250 children have been left fatherless by the disaster, and in most instances they are young and unable to help themselves.

WEST VIRGINIA.

The output of coal and coke from the Flat Top field during the year 1891 is given in the following table by the "American Manufacturer." The number of ovens in operation, the number in process of construction, and those under contemplation are also given. As the report closes Dec. 31st, many of these ovens are now completed:

Collieries.	Coal.	Coke.	No. of ovens in operation.	No. of ovens under construction.	No. of ovens in contemplation.
S. W. Va. Imp. Co.,	556,585	85,902	444	156	
Mill Creek C. & C. Co.,	154,091	28,751	150		
Caswell Creek C. & C. Co.,	206,178	15,244	146		50
Booth-Bowen C. & C. Co.,	154,478	10,853	91		59
Buckeye C. & C. Co.,	138,406	10,036	100		46
Goodwill C. & C. Co.,	78,756	6,139	50		
Louisville C. & C. Co.,	81,516	8,120	75		25
Coaldale C. & C. Co.,	92,144	9,240	53		50
Falkhorn C. & C. Co.,	51,705	13,008	100		64
Shamokin C. & C. Co.,	80,390	13,075	100		100
Norfolk C. & C. Co.,	36,358	17,779	172		
Lick Branch Colliery,	76,555	16,412	120		50
Crozer C. & C. Co.,	171,620	5,626	250		
Turkey Gap C. & C. Co.,	98,107	31,058	150	50	50
Houston C. & C. Co.,	80,646	11,325	100	50	50
Powhatan C. & C. Co.,	85,823	13,730	125	25	130
Lynchburg C. & C. Co.,	25,477	4,817	100		
Upland C. & C. Co.,	9,885			100	
Algoma C. & C. Co.,	618			50	50
Total	2,259,411	301,015	2,326	581	574

Gilmer County.

A report on the new Glenville coal field in West Virginia has been made by Andrew Roy, formerly mine inspector of Ohio: "The field is situated mainly in Gilmer County, on both sides of the Little Kanawha River, between Glenville and Burnsville. The main seam of coal of the district, which is the equivalent of the Pittsburg bed, is 6 to 7½ ft. thick, in a homogeneous mass. The coal belongs to the coking variety, burns with a long flame and holds fire well. It is estimated that there are 100 square miles of the Pittsburg vein in this field, three-fourths of which hold the coal above water level. Mr. Roy says of the coke made from the Glenville coal: "I have examined the coke made from this coal. It is firm, and having a metallic luster, it is low in ash and not unreasonably high in sulphur. The following is an analysis: Fixed carbon, 89.94; ash, 9.08; sulphur, .96. It will be seen that there is less than 1 per cent. of sulphur in the coke, while the amount of ash is not excessive. The result, however, has I judge, been obtained from coal which has been crushed and washed, as the coal in the hill appears to contain considerable sulphur in the form of pyrites of iron, which can be readily freed by crushing and washing before being put in the ovens. To produce a coke fitted for the smelting of iron the coal will, in my opinion, require to be crushed and washed, which with the appliances now in use in many mines in Pennsylvania can be done at a cost not exceeding 4 cts. per ton. An analysis of the raw coal gives the following result: Moisture, 1.08; volatile combust, 52.12; fixed carbon, 41.02; sulphur, 1.55; ash, 4.22. The amount of volatile matter in coke is extraordinary, and when subjected to the test the coal will undoubtedly make one of the best gas coals in America. In none of the coals used in the manufacture of gas in Ohio does the volatile matter reach 40 per cent., and the same is true of the best gas coals of Pennsylvania, the Westmoreland gas coal for example, which contains only 37 per cent. of volatile matter."

WISCONSIN.

Gogebic Range.

Aurora Iron Mining Company.—This company has shipped from Ashland during the past season up to and including May 4th, 4,198 tons of ore.

Tilden.—During this season and up to the 4th inst. there had been shipped from Ashland the total shipments of iron ore from this mine aggregate 1,339 tons.

WYOMING.

Fremont County.

Sweetwater Gold Mining Company.—This company was organized and incorporated Oct. 8th, 1889, with a capital stock of \$500,000, divided into 50,000 shares of \$10 per share, fully paid and non-assessable. This company owns 660 acres of gold placer lands on the Sweetwater River, embraced and covered by five gold placer mining claims known and recorded as the Royal, Manhattan, Emerald and Sweetwater Nos. 1 and 2. The property extends along the banks of the Sweetwater River for seven miles, comprising both the bed of the river and adjacent banks and waters. This territory is said to have sufficient fall and ample dumping ground, with water amounting to 15,000 miner's inches. The gravel itself is said to be fairly rich. It is 120 miles from Casper, the nearest point on the Chicago & Northwestern Railroad, but the surveys, it is said, pass very close to the property, and it is possible that the completion of the road will render transportation easy. The directors have decided to place 6,000 shares of the stock at 25 cents a share on the market for a working capital.

FOREIGN MINING NEWS.

MEXICO.

The Department of Fomento has at last presented to Congress its project of a new mining law which is a most radical change from that at present in existence. According to the "Two Republics," the mineral substances for whose exploitation a concession is in each case necessary are: Gold, platinum, silver, quicksilver, iron, except that in water or in ochres that are worked in the same manner as coloring materials; lead, copper, tin, antimony, nickel, cobalt; manganese, hismuth, arsenic, precious stones, rock salt and sulphur. The owner of the surface can work freely, without the necessity of a special concession in any case, the following mineral substances: Combustible minerals, mineral oils and waters, the rocks in general of commercial value for building and ornamental uses, valuable clays and earths and sand of all classes, mineral substances except those noted above. Mining property acquired according to the specifications of this law will be irrevocably and perpetually, upon payment of the federal fees, the property of the exploiter. Waters proceeding from the subterranean works of mines are the property of the owners of said mines, who must observe the specifications of the common laws in directing the course of these waters. The works required for the exploitation of the mines and placers are of public utility, and if there is lack of agreement there can be a forcible condemnation of the lands necessary for this purpose. All inhabitants of the republic have the free right to explore the public lands for minerals, but no excavation shall exceed ten meters in width, length or depth. For this much space no license will be required, but it is obligatory to notify the proper authorities. In lands owned by private parties it is not lawful to prospect for mines without

permission of the owner, or his representative, but in case this permission is not obtained the prosecutor can apply to the proper authorities, who will estimate the damage caused by the explorer in the presence of the owner of the lands, or his representatives, and require a bond to be given by the prosecutor. Within private buildings and grounds belonging thereto prospecting can only be made with permission of the owner. It will not be lawful to explore for minerals within the limits of any city or town, nor within public edifices or works, nor within fortifications and adjacent grounds. In all such cases the regulations fix the minimum distance to which these explorations can be carried. A mining claim, or "pertencia," shall be a square of 100 meters on each side and of indefinite depth. The mining claims will always be given to the first persons soliciting them and will embrace in every case the number of "pertencias" (whenever there is sufficient free territory) that may be asked for by the interested party, who should specify in the clearest terms and in accordance with the laws the location of the "pertencias" embraced in the claim. The concessionaire having obtained title to property, possession can be taken at once and without other formality. The societies or companies formed for the exploitation of mines shall be formed according to the commercial code and civil code of the federal district, except that part which is not admissible on mining subjects. The contract which has heretofore been known as "Avio" will in the future take the form of a stock company or of a mortgage. The new tax imposed on all mining concessions, excepting those expressly exempt by contract, will be a federal property tax and will be established by special law. In respect to taxes on mines the specifications of the law of June 6, 1887, will be observed. The contracts for the exploration and exploitation of mining zones concluded with the Department of Public Works, Colonization and Industry which may be still in force when this law takes effect will remain in vigor for the whole of the stipulated term if the concessionaires so desire. However, these concessionaires may upon the promulgation of this law accept its provisions within the term of one year by making the necessary declaration to the department; and they will be relieved from the obligations imposed by their contracts. This law will go into force the 1st day of July, 1892, from which date the Mining Code of Nov. 22d, 1884, and all the circulars and rulings relative thereto become abolished.

Durango.

San Luis.—A 30-stamp mill is being erected at this mine at Guanacevi, Durango, Mexico, for the owners, J. B. Haggin and others. A wire-rope tramway over a mile long will convey the ore from mine to mill. White-Howell furnaces are to be used in connection with the mill. This is an old mine formerly owned by English people. The ore carries silver and gold, and some of it is very rich, running as high as \$1,000 per ton. There is at this time, it is estimated, enough ore out to keep the mill running two years, and it will average from \$50 to \$70 per ton. In order to take this new machinery to the mine a road costing some \$30,000 had to be built. From the railroad station at Jimenez it is about three-days' trip by team to the mine.

Salvador.

Jesus Maria y Todos Santos.—These mines, it is reported, are about to be sold to American capitalists dependent upon the report of examining engineers. The price is said to be \$190,000, \$40,000 of which is to be in gold. The mines are situated in the San Jose de Gracia district.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, May 13.

Heavy Chemicals.—There is no change to report in the condition of this market. Without any exception the position of the various heavy chemicals remains the same. Carbonated soda ash was quiet and featureless. Alkali was in slightly better demand during the week, and some sales for future delivery were made at 1.47@1.60c. Caustic soda continues as last reported. Owing to the appointment of agents in the United States the trade in this chemical has become of a quiet, routine character like that of bleaching powder, which has remained unchanged for many months past. Sal soda has been in better demand, especially the domestic article, at 90@95c. Prices remain unchanged in other chemicals 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%, 1.62½@1.75c.; 58%, 1.50@1.55c. Alkali, 48%, 1.60@1.65c.; 58%, 1.47½@1.57½c. Sal soda, English, 1.10@1.15c. Bleaching powder, 2.15@2.20c. on the spot, according to quantity.

Acids.—Manufacturers continue to report a steady market, with a good demand for spot and for future delivery. Some large producers claim to be sold up to their full capacity and even to have been obliged to buy from other makers in order to supply their customers. Naturally these manufacturers are talking of higher prices, but on the whole we do not think that there has been any change since our last report. There is a better feeling and it is easier to obtain orders at the prices quoted than it was a month or two ago. We quote per 100 lbs. in New York and vicinity, in lots of 50 carboys or more: Acetic, \$1.60@\$.2, according to quality; alum, lump or ground, \$1.55@\$.1.80; muriatic, 13°, \$1.20; 1.12½@\$.1.25; 22°, \$1.25; nitric, 40°, \$4; 42°, \$4.50@\$.4.75; sulphuric, 90c. @ \$1.10; mixed acids, according to mixture; oxalic,

\$7.25@7.75. Blue vitriol is quoted all the way from \$3.25@3.50. Glycerine for nitro-glycerine, 11 1/2@12 1/2c., according to quality and quantity.

Brimstone.—This market is again higher and continues very quiet. There are no goods on the spot and quotations to arrive, May and June, are \$22.50 for best unmixed seconds and \$21.75 for best unmixed thirds. We understand that for arrivals nearby sales have been made at \$23 to \$23.50 for seconds.

Fertilizers.—The present month has seen only a moderate business in fertilizing chemicals. The main features of the market are unchanged from last week and prices have been fairly well maintained. Prices do not show much change from last week. We quote: Sulphate of ammonia, \$2.90 for bone goods and \$2.90@2.95 for gas liquor. Dried blood, \$1.95 @ \$2 per unit for high grade and \$1.85@1.90 for low grade. Acidulated fish scrap, \$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 for lots of from 10 to 50 tons ex vessel New York: 48-53%, \$1.13 1/2@1.23 1/2; 90-95%, \$2.13@2.23 1/2.

Kainit.—There is nothing of interest to report of this chemical. Prices remain \$8.75 for invoice weight and \$9 for actual weight, New York and Philadelphia.

Muriate of Potash.—Arrivals during the week aggregated 775 tons, of which about 100 tons were sold at current prices and the rest went into consumption. Things are very quiet in this market just now and nothing of special interest can be reported.

Nitrate of Soda.—Owing to large arrivals lately the spot market has been rather unsatisfactory to dealers, as some of the stocks have had to go into store. A press dispatch from Valparaiso, Chili, on the 11th inst., announced that the nitrate "combination" in London had ordered its managers at Iquique to limit the output to 17,000 quintals. This has been confirmed by subsequent advices from England. Quotations are 1 65c. for spot and for nearby arrivals. For shipments prices are a little higher, 1 67 1/2c. being asked.

Liverpool. May 4.

(Special Correspondence of Joseph P. Brunner & Co.)

There is no improvement to report in the position of heavy chemicals, the demand all round being of an unsatisfactory nature.

Although the colliers' strike in the Durham district is not yet settled, the Tyne chemical manufacturers are able to increase their output, as they are getting their supplies of fuel from other districts.

Soda Ash.—The position remains unchanged. The "Union" declining to quote for earlier delivery than July, for which the minimum quotations for the commoner qualities are as follows:

Caustic ash, 48%, 45 6s. 3d. per ton, 57 to 58%, 46 7s. 6d. per ton; carb. ash, 48%, 45 9s. 9d. per ton; 58%, 46 12s. 9d. per ton; ammonia ash, 58%, 46 7s. 6d. per ton, all net cash.

Prime brands are quoted at a considerable premium on above figures.

Soda Crystals are quiet, but a moderate business passing at £3 7s. 6d. @ £3 10s. per ton, less 5%.

Caustic soda is almost unsalable. The "Union" is prepared to make concessions for special markets, although the nominal spot quotations for most quarters remain unchanged as follows: 60% 49 7s. 6d. per ton, 70% 41 10s. per ton, 74% 41 10s. per ton, 76% 41 7s. 6d. to 41 15s. per ton, all net cash. For parcels under 10 tons 5s. per ton extra is charged. Shipment to the United States "harred" by the Alkali Company.

Bleaching powder is only moving slowly, but quotations are maintained at £7 15s. to £8 per ton net cash for hardwood for all quarters except to United States and Canada.

Chlorate of Potash.—The improved demand reported last week has died away again, and there is little doing. For prompt delivery resale parcels are offered at 6 1/2d. per lb., while the syndicate quote 7d. for May and June. For July, December the syndicate quote 6 1/2d. per lb., while resellers would probably accept 6 1/4d., but at the same time there is little disposition to operate on the part of buyers for forward delivery.

Bicarb Soda in fair request at £6 15s. @ £7 per ton, less 2 1/2% for 1 cwt. kegs, with usual allowances for larger packages.

Sulphate of Ammonia is still quiet, and sellers are disposed to meet buyers. The nearest spot values are about £10 5s. @ £10 6s. 3d. per ton for good grey 24%, and £10 7s. 6d. @ £10 10s. for 25% both in double bags, less 2 1/2% f. o. b. here.

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 536 and 538.]

NEW YORK, Friday Evening, May 13.

It is the old story of dullness in the mining stock market, unrelieved by anything of interest. Trading during the week has been light and devoid of any features whatsoever.

With but few exceptions the trading in Comstock stocks has been very light. There was a sale of 50 shares Chollar at \$1, and 100 shares Mexican at \$2.60. Of Comstock tunnel stock 6,800 shares were sold at 13c. @ 17c.; a sale of a 1,000 scrip at 20c. was made

—the first in a long time. Consolidated California & Virginia advanced from \$3.90 to \$4.70, with sales of 250 shares. Of Ophir 200 shares were sold at \$2.30 @ \$3, and Savage 450 shares at \$1.50. No other Comstocks were dealt in.

Of the Tuscaroras there was a sale of 200 shares of Navajo at 15c. Among the California stocks Belmont is reported in the official lists to have dealt in to the extent of 6,000 shares at 33@35c. Brunswick Consolidated shows sales of 32,000 shares at 12@16c. Mr. H. R. Lounsbury, treasurer of this company, informs us that all but 3,000 shares of the stock have paid the assessment. The last letter from the superintendent of the mine states that the shaft has been sunk to the 600-foot level; and that the ore at the bottom of the shaft is good milling ore. A station has been built at the 600 ft. level, and drifting has commenced.

Of Bodie Consolidated there were sales of 300 shares at 35c., and 800 shares of Bulwer at 42@43c. There was a single transaction of 100 shares of Standard Consolidated at \$1.45.

Of the Colorado stocks we note 200 shares of Chrysolite at 24c., and 500 shares of Little Chief at 26@27c. Enterprise had a sale in New York Stock Exchange of 100 shares at \$5. Leadville Consolidated appeared in some request; the price declined from 20c. to 16c. with total sales of 1,900 shares.

Of the Black Hills stocks there were sales of 400 shares of Caledonia at 85@86c. At the office of the company it was said that there was no news of special interest from the mine. Deadwood Consolidated sales of 200 shares at \$2 15c. @ \$2.25.

Horn Silver was quiet this week, only 100 shares being sold at \$3.30. The death of the company's bookkeeper at the mine, and the time which necessarily elapsed before a competent successor could be secured have been the causes of the delay in issuing the quarterly report, which is now due. We learn from the secretary of the company that the report will be in the possession of the stockholders within a few days. Of Alice 400 shares were sold at 18@25c. Phoenix of Arizona continues quiet. During the week 500 shares were sold at 42@45c.

Boston. May 12.

(From our Special Correspondent.)

There has been rather a better feeling in copper stocks the past week, and prices generally are a shade higher. The dealings, however, are confined largely to the Montana stocks, which are the favorites with operators, as offering a better margin for profits. The Lake Superior stocks are bought mostly for investment at present, and confined to the dividend paying mines. We look, however, for a better market a little later on, especially if ingot copper should continue firm at present prices.

Boston & Montana sold up to 44 1/2%, an advance of 1 1/2% over last week's closing, but the fraction was lost in to-day's operations, the market closing at 43.

Butte & Boston touched \$12 1/4 at one time during the week, but it was weak to-day, and sold off to \$11 1/2.

Calumet & Hecla holds firm at \$275, with an occasional sale at \$276.

Tamarack sold up to \$170, an advance of \$6 for the week. There is not much of it offered and an order to buy a round lot easily causes an advance.

Oseola sold at 32 1/2% ex dividend, but the stock coming out freely it dropped to 31 1/2% and closed at 32.

Centennial has been rather quiet with sales at 11 1/2% to 11 1/4%, about the same as last week.

Franklin and Kearsarge have been neglected the past week with only small sales at 14 1/4% and 13 1/2%, respectively.

Atlantic sold at 11 @ 11 1/2%, and Allouez at 75c. Santa Fe improved to 30c. The reports regarding the caving in of the mine are very meagre and there is nothing definite as to the amount of damage.

We have been unable to hear of any sales of Quincy the past week and the stock has not yet been reinstated on the Exchange.

In other stocks Napa Quicksilver was the only one quoted. There is a good demand for this stock but very little of it offered, sales this week were at \$6 1/2 @ \$6 1/4.

3 P. M.—There were no change in the market after the noon hour, stocks closed fairly steady.

Chicago. May 11.

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

I enclose herewith quotations of stocks of the several legitimate mining companies of the Mesaba range, also quotations of Gogebie, Marquette and Vermillion Range stocks. In several cases there has been no recent sales, and buyers and sellers are wide apart, but the prices quoted are the selling and holding values, as nearly as can be given.

Mesaba Range Mines.—Biwahkie, \$33 per share; Buckeye, \$30; Cincinnati, \$5; Champion, \$10; Cosmopolitan, \$20; Columbus, \$7.50; Clark, \$10; Great Northern, \$11.50; Gt. Northern I. & S. Co., \$1.35; Keystone, \$10.50; Kanawha, \$15; Lieking, \$7.50; Lincoln, \$10; Lake Superior, \$4.50; Little Mesaba, \$11.50; Mallan, \$1.35; Mountain Iron, \$5; Mesaba Mt., \$18; Minneapolis, \$10; Shaw, \$9; Washington, \$10.

Gogebie Range.—Ashland, \$50 per share; Aurora, \$9; Anvil, \$3.75; Brotherton, \$2.60; Germania, \$7.50; Gogebie Iron Syndicate, 20c.; Iron Belt, \$1.75; Metropolitan, \$73; Montreal, \$8.50; Minnewawa, 75c.; Pence, \$1; Section "33," \$9.

Marquette Range.—Champion, \$60 per share; Lake Superior, \$45; Jackson, \$100; Pitts, & Lake Ange, \$160; Republic, \$18.

Vermillion Range.—Chandler, \$46 per share; Minnesota Iron, \$30.

San Francisco. May 7.

(From our Special Correspondent.)

During the past week the trend of prices of mining stocks has been downward, but trading at the reduced rates has increased rather than fallen off. Several of the most prominent of the Pine street brokerage firms have, within the last few days, sent out notices to all their customers to settle up their accounts. The ostensible reason for this course of action is the retirement from business of the principal, etc., but as the effect on the "street" is rather curious, to say the least, the reason given is received with some latitude. Brokers are not overburdened with stock; indeed their holdings are very light, and as the public are not saddled with any large amount, the question arises, "Who has been gathering in the stocks at the reduced values?" Certain it is that, with the pressure brought to bear by the brokers who are calling in their accounts, prices will decline still further and the stocks will gravitate toward the same unknown hands that have been seizing, all they could get within the last few weeks. Homer King, one of the retiring brokers, has for years been known as one of the leading "inside brokers, and has been supposed to be in the confidence of the Bonanza firm. A. W. Foster, also has been equally prominent, and it must be confessed that, while the excuses offered may be correct, the action of these brokers is bound to react to the detriment of the market, and offset the advantage given to the "street" by the decision of the Supreme Court in declaring illegal margin trading; of course someone will benefit by a further depression that may occur, but it is always safe to assert, when any manipulative tactics are being practiced, that the "someone" will not be the gullible public.

On early call to day it seemed as if the North End Comstocks were about to have a spurt upward. Consolidated California & Virginia opened at \$4, and at that figure sold steady throughout the session. Later, however, a break took place, and during the afternoon the price ran down to \$3.85. Ophir sold down to \$2.25; Mexican, \$1.50; Sierra Nevada, \$1.30, and Union Consolidated, \$1.25.

As the day advanced, the middle group of stocks strengthened a trifle, Best & Belcher selling for \$2.25; Chollar, for 90c.; Gould & Curry, \$1.30; Hall & Norcross, \$1.35, and Savage, \$1.30.

Of the Gold Hill and South End Comstocks in demand the sales were fairly large but with little variation in price. Alpha sold for 15c.; Belcher for \$1.20, Bullion for \$1.25, Challenge Consolidated for 60c., Consolidated Imperial for 5c., Consolidated New York for 35c., Crown Point for \$1.30, Exchequer for 35c. and Yellow Jacket for 85c.

Of the outside stocks the Tuscarora group have been the most active, although even they have not sold with any particular freedom. Commonwealth sold for 20c., Nevada Queen for \$1.05 and North Commonwealth for 30c.

In the Bodie group Bulwer Consolidated sold for 40c. and Mono for 70c., with light sales.

SAN FRANCISCO, May 13th.—(By Telegraph.)

The opening quotations to-day are as follows: Best & Belcher, \$2.50; Bodie, 35c.; Belle Isle, 15c.; Bulwer, 40c.; Chollar, \$1.35; Consolidated California & Virginia, \$4.35; Eureka Consolidated, \$2; Gould & Curry, \$1.35; Hale & Norcross, \$1.60; Mexican, \$2.15; Mono, 70c.; North Belle Isle, 15c.; Navajo, 10c.; Ophir, \$3.20; Savage, \$1.50; Sierra Nevada, \$1.30; Union Consolidated, \$5.50; Yellow Jacket, 80c.

MEETINGS.

A regular meeting of the stockholders of the Anacoda Mining Company will be held at the office of the company, Rooms 1 and 3 Chambers Block, Butte City, Mont., on Tuesday, May 17th, 1892, at 2:30 p. m.

Adams Hill Consolidated Mining Company, at the office of the company, No. 320 Pine street, San Francisco, Cal., May 16th, at 1 p. m.

Himalaya Mining Company, at the office of the company, Salt Lake City, Utah, May 28th, at 7 p. m.

DIVIDENDS.

Deadwood Terra Mining Company, Dividend No. 41, of five cents per share, \$10,000, payable May 30th, at the office of Messrs. Lounsbury & Co., 15 Broad street, New York City. Transfer books close May 14th and reopen May 31st.

ASSESSMENTS.

Table with 6 columns: COMPANY, No., When levied, D'n'g't in office, Day of sale, Amt. per share. Lists various mining companies and their assessment details.

PIPE LINE CERTIFICATES.

(CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.)

	Opening.	Highest.	Lowest.	Closing.	Sales.
May 7.....	57	57	57	57	7,000
9.....	57	57 1/2	57	57 1/2	7,000
10.....	57	57 3/4	57	57 3/4	7,000
11.....	57 1/2	57 3/4	57 1/2	57 3/4	7,000
12.....	57 3/4	57 3/4	57 1/2	57 3/4	7,000
13.....	57	57	57	57	5,000

Total sales in barrels 47,000
Total sales at New York Stock Exchange.... 5,000 bbls.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 13th.
PRODUCTION OF BITUMINOUS COAL for week ending May 7th, and year from January 1st.

EASTERN AND NORTHERN SHIPMENTS.

	1892.		1891.
	Week.	Year.	Year.
Phila. & Erie R. R.....	1,342	32,194	42,363
Cumberland, Md.....	72,404	1,213,682	1,451,835
Barclay, Pa.....	3,858	71,463	62,391
Broad Top, Pa.....	9,858	205,547	207,652
Clearfield, Pa.....	77,495	1,326,682	1,572,199
Allegheny, Pa.....	26,602	417,134	502,182
Beech Creek, Pa.....	40,277	335,219	814,478
Poconahontas Flat Top.....	36,761	852,777	862,451
Kanawha, W. Va.....	57,055	865,347	813,181
Total.....	325,632	5,920,045	6,323,734

WESTERN SHIPMENTS.

	1892.		1891.
	Week.	Year.	Year.
Pittsburg, Pa.....	24,816	463,118	396,887
Westmoreland, Pa.....	34,304	545,683	704,048
Monongahela, Pa.....	13,844	183,788	198,826
Total.....	72,964	1,192,589	1,299,761

Grand total 398,596 7,112,634 7,563,495

PRODUCTION OF COKE on line of Pennsylvania R. R. for the year ending May 7th, 1892, and year from January 1st, in tons of 2,000 lbs.: Week, 98,118 tons; year, 2,063,497 tons; to corresponding date in 1891, 1,020,886 tons.

Anthracite.

The hard coal trade is in a satisfactory condition just now. Prices have been well maintained, and new business in some cases has exceeded anticipation. From some of the heaviest producers in the Reading combination, however, we learn that since the new prices went into effect, and the Reading Company's action in canceling all orders unfilled on the 10th inst., stocks have been accumulating owing to the quiet demand, but before long trade will undoubtedly become brisker. The main features of the market show little or no change over last week.

A reduction in tolls on coke and anthracite coal has been agreed upon by the Pennsylvania, Philadelphia & Reading and the Baltimore & Ohio Railroad Companies, and went into effect on the 11th inst. The reduction was 10%, and averages about 24 cents per ton on coke to points in Eastern Pennsylvania and about 10 cents per ton on anthracite coal. This reduction applies only to iron furnaces, rolling mills and kindred industries, and was prompted by a petition made to the railroad companies by the officers of these establishments, who stated that in view of the depressed condition of the iron market such a reduction would help them to withstand the competition of the Southern iron producers. This reduction, of course, has had no effect on the market here.

The actions of John C. Haddock and of Haddock, Shonk & Co., against the Delaware, Lackawanna & Western Railroad, which have been pending for about two years, have again come up before the Interstate Commerce Commission. As our readers will remember the actions seek to compel defendant to reduce tolls on anthracite coal both east and west bound. It is understood that since the organization of the Reading combination and the absorption of the output of many independent operators by different coal-carrying railroads, the Delaware, Lackawanna & Western has made overtures to the plaintiffs for a settlement. It is possible that such a settlement may be made. The matter in all probability will be decided shortly.

The general sales agents met in this city on the 12th inst. to consider the question of equalizing rates to interior points. Complaints have been made that there was an inequality of tolls to Buffalo and Toledo as compared with Chicago and northwestern and southwestern points. It was decided to recommend that a readjustment be made. The agencies in the different trade centers will arrange the affair. Eastern questions were not discussed at all, and the meeting adjourned to May 31st, when a meeting of the Western sales agents also will be held.

Bituminous.

The local trade is quite a good deal of coal is moving, but it is on old contracts, new business having been very small during the week. There has been a series of blockades both on the Baltimore & Ohio and the Pennsylvania railroads, but especially in the latter. This is becoming a serious question and several operators complain that they are greatly inconvenienced by the blockade, and that unless it is relieved soon great injury may result. No satisfactory service from the Pennsylvania Railroad is thought probable for some weeks yet, despite all the assurances on the part of the officials. For the past two weeks promises have been made that the blockade would be relieved in a short time, but nothing has been done in this direction. There are some rumors that coal is offering at Bal-

timore at \$2.30 f. o. b. but these have not been verified. Very few vessels are going thither just now and it would seem that Baltimore has become a port of the past. Connection has been made by the Cumberland Valley Railway with the Chesapeake & Ohio Canal at Powell's Bend, two miles south of Williamsport. This will increase the traffic over the canal.

Vessels are said to be plentiful. Freights show little change over last week, being: Philadelphia, 75 @80c. to Boston, Salem and Portland, and 75c. to Sound ports. From Newport News, Norfolk and Baltimore rates are 5c. higher than those from Philadelphia.

The officers of the Buffalo, Rochester and Pittsburgh Railway and of the New York Central, as lessee of the Beech Creek Road, have signed a traffic contract in connection with the Philadelphia & Reading. The agreement provides for the construction by the Buffalo, Rochester & Pittsburgh of 27 miles of road from Dubois to Clearfield, where connection is made with the Beech Creek, the latter having a trackage arrangement which brings it to the Reading at Williamsport, Pa. Work on the new road will be begun soon and it is expected to have it running within a year. The traffic arrangement secures to the Buffalo, Rochester & Pittsburgh an outlet to Atlantic tidewater.

By this extension the Reading will control a large bituminous coal tonnage. The bituminous tonnage of the Buffalo, Rochester & Pittsburgh Railway is said to be 3,000,000 tons a year; with access to a large bituminous coal territory capable of development.

The Reading also has made overtures to the Cresson & Clearfield Coal and Coke Company, owner of the Cresson & Clearfield Railroad, controlling 72,000 acres of developed bituminous coal lands and producing 1,000,000 tons annually for its product. If an agreement is reached a seven-mile line from Gazzin to Altoona will be constructed. At the office of the Cresson & Clearfield Company in this city further information was denied, but it appears that the company is considering the Reading's offers.

Boston.

(From our Special Correspondent.)

This has been a quiet and uneventful week in the coal trade. There are some orders being placed however, for the special coals, such as Lykens Valley. Dealers pay the advance prices without a murmur knowing that they cannot purchase for less. Dealers here are somewhat wrought up over the reports they get from New York middlemen that the combination proposes making another advance June 1. We note no change in prices.

We quote f. o. b. prices net at New York: Stove, \$4.15; egg, \$3.90; free burning, broken, \$3.75; chestnut, \$3.90; Lykens Valley, broken, \$4.50; egg, \$4.90; stove, \$5.40; chestnut, \$4.50. These prices on Lykens Valley coal are net at Philadelphia.

There is practically nothing doing in soft coal. Some few orders are placed for quick delivery. Prices are firm. We quote on cars here, \$3.15 for Clearfield, and George's Creek \$3.60@3.65. Parts of cargoes would be 10c. less. There is next to no news to relate on freight rates. Vessels are not wanted and prices must necessarily be easy. We quote: From New York to Boston, 60c.; from Philadelphia to Boston, 85c.; from Philadelphia to Portland, 85c.; to Bath, 90c.; to Providence, 75c.; from Baltimore to Boston, 90c.; Newport News to Boston, 70c.; Sound Points, 70c.

No changes are notable in the retail market this week. Trade is fair and prices are steady. We quote: Stove, \$6; nut, \$6; egg, \$5.75; furnace, \$5.75; Franklin, \$7.25; Lehigh egg, \$6; Lehigh furnace, \$6. The receipts at this port for the week ending May 7 were: 57,190 tons of anthracite and 16,771 tons of bituminous, against 44,479 tons of anthracite and 22,120 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 615,213 tons of anthracite and 224,997 tons of bituminous, against 519,046 tons of anthracite and 359,693 tons of bituminous for the same time last year.

Buffalo.

May 12.

(From our Special Correspondent.)

Trade in anthracite is very quiet and bituminous fairly active for manufacturing purposes and for the requirements of tugs, propellers, etc. Prices of anthracite unchanged and bituminous quotations weak, through an over supply on the market.

Coke quiet and nominally unchanged figures rule. Lake shipments moderate; shippers do not care to pay higher rates and owners prefer in most instances to leave light rather than to accept present quotations. Freight on coal advanced 5c. to Duluth. The rate now being 30c. per net ton. The ice still blockades Duluth; vessels during the past week have had much trouble in entering and leaving this port.

The shipments of coal from this port from May 1st to 11th, both days inclusive, aggregated 75,540 net tons, distributed about as follows: 29,350 to Chicago, 22,530 to Milwaukee, 4,600 to Duluth, 6,400 to Superior, 2,470 to Toledo, 650 to Saginaw, 1,850 to Racine, 1,230 to Detroit, 430 to Green Bay, 830 to Sheboygan, 2,000 to Ashland, 2,600 to Gladstone and 600 to Windsor. The rates of freight were as follows: 40c. to Chicago, Milwaukee, Saginaw, Sheboygan and Green Bay, 25c. 30c. to Duluth, 25c. to Windsor, Detroit, Superior and Toledo, 45c. to Racine, 30c. to Ray City, Ashland and Gladstone, and 75c. to Mackinaw.

The coal shipments to the Erie Canal for the week ending May 7th were 1,434 net tons.

Chicago.

May 12.

(From our Special Correspondent.)

Country trade still continues very light, but this is not unexpected as the market is generally quiet after an advance. There are even no rumors of deviation from circular prices by any of the shippers, although strong efforts have been made to obtain concessions of various kinds. The feeling in the trade here to-day from the election of the Vanderbilt interests to three places in the Delaware & Hudson directory, is that the D. & H. are now practically in perfect harmony with the consolidated companies, and the general public while still grumbling are more disposed to accept the higher prices for anthracite coal as inevitable. The fact that all the large retailers in Chicago giving their best trade, as we remarked several weeks ago, pointers on the situation, and the consequent deliveries of large amounts of coal during April will necessarily reduce the average annual sales for May, June and July. While at the same time it had the effect of taking a large amount of coal from docks and yards, thus making room for new shipments. Vessel coal is coming forward in good shape. Several propositions from large private consumers to have their coal supplied at a reduction from the circular have been refused consideration by agents. Regular quotations of \$5.35 for car coal, and \$5.50 from yards, or \$6.50 delivered to consumers, are steady.

Bituminous coal is rather quiet, and prices on Eastern coal (Hocking) are somewhat irregular f. o. b. boats from Lake Erie ports, the circular being shaded very freely—15 cents per ton. On large contracts, Pittsburg and West Virginia are also cut 15 to 25 cents on similar shipments from same points. Supplies of all kinds of soft coal are ample and the sensational rumors which have been freely circulated in the daily press as to trouble from water in Northern Illinois coal fields are very much exaggerated. The excessive rainfall in the West has somewhat interfered with regular shipments on account of railroad washouts, damage to bridges, etc., but we hear of no serious interruption in mining operations, other than here and there a delay of a few hours, and there are no complaints from consumers. The market, as a whole, appears to be in good shape all around. In Indiana, several new mines of bituminous coal (not block) have been opened, and the product is favorably spoken of and a good portion of it will find a market here. It will grade equal to the best of Illinois steam coal, and command as good a price.

Coke is rather quiet and demand only moderate, as many foundries are working short time. Little improvement is expected in this fuel until the iron trade becomes more active.

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

Pittsburg.

May 12.

(From our Special Correspondent.)

Coal.—If we except the local trade, the market has been dull. The supply exceeds the demand at all points, the Southern and Western markets being crowded. There is a certain amount of mining being done in the various points. The stage of water in the Ohio has been ample; as fast as a ton is produced same is forwarded south. Shipments since our last report to Cincinnati were 796,000; Louisville, 686,000; total, 1,476,000 bush. An accident happened last evening at Merriman, a few miles below the city. W. H. Brown Sons and Charles Jutte & Co. had 188,000 bushels coal sunk. Messrs. W. H. Brown Sons have the contract for furnishing the St. Louis Gas Company 2,000,000 bushels of Pittsburg coal. A member of the firm said: "We commenced delivery on Feb. 16, and on April 28 had 1,298,000 bushels; since that date we have forwarded 350,000 bushels; the balance will be delivered before the end of the month. The entire contract will thus have been delivered in three and a half months, which is an unprecedentedly short time. Our firm has had the contract off and on during the past 26 years."

Connellsville Coke.—The past week witnessed several changes, but unfortunately they were against the producers. During the week a large number of ovens have been blown out and others are expected to follow. Of course the shipments of coke show a corresponding decrease. How long this condition of trade will be kept up, or what will be the result, will be decided in the future. Of 17,180 ovens 11,283 are in blast, and 5,897 idle. Owing to the blowing out of so many ovens the Frick Coke Company made a better average, being 4.85 days as against 4.52 days the week previous. The number of active ovens was reduced 470. The McClure Coke Company made 5 days. The Southwest Company ran full 6 days, as did the Elm Grove. W. J. Rainy made 5 days; Paul, 4 days; Cochran, 6 days; Juniata and Nellie, 5 days. The week's shipments, 109,728 tons; week's decline, 5,634 tons; week's shipment to Pittsburg, 1,900 cars; east of Pittsburg, 1,221; west of Pittsburg, 2,975; total, 6,096 cars. Western shipments fell off 129 cars; Eastern, 134 cars, and Pittsburg, 50 cars. Prices are unchanged.

METAL MARKET.

NEW YORK, Friday Evening, May 13, 1892.
Prices of Silver Per Ounce Troy.

May.	Sterling Exch. Re.	London. Pence.	N. Y. Cents.	Value of sil. in \$1.	May.	Sterling Exch. Re.	London. Pence.	N. Y. Cents.	Value of sil. in \$1.
7	4.87 3/4	39 3/4	87	.672	11	4.87 1/4	39 1/2	87	.672
9	"	39 1/2	87 1/4	.674	12	"	39 1/2	"	†
10	"	39 1/2	87	.672	13	"	40 1/4	88	.682

* 87 3/4 @ 87 1/2. † 67 1/4 @ 67 3/8.

Our market has been steady, with a disposition manifested in London to absorb our surplus silver at current rates. The announcement by Mr. Goschen that England would accept America's invitation to send delegates to a monetary conference has revived the hopes of friends of silver and has advanced the price about 3/8d. It is premature to indicate what the results of this conference will yield. No radical change in the monetary unit of value in England is at all probable, but some larger use for silver may be pointed out, which would materially prevent the further fall of this metal and perhaps increase its further value.

The United States Assay Office at New York reports the total receipts of silver for the week to be 71,000 ounces.

A report from Havana dated May 7 says the dry goods importers have passed a resolution to the effect that all their sales will be made on a gold basis only, and that they will refuse to accept silver (which, owing to the heavy importation from Spain, is already quoted at from 4 1/2 to 5% discount against gold) in any quantity above \$5.

Silver Bullion Purchases.

WASHINGTON, D. C., May 13, 1892—(By Telegraph).—The Treasury Department purchased to-day 520,000 oz. fine silver at prices ranging from '883 to '884 per oz.

Silver Bullion Certificates.

	Price.		Sales.
	H.	L.	
May 7.....	.....	.....	.....
May 9.....	.....	.....	.....
May 10.....	.....	.....	.....
May 11.....	.....	.....	.....
May 12.....	88	87 3/4	33,000
May 13.....	88 3/4	88 3/4	27,000
Total sales.....	.....		60,000

Domestic and Foreign Coin.

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

	Bid.	Asked.
Trade dollars.....	\$.70	\$.75
Mexican dollars.....	.69	.70
Peruvian soles and Chilean pesos.....	.65	.68
English silver.....	4.83	.....
Five francs.....	.93	.95
Victoria sovereigns.....	4.88	4.90
Twenty francs.....	3.88	3.90
Twenty marks.....	4.74	4.76
Spanish doubloons.....	15.60	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.....	.88 3/4	.89

Copper.—The market has not displayed quite as much strength during this week as it developed during the few preceding. This is to be attributed in part to the falling off in the demand from manufacturers, but, to a larger extent, to the more plentiful supplies which have now come to hand as the result of opening of lake navigation. The first shipments arrived a few days ago and the scarcity, which was more pronounced for wirebars and cakes than for ingots, has now vanished, as have the premiums which were paid for the two former descriptions. Manufacturers claim that orders do not come in at as satisfactory a rate now, owing to the generally dull condition of trade, but nevertheless consumption of copper may still be considered very satisfactory, and as the stocks at the Lakes on the opening of navigation were not excessive, a great deal of the production having been shipped during the winter overland, it is not to be expected that the temporary lull will be followed by any material decline. This week some business was done in Lake at 12 1/2c., cakes, wirebars or ingots, for shipment from the Lakes, while second-hand lots of ingots in New York were offered at 12c. without finding buyers. Of Arizona copper very little is offered, most of it having been contracted for, while what little there is left is not for sale at market prices. Casting copper is rather neglected at 11 1/2 @ 11 3/4c.

The English market has fluctuated but slightly, having closed last week at £45 15s. for spot and £46 5s. for futures; opened on Monday at £46 for spot and £46 10s. for futures, and closes at £46 5s. and £46 15s. respectively.

The long-talked-of agreement between foreign and domestic producers of copper to fix a maximum

production has developed no new features, with the exception that the parties interested are trying very hard to arrange for another meeting, either here or abroad, but so far have not arrived at any result.

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

To Antwerp.....	Copper.	Lbs.	
S. S. Rhynland.....	152 pigs.	40,269	\$5,000
To Bordeaux.....	Copper.	Lbs.	
S. S. Tancarville.....	104 pigs.	29,039	3,700
To Swansea.....	Copper.	Lbs.	
S. S. Manitoba.....	660 bars.	45,180	4,000
To Liverpool.....	Copper Matte.	Lbs.	
S. S. Wyoming.....	4,155 bags.	450,649	30,000

Tin has been the most active of all metals, spot having advanced from 20'45, its temporary decline, to 20'90, closing very strong, with prospects of a further rise. Business done during the week has been more of a speculative character, and confined chiefly to dealings at the Exchange, where several hundred tons of far futures—for delivery up to the end of the year—were sold at from 20'80@20'95, the asking figure for the same delivery being 21c. to-day.

The London market which has of late been taking the initiative, and which last week declined to £93 10s. and £93 7s. 6d. for spot and futures, opened at £93 15s. spot, and £93 10s. 3 mos., and closes at £93 5s. and £94 17s. 6d.

Lead continues in its monotonously dull condition, the market being rather quiet and weakish, with offerings in excess of the demand. The asking price, in a wholesale way, is 4 1/4, with buyers at 4'25. The only feature of importance is that it is generally expected that operations in the Cour d'Alene district will be resumed in the course of a few days, and that the trouble with the miners, as well as the railroads, will be adjusted simultaneously.

The foreign market is steady, Spanish lead being quoted in London at £10 12s. 6d., and English lead, £10 15s.

Chicago Lead Market.—The Post Boynton Strong Company telegraphs us as follows: "The market has ruled quiet though firm. Sales 200 tons of Missouri at 4'12 1/2c. and 700 tons desilverized at 4'15c. The demand is increasing with the tendency of values higher."

St. Louis Lead Market.—The John Wahl Commission Company telegraph us as follows: "The market during the past week has been quiet. Sales have been made in carload lots at 4.07 1/2c. @ 4.10c. In the last few days these prices have been shaded a little on small sales. Refiners are not pressing sales, nor do consumers seem anxious to buy, hence a very quiet market."

Antimony continues very firm, spot supplies being meager. Cookson is 15; L. X., 12 1/2, and Halletts, 11 1/2.

Spelter is a little weaker, the offerings being a little more plentiful, not so much for immediate delivery as for delivery the balance of the year. Prompt shipment, as also May and June delivery, is scarce, all the smelters being well sold ahead, and the price for this, which to-day is about 4'80, New York, is more or less of a nominal character, but delivery the second half of the year can be bought at somewhat less.

The foreign market is very strong, and the quotation is £22 15s. for spot delivery, the demand for delivery after June being very light.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 13, 1892.

Pig Iron.—This market shows no change. The dullness we have been reporting since the first of the year continues unabated. The production of pig iron has been curtailed during the past month, but it is doubtful whether stocks have grown smaller, for the demand has been decreasing. This would indicate that consumers are by no means well supplied and from this fact some encouragement may be derived. The market is in the buyer's favor in so far as prices are concerned, and will probably remain so for some time to come. Just now, from all we can learn, the iron being delivered consists of old orders, new business being small and unimportant. The dealers in this city report an increased inquiry, but it has not resulted in any actual business thus far.

The furnaces, through their agents in this city, apparently adhere firmly to their prices of a month ago; but there are not wanting skeptics who assert that to their knowledge Southern iron, No. 1 X foundry, has been sold at less than \$15; and that No. 1 Pennsylvania iron has been sold below \$16, which is the price fixed by the Thomas Iron Company some time since. However, we are inclined to the belief that prices to-day are as they were a month ago, and that the very low figures of which we hear rumors constantly have been obtained only in the imagination of certain people. Such attacks should not be made upon the iron market, which is in sufficiently poor condition already. Certain it is, that if the market has not improved, neither has it grown any worse, and this applies not only to the New York market, but to the market of the entire country.

A meeting of the stockholders of the Tennessee Coal, Iron and Railroad Company was held at Tracey City, Tenn., on the 10th inst. About 85% of the stock was represented, in person and by proxy.

The meeting, it is said, was harmonious, and the deal with the De Bardoleben Coal and Iron Company, of which an account was published in the ENGINEERING AND MINING JOURNAL, was ratified by a unanimous vote. According to a press dispatch the annual reports of the two companies show larger net earnings for the past year than for any previous period in their history.

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.—The market for both ferro and spiegel is unchanged. No business of any consequence is reported in either of these, although there has been a slightly better inquiry for ferro during the week. Quotations remain nominally as follows: 20% spiegeleisen, \$26 @ \$27, and 80% ferro-manganese, \$61 @ \$62.

Steel Rails.—We do not hear of any important sales of steel rails during the week. The market continues as dull and uninteresting as ever. Prices remain unchanged at \$30 f. o. b. mill and \$30.75 tide water. Billets are still offered at low prices.

Rail Fastenings.—There is nothing doing in this market. One of the most prominent of manufacturers stated this week that trade had not been so dull for quite a long time. We quote this week as follows: Fish and angle plates, 1'65 @ 1'70c.; spikes, 1'95 @ 2c.; bolts and square nuts, 2'70 @ 2'80c.; hexagonal nuts, 2'80c.

Merchant Steel.—We do not hear of anything interesting in this market. Business continues rather light and prices are unchanged. We quote: Mushet's special, 48c.; English tool, 15c. net; American tool steel, 7@8c.; 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.—Manufacturers report a slightly improved business in this market. Prices remain unchanged; We quote ruling discounts as follows: Butt, black, 57 1/2%; 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.—Nothing of importance has happened in this market since our last report. Manufacturers are getting ready for the busy season, which they say will probably prove very good. Complaints about low prices continue to come from the manufacturers. 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 absolutely lifeless. We do not hear of any business, and it is impossible to give quotations which shall be a fair criterion of the market.

Buffalo. May 12.

(Special report by Rogers, Brown & Co.) Foundries are ordering forward their iron more rapidly than for a good many months. There are more evidences of increasing business generally, but as yet no advance in prices. Southern furnaces are becoming pretty well supplied with orders, and are refusing some so-called good offers. The market for all kinds of pig iron shows more firmness than one week ago. We quote for cash f. o. b. cars Buffalo: No. 1X Foundry Strong Coke Iron Lake Superior ore, \$15.75; No. 2X Foundry Strong Coke Iron 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; Tennessee Charcoal, \$17.50; Southern Soft No. 1, \$14.65; Alabama Car Wheel, \$19; Hanging Rock Charcoal, \$20.50.

Chicago. May 12.

(From our Special Correspondent.) The market generally has been quieter during the past week, and while inquiry is still quite good for crude iron, there has been a decrease in tonnage actually sold, which dealers explain by the fact that consumers plainly intimate by their offers, that lower prices are looked for. Notwithstanding which, several season's contracts for local coke iron have been placed at figures close to our quotations which had been pending several weeks. Many of the structural foundries are working one-half or two-third time only, and from this source demand is light. Soft steel is gradually crowding out cast iron in architectural work. The differences between the master boiler-makers and men remain unsettled, and now the tin and sheet iron workers are preparing to make a strong fight for the eight-hour day and a minimum wage rate. While the inquiry for structural material is fully up to that of a year ago, prices are so low that many iron works are refusing to bid on specifications. Bars are in light demand despite the number of freight car orders given out. Sheets, both light and heavy, are inactive and plates very quiet. Indications point to a large demand for soft steel from implement makers and a good deal of inquiry is around. Supplemental orders on contracts for steel rails already placed, are more frequent, and light rails are in fair demand. Old material of all kinds is perfectly flat.

Pig Iron.—The offers of some buyers for coke and charcoal are perfectly absurd. They reason that as the market has been on the decline for nearly a year, it will still continue to go the same way, and also argue that in the face of heavy stocks a

further decline must come. But they overlook the fact that prices are now too close to cost, and Northern furnaces as well as some Southern companies have concluded to hold their product in preference to making further concessions at a sacrifice. There has been less activity during the week, and although several round lots of coke iron have been placed for extended deliveries the market has been quieter. Some consumers are convinced that local iron will go no lower, and negotiations are pending which will result in business during the week. Lake Superior charcoal iron is in good inquiry, but the views of buyer and seller are widely divergent. Offers of \$16, \$16.25 and \$16.50 are made for ten months' delivery, but makers insist on not less than \$16.75. For prompt delivery, on a cash basis, \$16.35@16.50 would be acceptable. Several seasons' contracts have been closed at \$16.75, running to next April and May.

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.—The volume of inquiry is large, and a good deal of figuring is done, but results are slow. For alterations and extensions there is an excellent demand from warehouse for steel columns, beams, plates, etc. 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, \$2.10@2.25.

Plates are dull, as only a few of the smaller boiler shops have conceded the strikers' demand. Several fair-sized mill orders for outside parties have been closed with mill agents. Prices are weak. 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.—Inquiry from the implement trade is good, but few orders have as yet been placed. Tool steel is active. 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.—Locally, the agitation among sheet metal workers is restricting demand. Discounts are weak, but 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.—Generally the demand is of meager proportions, and mill quotations are easier at 2 1/2 c. for common stock No. 27; dealers quote 3c. from stock.

Bar Iron.—Mill agents are much firmer in their views, and concessions are few. Manufacturers evidently look for trouble when the wage scale comes up for consideration. Demand is light and quotations unchanged at 1 65 c. @ 1 67 1/2 c. for all muck bar for car work. Common iron is 1 55 @ 1 57 1/2 c. with half extras, out of store orders are filled at 1 70 @ 1 80 c., according to quantity, etc.

Nails.—Wire nails are in good demand but price is weak at \$1.70 Chicago, from mill, and \$1.80 from stock. Steel cut nails are rather dull, and \$1.60 Chicago for carloads is scheduled on regular average. Dealers quote \$1.70 from warehouse.

Steel Rails.—Demand for small quantities in lots of 500 to 1,000 tons are frequent, and some large deals are still pending, but will probably be placed as soon as financial arrangements are satisfactorily adjusted. Quotations are steady at \$31@32.50, according to quantity. Regular prices for splice bars are \$1.70 for steel and iron; spikes at \$2.05@2.15 per 100 lbs.; track bolts, hexagonal nuts, \$2.65@2.70; square, \$2.55.

Scrap.—Railroads are offering large quantities of all kinds both to consumers and dealers. Sales at almost any price are made with difficulty. Prices are weak. No. 1 railroad, \$16.50; No. 1 forge, \$15.50; 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.—Old iron rails are in some demand at a lower price than holders wish to accept. Nominal quotation is \$18.75@19. Old steel rails are lower for mixed lengths at \$12, and for selected there is no market at all at \$14. Car wheels are quoted at \$15.50@16 and movement light.

Louisville. May 7.
(Special Report by Hall Brothers & Co.)

Another week passes without any especially new features; dull and drooping seems to be the password, although there have been inquiries for lots ranging from car loads up to 500 tons, and sales of car loads, 50, 100 and 300 ton lots. Some orders have

been taken for as little as 100 tons for delivery through the year. Though a ray of hope is apparent, consumers are scarce of orders as a rule, and many say prospects are very unfavorable, and of course are very conservative, buying only such as they must have. One consumer states that they melted 300 lbs. of iron last week, when ordinarily they should melt 30,000 lbs., and doubtless many others could truthfully say the same, and were it a fact that such was the case throughout the country, how long would it take to accumulate sufficient stock to last consumption a year? It would only require a very short while. However, it is not reasonable to suppose such a state of affairs will exist for any great length of time. Yet there are some who express the belief that the bottom has not been reached, while others feel confident of an early improvement.

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 12.
(From our Special Correspondent.)

Pig Iron.—The reduction made in freight rates by the Reading and Pennsylvania companies has been the talk of the market since Monday. It is not probable that there will be much practical outcome to it, although a good deal of satisfaction to iron makers. Any reduction in cost will be followed by easier prices. The representatives of leading companies said yesterday that offers had been received for a large amount of forge and foundry iron for summer delivery at shadings of about 25 cents below the lowest Southern prices that have yet been mentioned. To-day the news is that these propositions are being considered favorably, and some of them may possibly be accepted to-morrow. Makers and brokers are very anxious to sell; the tendency of prices, it must be admitted, is still downward. While quotations can be given generally at \$15.50 to \$16.50 for No. 1 Northern, and \$15 for Southern, it is quite probable that even better figures than these will be mentioned within 48 hours for large lots. Everything points to an active demand within a few days. Buyers are quite willing to make contracts, and the only point is the figure at which iron will be delivered. Forge iron is quoted all the way from \$13 delivered up to \$14.25. A good deal of business in forge is in prospect.

Muck Bars.—The transactions have been unimportant.

Steel Billets.—The pressure on steel billets is still downward. It transpired to-day that some twenty thousand tons are under negotiation. Quotations range from \$24.25 to \$25.25, according to point of delivery.

Merchant Iron.—The retail demand for merchant iron is improving, but only for prompt deliveries. City mills are selling at 1 70; country at 1 65; large orders at less. A few mills are crowded with work, but there are a good many more that need more business.

Sheet Iron.—A good week's business has been done in all kinds of sheet and galvanized, and on the bulk of business coming in, prices are the lowest that have been named for a very long time.

Nails.—The nail trade continues to be quite active, but at prices that afford scarcely any margin. Makers are much disappointed at the crowding competition which has put prices very low.

Merchant Steel.—All of the merchant steel makers admit that a good deal of new business has come in within a few days, but have nothing to say about prices.

Plate and Tank Iron.—Taking the reports received from various quarters it is evident that a good deal of new business has come in and competition is sharp, and it is a question of getting business rather than making money. A few small lots of firebox has been sold at 2 75, steel and flange, 2 30. Iron tank, 1 75.

Structural Material.—It was generally anticipated that this week would bring a few very large orders into the market, but for some reason or other engineering operations are not requiring urgent deliveries. Two large orders have been booked, which have been on the market for some weeks, for elevated railroad work, some of it for local use, but most of it for shipment to near points. Quotations for bridge plates, 1 85 c.; angles, 1 80 c.; channels and tees, 2 15 c.

Steel Rails.—Small sales are reported. Quotations, \$30. Nothing of importance going on.

Old Rails.—Old rails are selling at \$20.50 for iron and \$16 for steel.

Scrap.—Scrap is quoted at \$18@19 for No. 1 railroad.

Pittsburg. May 12.
(From our Special Correspondent.)

Iron and Steel.—Trade since our last report has not been very active. Still, at the same time, there has been a fair amount of business when the aggr

gate is summed up. Bessemer or standard grey forge has suffered no decline. Producers appear to have come to the conclusion that it is time to call a halt so far as prices are concerned. The outlook for the immediate future is far from promising to the manufacturers of crude and finished material. The market for pig iron presents no new features, the competition among the various furnaces to dispose of current output keeping prices at the lowest point ever before known. Notwithstanding that iron and steel can be purchased at rates extremely favorable to consumers, the largest portion of the sales continue small and for immediate use, certain buyers showing little confidence in the near future.

On the other hand, there are certain moneyed parties who are disposed to purchase a few thousand ton blocks as an investment until prices again advance somewhere near legitimate values. Just how long before this event will be reached is uncertain; but, nevertheless, it seems certain to come, and some people are of the opinion that the time is not far off. City-made iron and steel still command the top figures, as parties interested know the value of material made at Pittsburg. At the same time we occasionally bear of an outside lot, or an unknown brand, being shaded in order to make a sale. Such operations produce no effect on leading producers, who hold firmly to existing quotations, and are not disposed to meet the rates of the weaker furnaces, which are compelled to realize. A well-informed dealer has this to say: "The drift of opinion seems to be that the turn is now within sight. Not that business is likely to be particularly good, but things are so bad that there must of necessity be a change." Manufacturers cannot continue doing business at prices below those now current and a good many are believed to be losing money on almost every ton of iron they sell; consequently, there must be a decrease in the supply, which in its turn will eventually bring more or less of an advance in prices. The fact that certain consumers recognize this phase of the situation is shown by their efforts to make contracts at present prices for long deliveries. There are very few who are not willing to engage all the material they are likely to need during the present year, provided they are guaranteed present prices, but they are not confident to pay an advance. This, however, shows their change of attitude.

"Hitherto it has been difficult to place anything more than was immediately needed; beyond that special prices were demanded, and in most cases were secured. Buyers have no intention, and at present are under no necessity, of paying an advance; but they feel pretty sure that further concessions are almost beyond the bounds of probability, so that they feel safe in engaging their favorite brands for so long a period as sellers are willing to make contracts." Steel slabs and billets showed more firmness; last week the lowest transaction was at \$22.35@22.40; this week rates are \$22.50@22.60. Muck bar, weak, being offered at \$25. Ferro-Manganese—We hear of further sales of imported at seaboard, \$59.25. Spiegel, 10@12% seaboard, \$23.25; 20%, \$26.50. Skelp Iron—Prices maintained for the various kinds. Old iron and steel rails are very dull; prices uncertain. Southern iron dull. Steel Wire Rods—Sales of American fives at mill, \$31.85.

Coke Smelted Lake and Native Ores.

2,500 Tons Bessemer, June, July.....	\$14.35 cash
2,500 Tons Bessemer, June, July.....	14.40 cash.
2,000 Tons Grey Forge, City Furnace.....	13.00 cash.
1,200 Tons Bessemer.....	14.35 cash.
1,000 Tons Grey Forge, June, July.....	12.80 cash.
1,000 Tons Grey Forge.....	13.00 cash.
500 Tons Grey Forge.....	12.85 cash.
500 Tons Mill Iron, June.....	13.00 cash.
500 Tons Bessemer.....	14.50 cash.
250 Tons Grey Forge.....	13.00 cash.
250 Tons Grey Forge, in Valley.....	12.85 cash.
200 Tons No. 2 Foundry.....	14.25 cash.
150 Tons No. 1 Foundry.....	15.25 cash.
100 Tons No. 1 Silvery.....	16.75 cash.
100 Tons No. 3 Foundry.....	13.50 cash.

Charcoal.

100 Tons Cold Blast.....	26.50 cash.
50 Tons No. 2 Foundry.....	20.00 cash.
50 Tons Cold Blast.....	25.75 cash.
50 Tons Cold Blast, Hard.....	23.00 cash.
50 Tons H. B. Mill.....	17.50 cash.

Steel Slabs and Billets.

3,000 Tons Steel Billets, June, July, Aug.....	22.50 cash.
2,500 Tons Steel Billets, July, Aug., Sept.....	22.40 cash.
2,500 Tons Steel Billets, May, June, July.....	22.40 cash.
2,000 Tons Steel Slabs, May, June.....	22.40 cash.
1,000 Tons Steel Billets, June, July.....	22.50 cash.
500 Tons Steel Billets, May, June.....	22.60 cash.

Muck Bar.

500 Tons Neutral, May, June.....	25.60 cash.
500 Tons Neutral, June.....	25.60 cash.
500 Tons Neutral, Sept.....	25.00 cash.

Skelp Iron.

800 Tons Sheared Iron.....	1.80 4m.
425 Tons Wide Grooved.....	1.57 1/4 4m.
380 Tons Narrow Grooved.....	1.55 4m.

Steel Skelp.

750 Tons Wide Grooved.....	1.45 4m.
500 Tons Narrow Grooved.....	1.40 4m.

Ferro-Manganese.

150 Tons 80% imported seaboard.....	59.25 cash.
75 Tons 80% domestic Pgh.....	62.50 cash.

Steel Wire Rods.

400 Tons American Fives, at mill.....	32.00 cash.
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Old Iron and Steel Rails.

1,000 Tons Old Steel Rails.....	15.50 cash.
450 Tons Old Iron Rails.....	20.50 cash.

Blooms and Beam Ends.

850 Tons Bloom and Beam Ends.....	16.50 cash.
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Scrap Material.

200 Tons No. 1 W. R. R. Scrap, net.....	17.00 cash.
200 Ton Wrought Scrap, net.....	16.00 cash.
100 Tons Cast Scrap, gross.....	12.00 cash.
100 Tons Leaf Spring Steel, gross.....	30.00 cash.

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

Main table with columns for Name and Location of Company, dates from May 7 to May 13, and Sales. Includes companies like Adams, Alice, Amador, Atlantic, etc.

*Ex-dividend. †Dealt at in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 6,700. Non-dividend shares sold, 16,650. Total shares sold, 23,350.

BOSTON MINING STOCK QUOTATIONS.

Table with columns for Name of Company, dates from May 6 to May 12, and Sales. Includes companies like Atlantic, Bodie, Bonanza Development, etc.

† Ex-dividend. Dividend shares sold, 3,889. Non-dividend shares sold, 3,690. Total shares sold, 7,579.

COAL STOCKS.

Table with columns for Name of Company, dates from May 7 to May 13, and Sales. Includes companies like Cambria Iron, Cameron Coal & I. Co., Ches. & O. R. R., etc.

Total shares sold, 366,161.

San Francisco Mining Stock Quotations.

Table with columns for Names of Stocks, dates from May 6 to May 12, and Closing Quotations. Includes companies like Alpha, Alta, Belcher, etc.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

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

G. Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. + This company, as the Western, up to December 10th, 1881, paid \$1,400,000. † Non-assessable for three years. ‡ The Deadwood previously paid \$275,000 in eleven dividends and the Terra \$75,000. ‡ Previous to the consolidation in August, 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia \$12,500,000. § Previous to the consolidation of the Copper Queen with the Atlanta, August, 1888, the Copper Queen had paid \$1,350,000 in dividends. ¶ This company paid \$190,000 before reorganization in 1890. ** This company acquired the property of the Raymond & Ely Company which had paid \$3,075,000 in dividends.

STOCK MARKET QUOTATIONS.

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

Table listing company names and their respective stock prices.

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Helena, Mont.

(Special report by SAMUEL K. DAVIS.) Prices highest and lowest for week ending May 7, 1892:

Table listing various commodities and their prices in Helena, Mont.

Trust Stocks.

Special report by C. I. Hudson & Co., members New York Stock Exchange. The following are the closing quotations May 13:

Table listing trust stocks and their prices.

Foreign Quotations.

London. April 30.

Table listing foreign quotations for various commodities and metals.

Paris. April 28.

Table listing Paris foreign quotations for various commodities and metals.

CURRENT PRICES.

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

Large table listing current prices for a wide variety of chemicals, minerals, and metals.

Powdered, # lb.

Table listing prices for powdered and other materials.

THE RARER METALS.

Table listing prices for rarer metals such as Aluminum, Arsenic, Barium, etc.