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CONTENTS.

THE statistics of the mineral industry which we are collecting is already far advanced, but the great book containing them cannot appear for a short time on account of the enormous amount of work involved in preparation and printing. We now have in hand the returns of very nearly every producer of copper, lead, zinc, salt and nearly every other metal and mineral in the United States and many in foreign countries, and we shall publish a few of these figures in the ENGINEERING AND MINING JOURNAL next week. The whole work—a large octave volume—containing all the information of production, prices and technology of the mineral industry, will be issued as quickly as the printing and binding can be performed. It is very safe to say that no such comprehensive and valuable work on the mineral industry has ever before been produced.

THE SMOKE QUESTION AT BUTTE, MONT.

During a campaign political doctrines are warmly debated in Butte, but public interest is much more concerned in the settlement of the vexed "smoke question," ever present in the minds of the unfortunate citizens of the great mining camp.

The so-called smoke is in the main the product of combustion from the roasting of sulphuretted ores; sulphurous acid, as a matter of course, is the main constituent, and one which on account of its irritable nature gives the dweller in Butte a premature taste of the hereafter. From the flat down by the Parrot smelter to the grade at Walkerville the smoke rolls in great clouds, obscuring the vision and rendering precarious the path of the pedestrian. It is said by those who prefer Helena or Anaconda for the capital, that the unfortunate traveler from South Butte traces his way not by landmarks, for these are utterly invisible, but by the hacking cough of his forerunner, who though a few feet away is completely veiled in smoke. Be this as it may, the smoke nuisance is a "burning question" in Butte, as in some other metallurgical centers. In Freiberg, Saxony, and Swansea, Wales, public opinion has been aroused in the same manner.

At the first meeting of the citizens in the winter of 1890-91 several projects were made, based on chemical grounds, but none of which were adopted. Later Dr. E. D. PETERS, JR., proposed a plan somewhat similar to that advocated by one of the members of the local committee. It consisted in a cheap process of manufacturing sulphuric acid, this product to be utilized in working ores and refining mattes. But as the process would require additions to existing plants, a modification of the roasting furnaces, and more water than was readily available, they were not adopted or even considered favorably, though they were advocated by metallurgists of standing. On the other hand, the proposition of a Chicago smoke-consuming expert, who claimed off-hand that no variety of smoke was intractable to his furnace, met with instant favor and a sum of money was voted to defray the expenses of one HUTCHINSON, who came to Butte, erected his furnace and steam jets at the Parrot smelter and made a failure.

It had been thought that the greater portion of the smoke came from the Boston & Montana smelter at Meadeville, where heap-roasting was in vogue, so a city ordinance was passed forbidding this system of roasting. But the trouble continued. All Butte is now as much puzzled as ever. The nuisance can, of course, be stopped at once by the heroic method of shutting the smelters down, but this would cut one of the main commercial arteries of the city, which the inhabitants are loath to do. As a matter of fact, the plan now proposed, to build tall stacks 500 feet in height, would seem the best manner of solving the question.

It is possible that one main stack built in a proper position with long connecting flues might suffice for all the works. The proposed plan for the city and the smelting companies to unite in defraying the cost of construction seems equitable. It is to be hoped that this flourishing city will soon be relieved from this affliction, which without doubt has impaired the value of property as well as endangered the health of its citizens.

THE CONDITION OF SILVER.

During the past year no improvement has taken place in the status of silver; on the contrary, notwithstanding the large purchases of the United States Government, the value of the metal has constantly declined. The results of purchasing 54,000,000 oz. of silver per annum have been as follows: About $50,000,000 in treasury notes have been added to our currency; the rates for money have been cheapened to such an extent that capitalists have preferred to lock up their money rather than invest it; gold has left the country in the face of unfavorable rates of exchange, in response to small premiums paid by several European nations, and the amount of free gold in the United States Treasury has twice been dangerously near exhaustion after deducting the $100,000,000 held as a special fund to protect the United States notes. European holders of our securities, alarmed at the depletion of our gold reserve, and believing that the country is rapidly dritting toward a silver basis, have sent them back in large quantities and thus helped to reduce the country's gold stock; a favorable trade balance of $185,813,582 was reduced by June 30th, '92, to $87 -

643,669, by September 30th, to $73,927,955, and is now about $60,000,000; silver has fallen from 95 to 83 cents per oz., and finally it has come to pass that even our own people, made timorous by the state of affairs, are saving gold in the fear that in the near future it may be at a premium. This change in our financial condition has not taken place without warning and remonstrance from those well qualified to judge of the danger of such legislation, nor has the change taken place so insidiously that its effects have not from time to time been recognizable. To prevent exports of the yellow metal the Treasury Department first refused to supply bullion in bars and then undertook to pay out worn coin from the Pacific Coast, but that these efforts proved unavailing is shown by the unusually large exports of December, exports unprecedented at that time of the year.

Early in the year the Administration invited foreign countries to send delegates to an International Monetary Conference. This invitation was accepted by some twenty nations and the conference met at Brussels. November 22d. Various plans were submitted and discussed, but none had the merit of feasibility, and the conference adjourned to meet in May, 1893.

The ENGINEERING AND MINING JOURNAL having not only the silver interests of the West, but the general prosperity of the country at heart proposed in its columns of December 3d what we believe to be a complete solution of the silver question, a solution which would not only benefit the West but the East, not only the United States but every country which should join in the compact.

The plan which provides for an international clearing house and the purchase of all silver offered, this silver to be allotted among the nations on the basis of their present holdings of the precious metals has met with praise, from all to whom it has been submitted.

Of it Mr MUHLEMAN, cashier of the United States Sub-Treasury, says:

"The prosposed plan should be welcomed as the forerunner of a new dispensation in financial affairs, pregnant with tremendous possibilities, in the direction of uniformity of standards, furnishing stability of the media, equitably throughout the world, cheapening as well as guaranteeing exchanges and freeing commerce from burdens which cannot but enhance by their expensive clumsiness the cost of commodities to the consumer."

President WILLIAMS, of the Chemical National Bank, says of it:

"The plan proposed is thoroughly good; the ratio is equitable, and its adoption would not fail to benefit all concerned. It would lend added security to the debts of the silver countries which alone should insure its adoption."

Mr. JOHN A. STEWART, president of the United States Trust Company, says:

"The plan is grand in every way, and its adoption could not fail to please the National Banks. The ratio proposed, that of Soetbeer, is just and should commend itself to the Western silver advocates. The plan of an international clearing house is well conceived, and will meet with nothing but approval here.

Mr. ROBERT BASSERMANN, of Mannheim, Germany, says:

"Of all the propositions I have seen, I believe the plan proposed by Mr. Rothwell to be the most able and ingenious one to solve the silver question in the way the American people wish it to be solved."

The Butte *Daily Miner* says:

"The ENGINEERING AND MINING JOURNAL has been a bitter enemy of silver, but it publishes a plan for the solution of the silver problem which in many respects can be indorsed by the most ardent advocate of free coinage."

MR. JOHN RICHARDS, the able editor of *Industry*, a San Francisco magazine, says:

"We think MR. ROTHWELL'S monetary scheme by all odds the most rational one yet presented."

MR. SHERER, manager of the New York Clearing House, the most important financial institution in this country, says:

"I can see many advantages that would follow its adoption. Besides the settlement of the silver question which is by far the most important, the adoption of an International money which the plan involves, would obviate the frightful waste incident upon the shipping of gold coin as well as the waste of time and money in its frequent recoinage of foreign coin."

SENATOR ALLISON one of the delegates to the International Conference, says: "Parts of this plan were submitted by various delegates to the Conference, but by none was it presented as a complete whole. It was evidently worked out by one thoroughly conversant with the silver question and it should be worked out in detail and presented to the Conference in May."

These opinions are gratifying, as they show that the desire of the ENGINEERING AND MINING JOURNAL to assist in the settlement of the question is meeting with appreciation. At present much remains to be done; the first thing is the repeal of the Sherman act.

While all persons conversant with the subject unite in declaring the Sherman act a failure, there is a great diversity of opinion concerning a substitute. Congressman ANDREWS, of Massachusetts, has introduced a bill providing for its repeal and for an increased issue of national bank notes. Senator STEWART, of Nevada, has introduced a bill providing for free coinage of silver. Senator MCPHERSON, of New Jersey, has introduced a bill empowering the Secretary of the Treasury to suspend purchase under the Sherman act.

M. D. HARTER, of Ohio, has introduced a bill which provides

That all further purchase of silver bullion by the United States of America shall cease from and after the passage or adoption of this resolution, and that said purchases shall not be resumed until an international agreement shall be reached, which agreement shall at least include Great Britain, Germany, France, and the United States of America, and which agreement shall fix the valuation at which silver bullion will thereafter be received for coinage, without limit as to quantity, at the mints of all the nations which are parties to said international agreement.

This bill is the best yet presented and would do much toward securing an international agreement.

NEW PUBLICATIONS.

RECENT PROGRESS IN ELECTRIC RAILWAYS. Being a summary of current periodical literature relating to electric railway construction, operation-systems, appliances, etc. Compiled by Carl Hering, 389 pages, 104 illustrations. Price, $1.00. New York. W. J. Johnston Company, Limited.

As the author states in his preface the progress in the field of electrical engineering has been so great in late years as to render it nearly impossible to keep up with its literature, especially that found in periodicals. It is for the purpose of relieving the reader from a bewildering amount of chaff that the author has compiled this work, principally, we believe, from the columns of the *Electrical World*. In this task he has succeeded admirably, and has compiled a work of as much interest to the general reader as it is of value to the specialist.

It is not generally known that Thomas Davenport, a self-taught Vermont blacksmith, as early as 1835 had constructed a model of an electric railroad, in which the motor embodied several points found in every practical motor of the present day. The compiler, however, has neglected to mention the invention of the late Eugene Cowles, of Cleveland, O., was prior to the installation of the Bentley and Knight system in that city, in 1884, which latter was the first electric car in operation in the United States. The work is conveniently divided into chapters under the headings of: Historical notes, Development and Statistics, Construction and Operation, Cost of Construction and Operation, Overhead Wire, Surface Railways, Conduits and Surface Conductor Systems, Storage Battery Systems, Underground (tunnel) Systems, High Speed Interurban Railroads, Miscellaneous Systems, Generators, Motors and Trucks, Accessories.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
All letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

The Flouring of Quicksilver.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR:—Some years ago I had a mercury trough made of cast iron which, as the sides were quite thin, the iron founder made of Scotch iron, and in consequence the surface of the casting was thickly covered with "kish," (graphite). Clean, perfectly fluid mercury immediately became "sick" when put into it, and I had to varnish it carefully with shellac before I could use it. What really happened to the mercury I do not know, but it is possible that similar effects in a cast iron pan might interfere with amalgamation and give an explanation of the alleged superiority of the arrastra with its stone-grinding surfaces.

EASTON, PA., Dec. 3, 1892. F. F.

[The flouring of quicksilver or its division into extremely small, non-coherent particles is due, as in the case cited above, to the covering of the surface with a coating of a compound, usually non-soluble in water, although some soluble chlorides cause this action, owing to formation of calomel on the surface of the mercury. Grease is dreaded by the amalgamator on this account, and many cases of flouring are attributed to it that should be charged to other causes. Carbonate of lead when finely divided, causes this action, as do some metallic oxides. The production of ferric chloride and the consequent production of calomel in an iron pan, when amalgamating ores with salt and sulphate of copper frequently causes flouring to a certain degree, but as these chemicals are not added to the pan charge, when amalgamating purely gold ores, we have no reason to think the greater efficiency of the arrastra in certain cases to be due to the non-flouring of the quicksilver, but rather to the longer grinding and greater amalgamating surface. Experiments have proved that if flouring is caused by metallic chlorides, a certain amount of metallic zinc added to the charge will preserve it, but if it is caused by graphite, there is no remedy than that followed above.—ED. E. & M. J.]

Gilbert's "De Magnete."

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: One difficulty in answering an attack like the letter from Silvanus Thompson printed below, which appeared in the *Electrician* of London of December 9th, 1892, is that it serves to magnify unduly an individual who would otherwise be left to his proper obscurity.

The writer is not to be drawn aside from the question of "De Magnete" simply because mud is thrown from a different direction, and an issue raised on a matter wholly foreign to the subject involved. Suffice it to say, the firm who are about to publish "De Magnete" do not publish Ruskin, and were not publishing it at the time they contracted to publish Mottelay's translation. The reputation of a house a century old, who never had a lawsuit or any difference with its authors, requires no defense, and none will be attempted.

As to this translation of Gilbert, its history with us is as follows: A year or two ago Park Benjamin showed the writer, who was visiting him, the original, and spoke of his wish to translate it, and read him certain passages of exceeding interest. He was assured at the time of our sympathy with his ideas. Later he sent Mr. Mottelay to us with the completed translation, and the work was started at once, in July last.

We have never heard of any other translation, and were even in ignorance of a Gilbert Society and of "one of its secretaries," knowing S. P. Thompson merely as the author of some book on electricity.

Now, what are Mr. Thompson's claims to Gilbert? As nearly as his letter states, that he has announced his intention of making a translation, which, he says, he has not yet completed, and that, with more or less questionable taste, he has accepted money for the translation in advance, and he has sought to throw discredit on our translation, which he has never seen, and to institute comparison with his own, which has never appeared.

Why Mr. Thompson thinks he has any exclusive claim on Gilbert it is difficult to see. Does he in his pride think Gilbert's mantle has fallen on ——? But no! For Gilbert, though dead for over two centuries, has rights that those of the present day must respect and we beg his pardon for even the thought. Very respectfully, WM. H. WILEY,

NEW YORK, Jan. 3, 1893. Of John Wiley & Sons.

The following letter appeared in the *Electrician* of December 9th, 1892:

SIR: My attention has been drawn to the paragraph in your "American Notes" on p. 135, in which there is astatement that a translation of Gilbert's "De Magnete" is about to be brought out in the States, and which further refers to the Gilbert Club, of which I have the honor to be one of the secretaries.

I think your American correspondent must be under some mistake in attributing the proposed translation to Mr. Mottelay, who is an honorable gentleman. He visited me at my laboratory rather more than a year ago, when we talked of Gilbert and of the Gilbert Club and its long-cherished work. He then begged me to enter his name in one of the then remaining places in the list of members, that in due time he might receive the copy of the English translation of "De Magnete." He is not the man to lend his name in an underhand way to an attempt to depreciate the careful work that has been going on for three years by the editing committee of the club.

As to this alleged American translation, it is quite enough for most persons to know that its publishers are to be Messrs. J. Wiley & Sons, of New York, who have earned for themselves evil notoriety by their pirated editions of Ruskin's works. The Gilbert Club may well ignore anything emanating from so tainted a source.

SYLVANUS P. THOMPSON.

James Dredge, editor of *Engineering*, has written the following letter to the *Electrician:*

To the Editor of the Electrician:

SIR: Prof. Sylvanus P. Thompson appears injured because a hard-working and singularly erudite American is publishing a translation of "De Magnete," the only conceivable reason for this emotion being that such a publication will make more ridiculous than they are at present the hitherto sterile pretentions of the "Gilbert Club," about which such a fuss was made some years ago by Professor Thompson. Since when did this abusive gentleman possess an international copyright in "De Magnete?"

The following facts may be of interest: Last autumn Mr. Mottelay came to consult me as to the course he should adopt with regard to the richly annotated translation he had made of Gilbert's work. He was divided between two opinions. He hesitated to do what he thought might interfere with the vague intentions of the "Gilbert Club," and he was very reluctant to allow injustice to be done to the "De Magnete," a result he feared would inevitably follow, owing to what he considered Professor Thompson's surprising want of knowledge on the subject.

I strongly advised him to publish, urging his absolute right to do so; the folly of allowing the great labor he had devoted to the subject to be wasted; the apparently doubtful, and in any case the limited, issue of the Gilbert Club programme, and, taking his statement for granted, the imperfect character of the translation if it ever were published. Mr. Mottelay decided to follow my advice, and Professor Thompson may therefore look to me as being primarily responsible in the matter.

The reputation of Messrs. Wiley & Sons needs no defense at my hands against the scurrilous attack of Professor Thompson. They rank as high as any publishers and gentlemen in the world. It is true that they published several American editions of Ruskin's works; and it is also true that they exhausted every possible means to pay a royalty on these works and only abandoned the attempt when, after many years, Mr. Ruskin refused to negotiate.

JAMES DREDGE.

LONDON, Dec. 21.

THE PERSISTENCE OF ORES IN LODES IN DEPTH.

Written for the Engineering and Mining Journal by Wm. P. Blake.

As the evidences multiply that most if not all of our metalliferous veins are due to the leaching of the surrounding rock formations by slowly percolating water, or rather by an endosmotic flow through the invisible pores of rock inward to fissures, rather than to the upward flow of water, or steam, in stronger currents from some remote deep-seated source, we are inclined to lose faith somewhat in the old comforting idea that the deeper we mine the nearer we get to the fountain source of the wealth we seek. If we accept the modified theory of lateral secretion of ores, do we not generally accept with it a fear that in mining we may sink below the horizon of the attendant chemical action, and so find a lode getting poorer instead of better in depth?

If the adjoining rocks are the sources of our ores and metals the presumption, fairly stated, is that the chemical action is rather superficial than deep-seated. We naturally suppose that the solvent action, and the movement of the solutions, must be greater within the region of the influence of surface waters, or where the flow may be strongest owing to the surface supply, to the evaporation or to drainage. I repeat that the tendency of the theories of lateral secretion seems to be to shake our faith in the full mineralization of lodes at great depths.

This train of thought is prompted at this time by the recent developments in the depths of the Dolcoath mine, 2,700 ft. below the surface, elsewhere described (this Journal, vol. XIV., p. 414). The fact that rich bodies of ore have been found there, ore bodies, or lode filling, richer and heavier than have been found above, goes to show conclusively the entire independence of lode formation, or lode filling, of any superficial influences. In this instance, as in others which may be cited, increase of depth does not show any impairment of the richness of the lode, but rather its betterment. We are not, however, justified in accepting the popular idea, or hope, that lodes grow richer and richer in depth. We shall be satisfied if it can be shown that lodes can be expected to maintain their average value at any depths we are ever likely to reach in mining operations.

In the discussion of this subject we must not lose sight of the varying conditions in composition of the enclosing rocks. We cannot expect uniformity of contents of a lode unless the enclosing or country rock is uniform. In the case of granite or other crystalline rocks we may assume that practically there is homogeneity and uniformity of composition to great depths. If a lode cuts different formations we must expect its contents to change with change of rocks either downward or horizontally. The change in Cornwall from copper-ore to tin-ore in passing from the killas into granite is a good example of this. Where lodes traverse stratiform rocks parallel with the bedding, the conditions as respect the chemical constitution of the walls may be assumed to be alike for great distances, and therefore we may look for similar mineral contents as far as these conditions extend. But when the lode traverses a group of beds transverse to the bedding, uniformity of mineralization, either in quality or quantity, need not be expected.

It is well known to those who are familiar with mining that lodes are often worked below the horizon of any water percolating from the surface or having its source, apparently, from the vicinity of the outcrops. The first two or three levels of a mine may be very wet, say to the depth of 300 or 500 ft. from the surface, below which the rocks do not appear to carry water, and levels driven at greater depths are nearly or quite dry, provided the water from the higher workings is not allowed to flow down to them, as is often the case. A very good example is found in the Allison Ranch gold mine, Grass Valley, Cal. This, a very wet mine, requiring a great outlay and large pumps to keep the water out, was a dry mine in depth. The water came from the upper levels. The Levant tin mine, Cornwall, England, at the Land's End, with its levels out under the bed of the Atlantic ocean for half a mile or more, presents the unexpected phenomenon of a dry and dusty level at the bottom, while the upper levels are wet. Hayward's gold mine at Amador City, California, at about 1,300 or 1,400 ft. in depth, was dryer than near the surface. Without multiplying examples, it may be said that in each of these mines there was no attendant diminution in the productiveness of the lodes, and so far the evidence is in favor of the non-dependence of the lode-filling upon the flow of waters near the surface.

In the lode formations of the granite rocks of Butte, Mont., and its vicinity, the metamorphic action of flowing solutions—we may say water—is clearly shown on every hand. It is very evident in the Valdemere, the Magna Charta, the Alice, Moulton and Rising Star and the adjoining claims; so also in the Lexington and in the Blue Bird, at Rocker, similar phenomena are found. In these mines, if anywhere, we must recognize the potency of an invisible endosmotic flow by which veins and veinlets are formed, the small veins typical of the larger; but the small veins apparently have rarely suffered the great sliding and crushing movements recorded in the massive lodes, and so have not had their contents crushed and mechanically mixed.

In my experience I do not know of a region where this question of lateral secretion and vein filling and the depth to which it extends, have been so constantly forced upon me as in the depths of the mines at Butte. In one or two instances where new and deeper levels were driven, and the lode was found to be poorer than the levels above, there seemed to be an actual demonstration of the dependence of mineralization upon the greater, or supposed greater, movement of mineralizing waters toward the surface, but in these same mines, on pushing down the shafts and winzes to greater depths, better levels and better ores were found. In the Alice mine, for example, some of the best ores come from the 1,200-ft. level. It is safe to say that at the greatest depths reached in the Butte granite there are signs of the alteration of the granite contiguous to the lodes, and in some places there are evidences of active oxidation far below the usual horizon of the oxidized ores at and above the permanent water level. The effects upon the hard and massive granite* are not unlike some of the phenomena of change and alteration visible in the granites of Cornwall, described by Le Neve Foster and others, effects produced apparently, at least, far below the influence of any surface flow or superficial conditions.

That climatic conditions are not without great influence upon the upper portions of veins is evident to all close observers. I do not now refer so much to the oxidation of sulphides above the permanent water level and the formation of comparatively barren gossans as to phenomena of outcrops in arid or desert regions where there is but little, if any, rainfall or humidity, and no visible source of water at or near the surface. In such regions—parts of Arizona, for example, or portions of the plateaus of Mexico—the tendency of any rock moisture is to rise to the surface. The plains covered with the white efflorescent *tequisquita* offer us an illustration. After a chance shower, or the flooding of the surface by water from some distant mountain, the saline incrustations disappear in the the earth, the water evaporates, and the salts then begin to rise to the surface and to concentrate and crystallize, and the expanse of brown mud becomes sheeted with the white salts. The action of the sun and the arid air is to remove the water, and fresh supplies coming up from below bring with them the salts in solution. A similar action goes on in such regions in the upper portions of mineral veins. The evaporation brings fresh accessions of soluble mineral salts and the outcrops of veins so situated are often much richer in metalliferous contents than the body of the lode at greater depths. This, which apparently contravenes the position already taken, refers only to the *affleurement*, "blossoming," or outcrops of lodes, yet it does show that there is an upward flow due to atmospheric conditions constantly drawing moisture upward, and we can readily imagine that in all regions there must be more or less movement up and down of solutions in the pores of rocks due to atmospheric conditions and the water supply.

In rainy and humid regions the soluble salts are washed out of outcrops and carried away in rivulets, or rivers, or descend through the earth to lower levels. The great beds of cupriferous pyrites of Ducktown., Tenn., are good illustrations of this class of phenomena. The beds above the permanent water level have lost their copper by leaching and only a honeycombed mass of ferruginous gossan is left. The copper solutions have filtered downward, and meeting the surface of the unchanged pyrites at the water level giving off by slow alteration more or less sulphurous gases, the solutions were reprecipitated in the form of black sulphides and oxides. In this instance we have a case of a layer of rich ore at the water level between the unchanged pyrites below and the leached out lode above, the reverse of the condition I have described as occurring in arid regions, for in Arizona in such a bed the richest copper ore would have been at the surface.

There is another phenomenon of mineral veins particularly observable in dry regions, where there is a considerable variation in the level of the permanent water underground. The ebb and flow of the underground water standing in the lode tends to wash out the contents of the lodes and leave only barren skeletons of veinstone for several feet up and down or between high and low water mark in the lodes. In the company of the late and lamented I. E. James, formerly known to all miners upon the Comstock Lode, I examined and found these conditions remarkably well shown at the water level in the Contention Mine, Tombstone. All above that point was crushed and fragmentary, and although yielding millions, belonged rather to the outcrop than to the normal unchanged lode, to be found only below the permanent water level.

Laying aside the consideration of the outcrop of veins, and their modifications by climatic and other agencies, one object of this paper has been te show that whatever view we may take of the source of the mineralization of lodes, we may conclude from the evidence that it is deep-seated, and in a homogeneous country rock may be expected to extend as far as we can ever reach downward in mining operations.

[To this interesting article by Professor Blake we call the attention of our readers and invite criticism and articles embodying the experience and conclusions of other engineers on this important subject.—Ed. E. and M. J.]

* These effects are described in part in my reports upon the Alice mine, and papers in Trans. Inst. Min. Engrs.

MICA AND MICA MINES.*

By C. Hanford Henderson.

The name mica is not that of a single mineral, but is a family cognomen which includes a number of varieties, all of which shine and split into more or less transparent sheets highly elastic and having certain ingredients in common. The following seven well-defined minerals have all these properties: Phlogopite, a magnesia mica, commonly of bronze or copper color; biotite, or black mica, a magnesia-iron mica, of dark green or black color; lepidomelane, an iron-potash mica, of black or green color; astrophyllite, a rare titanium mica, whose powder resembles mosaic gold; muscovite, or common mica, a potash-aluminum compound of varying color—white, gray, brown, green, and even violet or rose; lepidolite, or lithia mica, a mineral of pearly luster, and grayish to rose or violet color; cryophyllite, a very rare lithium mica, of greenish color.

Were the micas only important as a rock constituent, they would doubtless receive very careful study, but in addition to this their characteristic physical qualities, their transparency, elasticity, laminar structure, luster, comparative infusibility, and electrical non-conducting power, give them a number of applications in the arts, and make them the object of industrial mining. The mica of the market is in nearly all cases the common white mica or muscovite. Although mica is so widely distributed in nature, it is only in a few localities and when fissures in the rock have been filled with very coarsely crystallized granite that the mica can be mined with profit.

Such fissure veins occur in a number of localities, notably in Siberia and Norway on the other side of the water, and, in our own country, in New Hampshire, in North Carolina, in Wyoming, in New Mexico, in the Black Hills of Dakota, and probably in paying quantities in Alaska. Of late years the importation of mica from the East Indies has been quite heavy and has closed many of the American mines. The recent tariff of thirty-five per cent. is leading to their partial reopening.

All these mines are more or less alike so far as their natural features are concerned. The chief differences are artificial, and consist in the methods of mining and handling the mica. The mines of western North Carolina have been largely exploited and may well serve as a type.

As one travels across the State to the westward, one passes over three distinct belts of country: the lowlands, covered by recent alluvial deposits; the middle or Piedmont section, a low plateau underlaid by older sandstones and shales; and, last of all, the western or mountain section, in which the Appalachian system reaches its finest development, and in Mount Mitchell its culminating point. The trend of the rocks in this mountain section is pretty evenly northeast and southwest; they dip at angles which are generally forty-five degrees or over. There are a few mica mines to the east of the Blue Ridge, but the most of them and the best lie to the west. Once beyond this barrier, and evidences of mica abound on all sides. There are giant upthrows of granite and gneiss, and these are full of fissures carrying the coarsely crystallized matrix in which the pay mica is found.

Many of the veins occur in a fine-grained black gneiss, which passes with the mountain miners under the name of "slate." The vein generally dips with the bedding of the gneiss, but occasionally it changes abruptly and cuts across the strata. In some of the mines the vein does not come to grass, as the miners say, but only begins some distance below the surface. The veins vary in thickness from less than an inch to ten or a dozen feet, occasionally to as much as thirty or forty feet, but these instances are rare. In places the vein pinches out completely and is practically lost, or is cut off perhaps by a large mass of displaced country rock.

The contrast between the vein stuff and its containing walls is very striking and often very beautiful. The "slate" is almost black, and is generally clean and glistening, while the vein itself is almost snow-white. This is due to the feldspar with which the fissure is filled. It breaks with a clean, smooth cleavage, and shows on such surfaces a brilliant, pearly luster. Interspersed with the feldspar are masses of grayish-white quartz and occasional blocks of the coveted mica.

It would be of great interest to know how these three minerals got into the vein and arranged themselves in their present form. The fissures themselves are doubtless simple cracks formed by those shiftings and readjustments which are constantly going on in the surface rocks of the earth. The most reasonable supposition is that the material came into the vein in a condition of aqueo-igneous fusion. The question as to which mineral separated first would seem almost hopeless. There is quite strong circumstantial evidence to show that the mica was the first to form, as it is much more uniformly crystallized than either of the other two minerals, and frequently leaves the impress of its lamina on the crystals of quartz. After the mica, the feldspar probably separated; and, last of all the silica that was left over after the formation of these two minerals collected into crystals of quartz.

The discovery of the mines has been largely accidental. So far as I have been able to learn, the first one opened was the Sinkhole Mine in Mitchell County. The spot was marked by the existence of trenches, many hundred feet long in the aggregate, and in places fully twenty feet deep. Large trees growing on the debris indicated that the workings were very ancient. It was supposed that they had been for silver; and when the trenches were reopened at the close of the war, the search was for that metal and not for mica. The search for silver being unsuccessful, the mines were again abandoned. The mica that had been thrown out was left on the dump, and soon advertised the real character of the mine. A stock-driver, passing that way, carried a block of it with him to Knoxville, where it attracted the attention of men acquainted with its value. They investigated the matter, emigrated at once to Mitchell County, and began systematic mining for mica. As the mineral was then selling for from eight to eleven dollars a pound, the rewards were considerable, and much enterprise was shown in the development of the industry. The first-comers had the easy and profitable task of simply preparing and shipping the mica that had been already mined, and they enjoyed the further advantage of an undisturbed market. So profitable an enterprise, however, soon attracted others.

In most cases the mining has been decidedly incidental in its character, and has been abandoned as soon as water was reached, or as soon as the yield of mica ceased to be immediately profitable. Perhaps the most famous of the Carolina mines is the Clarissa, near Bakersville. It was opened soon after the Sinkhole, and is said to have produced more mica than all the other mines in the county combined. The vein is from four to twelve feet thick, with an average of about six. It has been followed to a depth of over three hundred feet. The mine is now idle and full of water.

When the vein stuff has been blown down, it is an easy matter to separate the blocks of mica from the feldspar and quartz. These blocks of mica are in the shape of rough hexagonal prisms (monoclinic), and if of any thickness are quite opaque. They vary in color from silver-gray and green to a rich, almost ruby-brown. This last is known as "rum" mica, and sometimes commands an extra price.

The mica is seldom prepared for market at the mine itself, but is taken to a conveniently located glass-house.

Here the mica is put into shape for shipment. The blocks vary greatly in size. One from the Wiseman mine, near Spruce Pine, is reported to have been six feet long by three wide. Pieces a yard in diameter have been obtained at the Ray mine, in Yancey County, and similarly large plates have been found in Siberia, but these are exceptional. The average block is little larger than the page of a magazine, and is generally less than six inches in thickness. It separates very readily into sheets parallel to the base of the prism. It is estimated that this cleavage may be carried so far that it would take three hundred thousand of the mica plates to make an inch. The mica is generally split into plates varying from about one-eighth to one-sixty-fourth of an inch in thickness. In preparing these plates for market, the first step is to cut them into suitable sizes. Women are frequently employed in this work, and do it as well as, if not better, than the men. The cutter sits on a special bench which is provided with a huge pair of shears, one leg of which is firmly fixed to the bench itself, while the movable leg is within convenient grasp.

The patterns according to which the mica is cut are arranged in a case near at hand. They are made of tin, wood or pasteboard, according to the preference of the establishment. Generally they are simple rectangles, varying in size from about four square inches to eighty.

The cutter selects the pattern which will cut to the best advantage, lays it on the sheet of mica, and then, holding the two firmly together, trims off the edges of the mica to make it correspond with the pattern.

The cleaning process comes next. The cleaner sits directly in front of a window and must examine each sheet of cut mica by holding it up between her eyes and the light. If there be any imperfections, and there nearly always are, they must be removed by stripping off the offending layers of mica until a clear sheet remains.

Finally, the cut and cleaned mica is put up in pound packages and is ready for the market. There is an enormous waste in the processes of preparation. One hundred pounds of block mica will scarcely yield more than about fifteen pounds of cut mica, and sometimes it is even less. The proportion varies, of course, with different localities.

The chief use of the cut mica is in stoves. In Siberia the sheets of mica are still sometimes used in windows. The sheets are also used in the peep-holes of smelting furnaces, in lanterns, in shades, and in the port-holes on board naval vessels, where the vibrations would soon demolish less elastic glass. Mica is an excellent non-conductor, and of recent years has been cut to some extent into narrow strips for use in the construction of dynamos. The scrap mica was formerly thrown away, with the exception of a small quantity used as a lubricating material, but it has recently found a market in several new directions. Old waste heaps are being bought up, for a few dollars a ton, and their contents cleaned by being pased through a rough mill. This is simply a rotating cylinder of coarse wire screen with its axis slightly inclined to the horizontal. The scrap is fed into the upper end of the cylinder, and slowly discharges itself from the lower end. As it makes its way from end to end, the sand and trash are supposed to fall through the meshes of the screen. The cleaned scrap is then ground into a coarse powder and distributed to the various industries requiring it. Large quantities are used in the manufacture of wall paper. Considerable amounts are used to produce the snow effects on Christmas cards, and in stage scenery and other tinsel; while smaller packages, under the name of diamond dust, are sold as powder for the hair. Much of the ground mica is sent to France, and this, oddly enough, when the East Indian sheet mica is pressing our own pretty heavily in the home market.

*Abstract of an article in the "Popular Science Monthly" for September, 1892.

Quadruple Expansion Engine for a Diamond Mine.—Fleming & Ferguson, of Paisley, Scotland, have just completed a quadruple expansion engine of 500 I. H. P. for a diamond washing plant at Kimberley, South Africa. The price of coal at Kimberley runs to about $45 per ton, and economy of consumption is therefore highly necessary. This is the first quadruple expansion engine sent to South Africa, and its performances will reduce the expenditure of the diamond company considerably.

Petroleum as a Fuel for Torpedo Boats.—The French government have recently conducted some experiments at Toulon to ascertain whether it would be possible to use petroleum as a fuel for torpedo boats. The smaller space occupied by petroleum per useful thermal unit would make its use highly desirable if safety from fire and explosion could be insured. In order to obtain information on this point the authorities floated on a raft ten cases of petroleum protected by steel plates similar to the sides of a torpedo boat. A quick-firing gun of 1·83 in. caliber was placed on a floating pontoon 100 metres away. Twelve shots were fired at the plate with the result that eight of the cases were ignited. The authorities concluded that the unsafety of petroleum as a fuel for torpedo boats was thoroughly demonstrated.

BRISTOL'S RECORDING PRESSURE GAUGE FOR SMALL RANGES OF LOW PRESSURE.

It is now some three years since Mr. W. H. Bristol, of Hoboken, N. J., introduced his sinuous tube recording pressure gauge. These gauges have proved generally successful, but it has been found impracticable to make gauges on the flattened sinuous tube principle that would be sufficiently sensitive to register extremely small ranges at low pressures. A new form of gauge has, therefore, been invented by Mr. Bristol to meet the case, and this was described in a paper by him read before the last meeting of the American Institute of Mechanical Engineers.

Small ranges at low pressures are met with in the case of illuminating gas in street mains, when the total range rarely exceeds two ounces per square inch. For such low pressures it is necessary to offer a very large area for it to act against. This is effected by arranging a series of corrugated diaphragms in pairs and joined as shown, with a continuous opening through the line of centers. The pressure acts simultaneously on the interior of every pair, and thus produces an elongation of the whole. Along the edges of the diaphragms on one side is fixed flexible strip B, and this strip prevents that side of the set of diaphragms from expanding. The recording arm which is fixed to the top of the tube thus receives its deflection without the aid of any multiplying mechanism. The strip thus stiffens the diaphragm tube and also produces a greatly multiplied lateral motion. The recording pen is attached directly to the end of the tube, and the dial plate is revolved by clockwork as usual.

This gauge would, in all probability, be of considerable value about coal mines when it is necessary to have a check on the working of blowers, or an exact record from which the amount of air furnished for ventilation could be calculated.

EFFECT OF HIGH TEMPERATURES ON METALLIC OXIDES.

Mr. Henri Moissan describes, in Comptes Rendus, some experiments on the effect of very high temperatures on metallic oxides. The furnace employed was made of two blocks of quicklime placed one over the other. The lower one was grooved to receive two electrodes and was hollowed out in the center so as to form a crucible. Three series of experiments were conducted: 1. With a current of 30 amperes at 55 volts, the temperature being registered as 2,250° C.; 2. With a current of 100 amperes at 45 volts, temperature 2,500° C.; and 3. With a current of 450 amperes at 70 volts, temperature 3,000° C. The oxides were first ground to powder. The carbon electrodes were previously submitted to the action of chlorine at a high temperature and afterward cooled in a stream of nitrogen. The tips of the carbons at the end of each experiment were found to be converted into graphite, and at the end of the third series of experiments the lime walls of the furnace melted and ran like water. The results of the experiments with various oxides are given herewith.

Pure lime (CaO), when submitted to a current of 25 amperes at 50 volts became quickly covered with bright white crystals. Complete fusion was obtained with 350 amperes at 70 volts, and the molten mass afterward crystallized confusedly.

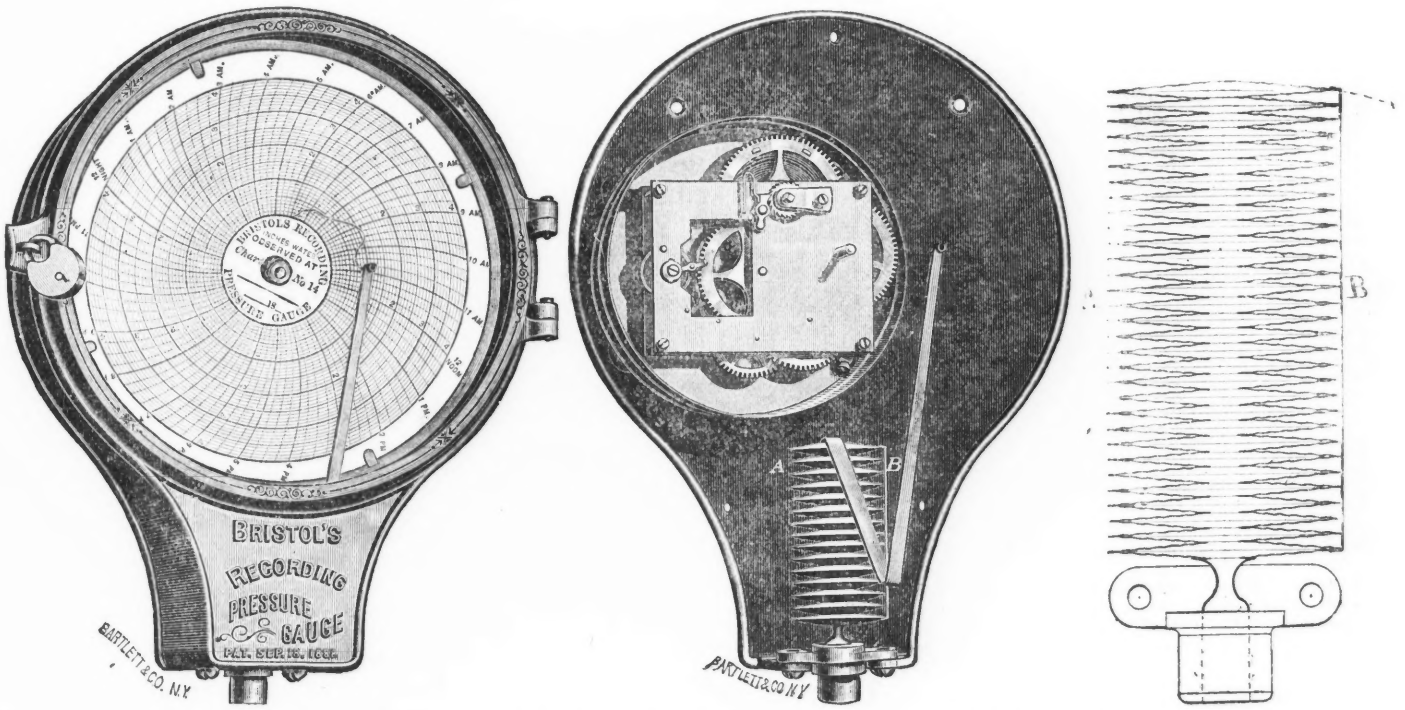
Strontia crystallized at first in the same way as the lime. At about 3,000° C. it melted into a transparent liquid, which on cooling crystallized confusedly. Baryta became liquid at 2,000° C. and remained intact at 2,500° C. On cooling it became a confused mass of crystals. Magnesia did not crystallize until a temperature of 2,500° C. was reached. When the current was increased to 360 amperes at 70 volts, the crystals melted. Alumina (Al_2O_3) melted at about 2,250° C. If a little sesquioxide of chromium was added, small red crystals of ruby detached themselves from the mass. When the alumina was exposed to a current of 75 amperes at 25 volts, it was volatilized.

Sesquioxide of chromium melted when exposed to a current of 30 amperes at 5 volts, and gave a black mass bristling with small black crystals. Dioxide of manganese when exposed to a similar current melted, boiled, and liberated oxygen; liquid protoxide was formed which soaked into the lime. Sesquioxide of iron melted also and evolved oxygen, forming magnetic oxide in a liquid or partly crystalline state. Protoxide of nickel left a fused mass covered with small transparent green crystals. Protoxide of cobalt gave rose-colored crystals. ,

Peroxide of titanium, when submitted to a current of 25 amperes at 50 volts, gave beautiful black prismatic crystals whose properties and appearance resembled protoxide of titanium. Oxide of copper was completely broken up at 2,500° C. Oxide of zinc was volatilized in a few moments, and long transparent flakes were deposited on the carbons. Oxide of uranium was reduced at 3,000° C., and in ten minutes a piece of uranium metal weighing 120 grammes was obtained.

THE QUANTITATIVE SEPARATION OF SILVER AND LEAD.

In the Zeitschrift fur Analytische Chemie Messrs. R. Benedict and L. Gans described a new method of quantitatively separting silver and lead. It is founded on the different behavior of silver and lead iodides with dilute nitric acid. First the metals are prepared in the form of nitrates by dissolving either the alloy or the galena in nitric acid. The addition of an equal quantity of tartaric acid will hasten the solution. The solution of nitrate is diluted with cold water so that there shall be 0.5 gramme of metal in 200-300 cc. This solution is placed in a capacious glass capule and about 10 cc. of a 10 per cent. solution of potassium iodide poured in. This is more than sufficient in all cases to precipitate the silver. Then 10 cc. of nitric acid diluted with 10-20 cc. of water is added and the capsule is covered with a watch glass and heated on the water bath. As soon as the liquid has become hot the lead iodide dissolves, the liquid becomes dark brown and vapors of iodine are given off. The watch glass is then removed and rinsed into the capsule, and boiling water is added. The capsule is left on the water bath, and water is added from time to time to compensate for the loss by evaporation. This is continued until the liquid has become colorless or pale yellow, i. e. when the iodine has been all expelled. The silver iodide is then collected in a small glass tube, filled with glass wool, and it is afterward dried and weighed. Before drying it is best to wash it in hot water containing a little nitric acid and afterward in hot water alone. The presence of other metals of the same group, with the exception of mercury, does not interfere with the process. Sodide of copper, bismuth and cadmium behave in the same way as lead iodide. Mercurous iodide is converted into red iodide, which is not further attacked.



BRISTOL'S RECORDING PRESSURE GAUGE FOR SMALL RANGES OF LOW PRESSURE.

A Large Mineral Collection.—The largest and richest private cabinet of minerals in America is said to be that of Mr. Clarence L. Bement, of Philadelphia. His collection fills nearly a whole floor of his large house, which is lighted with special reference to seeing his treasures to advantage, and none of the great public museums have specimens of a size, beauty and perfection to surpass those that he has been patiently gathering for the past 20 years or more. The leading dealers in this country have standing orders to send him the best of what comes to them, and they willingly do so, for he is prompt and liberal in his payments, being a gentleman not only of enthusiasm, but of ample fortune. What he does not take is sent to the British Museum, as the second best buyer. It is said that Mr. Bement's cabinet is worth $125,000.

THE TREATMENT OF COPPER ORE AT BOGOSLOWSK, RUSSIA.*

By M. Weiss, M. E.

The works of Bogoslowsk are in reality the only successful ones in the Urals. Some ten years ago the State Counsellor, Polortzof, purchased for 6,000,000 rubles this mineral district, covered by forests and abounding in ores of iron, chromium copper and gold, and which has been systematically explored by the director of the district, M. Auerbach, mining engineer.

The copper works are situated at the village of Bogoslowsk, in the department of Perm, 238 versts north of Kouchva, a station on the railway between Perm and Tioumen. The copper mines are 6 kilometers from the reduction works, and are reached by a narrow gauge road which is prolonged for 50 versts to the Sosva River. This railroad is employed to haul the ores to the works and to transport the copper to Filkina, the point of embarkation on the Sosva River, from whence it is carried by boats to Tioumen.

From Tioumen they send the copper by the railroad to Perm, thence by the Kama River to Nijni Novrogod, where is the principal market for the metal. But one shipment of copper is made annually, and that in the springtime when the melting of the snows permits of the navigation of the rivers. The Bogoslowsk works are too far distant to utilize the bituminous coals of poor quality which are produced in the Urals, so that the only fuel used is wood. The wood is cut in the autumn, then transported in winter on sleds or on rafts in the spring when there is high water in the numerous small rivers of the district.

Ores.—The ore treated is a cupriferous pyrite, which occurs in veins in diorite, carrying 4 to 5% copper. The composition, after analyses made in 1889, is as follows:

	Bachmakoff.	Rachette.	Troitzky.	Pestchank.
S.	10·04	1·58	0·33	1·52
SiO_2	14·93	37·05	45·70	32·70
Fe_2O_3	55·42	19·61	18·85	26·42
Al_2O_3	1·84	2·39	3·41	1·53
MnO	0·50	0·55	0·46	0,85
CaO	5·68	11·75	10·75	25·17
MgO	Traces	Traces	.....	.....
CuO	5·62	3·88	3·41	1·59

The copper mines have become poor in depth, and since 1881 the percentage of copper in the ores heated has steadily declined. In 1881 the average was 10·09%, while in 1887 it was but 5·28%. In 1890 the mines of Rachette hoisted 21,967 tons of ore, which when sorted by hand gave 10,780 tons of crude ore. The Bachmakoff mines raised 17,255 tons in the same period, which were sorted to 15,408 tons. These ores were then partially roasted at the mines, yielding 10,266 and 14,200 tons, respectively. The Troitzky and Pestchank mines are merely prospects, and as yet have furnished but insignificant quantities of ores.

The average cost of the roasted ores on the ground at the mines is 10·424 roubles† per ton, divided as follows:

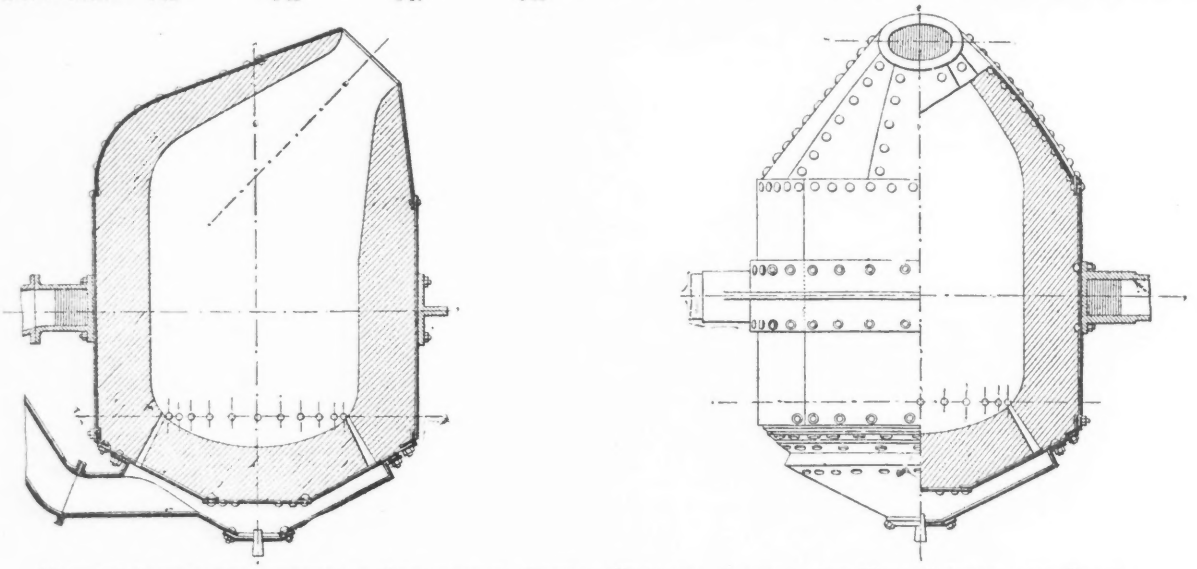
	Rachette.	Bachmakoff.
Draining	1·62	0·582
Drilling	3·78	1·362
Development work	3·168	2·061
Prospecting	0·038	0·198
Wood cutting	0·79	0·228
Filling	0·03	0·048
Tramming	0·708	0·360
Hoisting	0·288	0·276
Sorting	0·792	0·156
Roasting	0·334	0·594
Various work	0·012	0·012
Amortisement of plant	0·27	0·198
Filling wagons	0·036	0·120
Unforseen expenses	0·51	0·372
General charges	0·518	0·792
Amortisement of mine		0·365
	11·314	7·728

The Reduction Works.—These works, which were at a standstill in 1875, when the property belonged to the Crown, have undergone great improvements since 1881, at which period they came into the hands of M. Polortzof. The former treatment consisted in roasting the ores in heaps and in several furnaces and in smelting copper-iron matte to copper. This iron-copper matte was roasted in several furnaces, then smelted to black copper in a *spleissofen*. The black copper, containing 90% copper, was refined in a reverberatory furnace. M. Auerbach, the manager appointed by M. Polortzof, began to change the old system, and among other departures he introduced the smelting for white-metal of 60% copper. Later, in 1886, he began to consider the employment of the Bessemer converter, which up to that time had given poor results. The attempt was entirely successful, and if the Bessemer process has not completely replaced the old system it is due to the fact that the eight Bessemer converters erected have not sufficient capacity to treat the increased production. In 1890 there was produced 2,745 tons of black copper from the converters, 30 tons in the shaft furnace, and 687 tons in the *spleissofen*.

The Bessemer Process:—The application of the Bessemer process to copper mattes presents great difficulties. When the production, at one operation, of black-copper from iron-copper mattes, is attempted, the temperature of the metallic bath falls very low toward the end. At the beginning, owing to the combustion of the iron and sulphur, the temperature is high: at the end, however, the black copper is scattered through the extremely fluid matte and sponges are formed which thicken the bath and are violently cast out by the blast. It is owing to this that large losses of copper occur. At the end the copper obtained is spongy, poor, and is refined with difficulty. M. Auerbach divided the operation into two parts, a first oxidation giving a white metal containing 60% copper and a second, black-copper of 96%, with the great advantage of separating the poor slags of the first operation from the rich ores of the second. This division has caused a considerable improvement, less copper is lost and there is but a slight increased expense owing to the fusion of the matte in a reverberatory furnace. In a converter of the Manhès type the tuyeres are in a horizontal position almost at the surface of the bath. Shortly after the beginning of the operation, slags are abundantly formed on the surface. The blast then acts on these slags and not on the matte, and the oxidation is considerably less energetic.

If these tuyeres are placed vertically at the bottom, as in the Bessemer converter for steel, the black-copper remains at the bottom, owing to the difference in specific gravities between it and the matte, the blast then blows through the copper, giving rise to projections of the matte and losses.

M. Auerbach places the tuyeres at an angle of 45°, and so calculates



MANHES' COPPER CONVERTERS AT BOGOSLOWSK, RUSSIA—(VERTICAL SECTION AND HALF SECTION AND PLAN).

the quantity of the charge that when the white metal or black copper is formed, the surface of the separation of the matte or of the copper and of the slag is almost at the outlet of the tuyeres. In this manner he does not blow through the slags nor does he oxidize the product, rich in copper, which remains at the bottom.

One of the causes which led to the abandonment of Manhès process by the Vivian works was the enormous consumption of refractory materials. The melted white-metal is extremely corrosive; in a short period it eats through the hearths of the reverberatories and corrodes strongly the sides of the converter. As in the Bessemer process for steel it is impossible to charge silicious sand without freezing the bath, the scorification therefore is made at the expense of the lining. When the use of high quality refractory materials is attempted, after a few blows the lining must be replaced. This raises considerably the cost of producing copper. M. Auerbach has ceased to employ refractory materials of good quality, finding that the ordinary clay found close to the works answers sufficiently well for the linings of both reverberatory furnaces and converters. This common clay is hardly attacked any more than silicious bricks, and is replaced with slight expense. Under these conditions the modified Manhès process has become a success.

In August, 1891, the Bessemer works, built at a cost of 200,000 rubles, consisted of eight convertors, in two groups, with two reverberatory furnaces for each group. In a group of four converters, one is in operation, one being repaired, one is cold and the fourth is being reheated.

First Operation.—The mattes are obtained by a fusion of the copper ores in the furnaces of the old plant. They contain on an average 20% copper. They are raised by means of a hydraulic hoist to a higher level than the reverberatory furnaces, and are then shoveled into them. Each charge is of 1·6 tons, and the fusion lasts about three hours. The consumption of wood is about 1 cubic metre per ton of matte. When the matte is melted the converter is turned horizontally and the matte is run from the furnace to the mouth of the converter through a movable trough lined with a mixture of charcoal and quartz. When the furnace is empty the converter is turned back and the blast commenced.

The first operation is to eliminate the iron and to obtain a rich white metal; it does not last over 25 to 30 minutes. The combustion of the iron

* Translated for the ENGINEERING AND MINING JOURNAL from an article in the *Annales des Mines*.

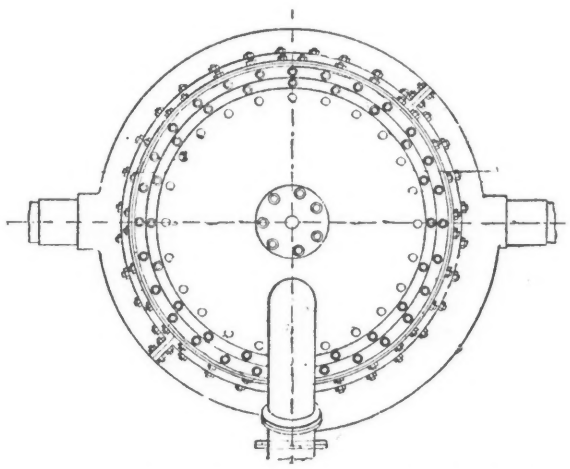
† The rouble which is used in calculation throughout is equal to 58.8 cents.

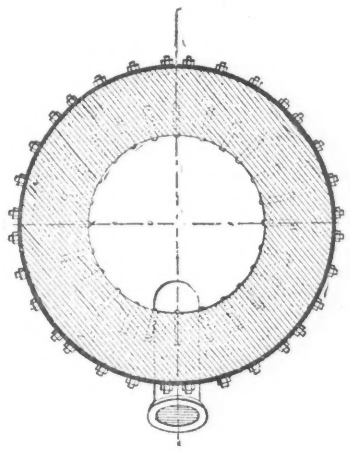
and the sulphur rapidly raise the temperature of the float; the flame, which laps the mouth of the converter, is yellow, violet edged, and is crossed by brilliant sparks. When the flame diminishes and becomes green it is a sign that the iron is burnt, and when it becomes entirely green the operation is ended, and the matte is run into molds. After cooling the slag is separated from the matte by the blow of a hammer. The white metal matte averages 64% copper.

Second Operation.—The white metal is remelted in a reverberatory and is then treated as in the first. This second blow is more difficult than the first. The temperature is very low, owing to the scarcity of sulphur, and this, which is the chief impurity to be eliminated, is not disengaged at a low temperature. At the moment the metal threatens to congeal, when the projections appear, charcoal is thrown into the converter to raise the temperature. Two workmen remain constantly by the converter clearing the tuyères with iron rods. The blow lasts from one hour and thirty minutes to two hours. It is considered finished when on introduction of a shovel in the converter the projections, which solidify upon it as they descend, are no longer of white metal. The flame which was green at the beginning is now yellowish red. The slag flows out first when the converter is turned, and then the black copper, which later is refined in a reverberatory furnace. The slag contains about 5% copper. In the same converter there are three or four operations for white metal, then two for black copper, and then two or three again for white metal in order to dissolve the masses of copper which remain in the converter.

ANALYSIS OF THE VARIOUS PRODUCTS OBTAINED BY THE MANUFACTURE OF COPPER BY THE BESSEMER PROCESS.

	White metal.			Black copper.		
	1 Poor blow.	2 Good blow.	3 Poor blow.	From converter.	From spiess of ld.	From copper furnace.
Cu	75·08	68·60	76·76	95%	97 72	92 72
Fe	3·52	7·50	2·06	.....	0·04	5·28
Ni and Co	0·82	0·51	0 76	.....	0·35	1·42
Ag	trace.	trace.	trace.	.....	trace.	trace.
As. Sb	0·08	0·05	0·01	.....	0·17	0·65
Sn	0·07	.....	.....	.....	.....	.....
S	20·34	23·22	19·46	.....	0·01	trace.
Q	.....	.....	.....	.....	1·81	0·69





MANHES' COPPER CONVERTERS AT BOGOSLOWSK, RUSSIA—(HORIZONTAL SECTION AND PLAN OF BOTTOM).

ANALYSIS OF SLAGS FROM MANUFACTURE OF WHITE METAL.

	No. 1.	No. 2.	No. 3.
SiO_2	27·28	33·70	30·54
Al_2N_3	3·74	1 62	3·84
Cu	1·62	0·81	1·74
Fe	44·98	47·59	47·18
Ni and Co	0 78	0·76	1·10
Sb. As	trace.	.. ..	.. .
Sn	0 21	.....	...
CaO	0·42	0·95	0·50
MgO	0·11	0·38	0·11
S	0·82	5·93	0·76
O, etc	15·34	8·23	14·23

The following is the details of labor required in a Bessemer plant:

Foreman at 50 roubles per month, receiving a bonus of 0·5 rouble for each blow over five made in twelve hours	1
Machinist to operate, the matte elevator, etc., at 25 roubles per month	1
Workman to weigh the matte at 0·55 rouble per day	1
2 smelters at the reverbatory furnaces at 1 rouble	2
2 firemen for the reverbatory furnaces at 0·85 rouble	2
2 workmen at the converters at 0·75 rouble	2
2 workmen clearing the tuyeres of converter at 0·75 rouble	2
2 tappers at 0·75 rouble	2
4 workmen for repairing converters at 0·80 rouble	4
2 workmen to remove the matte and to bring wood at 0·80 rouble	2
Total men	17

The Cost of Various Methods of Producing Copper in 1890.—These details do not include the general charges, save in the case of the iron-copper matte formed at the first fusion, to which are charged the general expenses of the works, but not of the entire property.

The Manufacture of Copper-Iron Matte.—In 1890 there were mined 37,388 tons of ore at a total expense of 247,734 roubles, or 6·59 roubles per ton. This cost was extremely low owing to the treatment of a large quantity of old ore which had been considered of low grade and which had been left at the surface of the mine. In addition, the following materials were smelted:

	Tons.	Value according to contents in copper. Roubles.
Slags from spleissofen	4,848	28,396
Slags from Converters, { No. 1, from white matte blows	944	3,286
{ No. 2, from fusion in reverberatory	404	8 669
{ No. 2, from block copper blows	309	3,649
Slags from the smelting for copper-iron matte in shaft furnace	1,288	5,218

The costs of smelting were:

Labor	30,388
Fuel	101,637
General charges of works	10,364
	142,384

There were obtained 10,026 tons of matte of the value of 46·2 roubles per ton. The cost per kilo of copper, including mining, amounted to 0·23 rouble.

Manufacture of Black Copper in the Shaft Furnace.—There were treated 1 805 tons of copper-iron matte:

Cost of smelting and roasting	8,113
Cost of the matte	76,511
Fifty-six tons of silicious flux	500
	85,124

There were obtained:

Tons.		Roubles.
27·35 of 93% black copper, valued at		12.245
408·46 of Dunnstein,	"	65,813
1,620·23 of slags,	"	7,193

The values of the products are calculated according to the copper contents. The cost of a kilo. of black copper was 0·447 rouble, or per kilo. of copper, 0·48 ruble.

Manufacture of Black Copper in the Spleissofen.—There were smelted in these furnaces the following material:

	Tons.	Value roubles.	Percentage of copper.
Copper-Iron-Matte	4,160·05	172,325	18·4
Dünnstein	425·58	70,121	50·0
White metal from converters	254·68	42,634	64·0
Fumes and dust from converters	51·61	5,136	44·5
Slags from refining	113·31	16,936	51·0
Dust and fumes from spleissofen	30·10	.....	34·2

The production amounted to 687·96 tons of 967· black copper and 4,466 tons of slags of a value of 57,340 roubles.

	Roubles.
Value of material smelted less value of slags	249,812
Cost of fusion—Labor	11,230
Wood	19,270
Various costs and supplies	9,802
Total	290,114

Cost per kilo of black copper 0·424, or per kilo of copper 0·441.

Manufacture of black copper by the Bessemer process, there were treated 51,013·16 tons of an average of 19·05% copper and a value of 220,418 roubles; 3,825 blows for white metal were made, and 887 for black copper. Each blow cost 7·86 roubles.

The expenses were divided as follows:

	Roubles.
Labor	13,245
Fuel	11,506
Various costs and supplies	12,208
Total	37,059

In the blows for white metal there were obtained:

	Tons.	Values roubles.	Contents in copper, per cent.
White metal	1,549·21	238,892	63·29
Slags from melting of matte in reverberatory	337·85	8,669	10·20
Slags from converter	960·26	3,311	1·80

The cost of the white metal is considered as including all the expenses upon the cost of the matte, with the deduction from this sum of the slags valued according to their contents in copper.

In the second operation for black copper there were treated:

	Tons.	Value in roubles.	Contents in copper, per cent.
White metal	1,418·70	219,162	63 80
Dünnstein	104·21	15,692	48·90

There were obtained:

	Tons.	Value in roubles.	Contents in copper, per cent.
Black copper	745·80	231,935	96
Slags from converter	383·01	3,792	5·70
Dust " "	64·16	6,102	14·69
Cost per kilo of black copper		0·3108 rouble.	
Or per kilo of copper		0 322 "	

Refining of Black Copper.—In 1890 there were refined the following quantities of black copper:

	Tons.	Value in roubles.	Contents in copper, per cent.
Copper furnace	315·50	14,859	93
Spleissofen	696·25	291,365	96
Bessemer	777·40	238,913	96
Treatments of old "loops"	6·23	2,575	...

The expenses of refining were:

Labor	2,704
Fuel	2·833
Various costs	693
Total	6,230

There were obtained 1,383·8 tons of pure copper and slags containing 527· copper, valued at 17,656 roubles. The 1,383·8 tons of copper cost, therefore, 536,266 roubles, or, with 27,700 roubles added for the general charges of the works and 47,646 roubles for the general charges of the estate, the total cost amounted to 601,612 roubles, or 0·43 rouble per kilo. The state tax is 0·03 rouble per kilo. and the freight to Nijni Novgorod the same. At Nijni, the copper market, the cost of the copper amounted to 0·49 rouble per kilo. This review of the cost of producing black copper demonstrates the advantage of the Bessemer process for treating pure ores. The process is being perfected daily and will replace the old methods.

THE RUSSELL PROCESS AT THE BLUE BIRD MINE, MONTANA.

Written for the Engineering and Mining Journal by C. A. Hoyt.*

The Blue Bird, 80-stamp, dry crushing, chloridizing-roasting and amalgamation mill was built in 1886, and for a time worked the ores of this mine with considerable success, but as time went on the percentage of base minerals increased and the extraction decreased until the management deemed it advisable to experiment with other processes. 17% higher than was obtained by amalgamation from this class of ore, was shipped to the Marsac Mill of the Daly Mining Company, Park City, Utah, in which the Russell process was used, for experiments by this process. The results were satisfactory, the percentage extracted being 17% higher than was obtained by amalgamation from this class of ore and the late Ferdinand Van Zandt erected a lixiviation annex to the Blue Bird Mine, with a capacity of 60 tons daily. The temporary suspension of work on this property during 1890 deferred the starting of this plant until 1891, when nearly 3,000 tons were treated under the direction of E. H. Russell. The results of which tests I shall give.

An analysis of the Blue Bird battery samples for six months was as follows: Silica, 64·4; sulphur, 5·0; iron, 3·74; lead, 4·22; zinc, 12·8; manganese, 5·21; copper, 0·20.

The raw ore, for both amalgamation and leaching, was crushed for Run No. 1 through an 18-30 mesh screen, for Run No. 2 through a 24 mesh, and Run No. 3 through a 20-24 mesh. The amount of salt used was 11 to 15% crushed through a 20 mesh. The rate of roasting was 50 to 60 tons per day for one Stetefeldt furnace. After lying 18 to 20 hours on the cooling floors the roasted pulp was wet down while still red hot and transferred, part to the amalgamating pans and part to the ore vats for the leaching plant. This wetting down while hot has a very injurious effect on the extraction by the leaching process. In five of the mills in which the process has been in use, all the ore is charged dry to the ore vats, the average extraction by the Russell process on ore, charged dry to the ore vats, being 8% above that which could be obtained on the same ore if wet down while hot.

The net weight of each charge to the amalgamating pans was 1¼ to 1½ tons, and to the leaching vats 20 to 70 tons.

The manipulations of the wash waters and solutions of the Russell process in the mill for charges of about 7½ feet deep, were as follows: In order to gain time, the first part of the first wash water was run in from below the filter, while the ore was being charged into the vat, the leaching with water being afterward from above downward, as soon as the charging of the ore was completed.

The leaching with water, to remove the soluble salts, was followed by about 100 in. in depth of ordinary hyposulphite solution, which is the solution of the old or Patera process. This was succeeded by about 30 in. of the "extra solution" of the Russell process, containing 1% of blue stone in addition to the hyposulphite of soda of the ordinary solution. This was allowed to stand in the ore 7 to 10 hours. It was followed by 40 to 60 in. of the ordinary hyposulphite solution again, and then by 10 in. of the extra solution of the same strength as before, which was allowed to stand 3 to 10 hours in the ore, and finally by 50 to 60 in. of ordinary solution. The second wash water was then turned on to expel the solution contained in the charge, and thus restore the stock solution to its original volume, as otherwise that portion of the solution would be thrown away with the tailings. The strength of the stock solution was 1·6% to 1·9% in hyposulphite of soda, and all solutions were kept at a temperature of 90 to 120° F.

The silver and gold were precipitated from both solutions and wash water with sodium sulphide, the lead by itself from the solutions by soda ash.

The whole number of tons treated was between 2,700 and 3,000, the actual weight not being obtainable owing to the varying amount of moisture in the roasted ore, this ranged from 15 to 25% on account of the irregular "wetting down" on the cooling floors. For this reason only "apparent extractions," based on roasted ore values are given in this article, that is, the extractions obtained by comparing the values of roasted ore and tailings. The total number of vat charges treated was 50, averaging 50 to 60 tons each.

No change was made in the mode of preparation of the ore, which was to be treated by lixiviation, the crushing, amount of salt used, mode of roasting and the "wetting down" on the cooling floor being the same as had been found most beneficial for amalgamation, no experiments being made to determine whether or not these methods of preparation were the most suitable for ore to be treated by lixiviation.

Results.—The ore treated was divided into three runs of 10, 30 and 10 charges respectively. The average chlorination on this ore as determined by lixiviation with hyposulphite of soda in the assay office was 73·2%. The Russell process solution, also in the assay office, extracted 88·9% when the solutions were applied in the mill, the Russell solution extracted 84·7% from the first ten charges, which contained 60% of base ore, while the ordinary solution in the assay office extracted but 69.3. In the two following runs when the percentage of base ore was increased so that there was 90% in the second and the third consisted entirely of rebellious ore, the extraction increased to 89·0% and 88·6%. making an average for the three runs of 86·5%. The average chlorination, as show by hyposulphite of soda, was 73·2%. The consumption of chemicals in pounds was as follows:

Number of charges.	Hyposulphite of soda.	Blue stone.	Soda ash.	Caustic soda.	Sulphur.	Total chemicals per ton.
6	3·4	9·0	6·7	5·9	3·4	27·5
24	3·3	5,6	3·7	3·7	2·5	18·8
20	3·7	8·0	4·9	4·4	2·9	23·9

A comparison of extraction by lixiviation with that by amalgamation was made. The extraction by amalgamation varied from 58·5% to 80%, while the lixiviation averaged 84·1%. The cost of chemicals and quicksilver averaged $0.80 for amalgamation and $0.99 for lixiviation. Mr. E. H. Russell believes that the total saving by using his process at the Blue Bird would be about $4 a ton.

* Late assayer for the Blue Bird Mining Company.

THE ACTION OF SULPHURIC AND NITRIC ACIDS ON LEAD OF DIFFERENT DEGREES OF PURITY.

Written for the Engineering and Mining Journal by Prof. George Lunge, Ph. D., Zurich.

When the enormous quantity of lead consumed in the construction of apparatus for the manufacture of chemicals, especially of sulphuric acids, is considered, it is remarkable that hitherto there has been no certainty concerning the necessary chemical composition of a lead which offers the greatest possible resistance to sulphuric acids, whether pure or containing the ordinary impurities, of which we need not regard here any except nitrous and nitric acid. A considerable number of researches have been made in that direction, but with extremely discordant results. While a number of authorities maintain that pure lead resists the acids less than that which contains certain impurities, especially antimony, other authorities maintain the reverse of this; and this holds good of other foreign metals as well. The matter is confused by the fact that the impurities of the lead have evidently sometimes an opposite effect at different temperatures, and by the fact that the contaminations of the acid play a part of their own.

This question is really of great importance. Hochstetter quotes cases from his own practice in which concentrating pans for sulphuric acid were strongly acted upon in the course of a single week; and Hasenclever mentions similar cases. But even if we do not regard such extreme instances it is far from being an indifferent question whether an acid chamber, a Glover tower, or a boiling down pan lasts twice as long or half as long in one case as in another where a different quality of lead had been employed, and such differences occur very frequently. Hitherto the parts played by only a very few of the metals occurring in commercial lead has been known with any degree of certainty. It has been generally assumed that even very slight quantities of zinc and of bismuth are injurious; copper has been regarded as useful by the majority of those who have paid attention to it, but the greatest diversities of opinion exist concerning antimony. Silver, cadmium, arsenic and tin occur only in minute quantities in commercial lead, and their presence is generally agreed to be undesirable. Some have thought, but have never proved, that lead is the more acted upon the more oxygen it contains in the shape of oxides.

In order to settle these questions, which are of equal interest to the lead smelter and the chemical manufacturer, I secured the co-operation of a very trustworthy pupil and assistant, Dr. Ernest Schmid, whose carefulness and patience in carrying through upwards of a thousand accurate experiments I cannot sufficiently praise. I now lay the results of two years' labor before the readers of the ENGINEERING AND MINING JOURNAL.

It was necessary, evidently, to lay down certain limits for our researches, and I resolved, therefore, to confine them to three admixtures of lead which I believe te be most important in this respect, viz., with antimony, copper and oxygen, leaving the others to themselves as certainly not calculated to increase the resistance of the leads. We varied the concentrations of the acid, its percentage of nitrous acid and of nitric acid (going ultimately up to pure nitric acid). Various temperatures were also tried.

The lead which served for our researches was partly obtained through the kindness of the Royal Saxon Smelting Works at Freiberg, and of Prof. Ledebur, of the Freiberg Mining Academy; a portion was rolled expressly for us, in somewhat large quantities, by one of the principal Cologne firms, Wilhelm Leyendecker & Co. The Freiberg lead contained the following impurities:

	Soft lead I.	Hard lead.	Regulus metal.
Copper	0·001	0·05	0·1 to 0·3
Bismuth	0·044	0·01	.....
Antimony	0·0004	1·81	18·1 to 18·3
Arsenic	none.	....	1·0 to 3·1
Iron	0·0005	0·01	.....
Tin	0·0004	0·04	0·1
Silver	0·0005	0·10	....

I give the name "Regulus Metal" as is usual in the North of England, to an alloy of about one part antimony with five parts lead.

The regulus metal is not quite homogeneous; the piece employed for our experiments was specially tested for copper, of which it contained 0·14 per cent. The antimony may be taken at 18·2 per cent.

The soft lead which is obtained from Cologne as the purest obtainable, was most carefully analyzed in our own laboratory by the method of Fresenius and by cupellation; it contained:

Copper.....	0·0034 per cent.	Cadmium....	0·00025 per cent.
Bismuth....	0·0019 "	Nickel and cobalt traces.	
Antimony..	0·0029 "	Silver.....	0·0010 per cent.
Iron.....	trace	Zinc.....	0·0002 "
Arsenic	0·0047 "	Oxygen.....	0·0024 "

Several hundredweights of this soft lead were melted with varying quantities of antimony and of copper, in order to eliminate the disturbing influence of the other impurities. We thus obtained alloys containing exactly 0·2 per cent. of antimony, and 0·02, 0·1, 0·2, 1·0 per cent. of copper.

The mode of investigation which was chosen was the determination of the loss of the weight of the metal after a certain time of immersion in the acid, taking every care to obtain accurate results by working in a perfectly uniform manner. The apparatus used and the special precautions employed are described at length in a paper to be published later on in the *Zeitschrift für Angewandte Chemie*, and in more detail in Dr. Schmid's *Inaugural-Dissertation*, of which I will place copies at the disposal of those who are more specially interested in the methods used and the other details of our investigation, the results of which I shall give with sufficient fullness in the ENGINEERING AND MINING JOURNAL. Those who wish to know why the method described above was preferred to an estimation of the metal dissolved in the liquor and to other methods, I refer to the other papers. I shall explain here only briefly why we rejected the plan of measuring the attack on the lead by the quantity of gas (chiefly hydrogen), given off in contact with the acid. A special apparatus was constructed for this test, avoiding any organic joints, such as india rubber or cork; the gas was measured in a "gas volumeter," as constructed by me for general purposes. We made a number of tests by means of this apparatus, which permitted us to measure the gas with perfect accuracy, and we found the following results, after exposing the various descriptions of metal to the action of concentrated sulphuric acid at the ordinary temperature for the space of eight days. Soft lead gave off a quantity of gas almost accurately agreeing with the theoretical equation $Pb + H_2SO_4 = H_2 + Pb\,SO_4$. Hard lead (with 1·8% Sb) and regulus metal (with 18% Sb), which were far more strongly acted upon than soft lead (as we shall see directly) yielded very little gas, amounting to $\frac{1}{200}$th part of that which should have been given off according to the above equation. Hence it is absolutely inadmissible to judge of the resistance of lead to sulphuric acid from the quantity of gas given off in contact with the acid. Lead containing antimony yields only a minute fraction of the gas which lead without antimony gives off, undoubtedly owing to the fact that after a short time the antimonious sulphate formed is reduced by lead, which is thus prevented from evolving hydrogen from free sulphuric acid.

This observation possibly explains the prejudice of many manufacturers, who believe that lead containing antimony resists sulphuric acid better than pure lead, because they *see* the attack in the latter case from the bubbles of gas, which are missing in the former, though in reality it is much more attacked. The same experiment shows that lead containing a few per cent. of antimony is preferable to pure lead for vessels or lining of boxes intended for sea carriage of sulphuric acid, which are soldered up, and thus made air tight. The gas given off cannot escape in this case, and the lead vessels are seriously strained and may ultimately burst, while the quantity of gas given off in the case of hard lead vessels is too slight to be injurious. About 0·5% of antimony seems to suffice for this purpose. Sulphuric acid makers ought to pay attention to this fact, which is, however, of minor importance now that iron vessels are so generally adopted for storing and carrying sulphuric acid.

I shall now give a synopsis of the results of our experiments made under varying conditions.

I. *Action of Sulphuric Acid on Pure Lead and on Lead Alloyed with Antimony.*—We tested in the first series of experiments the above described Freiberg lead (soft, hard and regulus metal); in the second series the Cologne lead and an alloy of this with 0·2% antimony.

The acids employed in the first series were: 1. Chemically pure concentrated sulphuric acid of spec. grav. 1·84 at 15° C (say, 95% H_2SO_4), in contact with previously dried air. 2. The same in contact with previously dried air, with addition of enough chamber crystals, to make exactly 1% N_2O_3, which resultant acid I call "nitrous vitriol" 3d. The same nitrous vitriol protected from the air. 4. Pure acid, diluted to 1·725–1·765 specific gravity. 5. The same acid with 1% N_2O_3 as above.

The conditions of temperature and length of contact were varied as follows: Digesting eight days at the ordinary temperature; digesting six hours at 100° C.; digesting three to six hours at 200° C. The second series (with the Cologne lead) was made in a similar way, but in all cases without contact of air. Each single case was tested by exposing six to eight samples in the same way, taking every precaution to secure an almost absolute uniformity as to the treatment of the tests before and after the experiment, by carrying on the experiments under exactly the same conditions. I believe we have thus attained perfectly comparable results, but I must refer the reader for proof of this to the German publications referred to above, and I here give merely a synopsis of the average results of the 341 single experiments comprised in this series, arranged in such a manner as to make clear the conclusions to be drawn from them. The synopsis is to be understood in this way: Column *a* shows the concentration of the acids, the temperature and the length of contacts; column *b* the kind of lead used as described above; columns *c*, *d* and *e* the comparative attack of pure acids of nitrous vitriol without air and of nitrous vitriol in contact with dry air, the lowest attack being always put = 100; column *f* gives the *absolute* value of the unity 100 for each of the 13 special series of tests, viz., the loss of weight of one superficial metre of lead expressed in grammes. Thus on the first line the real values of the figures appearing under *c*, *d* and *e* (100, 124, 147) are: 128.1, 158.8, 188.3 grammes of lead per superficial metre of soft lead No. I. lost by eight days' contact with cold concentrated acid. (It was impossible to choose a common unity since the duration of the experiments necessarily differed in the different series.)

We see plainly that at ordinary temperatures concentrated sulphuric acid acts least on soft lead, more on hard lead, and most on regulus metal. This holds good of all three descriptions of acid; pure acid acts least, nitrous vitriol without air is more destructive, and nitrous vitriol in contact with air is most active. The injurious influence of notable quantities of antimony is most apparent in the case of nitrous vitriol; the loss of weight increases very rapidly with higher percentages of antimony: a very slight addition of antimony (0.2%) is rather beneficial than otherwise so far as the ordinary temperature is concerned (series No. 2), but even then only to a very limited extent.

a Description of experiment.	*b* Description of lead.	*c* Pure sulphuric acid.	*d* Nitrous vitriol (1% N_2O_3) without air.	*e* Nitrous vitriol in contact with dry air.	*f* Absolute value of the unit 100 in grammes per sup. metre.
1. Acid of 1·8 sp. gr. eight days at ordinary temperature.	Soft lead No. I.	100	124	147	128·1
	Hard lead (1·8% antimony)	102	126	148	"
	Regulus metal (18% antimony)	116	156	178	"
2. The same acid 30 days at ordinary temperature	Soft lead No. II.	100	305		348·1
	The same with 0·2% antimony	87	245		"
3. Acid of 1·84 sp. gr. at 100° C. for six hours	Soft lead No. I.	100	105	122	86·8
	Hard lead	351	474	535	"
	Regulus metal	224	398	437	"
4. The same acid at 100° C. 10 hours	Soft lead No. I	100	101		79·1
	The same with 0·2% antimony	145	182		"
5. Acid of 1·84 sp. gr. at 200° C. 3 hours	Soft lead No. I.	100	95	154	277·6
	Hard lead	1,381	1,252	1,397	"
	Regulus metal	865	1,270	1,437	"
6. The same acid at 200° C. 4 hours.	Soft lead No. I	100			565·4
	Hard lead	1,308			"
	Regulus metal	925			"
7 The same acid at 200° C. 6 hours	Hard lead	100	95	106	4,728·9
8. The same acid at 200° C. 10 hours	Soft lead No. II.	100	102		601·4
	The same with 0·2% antimony	108	139		"
9. The same acid at 200° C. 3 hours	Soft lead No II.	100			190·0
	The same with 0.2% antimony	102			"
10. Acid of 1·725 sp. gr. at 100° C. 6 hours	Soft lead No. I.	100	66	80	47·0
	Hard lead	104	100	90	"
	Regulus metal	112	168	163	"
11. Acid of 1·725 sp. gr. at 200° C. 6 hours	Soft lead No. I.	100			191·9
	Hard lead	783			"
	Regulus metal	1,146			"
12. Acid of 1·765 sp. gr. at 100° C. 10 hours	Soft lead No. I.	100			51·4
	Hard lead	108			"
	Regulus metal	133			
13. Acid of 1·720 sp. gr. at 100° C. 10 hours	Soft lead No. II	100	71		55·7
	The same with 0·2% antimony	114	74		"

At 100° C. the soft lead in all cases resists the attack better than that alloyed with antimony. The different acids attack in the same order as before; the injurious effect of antimony is even more apparent with nitrous vitriol than with pure acid (series 3 and 4).

At 200° C. the action is of course much stronger, but of the same character as at 100° C.; that is to say that antimony is decidedly injurious and in the case of large quantities (1·8% and upward) to an enormous extent. The different descriptions of acid follow on the whole in the same order; the apparent anomaly that nitrous vitriol without air sometimes acts slightly less than pure acid is easily explained by the fact that the current of dry air employed in the case of pure acid carried away much water and gradually concentrated the acid.

In the case of less concentrated acids (sp. gr. 1·725 to 1·765) at 200° C., the injurious effect of antimony is apparent in every case at a very much higher rate than at 100°. Nitrous acid sometimes acts less than pure acid in this case, evidently because a coating of lead sulphate protects the lead here. This, however, is not the case with concentrated acids, where the lead sulphate is dissolved, nor with more dilute nitrous acids, where nitric acid is formed and dissolves more lead.

It may be expedient to state that our results agree in all essential features with the fragmentary, and hence inconclusive, results formerly found by John Glover (the inventor of the Glover tower) and Cookson and Sanderson (*Chem. News*, vol. xlv., p. 105). They decidedly disagree with the well-known statements of Calvert and Johnson, according to whom pure lead resists sulphuric acid less than impure lead. But that statement is entirely worthless, as their "virgin lead" contained 0·3246% iron and 0·4374% copper, and they did not estimate antimony at all. Quite recently Hochstetter, whose memoir will be mentioned later, has also maintained that a slight addition of antimony (0·2%) protects lead against the action of hot acid; but his mode of investigation was exceedingly rough, and he has not dared to draw practical conclusions from it, as he has done in the case of copper, so that I really think his assertion (for it does not amount to any proof whatever) concerning the protecting influence of antimony cannot be held to outweigh the hundreds of experiments carefully conducted by us.

II. *Action of Sulphuric Acid on Lead Containing Copper.*—The protecting influence of copper upon lead intended for contact with hot acids has not heretofore entirely escaped notice, but it was only quite recently that Hochstetter, the manager of large chemical works in the north of France, made such practical experiments in this direction that the attention of industrial chemists has been forcibly attracted thereby. He found that virgin lead in some cases was rapidly attacked or even entirely destroyed when left in contact with very hot concentrated sulphuric acid, while lead containing a little copper sustained very little injury. According to him as little as 0·02% of copper is sufficient for this purpose, as proved by trials on a practical scale with concentrating pans, made of virgin lead to which 0·023% of copper had been purposely added.

Inasmuch as Hochstetter had in this case put his assertion to a practical test (which he had omitted to do in the case of antimony, where his assertion is diametrically opposed to our experimental results), and as the protecting influence of copper agreed with some previously published data and was contradicted by none that I know of, I thought it necessary to make a series of tests on that subject. In order to exclude the accidental influence of other impurities, I caused several hundredweight of the pur-

est soft lead (the soft lead No. 1 mentioned before) to be alloyed with varying proportions of copper, viz., 0·02, 0·1, 0·2 and 1·0%. The 1% alloy could not be made homogeneous, and I therefore do not place any special reliance on the results obtained with it. Even at 0·2% copper there were irregularities found here and there, and in practice this seems to be the highest percentage of copper regularly obtainable.

As far as the acids are concerned it seemed unnecessary in this case to try nitrous vitriol, both with and without access of air, as the tests with lead containing antimony had sufficiently proved that this kind of acid acts much more strongly in the presence than in the absence of air. Otherwise the experiments were carried out as before, and the average results of the 262 tests made are represented in the following synopsis, arranged on the same plan as that referring to alloys of lead and antimony.

	Concentrat'd acid 1·84 sp. gr. 30 days as ordinary temperature.		Concentrat'd acid of 1·84 sp. gr. 10 hours at 100° C.		Concentrat'd acid of 1·84 sp. gr. 10 hours at 200° C.		The same 3 hours at 200° C.	Acid of sp. gr. 1·720 10 hours at 1000° C.	
	pure.	nitro's	pure.	nitro's	pure.	nitro's	pure.	pure.	nitro.
Absolute value of the unity 100, in grammes of lead per superficial metre.	348·1		79·1		601·4		190.0	55·7	
Soft lead No. II.....	100	305	100	101	100	102	100	130	71
" + 0·02% Cu.....	121	288	101	102	101	108	102	100	70
" + 0·1% Cu.....	222	280	102	103	81	113	98	102	72
" + 0·2% Cu.....	102	295	101	105	82	108	100	99	73
" + 1·0% Cu.....	275	346	121	111	82	107	97	85	63

We may now draw the following conclusions. The results are here not always quite so decisive as in the case of antimony. Especially with the 1% alloy the six or eight parallel tests made for each special case disagree too much to base a certain conclusion thereon, undoubtedly on account of the want of homogeneity of that alloy, and we shall, therefore, leave it entirely out of consideration. Otherwise we find that in the cold, concentrated pure sulphuric acid acts decidedly more on lead containing copper than on pure lead, and except in the case of the 0·2% alloy, nitrous vitriol always acts much more strongly. At 100° C., both pure and nitrous acid acts practically alike upon all descriptions of lead up to 0·2% copper, the copper having no protecting action whatever at that temperature. At 200° C. concentrated pure acid acts perceptibly less on lead containing 0·1 or 0·2% of copper than on pure lead, or lead containing but 0·02% Cu; nitrous vitriol, however, acts in the reverse manner.

This would lead us to conclude that for any use of lead below the temperature of 200° C., that is, for acid chambers and in nearly every other case, copper has *no* protecting action on lead. Only at 200° C. do we find such an action, and that to only a slight degree, and only in the case of pure acid, but not in that of nitrous vitriol. Hence acid pans in a general way ought never to reach, and still less to exceed, that temperature. It would follow that even they ought not to be made of lead containing copper; but we shall see presently that this conclusion must be modified.

(To be Continued.)

A New Smokeless Powder.—A new smokeless powder, invented by Captain St. Marc, is being experimented with by the Armstrongs of England. With a Hotchkiss quick firing gun, a muzzle velocity of 1935 ft. per second was given to a projectile weighing 3·3 lbs. with a charge of 5 oz. The explosive is said to possess neither of the two disadvantages of nitro-glycerine powders, viz., the danger at low temperatures and the inability to keep. It is also said that the new powder heats the gun much less than any other powder hitherto brought forward.

Test of Armor Plate in Russia.—It is learned that the recent armor test at Ochta, Russia; was made competitive between plates submitted by John Brown & Co., of Shetfield, Eng; Charles Cammell & Co., also of Sheffield, and the French St. Chamond Company. The trial took place before Admiral Tchikhatcheff, the Grand Duke Alexander Michailowitch, the Russian Minister of Marine and numerous Russian army navy officers. Brown & Co. submitted two plates and Cammell and the St. Chamond people one each. Each plate measured 8 ft. sq. and 10 ins thick. A 4-in. high power ordnance rifle throwing a 97 lb. projectile was used in the test. The initial muzzle velocities recorded averaged 2,190 ft. per second. This velocity is deemed extraordinarly high. The British used 1,975 foot-seconds velocity at the Nettle test. The standard United States Government velocity is 2,075 ft. per second. The Russians have exceeded this latter by 115 foot seconds. The Russians used in their recent test Holtzer armor-piercing projectiles of Russian make. These latter were the product of the Pooteeloff works. When put in position for the test the four plates were unframed. The backing consisted of 12 ins. of pine timber and three ½ in. boiler plates stiffened and strutted from the rear. During the trial the snow was falling for the greater period, and the thermometer registered 2 (Reaumur) of frost. As a result of the trial the St. Chamond plate was generally considered the best, inasmuch as it went through the ordeal without cracking and resisted six projectiles with from 11 in. to 12 in. penetration. One of the Cammell plates showed up nearly as well, the penetration being a little deeper, and the first and only crack being caused by the sixth shot. The second Cammell plate, which had been surface hardened, proved too brittle and was demolished at the third shot. Brown's plate completely shattered five projectiles with a very small amount of penetration, but in so doing was itself broken in many places although the backing remained perfectly intact. The fracture exhibited numerous internal flaws, due to some unexplained accident of manufacture, and the plate on that account was not considered to be a fairly representative one. Without its being positively stated, it is pretty well assured from local advices that the successful St. Chamond plate will have its duplicate pitted against the American Harveyized plate now in Russia. Why the Harvey plate was not used in the test Russian officials do not explain.

ELECTRICAL SHOT-FIRING IN MINES.*

By F. Brain.

About 150 years ago Benjamin Franklin first proposed that a spark from an electric machine should be used for firing a cartridge of gunpowder. It was not, however, until 1835 that this proposition was adopted and applied practically. Between 1835 and 1840 some very useful work was done by Sir Charles Pasly with electric exploders, in blasting the hulks of wrecked vessels on the British coast. In those days a Daniell and afterward a Grove and a Bunsen battery was used. These have subsequently given place to the Leclanche battery. In all these cases the current of electricity is of low tension, and the exploding apparatus is bulky. Recognizing the necessity of having an instrument that takes up much less space and is much lighter, electricians have devoted a good deal of attention during recent years in inventing high tension apparatus that would be easy to carry about, especially in mines and rock excavations. Most of these consist of ebonite friction plates with suitable collectors and condensers, but the latest type consist of small magneto-electric machines. The fuses used with the high and low tension currents are naturally quite different from one another. The low tension fuse consists of two copper terminals, fixed at a certain distance apart by an ebonite head and connected by a fine platinum wire. This platinum bridge is embedded in fine gunpowder or other explosive, and enclosed in a cup. The head thus prepared is enclosed in a detonating cap containing a small amount of fulminate of mercury, and this in turn is inserted in whatever explosive it is desired to fire. In the high tension fuse the bridge of fine wire is dispensed with, and in its place is used a sensitive chemical composition which explodes on the passage of the electric current through it. The high tension generator presents another advantage over the low tension apparatus because it is much surer in its effect. A chemical battery is irregular in its action owing to polarisation, and it is usually necessary to test it before each firing. This, of course, is dangerous. A high tension generator is, however, almost certain in its action, and there is therefore no need to test it. A high tension apparatus, for firing one or two shots, measures 6½ in. by 5½ in. by 5½ in. and weighs 5¾ lbs.

The use of electric fuses is highly necessary in mines where there is any firedamp. During recent years many flameless explosives, such as roburite and tonite have been largely adopted in place of gunpowder in fiery mines, but the charges in most cases were at first, and in many cases still are, ignited by the ordinary time fuse. This is really just as dangerous as if a gunpowder charge were used. An electrically ignited fuse is the only really safe exploder for a fiery mine. It is also extremely useful where several shots are to be fired simultaneously. It is also safer, because while the time fuse can hang fire, an electric fuse never does, and thus accidents cannot occur from workmen going to replace an apparently ineffective fuse.

Very great exactness is necessary in all operations connected with electric shot firing. The instructions given by the Electric Blasting Apparatus Company, with their magneto-electric exploders, will therefore be of considerable interest.

Charging.—In charging a shot hole, great care should be exercised; 1. that the electric detonator is inserted and secured in the explosive; 2. that the fuse wires are kept straight from the explosive charge along the side of the shot holes; 3. that the tamping used is not of a gritty or cutting nature; 4. that the leading wires are not abraded, kinked or otherwise damaged during ramming; 5. that the joints between the ends of the fuse wires and the ends of the firing cable are perfectly made by the copper wires being quite clean, bare and well twisted together; 6. that the ends of the firing cable connected to the terminals of the exploder are clean, bare and firmly screwed down.

Firing.—In firing a shot great care must be exercised; 1. that the firing cable wires are not connected to the terminals of the battery while any workman is at the face, while the shot hole is being charged, or while the fuse wires are being connected; 2. that the operator's hands do not touch the terminals of the exploder; 3. that the handle of the exploder is turned with a firm, quick action three or four complete revolutions and then—and not till then—while still keeping up the speed, the knob firmly pressed to fire the charge. The strength of the current mainly depends on the speed of the handle.

Faults.—1. The constant use of the cables causes the insulation to become rubbed off and a short circuit is the result; 2. the wires sometimes get injured in tamping; 3. the fuses are often faulty by damp and are sometimes not adapted to the particular shot to be fired.

Connecting.—Where several fuses are being fired simultaneously, they should be connected in parallel and not in series.

Conditions.—The form of exploders, cables, fuses, etc., depends on; 1. the explosive used; 2. the length of the firing cable; 3. the length of fuse wires; 4. the conditions of working, whether the holes are wet or dry, whether a pit is being sunk, a heading made or the coal face being worked.

Magnets.—With magneto-electric exploders, the magnet gradually gets weaker, and should be tested by hand or voltmeter from time to time.

Electricity in Transvaal Mines.—The first electric installation erected in the gold mining district of the Transvaal is at the mines of the Champ d'Or Company. The plant was put down in September last, and has been running continuously since. It consists of two dynamos, the current from which is carried down to motors and pumps at the reservoir, 700 ft. away. These pumps supply the mill with water. Formerly they were driven from the mill by wire ropes. The engineers compute that they save $20,000 a year by the adoption of the electric transmission of power.

State Boundaries Between Iowa and Illinois.—The United States Supreme Court decided on the 3d inst. the case brought by the State of Iowa against Illinois, to settle the boundary between the two States, holding with the latter State that the dividing line was the center of the main steamboat channel, instead of the center of the main body.

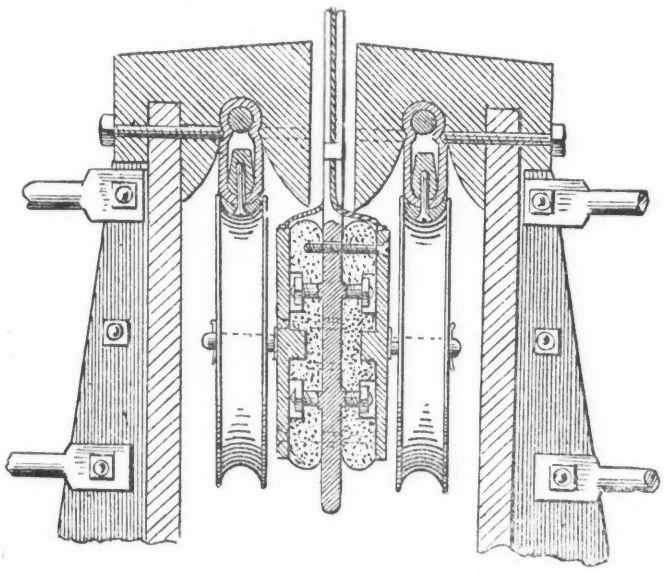
* Abstract of paper read before the Southwestern branch of the National Association of Colliery Managers of Great Britain, December 5th, 1892.

IRISH'S CLOSED CONDUIT FOR ELECTRIC RAILWAYS.

Mr. W. E. Irish, of Cleveland, O., has recently introduced an improved form of his closed conduit for electric railways. As will be seen in the illustration there are two conductors placed one on each side of the slot. Each is incased in a tube of india rubber or other flexible and insulating material. This tube is not circular, but is higher than broad. At the lower side of the tube is a sectional rail, i. e., a series of short rods with their ends slightly apart and fixed in their places by screws to similar pieces outside the flexible tube. The trolley runs along the bottom of the outer sectional trip of metal, and its upward pressure brings each section of the "sectional rail" into contact with the conductor. Thus, the current can be taken off the conductor only when the upward pressure of the trolley is present, and a practically closed conduit is obtained. The only question as to the feasibility of this scheme is the life of the india-rubbed tubing. It is said that as it is contained in a dark, damp chamber the rubber is not exposed to extreme or sudden changes of temperature. We should think, on the other hand, that the constant bending of the rubber at the points between two members of the sectional rail would not conduce to the life of the rubber.

THE VYRNWY DAM OF THE LIVERPOOL WATER-WORKS

In our issue of 13th August we gave an illustrated account of the new waterworks at Vyrnwy for supplying the city of Liverpool, England. The engineer, Mr. Deacon, gave some further information in a paper read on Dec. 7, before the Liverpool Engineering Society. He stated that the Vyrnwy masonry dam is the first high dam in which a by-wash has been avoided by permitting the whole of the surplus water to flow over the sill and down the apron to the river below. His opinion is that the reluctance on the part of other engineers to adopt such a system in the past has been due to their belief that serious wear of the apron would result. This view he considers a fallacy, due to the incorrect interpretation of the phenomenon of wear in rocky rivers by gravel and sand propelled by water, and in stone mill dams in front



IRISH'S CLOSED CONDUIT FOR ELECTRIC RAILWAYS.

of which detritus so rapidly collects that all signs of a pond disappeared in a few years and gravel and boulders are then rapidly hurled over the sill by every flood. Mr. Deacon has never found any evidence of serious mechanical wear either of rock or iron by water alone. There is a great advantage in utilizing the sill of the dam as an overflow on account of the great width afforded. As it was desirable to construct the apron of such a form that the water discharged over the sill would be directed horizontally at the level of the river at the bottom of the dam, the bench was made projecting like a horn at the back of the masonry some 45 ft. above the rock foundation.

The testing of concrete blocks taken from the structure exhibited some interesting features. In the compression tests the fractures took place in the usual way by the shearing of the material in such directions as to leave a pyramid standing; but the shearing usually took place through the solid stones, and did not follow the cement mortar joints. By using a large proportion of ground rock instead of river sand, the cement mortar was made almost as plastic as lime mortar. The rock used was clay slate, of nearly the same composition as the river sand. The increased plasticity of this mortar was due to the fact that the finer portions of the crushed stone and the cement sufficed to form a complete envelope round each coarser particle, and that the coarser particles could roll in the envelope during manipulation. Thus all interstices would be filled and the concrete rendered water tight.

A New Tower for London.—The proposed Watkin Tower outside London is really to be built. The building contract has been let to Heenan & Froude, of Manchester, a well-known firm of bridge builders, and the steel is to be furnished by the Stockton Malleable Iron Company. The tower will be 1,150 ft. high above the base, which will itself be 162 ft. above the ground. It will thus be some 200 ft. higher than the Eiffel tower.

DECISIONS OF THE SECRETARY OF THE INTERIOR AFFECTING THE MINING INDUSTRY.

PRACTICE—MINING CLAIM—MILL SITE.

1. Concerning decisions of the local office and General Land Office, when the evidence is conflicting, will not be disturbed on appeal, unless clearly wrong.

2. A mill site may be legally located prior to the application for patent on the mining claim connected therewith.—*Appeal of Robt. R. Hargrove from Land Office Decision, January*, 1892, *in contest against J. C. Robertson, at N. Yakima Land Office, Wash.*—Decision affirmed.—[*Secretary's Decision, Nov. 25th*, 1892.]

MINING CLAIM—EXCLUDED LANDS—MILL SITE.

A mineral entry should not be allowed for a lode-claim that includes land embraced within a senior location, or it is intersected by an excluded mill site.

Case of *Michael Howard*, involving "Howard Lodes" 1, 2 and 3, embracing 7·540 acres in Montana mining district, Clear Creek Co., Col. [*Secretary's Decision, Nov. 26th*, 1892.]

MINING CLAIM—PROTEST—CHARACTER OF LAND.

A protestant against a mineral entry, who alleges the land to be agricultural in character, is not entitled to an order for a hearing in the absence of a specific, showing that said land was agricultural at the date of application for a mineral patent, when the record discloses that the mineral applicant made the requisite showing as to the character of said land. *Houghton v. McDermott, et al.*, involving the *Placer Mining Claim* (132·05 acres) *entry, Helena, Montana.*—[*Secretary's Decision, Nov. 29th*, 1892.]

COAL LAND—HOMESTEAD ENTRY CONTEST.

1. On issue joined as to the character of land alleged to be more valuable for coal than for agricultural purposes, it is incumbent upon the plaintiff to show the existence of a coal deposit sufficiently valuable to be worked as a mine.

2. Before final certificate issues a homestead entry is open to attack on the ground that the land embraced therein is mineral in its character, without regard to the date of the alleged mineral discovery.—*Jones v. Driser*, involving land in Olympia Dist., Washington.—[Secretary's decision affirming decision of Land Office, Dec. 2d, 1892.]

MINING CLAIMS—EXCLUDED LAND.

A mineral entry should not be allowed of land embraced within the prior location and application of another.—*In Re Rocky Lode, Paquin Mining District, Ouray County, Colo.*—[*Secretary's Decision, Dec. 14th*, 1892.]

DIVIDENDS PAID BY MINING COMPANIES DURING DECEMBER AND DURING 1892.

NAME OF COMPANY.	Paid in Dec.	Paid since Jan. 1st.	NAME OF COMPANY.	Paid in Dec.	Paid since Jan. 1st.
Adams, Colo.	.....	$7,500	Hope, Colo.	$50,000	$100,000
Alaska, Tr'dw'll, Alaska	.....	300,000	Horn Silver, Utah.	50,000	200,000
American Coal, Md.	.....	90,000	Idaho, Cal.	7,750	66,650
American-Nettie, Colo.	.....	30,000	Iron Mountain, Mont.	.....	135,000
Argyle, Colo.	.....	20,000	Jay Hawk, Mont.	33,375	33,375
Aspen, Colo.	.....	100,000	Kennedy, Cal.	.....	60,000
Aurora, Mich.	.....	160,000	Lake Superior, Mich.	.....	252,000
Bald Butte, Mont.	.....	20,000	Leadville Cons., Colo.	.....	12,000
Bannister, Mont.	.....	6,000	Lexington, Colo.	3,000	36,000
Belden Mica, N. H.	$5,000	45,000	Maid of Erin, Colo.	.....	139,725
Best Friend, Colo.	.....	20,000	Maryland Coal, Md.	.....	84,000
Bimetallic, Mont.	40,000	200,000	Maxfield, Utah.	.....	18,000
Brotherton, Mich.	.....	40,000	Mayflower Gravel, Cal	25,000	25,000
Bull Domingo, Colo.	.....	4,000	Minnesota Iron, Minn	.....	840,000
Bulwer Con., Cal.	.....	15,000	Mollie Gibson, Colo.	150,000	1,700,000
Buxton, S. Dak.	.....	20,000	Monitor, S. Dak.	.....	22,500
Calumet & Hecla, Mich.	500,000	2,000,000	Morning Star D., Cal.	7,200	82,800
Centennial-Eureka, Utah.	15,000	75,000	Moulton, Mont.	.....	30,000
Champion, Cal.	3,400	57,800	Napa, Cal.	.....	70,000
Colorado Central, Colo.	.....	55,000	New Guston, Colo.	.....	123,750
Consolidation Coal, Md.	.....	205,000	North Star, Cal.	50,000	50,000
Colorado Fuel	.....	67,120	Omaha, Cal.	.....	7,200
Contention, Ariz.	.....	50,000	Ontario, Utah	.....	750,000
Cook's Peak, Colo.	.....	60,000	Osceola, Mich.	50,000	150,000
Copper Queen, Ariz.	.....	140,000	Pacific Coast Borax	15,000	180,000
Coptis	.....	15,000	Pandora, Mont.	.....	3,000
Cortez, Nev.	.....	95,000	Parrott, Mont.	18,000	216,000
Daly, Utah.	37,500	450,000	Pharmacist, Colo.	.....	24,000
Deadwood Terra, S. Dak.	.....	100,000	Plumas, Eureka, Cal.	.....	25,313
De Lamar, Idaho.	.....	272,000	Poorman, Ltd., Colo.	.....	56,935
Dexter, Nev.	.....	80,000	Quincy, Mich.	.....	200,000
Diamond, Kyune & Castle, Utah.	.....	7,500	Red Cloud, Idaho	10,000	70,000
Elkhorn, Mont.	87,500	362,500	Rescue, S. N., Mex.	.....	12,000
Enterprise, Colo.	50,000	450,000	Rialto, Colo.	.....	18,000
Eureka Con., Nev.	.....	12,500	R'ky Fork Coal, Mont.	.....	100,000
Franklin, Mich.	.....	160,000	Running Lode, Colo.	.....	6,000
Golden Reward, S. Dak.	5,000	55,000	Sierra Butte, Cal.	.....	36,750
GraniteMountain, Mont.	.....	500,000	Small Hopes, Colo.	.....	37,500
Great Western Quicksilver, Cal.	12,500	137,500	Standard, Cal.	10,000	40,000
Hecla Con., Mont.	15,000	180,000	Tamarack, Mich	.....	600,000
Helena & Frisco, Mont.	.....	20,000	United Verde, Ariz.	.....	30,000
Homestake, S. Dak.	12,500	150,000	Utah, Utah.	5,000	15,000
			W. Y. O. D., Cal.	3,000	36,000
			Yosemite No. 2, Utah.	.....	5,000
			Total.	1,270,725	13,443,918

An Omnibus with Pneumatic Tires.—The latest application of pneumatic tires is to street omnibuses. This has been experimentally tried with success in Glasgow, Scotland. The tires are 3½ inches thick, and can stand a pressure of 187 pounds per square inch. The india rubber is protected by plies of canvass, and are covered with wire cloth. A further luxury is provided in the shape of electric illumination supplied by storage batteries.

PERSONALS.

Capt. Willard L. Candee, American manager of the Okonite Company (Limited), sailed December 31st on the North German Lloyd steamship "Saale" for London on business connected with the company.

Mr. Nelson W. Perry, has succeeded Mr. Edward Caidwell as editor of the "Electrical World," of this city. Mr. Caldwell has bought a controlling interest in the "Street Railway Gazette," and will assume editorial charge of it.

Mr. Henry Ehrhardt, superintendent of the Rosario Mining Company, of Salinas-Victoria, Mex., has resigned his position and accepted that of general manager of the Santa Fe Mining Company, of Matahuala, San Luis Potosi, Mexico.

A notification has been received at the Lick Observatory, California, that the Leland prize of the Paris Academy of Sciences was awarded to Professor Barnard, of the Lick Observatory, December 19, 1892, for his work in astronomy, especially for his discovery of the fifth satellite of Jupiter.

Mr. John Fritz, who has been superintendent of the Bethlehem Iron Company for 22 years, has resigned his old position and has been promoted to that of consulting engineer. He will be succeeded by Mr. Owen Liebert, for years one of his most trusted assistants. Mr. Russell W. Davenport has been made second vice-president, Robert H. Sayre, Jr., assistant superintendent, and Albert L. Colby, now head chemist, has been promoted to the position of superintendent of blast furnaces. Mr. Fritz built the entire plant of the Bethlehem Iron Company, from the first blast furnace to their present extensive works. He is 70 years old.

President McLeod, of the Philadelphia & Reading Railroad, has appointed Mr. Rollin H. Wilbur, of Bethlehem, Pa., general superintendent of the Eastern Division of the Lehigh Valley, the position made vacant by the death of the late H. Stanley Goodwin. His territory extends from Lehigh and Wilkes-Barre Junction to Jersey City, and includes the coal branches. James Donnelly, superintendent of the New Jersey Division, will hereafter have charge of the Lehigh Division from Easton to Manch Chunck, in addition to his former territory. Mr. P. O. Esser remains superintendent of the Wyoming Division from Mauch Chunck to Lehigh and Wilkes-Barre Junction, and A. P. Blakeslee is still superintendent of the coal branches.

OBITUARY.

William Lacy, a well-known miner of Grass Valley, Cal., died at this place last week, aged 62 years. He was formerly interested in the North Star mine.

Col. Henry A. Bigelow died in Prescott, Ariz., on the 16 ult., aged 59 years. He went to Arizona in 1864, and was engaged in mining operations almost continuously.

Edward Langworthy died at Dubuque, Ia., on the 4th inst., aged 84 years. He was one of Dubuque's earliest pioneers and most prominent citizens. He went there in 1829, and three years before any other settlement had been made in Iowa, he was engaged in lead mining in this region.

Prof. Eben Norton Horsford, the eminent Harvard instructor in chemistry and archaeologist, died on the 1st inst. in Cambridge, Mass. Professor Horsford was born in Moscow, Livingston County, N. Y. in 1818. He was graduated from the Rensselaer Polytechnic Institute in 1838, and two years later was appointed teacher of mathematics and natural sciences in the Albany Female Academy, where he remained four years, when he went to Germany and spent two years in the study of analytical chemistry and experimental research in the Liebig Laboratory at Giessen. On his return to the United States Professor Horsford was elected to the Rumford professorship of science applied to the arts in Harvard, and soon after he submitted to Abbott Lawrence a plan for a department of anayltical and applied chemistry, which led to the formation of the Lawrence Scientific School at Cambridge, and Professor Horsford spent the next 16 years in the first laboratory organized and equipped for instruction in analytical chemistry in this country. He then resigned to go into the business of manufacturing chemicals in Providence, R. I., and afterward became president of the Rumford Chemical Works, in Boston. He was an able writer on scientific subjects, and more than 30 years ago he published an account of the result of many successful experiments for stilling waves by spreading oil upon the surface of the sea, and he lately gave to the world a lexicon of five Indian languages. During the closing years of his life, Professor Horsford took a great interest in Wellesley College. He provided for the endowment of the library and for continuous supplies to the departments of physics, chemistry, botany and biology.

EXPORT NOTES.

The total value of exports of merchandise from the United States during the 12 months ended November 30th, 1892, were $970,832,420, as against $949,025,502 during the preceding 12 months. The imports were $875,194,565, as against $819,675,251.

Merchants doing business with Spanish-American countries are beginning to get evidence that the fear of a premium on gold in this country has extended to some of their correspondents. In the drafts drawn upon New Yorkers it has been customary to write "American gold" or "United States gold," but on a few of those recently received in this city the words "silver excluded" have been added, as if the makers of the drafts were particularly anxious to have it understood that payment was not to be made in the white metal. These "no-silver" drafts are coming from only the nearer countries. The worry hasn't extended yet to the more remote regions of South America.

A bill creating a Department of Transportation, and providing for the construction of a Nicaragua ship canal, was introduced in the House of Representatives on the 4th inst. by Mr. Otis. The department is to have general supervision of the carrying trade of the entire country, and to exercise all the powers of the Inter-State Commerce Commission, which is abolished. On his appointment, the secretary of transportation is to name a commission to proceed to Central America to inspect the work done by the Maritime Canal Company, and report what treaties, etc., are necessary to give the United States full control of the Nicaragua Canal.

The statisticians of the Custom House of the port of New York have figured out the business of the office during 1892. The total receipts from duties during the pear were $129,552,006, being $6,009,375 more than those of 1891. The first two months of 1891 showed higher figures than the corresponding months last year, for the reason that the duties on sugar had not then been abolished.

Following is a comparative table by months of the receipts during the two years:

	1891.	1892.
Jannary.	$16.839.581	$12,014,431
February.	12,329,800	11,687.228
March.	10,581.780	10,943.563
April.	7,789,536	8,971.183
May.	7.543.137	8,189.328
June.	9.209.679	9,683,759
July.	11,357,771	12.358.576
August.	10.523.136	13 247.655
September.	10,024,787	11,401.689
October.	9,403.842	10,402.906
November.	8,565,769	10.003,886
December.	9.370,807	10,659,794
Totals.	$123,542,630	$129,552,006

WORLD'S FAIR NOTES.

Ohio will erect a mineral cabin in the Mines Building at the World's Fair to illustrate its mineral resources. The cabin will be 32×61 ft. in dimensions and 23 ft. high, and be constructed entirely of Ohio mineral products.

A sample of asbestos has been obtained from the Snake River mine in Owyhee county, Idaho. The mine was discovered only last fall. It shows a three-foot vein of fibrous asbestos. Asbestos has also been found in Cassia county.

The Pottstown Iron Company, of Pottstown, Pa., has rolled a steel plate 150 ft. long and 20 in. wide by 7-16 of an inch thick as an exhibition piece of work for the World's Fair. It is one of the largest pieces of iron ever rolled in this country, and three cars will be needed to transport it to Chicago.

Pure aluminum extracted from Idaho clay will be on exhibition at Chicago. It comes from Kootenai county. In the mineral exhibit is a piece containing about 75% lead and 15% sulphur, almost pure galena. It comes from the Queen of the Hills mine at Bellevue. The ore carries 130 oz. of silver to the ton.

An effort is being made to arrange for a grand reunion at the World's Fair of surviving "49-ers"—the men who left their homes in the East in 1849 to become gold hunters in California. It is thought that several thousand of them are still living, and that all would make an extra effort to go to Chicago next year, were a reunion arranged, as is proposed.

Idaho's collection of fossils is not extensive, but efforts will be made to increase it before the fair opens. With the exception of woods, fossils are not very plentiful in this State. A fine large fossil tooth of a mastodon has been received from Bingham county. The exhibit so far contains two pretty specimens of agatized wood. Other fossil woods have been received, and altogether will make an interesting exhibit.

The Idaho mineral exhibit contains specimens of sand from the placers in the Neal district. This sand contains zirconium. Zircon sand is found at Helena, Mont.; in southern Colorado; Santa Fe, N. Mex., and in Arizona. It is also found in Idaho and Washington counties in this State, besides the Neal district. At Warrens, in Washington County, it can be taken out in paying quantities. Efforts will be made in the spring to obtain more of this sand for the World's Fair.

Idaho will have a rare collection of gold nuggets for the World's Fair. These chiefly come from private cabinets that have been saved from the placer diggings since the early discoveries. These nuggets are very valuable, and are only loaned for use at the exposition. While many promises have been received from owners of gold nuggets, it is hoped that others who have not been heard from will send in their collection, that the exhibit may be as full as possible.

The most approved methods of artificial ice making and cold storage will be exhibited at the World's Fair. These processes will be shown in a building, 130×255 ft., and five stories high, with observatories at the corners and a lofty tower at the centre. About 80 tons of ice will be manufactured daily, three methods being employed, namely: the plate system, from filtered water; the can system, from condensed steam filtered and purified; and the can system, from deaerated water. Three different processes of cooling rooms will also be shown.

INDUSTRIAL NOTES.

Three more anthracite blast furnaces in Pennsylvania—at Leesport, Robesonia and Sheridan, respectively, will go into blast early this month, after a protracted idleness.

The works of the Fort Wayne Electric Company, in Fort Wayne, Ind., were damaged by fire on the 3d inst. to the extent of $250,000. The loss is covered by insurance.

The Carnegie mills at Homestead, Pa., are running full in every department. While several mills were closed on the 4th inst. for repairs, a number of the employees left, making room for the old men, many of whom were put to work.

In court, at Reading, Pa., on the 3d inst., the petition of the Clymer Iron Company was presented, asking for a dissolution of the corporation. The company was incorporated on May 6, 1873, and has no debts or liabilities. Some years ago it operated several furnaces.

A telegram from Seattle, Wash., says that the last spike on the Great Northern Railroad was driven on the 5th inst., in the Cascade Mountains, and train service will be commenced between Spokane and Seattle next week. Engines and cars are on the way from St. Paul.

By the explosion of a gas pipe at the old Greenwood furnace of the Logan Iron Company, in Huntingdon County, Pa,. on the 3d inst., the plant was wrecked. This was the only cold blast charcoal furnace in the Juniata Valley, and had been in constant service, it is said, since 1834.

A press dispatch states that a letter from Vice-President Hickey, of the Amalgamated Association of Iron Workers, to a man in West Superior, declares a systematic and extensive plan to boycott the Christopher Columbus, passenger whaleback built for the World's Fair, because the vessel is built of steel plates from the West Superior Steel and Iron Company, which is a non-union shop.

The Bethlehem Iron Company is manufacturing for the Navy Department a 14-in. Harveyized test plate, to be fired at with shot from a 10-in. gun. The tendency in armor plate manufacture is to make them lighter, and the department desires to find out the resisting power of 14-in. plate. The Harveyizing process lasted from December 20th until January 5th. The plate will be tempered next week and tested later on at the government proving ground at Indian Head, Md.

The De La Vergne Refrigerating Company states that one, J. R. Duff, has been representing himself as being in the employ of that company, and explaining that the name "United States Ammonia Company," which appears on his card, has simply been adopted by it for private reasons, and that Mr. J. C. De La Vergne has put him in charge of the ammonia business. The facts are, we are informed by the company, that J. R. Duff is not in their employ in any capacity.

A Cincinnati paper says that a member of the advisory committee, of Homestead, Pa., has been visiting that city on a mission to secure funds for the criminal prosecution of H. C. Frick, Secretary Lovejoy and Captain Breck, of the Carnegie company. He conferred with the leaders of labor organizations and was very successful. He stated that similar agents have been sent to Chicago, New York, Philadelphia and St. Louis, and that a fund of $30,000 will probably be raised to push the prosecution. Nothing was known at Homestead of the man nor of his mission.

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 address at 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.

2,858. A second-hand 20-ton hand-power crane. Pennsylvania.

2,859. A second-hand 500 to 800-lb. power or steam hammer. Pennsylvania.

2,860. A second-hand drill press. Pennsylvania.

2,861. A complete distilling outfit; capacity 50 to 100 gallons. Alabama.

2,862. Machinery for mining pebble phosphates. Florida.

2,863. Three good second-hand Embrey concentrators; also split wood pulleys for a gold mill. North Carolina.

2,864. A complete outfit of woodworking machinery, including shafting, hangers, pulleys, belting, etc. Virginia.

2,865. A 10-H.P. engine and a 20-H.P. boiler; also machinery for a first-class laundry. North Carolina.

2,866. Catalogues of stamp mills and mining machinery; printed in Spanish. Pennsylvania.

2,867. A key lathe and a cock grinder. Illinois.

2,868. Machinery for a roller flour mill. Virginia.

2,869. Catalogues of hay cutters to cut from 2,000 to 6,000 lbs. of hay per day; printed in Spanish.

2,870. Machinery for a 4-set woolen mill. North Carolina.

GENERAL MINING NEWS.

At the annual meeting of the stockholders of the Standard Oil Company on the 3d inst. the following directors were elected: John D. Rockefeller, William Rockefeller, H. M. Flagler, John D. Archbold, H. H. Rogers, W. H. Tilford, Charles M. Pratt, Paul Babcock, Jr., and A. M. McGreagor. The only change is the election of Mr. McGreagor in place of James McGee. The officers elected subsequently were: William Rockefeller, president; J. D. Archbold, vice-president; William T. Wardwell, treasurer, and L. D. Clarke, secretary.

ARIZONA.

Amador County.

(From our Special Correspondent.)

The new five-stamp mill being erected on Sutter Creek by the Wilds & Wheeler Co. will soon be completed, and the stamps chopping on $80 rock. The owners are congratulating themselves on the showing made in the property. The vein on the surface showed about 18 in.; at 50 ft. deep it had widened out to 6 ft., and at the bottom of the shaft it now shows 12 ft. From assays carefully made all the way down, the average yield will not be less than $80 per ton.

Butte County.

(From our Special Correspondent.)

Cherokee Mine.—This property will be sold on the 28th inst. to satisfy a claim of the Bank of California for $36,551.

Los Angeles County.

(From our Special Correspondent.)

The Pacific Oil Company, San Francisco.—The present output of crude oil from this district averages $3,200 daily. The oil is shipped to Alameda to the refineries of the Standard Oil Company. In all there are about 60 wells, and while the average production will not compare with the Pennsylvania wells, being only 10 to 200 barrels daily, the continuity of the flow is somewhat remarkable. Some of the wells have not flagged since opening, and the oldest well was opened 22 years ago. On account of the small daily output capitalists have not hitherto been interested in the industry, but the phenomenal lasting quality of the wells has caused a change of feeling, and now considerable money is being invested in the oil fields. No. 4 well is 21 years old and has produced oil valued at over $1,000,000—in quality just as good as the average Pennsylvania oil. All the oil in the San Fernando district runs 41° test, and after being refined makes a good illuminant. The oil in Ventura county and the fields farther west run 21° test, being a heavy, black oil, valuable for fuel but not for illumination.

Newhall & Castari Oil Co., San Fernando.—This company has recently organized for the purpose of working 2,000 acres of land adjacent to the lands owned by the company previously alluded to. As in the district there are 12 acres upon which are located a well to each acre, and the demand in local markets exceeds the supply, there is every reason why the new corporation should do well.

Yavapai County.

(From our Special Correspondent.)

Late advices from Flagstaff regarding the San Juan diggings continue to tell of the enormous number of miners from Utah, Colorado, California and this Territory who are pushing their way to the new grounds. The new camp was the scene of a fracas last week when several men were killed. As usual in such cases, claim jumping was the cause of the trouble. In the opinion of the average miner this episode is additional evidence of the richness of the new camp. Claims have been staked off on the San Juan River for 75 miles from its mouth and for 25 miles up the Colorado River. When bed-rock is reached the gold is found plentifully, but the lack of sufficient water will make working expensive. Living is enormously high, and many men are sleeping in the open, there being no material to build huts, and in the hurry to get on the ground tents were not brought. Several miners either possessing or representing capital have returned to San Francisco and Denver, Col., and are engaged in purchasing machinery to be forwarded to the San Juan camp.

CALIFORNIA.

Calaveras County.

Royal.—This mine, located six miles from Copperopolis, is down 230 ft., and the ore is said to be worth $16 per ton. A 10-stamp mill is working steadily. A dividend of $2,800 was declared in November, and in October the dividend was $2,000. A new boiler has been received at the property.

Siskiyou County.

River Mining Company.—According to a local exchange this company, on the Klamath, at the mouth of Ashe Creek, Siskiyou, is taking out considerable dust lately from an open cut of 40 ft. deep to bed-rock, having found an old channel, which is said to be quite rich. Other river claims in the same vicinity, between the mouth of Humbug and Cottonwood creeks, are also yielding good returns, and will probably be worked all winter, if the weather permits.

COLORADO.

Colorado Fuel & Iron Company.—The annual report for 1892 has been issued. This statement of production is from January 1st to December 31, 1892, inclusive, and in detailing the output of various coals from the different properties of the consolidation, it shows that there were 246,556.80 tons of R. M. and lump, 91,541.45 tons of slack, 54,825.45 tons of coke from Sopris; a total of 338,098.25 tons of coal. From Engleville a total of 243,899.90 tons of R. M. and lump coal. From Berwind, total 163,032.70 R. M. and lump. Rouse, 175,798 tons of R. M. and lump, 52,210 tons of nut and 71,914 tons of slack; total, 299,922. Walsen, 53,984.50 tons of R. M. and lump, 6,003.35 tons of nut and 9,972.80 of slack; a total of 69,960.75 tons. Cameron, 2,730.05 tons R. M. and lump, 172.15 tons nut and 734 tons slack; a total of 3,636.20 tons. Robinson, 52,183.80 tons R. M. and lump, 10,810.05 nut and 13,824 slack; total of 76,817.85 tons. Picton, 61,051.10 R. M. and lump, 18,678.50 nut and 10,542.35 of slack; total 90,271.95 tons. Coal Creek, 86,575.10 R. M. and lump, 17,803.70 nut and 18,193.30 slack; total, 122,570.10 tons. Crested Butte, 101,141.65 R. M. and lump, and 51,879.20 tons of coke. Anthracite, 40,578.75 R. M. and lump, 16,797 nut and 22,807.40 slack; total, 80,183.15 tons. Newcastle, 137,055.50 R. M. and lump, 15,777.10 nut, 22,318.95 slack; total, 175,151.55 tons. Spring Gulch, 77,526.70 R. M. and lump. Sunshine, 14,961.05 R. M. and lump, 1,995.95 nut, 26,824.50 slack; total, 43,781.50 tons. Marion, 17,200 R. M. and lump. Coleridge, 1,456 R. M. and lump, 629 nut and 1,445 slack; total, 3,530 tons. From the El Moro ovens, 95,052.80 tons of coke, and from the Cardiff ovens, 53,019 tons of coke. This production gives totals of 1,475,729.70 tons of R. M. and lump coal, 140,876.80 tons of nut coal and 290,117.75 tons of slack; a grand total of 1,906,724.25 tons of all coals, and a grand total of 254,776.45 tons of coke. The total production of both coal and coke of the company's properties thus gives 2,161,500.70 tons.

The production of iron, steel and iron ores shows a gratifying business for the only steel works in Colorado, the Bessemer plant at Pueblo. The company has enough orders ahead for 1893 to warrant an early increase of its present capacity. During the months of January, February, and March the pig iron furnaces were banked, yet the total output for the balance of the year was 69,957,199 lbs. Iron castings amount to 3,705,029 lbs.

The cast iron pipe furnaces, although banked during April and May, turned out 4,628,307 lbs.

The production of steel rails was 54,621,172 lbs., and 2,880,725 lbs. of Sarap bar and 281,600 lbs. of spikes. There were also 10,875,552 lbs. of merchant iron and 5,098,543 lbs. of unfinished iron.

Steel blooms amounted to 61,491,243 lbs., and steel ingots 70,473, 947 lbs. Muck bar amounts to 2,467,414 lbs., and spiegel 2,277,500 lbs.

Ores from the Orient and Calumet run up respectively to 71,265,100 lbs. and 31,221,300 lbs.

Clear Creek County.

Anchor.—This mine at Freeland has been transferred from C. L. Miller to Stephens Bros. & Hawke, who have been working it for the past two years under a lease and bond. The discovery shaft opened up a streak of lead ore at grass roots, says the Idaho Springs "Gazette," and it continued to a depth of 90 ft., where the shaft came into an adit driven in on the veins from the surface lower down the hill. The adit has been driven into the hill 100 ft. past the intersection with the shaft and carried a 10-in. streak of solid lead ore all the way.

Dolores County.

Rico-Aspen Consolidated Mining Company.—The mining suit of Lewis against Roeder et al. (See The Engineering and Mining Jounal, Dec. 24th) has been dismissed at plaintiff's costs. Lewis held 25,000 shares of the Rico-Aspen Consolidated Mining Company's stock. When the capital stock of the company was increased from $300,000 to $1,000,000, and then to $5,000,000, Lewis, who was superintendent of the company, and who had owned portions of the claims which now form this important group, was discharged, he says, because he asked for his rights. He demanded 500,000 shares of the 5,000,000, and was beaten in his first injunction suit. Then the defendants sued him for damages on his injunction bond, and Lewis began a second suit against them on the same grounds as the first one. To-day, John Taylor, Mr. Lewis' lawyer, appeared before Judge Burns and dismissed the case. It is said to have been settled by an agreement satisfactory to all.

El Paso County.

Lucky Gus.—The Wilson Creek Mining and Milling Company, of Buena Vista, has bonded and leased the Lucky Gus mine in Cripple Creek for $75,000 to a Leaville company. The sum is to be paid within 12 months. The vein of the Lucky Gus was cut last week, and good ore was struck. A force of men will be put on immediately. It is located on Bull Mountain, near Wilson Creek.

Railway Conductors Mining Company.—The tunnel on this company's property is in 300 ft. and cuts through a good mineral formation. Machinery for the plant to be erected on the property is being shipped from the East.

Strong.—This mine, which was recently sold for $60,000 to Colorado Springs parties, is a regular shipper. The ore is not high grade, the best returns so far not yielding more than $50 per ton net. Still the vein is nearly 12 ft. wide, the pay streak about 2 ft., and the balance will yield well when treated at the mill. At this mine the owners will sink a shaft 200 ft.

Ouray County.

Yankee Girl.—This mine on Red Mountain was shut down on the 31st ult., throwing about 50 miners out of employment.

San Miguel County.

Lucky Girl Mining Company.—This company is developing its property, situated at the head of Cornet Creek. The vein shows a 16-ft. body of ore on the surface, and within 200 ft. of the present workings will tap another vein, cross-cutting the Lucky Girl, which bears free gold. In driving about 60 ft. on the Lucky Girl vein, ore has been taken out assaying as high as 319.23 oz. in silver and a trace in gold, says the Telluride "Republican." Development work will be carried on all winter. The principal owners are F. D. Margowski, William Hoffman and J. E. Deems.

Smuggler-Union Consolidated Mining Company.—This company has purchased the Marshall Creek stamp mill from the Marshall Creek Mining Company. Consideration, $10,000.

Saguache County.

Mr. L. D. Roudebush, the well known mining man, arrived in Denver on the 29th ult. from New York, where he has been endeavoring to negotiate the sale of the Amethyst and Hidden Treasure mines at Creede, says the Denver "Republican." About two months ago Mr. Roudebush obtained an option upon the mines from the owners, Messrs. D. H. Moffat, L. E. Campbell, N. C. Creede, and Walter S. Cheeseman, for 60 days, the purchase price being fixed at $3,000,000 in cash. As soon as this option was obtained, Mr. Roudebush went East and endeavored to interest Eastern capital in the enterprise and effected a sale, but he was not successful in his efforts, and his option expired on the 31st ult. Unless it is renewed or some other arrangement is entered into between him and the owners of the mines, they will remain in statu quo. Messrs. Creede and Campbell, who are heavy owners in these properties, are in the city. Speaking of the failure of the deal, Mr. Creede is reported by the "Republican" as saying: "The purchase price is a large sum, but the mines are worth it. Last month they paid nearly $150,000 in dividends, and the ore vein is getting richer all the time. Mr. Roudebush's option expires to-morrow, and I ascribe his failure to make the deal for the purchase of the property to the present condition of the silver market. I do not know positively what we will do if Mr. Roudebush fails to meet the conditions under which he obtained his option, but I think, i fhe wants more time in which to arrange to dispose of the property, we will grant it, though I cannot speak for anyone but myself." Mr. Roudebush declined to say anything in regard to the failure to effect a sale of the property in the East. Mr. Moffat said that the option would not be removed.

Solomon.—On this property M. Watrows and H. Barrigan, of Denver, J. Pennings, and D. G. Bradt, of Creede, had a 10 days' option to purchase nearly a half interest in six months' bonds for $25,000. They in the meantime sunk a shaft 25 ft., and the result shows from 10 to 37% zinc in the vein, which caused the new parties to withdraw from the proposition. Dewey and Rowley, the original and present holders of the bond from the Chas. Nelson, are undecided as to their future action. The same condition of affairs, it is said,

exists in the Holy Moses mine, and it is believed that the Solomon is on the same vein.

IDAHO.

Alturas County.

The North Star, on the East Fork, continues to improve. A peculiar feature of this property is, for years it has been a lead-producing mine, and now it carries but 5 to 10% in lead, 6 to 20 ounces silver and runs up to $35 in gold. The smelter will be ready Jan. 20 to smelt this ore. They haul to the Union Pacific switch, three and one-half miles, then the cars carry the ore to the smelters, seven miles. This ore will nearly flux itself. The Narrow Gauge mine, in Narrow Gauge Gulch, has struck a nice body of ore and will be regular shippers next spring. The Camas Gold Company, at Soldier, Logan county, have started their mill up and are working their best ore, saving 87%. This quartz assays $16 in gold to the ton. The Champlain property is closed for the winter. The Solace Mining Company, at Red Wing, have closed for the winter their mine and mill, with the exception of four or five men on contract. They had a short but successful run this fall and winter, amounting to about $40,000. Next spring they will run continuously. The Silver King com will rebuild their mill next spring, it having burned down. The Buttercup group, owned in Detroit, Mich., have closed their mill down, but are piling their ore from large reserves to resume operations in May. The Red Elephant mill is running on good concentrating ore.

Custer County.

Dickens Custer Mining Company (Limited.)—At a recent meeting of this company in London, the report of Dr. E. J. Ball, who had been sent out to investigate the property, was read. Dr. Ball said he visited the mine, this time not in the capacity of a mining engineer simply and purely, but also, as the chairman has pointed out, as the company's legal representative on a minor scale. He started about the end of June and reached New York on July 4th, and then proceeded to Denver, where he met Mr. Axford, and, together, they saw Judge Markham, and obtained his opinion on Mr. Dusseldorf's proposition. Dr. Ball's report on the property was as follows: "In June, 1890, I visited your property for the first time. I advised you to prove the lode in the Summit claim, to search in the immediate neighborhood of the former ore bodies, to pick over the former workings in the Charles Dickens, to do as little barren development work as possible, and, generally, to explore your property in as economical a manner as possible. This was done, and during the summer of 1891, Mr. Axford was able to make a mill run of some length, though the actual exploratory work had not yielded satisfactory results. It having been decided that it was desirable to continue the same policy of exploration for another year, Mr. Axford was authorized to enter into a contract with a neighboring mine owner to work the ore. It was thought that the profits to be obtained from the treatment of this custom ore, combined with that to be derived from the lower grade ore belonging to the company, a small strike of high-grade ore on the Atlantic claim immediately at the close of the season, led Mr. Axford to somewhat higher hopes than he had previously held. Unfortunately, on my visit to the mines this summer, I found that the Atlantic discovery was so small and irregular as to be of no particular value to the company, and a cross-cut put through the lode at my request, though it struck another small streak of ore, confirmed me in this opinion. Small streaks such as these are not constant in their character. One day the face of the drift may show several inches of high-grade ore, the next day only a spot, or none at all, and then the next day again the streak may be wider and more valuable than ever. Such a mine is only of value for selecting or picking purposes—it is no mining proposition. The Custer slide was being worked by a dozen tributers. At this part of the company's property some thousands of tons of ore are in sight; but the grade is extremely low, and this ore cannot be looked upon as a reserve of any value at the present time. I again made as thorough an examination as I could of the Custer group of claims, and I am of opinion that, although at some future date high-grade ore may be met with in quantity, it will be only by an accident—the result of chance. The appearance of the claims leads me to believe that, starting from the Custer lode as a line of weakness, the whole mountain side has slipped downwards, resulting in a chaotic mass of debris, which may contain more or less broken-up masses of the original lode in many places, though their exact positions cannot be definitely forecast. The exploratory work, which has been done during the past year, has again led to no satisfactory results. Considering that the development work has been of so unsatisfactory a nature, I am of the opinion that the board has acted wisely in discontinuing further exploratory work under the present circumstances of the company.

Idaho County.

Lillie May.—A tunnel has been driven 135 ft. in the ledge. The vein at present is 7½ ft. wide, of sulphides of iron carrying a high percentage of gold. Two men can mine 15 tons of ore a day and run it ont on the dump. There are 300 tons of ore on the dump, and with a production of 400 tons a month the owner anticipates all the ore necessary by spring for shipping. The proprietor intends treating his ore by the McArthur-Forrest process.

Owyhee County.

A special telegram to the New York "Times" contains the following information: "Mr. Kuntz, said to be agent for the house of Van Amerengen, in Amsterdam, Holland, has visited the so-called diamond fields of Owyhee county, and procured several specimens. He started for the East with them on Thursday morning last. Before his departure he said in the presence of several gentlemen at Nampa: "That the geology of the country around the diamond fields is precisely the same as in South Africa, and not unlike that of Brazil, only it is not as much broken up. In my estimation these fields will be larger in general than those of either, the blowouts or shafts being a great deal larger and more clearly defined. The chimneys of the volcanoes show that the same process has taken place in the formation of this country as occurred in the other fields mentioned." He claims there is a kind of ledge extending from the Snake River, lying on the southerly side near the mouth of Rabbit Creek, and extending almost to the summit, some 15 contains the following information: "Mr. Kunz, with him while making the examination were Lucas B. Ruecaw, Albert Feifer, and William H. Mackey, of Helena, Mont., who have recently sold some sapphire ground in that State, and E. H. Fleming, of Nampa, a town about 20 miles from this city, on the Oregon Short Line.

It has been very difficult for men to bring themselves to believe that a diamond field has been found in this State. Nothing but the most absolute proof would satisfy the inquiring mind, but it is now at hand. To arrive at any other conclusion would involve an asperation upon the veracity and honesty of a number of men whose reliability none would question who knew them. There is a remote chance of their having been duped, but it is very much so. There is at least one instance on record in which a large tract was sown with diamonds for the purpose of consummating a gigantic fraud, which was successfully carried out. But this has no earmarks of a swindle, and the principal men interested are above reproach. After ex-Governor Stevenson and others equally reliable had secured their claims, the grounds were open to the public, and even tramps are among the claim owners. It is also the fact that some of the men interested in this find have been investigating the matter for a long time. If the diamonds had been sown for them to find, the plan would have been laid and sprung long ago.

A copy of the laws framed for the taking up of claims in Diamond Basin on December 1st, 1865, at a meeting held at Anderson's Ranch, on Sinker Creek, of which R. A. Miles was chairman and William Musgrave secretary, together with some of the proceedings, are matters of record in Owyhee county, and may be of interest. They are as follows:

"The name of this district shall be known as Diamond District, and shall be bounded on the north by Snake River, south by French District (or where the wagon road leaves Sinker Canyon, four miles from Sinker Mill), east by Catherine Creek, and west by Reynold's Creek.

"All free-born white citizens only shall be entitled to hold or work mining claims in this district. Each person shall be entitled to hold one mining claim of each kind, by location. All discoverers shall be entitled to one additional claim by discovery.

"Creek claims shall be 300 ft. in length, and extend from the base line of one hill to the base of the hill opposite. Hill claims shall be 300 ft. front, extending back 600 ft. Gulch claims shall be 300 feet square, the center of the gulch to be the center of the claim.

"All claims shall be recorded within five days after location, or they will be considered forfeited.

"No person shall locate a claim for another person, unless he is a resident of this county, and if not a resident, he must have a power of attorney to do so.

"All claims properly located and recorded shall be laid over until the 1st of May, 1865. After the 1st of May, 1866, all claims or set of claims shall be worked four days each month; if not, they shall be considered forfeited."

Charles Hilton was elected recorder of the district. He was to receive a fee of $5 for each claim recorded, and $2.50 for each additional claim. In 1865 there were 337 claims located. To Gov. Caleb Lyon four lcaims were given, which were selected by a committee composed of D. H. Fogus, J. McCourt, and William Musgrave. Among those who attended the meeting at Anderson's Ranch who are now living were "Mat" Joyce, of Bruneau; "Con" Shea, of Seton City; J. W. Gilmore, of Sinker Creek, and D. H. Fogus, of San Francisco. Some of these men identify the ground as the same staked in 1865.

This matter was referred to Mr. George F. Kunz, of Tiffany & Co., who gave the following interview to a "New York Times" reporter:

Mr. Kunz said that he had not been out of the city since the reported discovery, and that Tiffany & Co. had sent no representative or agent to examine into the matter. Within the last week, however, two samples of stones taken from the Idaho fields had been sent to Tiffany & Co. for examination. Both proved to be common quartz crystals instead of diamonds. Beyond this Mr Kunz and Tiffany & Co. know nothing about the supposed fields.

In the despatches from Boise City it has been asserted that the Idaho fields promised to rival those of Africa in size and general importance, and that the diamonds found thus far "were silicon diamonds, about 9¼ pure, and worth about half as much as the genuine water diamond."

Both of these statements, Mr. Kunz says, are absurd.

"There is no such thing as a silicon diamond," he stated. "No geologist would use such a term. A diamond is pure carbon and either a diamond or nothing at all. Unless quartz crystals were meant by the phrase, it was meaningless.

"And to say that the new fields promise to rival those of Africa is equally absurd. It took years to get any idea of the extent of the African fields. Such statements off-hand regarding undeveloped fields are worthless, to say the least. No one could tell anything about it on such a showing."

The fields are supposed to be the old "diamond beds" that caused the excitement in 1865, and a statement has been published that Caleb Lyon, who was then territorial governor, found six stones which he sold to Tiffany & Co. for $2,000. Mr. Kunz says that Tiffany & Co. have never bought any Idaho diamonds.

Previous investigations by Mr. George F. Kunz are recorded in his work on the "Precious Stones of North America," and he has always been inclined to treat the claims of Idaho as a diamond-producing region in a very conservative way. Although in his capacity as gem expert of the United States Geological Survey, he has written a number of letters to persons in Idaho, he has, as yet received no reports that would lead him to change his views.

MICHIGAN.

(From our Special Correspondent.)

Ore has been cut in the west shaft of Section 21. It is a rich, soft hematite, similar to that at the Winthrop. Stock piles are again growing at the mines now that navigation is closed. The mines of Negaunee raised 808,000 tons, half of which the Schlesinger group produced.

The Republic will not remove its plant to Mesaba, a majority of the stockholders thinking a new management will result in finding new bodies of ore. The Champion, one of the most expensively wrought mines of the district, is contemplating shutting down because it cannot produce ore under $2 per ton. Our mining school at Houghton has already outgrown its buildings, and a bill is to be introduced this winter at Lansing for an annex. Eighty-five students are in attendance.

Extraordinary efforts are being put forth at all the mines on all the ranges for a large output of ore this winter. Every ton of Bessemer ore sent forward during 1892 was bought before it reached Lake Erie ports, and thus leaves bare docks so far as that sort of ore is concerned, an unhear of state of affairs for years. Low grade ores are plenty and cheap, as they always will be. Ten millions of dollars are being expended by two governments at the Sault in two of the largest locks on earth, and all for the accommodation of Lake Superior commerce. A late purchase of the Schlesinger syndicate is the Aragon mine at Norway, Mich., on the Menominee range. Four hundred men are employed, and an output of 400,000 tons is expected for 1893. The group of mines at Negaunee which this sindicate controls is noted for its large product, cheap management and expert superintendance. Over 4,000,000 tons of ore have been shipped from Escanaba this season, making it the greatest shipping port on earth.

At the Cleveland lake shaft, an electrical train is being put in under ground. From the shaft east a drift has been driven many hundreds of feet, but while the water of the lake was overhead, the ore could not be thoroughly mined. Now that the water is pumped out the ore is to be mined, commencing at the farther end and taking it clean as the miners work back to the shaft.

The old Cleveland locality, known as the Sellwood pit adjoining the New York mine, is now being worked on a contract for five years. Many thousands of tons of so-called rock, from a large cave-in at Winthrop, has been hoisted to the surface and thrown away as useless a few years ago. This pile is now being sorted over and sold as second-class ore. It gives 47 to 50 in iron, but very low in silica, smelts easy, and, in a great measure, fluxes itself. Shipments from this will be made all winter. Ore is scarce, and to-day a 10-000-ton order could not be filled. After January 1st the old New York mine will be permanently abondoned. Everything connected with it is offered for sale then. The ground will probably be laid out with city lots. Its first shipment of ore was made in 1864, when 8,000 tons were produced. From that time to 1882 it was vigorously wrought, but since the last mentioned year owing to a legal controversy and poor showing in the mine, it has barely lived, producing only a few tons per year and not always shipping that. Its total output from the start has been nearly one and a quarter million tons. The real estate consisted of only one forty-acre tract.

A late sale of sandstone land at L'Anse brought $30,000. The tract was owned by two Indians, and had been in the family for centuries, but it took white men to develop it. Slate lands in this vicinity are being closely looked after.

Copper.

Peninsula.—It is said that State Treasurer Mr. Jos. F. Hambitzer will make an effort to revive this property, now idle. Those who have been prominently connected with it argue that it could be made to pay a profit were the necessary capital

invested. It is proposed to give speculators of Michigan an opportunity to take hold of the mine.

Iron—Marquette Range.

East New York Iron Company.—Between 40 and 50 of the men who held labor claims against the East New York Iron Company received the amount of their claims the Saturday before Christmas through Attorney E. E. Osborn, who had the collection of the accounts in hand. These claims footed up about $4,500. From outside stockholders of the company Mr. Osborn secured about $3,000, and the balance he got from local shareholders. Some of the claims amounted to $100 and over. Part of the men had one month's wages due, while others had from two to three months' pay coming. After waiting from five to six months for their money the men were greatly pleased to get it, even at this late day. There are yet some labor claims not paid, but those which Mr. Osborn held are all cleared up.

Republic.—Olof Wenstrom, of Marquette, mining engineer, has made an examination of the Republic mine, and gives it as his opinion that there is much in store for the company aside from the lenses now being wrought or in sight. The present lowest depth attained in the workings is about 1,000 ft., and he thinks the bottom of the ore basin at this point will not be reached in twice that distance, and by reason of this other large bodies of ore should be found in ground hitherto unexplored. He advises thorough exploration of the territory under the bottom of the present pits.

Platt.—The new hoisting machinery ordered for the Platt mine a short time ago has arrived, and is now being put in position. Chausse Bros. have completed the erection of a new engine house, a dry, shaft house and pocket, blacksmith shop, carpenter shop, and a new skip-road 200 ft. in length. The shaft is down 200 ft., and serves three levels, each 50 ft. apart. The first level is about 50 ft. from the surface, where the ore was first encountered. The last 150 ft. of the shaft is in clean Bessemer ore which will run from 62 to 66% metallic iron and is very low in phosphorus. On the second level a drift has been driven 400 ft., in which some fine ore has been encountered. Sinking will be continued until a depth of 250 ft. has been reached, when more attention will be given to drifting and hoisting. There is said to be upward of 100,000 tons of ore in sight at present. The C. & N. W. Ry. Co. built a track into the mine late last fall, and two cargoes of ore, amounting to about 3,000 tons, were shipped before navigation closed.

Iron—Menominee Range.

Armenia Iron Company.—The drilling work has been discontinued. One hole was drilled to a depth of 200 ft. and about 90 ft. of ore was cut. It has not yet been decided whether another hole will be drilled or a shaft sunk at once.

MONTANA.

Silver Bow County.

Boston & Montana Consolidated Copper & Silver Mining Company.—Sealed proposals addressed to the New England Trust Company, of Boston, Mass., trustees for the sinking fund, and indorsed proposals to sell B. & M. C. C. & S. Mining Co. 7% bonds will be received until noon, January 25th, 1893, for the sale of the above named bonds at not above 110 and accrued interest sufficient to absorb the sum of $50,258.57, or any part thereof, in accordance with the mortgage dated August 23, 1887.

Proposals will be opened, and successful bids declared January 25, 1893, and interest on accepted bonds will cease January 26, 1893.

NEVADA.

Esmeralda County.

Monte Diablo Mining Company.—The latest weekly official letter from the superintendent says: "We will begin to drive a south crosscut from the 7th east in a few days. The hanging stope on the east 6th shows 3 ft. of $40 ore. The stope near the winze on the same level shows a slight improvement. We are extracting the usual amount of ore from the main stope in the intermediate between the 5th and 6th levels. The west drift in this intermediate is in 47 ft. and shows 6 in. of $40 ore. The west stope of the same intermediate shows 18 in. of $50 ore. The main stope on the 2d east shows 2 ft. of $35 ore. The stope above the 1st west is giving considerable ore. The stope above the 1st east shows 2 ft. of $35 ore." On the 30th the company's office at San Francisco received another shipment of fine silver, amounting to 6,508 oz. The ore is being shipped to the company's mill at Sodavilla for reduction.

Storey County.

Comstock Lode, Belcher Mining Company.—The latest weekly official letter says: "The raise from the lateral drift on the 400 level, 100 ft. south of the main raise, has been advanced 28 ft. during the week, and is now up 70 ft. The top is in porphyry and clay. The west crosscut from the south drift on the 350-ft. level has been advanced to a total length of 38 ft. It has been stopped and a south drift started from it, which is now out 25 ft. The face is in porphyry, with a clay wall overhead. This wall has broken away in one or two places, exposing a streak of quartz lying on it about 2 ft. in width, which assays from $15 to $25 per ton. This drift will be connected with the top of the raise from the 400-ft. level, mentioned above, and has about 25 ft. to go. The north drift on the 350-ft. level has been continued for a distance of 46 ft. north of the 300-ft. level winze. The face is in porphyry and streaks of lively looking quartz assaying from $4 to $7 per ton. The north stope from the winze, 20 ft. above the 350-ft. level drift, has been carried about 35 ft. north. The face shows a streak of ore 2 ft. in width of good quality. There is no change to report elsewhere. Have shipped to the Brunswick mill for reduction during the week 417 tons 190 lbs. of ore, the average battery sample of which was $25.52 per ton."

Consolidated California & Virginia Mining Company.—Superintendent Lyman writes as follows to President Fish, under date of December 28th: "In the mine everything is working most favorably. The water that we turned into the 1,500 south drift is having the desired results. It has made the old Consolidated Virginia shaft an upcast from the 1,650-ft. level, the very thing we wanted. I expect now to reach the sill floor of the 1,500 level stopes within a week, and when we get there it will not take long to fill up the connection leading down to the 1,650 level. With all this accomplished we can resume ore extraction on the 1,500 level."

Crown Point Mining Company.—The latest official weekly letter says: "The west crosscut from the southwest drift, 150 ft. south of the shaft on the 400 level, has been extended 19 ft. since last report and is now out a total distance of 130 ft. The face is in a mixture of porphyry and clay. There is no change to report of the 160 level stope."

Savage Mining Company.—The latest weekly official letter says: "We have hoisted 471 cars of ore from the 950, 1,100 and 1,400 levels; shipped to the Nevada mill 450 tons and milled 520 tons. Average car sample assay, $22.43 per ton. Average battery assay, $20.68 per ton. Bullion yield for the week, $7,524.40. Shipped to United States Mint at Carson December 24th, 359 lbs. of bullion. On the 1,100 level we are stoping ore north from the 11th floor up to the 14th floor. The north prospecting drift on the eighth floor was advanced a total distance of 53 ft. We are now upraising from the face of this drift. On the 1,450 level, the west crosscut, started 100 ft. from our south boundary, is advanced 65 ft. The face is in porphyry and quartz. The joint north drift with the Gould & Curry Company on the Sutro tunnel level was advanced 15 ft.; face in very hard porphyry."

Storey County—Comstock Lode.

According to the San Francisco "Report," an improvement is reported in the grade of the quality which west crosscut No. 4 on the 1,800-ft. level of the Hale & Norcross mine, near the Savage line, is cutting. In the Potosi mine, a connection will be made between the west drift from the top of the upraise and the drift coming east from the footwall winze next week. Both drifts are being pushed toward each other with eight-hour shifts of miners. Once connected, the necessary ventilation will be secured to explore the ore vein to the southward. Both drifts are reported to be in favorable vein matter, but they are north of the place where the good ore is making. West crosscut No. 2 on the 1,800-ft. level of the Bullion mine, 300 ft. south of the Potosi mine, is now cutting into a favorable looking body of quartz.

(From our Special Correspondent.)

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

Mines.	Tons Hoisted.	Car Sample Assay.	Tons Milled.	Average Battery Assay.	Bullion Product for Week.	Bullion Shipped.
Belcher	.....	.....	417	25.52	.....	.....
Con. Cal. & Va.	.....	28.11	818	[1]29.25	.....	[2]31,758.65 [3] 8,322.70
Con. New York.	[4] 70	37.60	223	36.27	.....	[5] 276
Overman	268	20.09	311	15.04	.....	.....
Potosi	370	33.31	370	26.47	.....	.....
Savage	[6] 471	22.43	520	20.68	7,524.40	[7] 359

[1] A balance of 505 tons ore on hand at the mill was so superior to the 313 tons shipped that the battery assay shows better than the car sample.
[2] Shipped to the Carson Mint.
[3] Result of the annual clean-up of the Assay office. Shipped to S. F. Total bullion product for Dec.. $52,219 08.
[4 5] Cars.
[6 7] Crude bullion.

Consolidated California & Virginia Mining Company.—C. H. Fish, president of the company, left for the Comstock last night for the purpose of conferring with superintendent Lyman regarding the outlook in the mine. On Monday last J. Flood left for the East for the purpose of consulting Mr. Mackay regarding the proposal for the North and Middle mines to join the Pumping Association in making a united effort to drain the lower levels of the mine. It is also surmised that when two out of the three owners of the Comstock Mining Company meet some plan of operation will be decided upon. Reports from the lode are favorable, and the superintendent wrote yesterday that: "the water turned into the 1,500 south drift is having the desired result. It has made the old Con. Va. shaft upcast from the 1,650. I expect now to reach the sill floor of the 1,500 stopes within a week and then it will not take long to fill up the connection leading down to the 1,650. With this accomplished, ore extraction can be resumed on the 1,500." With the company again extracting ore, and a balance on hand—proceeds of the recent assessment—the stockholders may at least hope that they will not be called upon again to dive into their pockets.

The year just ending has not been a good one for the stockholders, and a glance at the following tabulated statement of the bullion production, during the calendar year, will show that the find has been very variable, and, as might be expected, is far short of the value as shown by the battery assays:

Month.	Tons.	Bullion Product.	Av. yield per ton. Gold.	Silver.	Total.	Av. value per battsple
Jan.....	4,400	87,760.01	10.62	9.20	19.82	29.03
Feb.....	4,020	73,470.29	9.37	8.89	18.27	24.25
March...	4,277	75,566.62	11.95	6.61	17.66	21.52
April ...	4,970	82,701.48	10.79	5.84	16.64	18.83
May.....	4,135	84,064.63	10.99	7.96	18.95	24.50
June	5,098	118,141.00	.....	.....	23.17	25.37
July....	4,820	74,047.74	9.58	7.72	17.30	24 29
Aug.....	4,350	72,849.00	9.35	7.39	17.84	22.64
Sept.....	4,250	78,215.45	.....	.....	18.40	22.62
Oct.....	4,350	70,685.09	.....	.....	16.24	22.87
Nov.....	4,150	68,147 16	.....	.....	16.42	23.17
Dec.. ..	2,764	49,893.38	10.92	7.12	18.04	23.16

A total of 51,884 tons, yeilding $935,039. 85, an average of $18.23. With the assay office clean up the bullion amounted to $943,362.55, a decrease of $726,369.45 from the product of 1891. The largest product was made in the month of June, but even that was less than in the corresponding month of the previous year.

NEW MEXICO.

Shipments of ore have been commenced again from the Tres Hermanas district, but the production of the mines there is not large, and shipments are mostly confined to small lots of high-grade ore, which are shipped to the smelters.

The Silver City correspondent of the New York "Sun" writes, under date of Dec. 27: The total production of gold and silver in New Mexico this year has been smaller than for three preceding years. The low price of silver has caused a very great falling off in the production of that metal, and this falling off would have been much larger had it not been for the discovery of large bodies of lead ore in Cook's Peak district, which carry considerable silver, and which can be worked for the lead alone when lead is worth four cents a pound more. During the year the big silver mines at Georgetown were practically closed down, being worked at this time on a small scale by lessees who have obtained leases in certain portions of the mines. The leases are not renewed as they expire, and the output of the camp is insignificant in comparison with what the production has been.

The production of gold at Pinos Altos has been but little over half what it was last year. The mines there produce both gold and silver, and there never was a large margin of profit in working the mines. An advance of a few cents in the price of silver per ounce would have the effect of increasing the output of the mines there considerably. The Manhattan Gold Mining and Milling Company, the largest mining company at Pinos Altos, has mined no ore this year, but has driven a tunnel over 660 ft. into the side of the mountain to strike the vein and reduce the cost of mining the ore. It is believed that when this tunnel is completed the company will be able to operate the property at a good profit. The Mountain Key mine, which produced over $10,000 a month for about three years in gold bullion, produced very little this year.

The Silver Creek mines have produced as much this year as they ever did, and there has been a very large increase in the production in the past two months, which will be maintained. Until this year the milling facilities in the camp have been insufficient, and as the camp is over 70 miles from a railroad only the highest grade ore could be shipped at any profit. The shipments of gold and silver bullion from that camp have been heavy for the past two months.

There has been some improvement at Gold Hill during the year, but the total output of the camp is not very large. The mines there have not yet passed the development stage, but it is a very promising camp.

In Sierra county the output of gold has been increased in the Hillsborough district, but the silver mines at Lake Valley, Kingston, Chloride, and Hermost have not made as good a showing as they did in years past. During a portion of the year a smelter was in operation at Hillsborough on copper ore mined in the district, and another smelter was started at Kingston a few weeks ago.

The mines of Lincoln county have produced more this year than ever before, and most of the ore has been taken out of the mines in the White Oaks district. Several good gold mines have been developed there, and preparations are being made to work them on a more extensive scale. New machinery is being brought in.

In the northern part of the Territory there has not been much doing in the mines on account of the fact that several of the best mines cannot be worked on account of pending litigation. The largest and richest placers in New Mexico are in Santa Fe county, but there is very little doing in them on account of the difficulty experienced in getting

water. Dry washers have been attempted, but without success.

Considerable copper has been produced in the Territory this year, the most of which was mined and smelted at Hanover, in Grant county. The smelter has been closed down for several months, and it is not probable that it will be started up again.

The production of lead has been unusually large. The mines at Cook's Peak have been the largest producers, but quantities of lead ore have also been produced in Socorro and Dona Ana counties. The output of lead has fallen off materially within the past six weeks on account of the depressed condition of the lead market.

A substantial increase in the output of gold is looked for during 1893 in this Territory, but unless there be an advance in the price of silver and lead there will be a still further falling off in the product of these metals.

Santa Fe County.

Santa Fe Copper Company.—A dispatch from Boston, Mass., announces that at a meeting of this company's bondholders on the 3d inst. Messrs. John C. Watson, John W. Belches and Frederick Beck were chosen a committee of three to represent the bondholders in foreclosure proceedings.

NEW YORK.

Oswego County.

Natural gas was struck at well No. 12, Sandy Creek, near Oswego, on the 2d inst.

PENNSYLVANIA.

Coal.

At the depth of 40 ft. the Dallas Agricultural Society, while digging a well, encountered a thin layer of coal.

Hereafter the coal mined at the Hollywood collieries, in the Hazelton region, will be shipped via the D. S. & S. to and over the Reading.

The culm banks of the old Potts colliery are on fire and the out-crop veins of the York Farm colliery are threatened. The culm banks adjoin a thickly populated portion of Pottsville.

Owing to the demolition of a large iron smoke-stack by the wind, the Clear Spring colliery at West Pittston was forced to be idle on the 3d inst. Operations were resumed the following day.

A. Pardee & Co. will continue during 1893 the same system of monthly wage announcements in operation by them since 1880. Each month, about the 15th, employés will be notified as to the wages to be paid for that month.

A steam shovel will be placed in position at the burning culm bank at Carter's No. 2 colliery for the purpose of cutting through the bank to prevent the fire from spreading. A large amount of water is being turned on the fire, but with very little effect.

The committee of the Schuylkill Coal Exchange appointed to determine rate of wages to be paid miners and mine laborers of the lower anthracite region for the last half of December and first of January, have fixed the rate at five per cent. above the two fifty basis.

A deal whereby 22,000 tons of coal per day will be diverted from the Reading Railroad to Coxe Brothers & Co.'s road has just been consummated between Coxe Brothers & Co. and C. Pardee & Co. The arrangement came about through the expiration of an agreement which was made by Pardee & Co. with the Reading company previous to the death of A. Pardee. On the first of the year these contracts expired and Coxe Brothers & Co. secured the business.

Choctaw Coal and Railway Company.—The stockholders of this company, which was organized by the Lehigh Valley Railroad several years ago, and which is now in the hands of a receiver, will meet next week and consider a plan of reorganization. It is probable that the road will be completed so that the company can supply the Rock Island & Atchison systems with its coal, which is said to be equal in quality to the West Maryland coal.

Greenwood Coal Company.—The Rev. William Springer has filed suit at Scranton, against the Greenwood Coal Company for the recovery of $1,500,000. Springer claims to be in possession of coal lands from which he alleged the defendant company has been stealing coal for the past six years, carrying away 500,000 tons, for which, under the provisions of the law, he asks treble damages.

Lehigh & Wilkes-Barre Coal Company.—This company ordered the starting of its three great collieries at Plymouth, Pa., on the 4th inst., giving work to 4,000 men.

Lehigh & Wilkes Barre Coal Company.—An attempt to burn this company's $120,000 South Wilkes-Barre breaker was made on the 3d inst., and in the next day's papers a letter threatening the breaker with destruction appeared. The writer is supposed to be a miner desperate from lack of work.

Lehigh & Wilkes-Barre Coal Company.—The agreement whereby the Reading Coal & Iron Company sold the coal of the Lehigh & Wilkes-Barre Coal Company has been discontinued, pending the termination of the Reading-Jersey Central suits in the New Jersey courts. The Lehigh & Wilkes-Barre Coal Company is practically owned by the Jersey Central Railroad Company.

Slate.

A dispatch from Bethlehem says that the Slatington-Bangor slate syndicate was organized on the 2d inst. The syndicate is composed of prominent business men and backed by ample capital. It will be under the personal management of James L. Foote. The treasurer is Joel Nett, also of Slatington. The syndicate expects to market 1,000,000 squares during the year 1893, to be largely increased in following years. The syndicate represents over 20 quarries, including the best quarries in the Slatington and Bangor and Pan Argyl, Pa., slate regions, and the Heimbach, Franklin, Washington and Blue Mountain veins.

UTAH.

The Western papers continue to publish accounts of the recently discoverd San Juan placers, but the reports no longer are full of glowing praises of the region. To some extent a reaction has set in and people are advised to stay away, that the ground is of such a nature as to be workable only by means of heavy machinery. One of the latest press despatches states that the Gable Mining Company secured the most valuable claims before the reservation was thrown open to prospectors, and that there is great excitement and ill feeeling in consequence of this. There is still considerable discussion as to the best route. President Mears, of the Rio Grande Southern Railway received the following information from a correspondent in Mancos, Colo.: The much-talked-of gold strike is on Rio San Juan, located in San Juan county, Utah, and extends—so far as has been prospected—from its junction with Rio Colorado up the bed of the river to the mouth of Clay Wash, something over forty miles. Outside of the river bed, gold has been discovered in both Clay Wash and Moonlight canyons. The distance from railroad to Clay Wash is about the same from Dolores or Mancos, both being stations on the Rio Grande Southern Railroad. From Macos to Bluff City, on Rio San Juan, is called 60 miles; from there to head of "Clay Wash' canyon is about 50 miles. Good wagon road from Mancos to Bluff City, via Cortez; a good trail and inferior wagon road from Bluff to within 8 miles of head of Clay Wash, and from that point trail down the canyon to Rio San Juan. This Clay Wash takes it rise near the Elk Mountains, an isolated group of hills situate south and west of Blue Mountains on the divide between Rio Colorado and Rio San Juan. The major portion of this divide being a sedimentary surface capping eruptive rocks, which are in many places reached, and in some places cut down several hundred feet in deeper canyons.

Some Denver papers hint that the railroads are doing their best to send out glowing reports in order to obtain traffic, which does not seem improbable. In short, great uncertainty still prevails as to the actual condition of the localities, and it is hopeless to gather the truth from the great mass of conflicting and contradictory reports.

Salt Lake County.

A general reduction of wages seems impending in Utah, which, unfortunately, is probably the forerunner of similar moves elsewhere in the mining regions. The reduction has already been announced at Bingham canon, where the managers of the Niagara group, employing 55 men, and of the Holden group, with 125, have given notice that after January 15th, 1893, wages will be $3 per day for engineers, $2.50 for miners, and $2 for laborers. Other mine, mill and smelter managers—such as A. Hanauer (80 men) and John Q. Packard (500 or 600 men)—while stating that they do not intend to reduce wages, announce their intention to close down their works, and thus in effect say to the men: "If you will accept the reduced scale of wages we can work; if you refuse we cannot."

Summit County.

Anchor Mining Company.—The main shaft was sunk 660 ft.; during 1892, a number of drifts, inclines and winzes were run and sunk, and the property was placed in thorough working order. A pipe line was laid from Deep Lake to the main shaft, a distance of 8,000 ft., to furnish pure water for culinary and steam purposes and to protect the works from fire. The Anchor shipped 22,874,830 lbs. of concentrates, which produced 8,030,918 lbs. of lead, 206,649 fine oz. of silver and 559 fine oz. of gold.

Daly Mining Company.—The present has been rather a poor year for surface improvements among the big mines, though a large amount of underground developments have been made. The Daly has sunk i s new shaft, No. 2, 700 ft. deeper and run several important drifts from the old shaft, all of which have exposed high grade ore in large bodies. This property has shipped 10,936,175 lbs. of ore and milled 45,388,000 lbs., the total value of which amounts to $936,000.

Ontario Silver Mining Company.—During 1892 the Ontario paid its usual dividends of $75,000 per month, with the exception of November and December. No. 2 shaft was sunk to a depth of 1,500 ft, at which point it will be tapped by the big drain tunnel, now in considerably over 11,000 ft. This drain tunnel has been a tremendous expense during the past year owing to the remarkably soft ground encountered, it requiring six weeks at one point to advance five feet and put in a set of timbers. The company expects to complete this enterprise during 1893. During the year 1892, the Ontario has mined and shipped 25,424,040 lbs. of base ore, an increase of of 11,350 lbs. over last year's product. The company milled 25,288 tons or ore that produced 820,194.23 fine ounces of silver and 361.50 fine ounces of gold, the total value being $709,958.81. The total value of milled and shipped ore was $1,305,983.40.

Silver King.—Hoisting works have been erected and a large two-cylinder direct clutch Corliss engine, 20×60 in. cylinders, is being placed in position. This mine was purchased during the present year from John Farish, Cornelius McLaughlin, W. H. Dodge and Martin McGrath by a company composed of David Keith, John Judge, Thomas Kearns, A. B. Emery and W. V. Rice, who paid $65,000 cash for it. The property has since been incorporated for $3,000,000, there being 150,000 shares of a par value of $20. The officers of the company are: David Keith, president and manager; Thomas Kearns, vice-president and superintendent; W. V. Rice, treasurer, and A. B. Emery, secretary. During the year the King has shipped 5,219,290 lbs. of ore and concentrates.

WASHINGTON.

Okacogan County.

Contention.—A shaft is down 95 ft. on the ledge, which has an average width of about four feet and shows a steady improvement both in the width of the vein and value of the ore. At the 50-ft.-cross-cut an average of the vein gave $43.14. At the 95-ft. level the average was $56.04.

Stevens County.

Old Dominion Mining Company.—The deed to this mine, which was purchased a month ago by a syndicate headed by Mr. G. B. Dennis of Spokane, was filed Saturday, the consideration being $500,000. The Colville "Republican" says of the mine: "The mine is situated seven miles from Colville. It was discovered in 1885, and though very bunglingly managed $500,000 net has been taken from it."

MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Aspen, Colo.; Baltimore, Pittsburh, Deadwood, S. Dak.; St. Louis, Helena, Mont.; London and Paris, see pages 22 and 24.]

NEW YORK, Friday Evening, Jan. 6.

The first week of 1893 has been very quiet in the mining stock market—so much so that if it is to be taken as an indication of what business will be during the coming year, the dullness of 1892 will be eclipsed by the still greater quietude of 1893.

Generally speaking, there has been no feature of interest. Sales have been small and devoid of significance. As we said last week, the demand seems confined to the stocks of gold mining companies.

Of the Comstocks, so far as actual transactions are concerned, no change can be reported. They continue dull and depressed, and the demand for them is very small. Consolidated California & Virginia declined from $2.20 to $1.90; total number of shares sold, 200. Of Gould & Curry 400 shares were sold at 90c @ $1.10. Hale & Norcross shows sales of 300 shares at $1.05@ $1.10.

Other sales are as follows: 100 shares of Ophir at $2; 100 shares of Sierra Nevada at $2; 400 shares of Yellow Jacket at 55@80c.; 125 shares of Best & Belcher at $1.50; 300 shares of Comstock Tunnel stock at 68c.; 500 shares of Julia at 15c.; 100 shares of Mexican at $1.45; 100 shares of Union Consolidated at $1.25.

Of the California stocks Bodie Consolidated shows sales of 300 shares at 25@30c. Of Bulwer 400 shares changed hands at 20c.; 400 shares of Mono were sold this week at 20c. Transactions in Plymouth Consolidated aggregated 300 shares at 60@65c. A meeting of the directors of the Plymouth Consolidated Gold Mining Company was held in this city on the 3d inst., with the object of determining the best course to pursue in regard to the company's property. The mine, as our readers know, has been closed for the past six months and has filled with water. However, the company owns valuable water rights and what to do with these will be determined later. At the meeting virtually nothing was done. It is thought that an Eastern director will visit the property next spring in the interest of the Eastern stockholders.

Belmont shows sales of 500 shares at 24@30c. and Brunswick Consolidated 700 shares at 9@10c.

Of the Colorado stocks we note sales of 1,000 shares of Chrysolite at 22c. Leadville Consolidated continues in good demand; during the week 2,500 shares were sold at 20@21c.

Horn Silver was quiet; only 300 shares were sold at $3.25@ $3.30. The official lists of the Stock Exchange show sales of 375 shares of Ontario at $14.13 @$15.25.

Kingston & Pembroke, for the first time in months, shows a sale of 100 shares at 20c.

Of El Cristo 2,400 shares were sold at 20@23c.

This week there was a sale of 100 shares of Silver King at 30c. It was the first transaction in this stock for many months.

Phœnix of Arizona was rather quiet this week only 500 shares were sold at 60@61c. Late advices from the company's property state that the mills are now running steadily and with satisfactory results. In our mining news columns will be found an interesting report of this property.

Boston. Jan 5.

(From our Special Correspondent.)

The market the past week, incident to the closing of the year and the opening of the new one, has not been very active, although there has been more or

less inquiry for the good copper stocks by investors, who believe prices have reached a level from which a substantial advance may be reasonably looked for within the next few months. The speculative element has not as yet shown much disposition to operate to any extent outside of the Montana group, Boston & Montana being a leader for this class. Early in the week the stock sold at $34, but gradually settled with each day's business to $32¼, this being the price at which it sold to-day. Butte & Boston has shown more strength, and advanced from $11 to $11½, with later sales at $11¼. The prospects of this company look brighter for the coming year, and much higher prices for the stock are predicted.

Calumet & Hecla is in good demand by investors, and sold at $298.

Tamarack advanced from $158 to $160 on the announcement of a $4 dividend, selling at $155 ex-dividend later.

Osceola, has ruled quite strong, selling at $35½, with small lots in demand at $35¾.

Franklin advanced to $13½, a gain of one-half of the late dividend, and is wanted at this price.

Centennial sold at $8 with latest sales at $7¾.

Kearsarge advaneed ¼ to $12¼.

The dealings in both these stocks have been small and there is no pressure to sell either of them. We look to see them sell higher in 1893.

Quincy sold in a small way at $143½@$142, but round lots of 100 would bring higher prices.

Tamarack, Jr., sold at $20, a decline of $1.

Wolverine advanced from $1¼ to $1¾, with reaction to $1½.

National is in demand at $1 bid, with sales small lots at this price.

Bonanza sold at 30c., a gain of 5c.

We note a sale of 100 shares Atlantic to-day at $10, which is a gain of one-half over last sale, December 20th.

Napa quicksilver sold at $5¾.

3 P. M.—The market closed barely steady, a little inclined to weakness. Franklin sold at $13 and Kearsarge at $12.

San Francisco. Dec. 30.

(From our Special Correspondent.)

Trading in mining stocks has been, as might be expected, very dull during the holiday week, but yesterday and to-day there has been a demand, amounting to almost a rally, for North Comstock advanced prices materially and gave a stronger tone to the general market. The reports received from the Consolidated California & Virginia mine regarding the probable resumption of ore extraction at an early date has had a tendency to relieve the depression, but, in the absence of Mr. Flood from the city, it may be assumed that there is no meaning to the present state of the market, beyond the fact that it is being supported from the inside.

Consolidated California & Virginia sold to day steady at $1.90, Ophir at the same figure; Mexican at $1.25; Sierra Nevada at $1.30, and Union Con. at $1.05.

Of the Middle Comstocks, Savage has been in better demand at an advance on the rate ruling for some time past. This morning the stock opened at $1.05, advanced under steady sale to $1.15 and shaded off a point at the close. Potosi, that has shared with Potosi most of the attention of buyers in this group, opened at $1.90 and during the informal session rapidly advanced to $2.00. In the afternoon it sold one point higher and then fell back to $1.90 at the close. Chollar sold for 60c.; Best & Belcher for $1.30; Goued & Curry for 90c., and Hall & Norcross for 95c.

The Gold Hill and South End Comstocks have not been in demand and prices have, in consequence, languished. Alpha ruled to day at 15c.; Alta at 25c.; Bullion at 85c.; Belcher at $1.70; Challenge at 35c.; Con. New York at 45c.; Confidence at $1.20; Crown Point at 60c.; Con. Imperial at 5c.; Kentuck at 15c.; Seg. Belcher at 70c., and Yellow Jacket at 45c. Before the close Belcher broke to $1.60, closing at that price bid.

In the Quijotoa group of stocks Central, Crocker, Locomotive and Weedon were held for 5c; Peerless 10c. asked, Peer 10c. bid, and Silver King 50c. asked.

The Tuscarora stocks ruled as follows: Belle Isle, North Belle Isle, Commonwealth, North Commonwealth and Navajo, held for 15c; Del Monte for 5c. and Grand Prize and Nevada Queen each for 10c., with 5c. bid, and the stock of the Mayflower Gravel Mining Company of Placer County that was listed in the Pacific Board a short time ago, has been selling steady at $1 20 to $1.30. Other miscellaneous stocks have been inactive, Eureka Consolidated being quoted at $1.40, and Mount Diablo at 75c.

It is difficult to account for the fact, but nevertheless the fact remains, that a feeling of hopefulness is abroad regarding the stock market during the opening mouths of the coming year. Why a strong market should be counted on, unless on the assumption that the year 1892 has been a stall, and on the whole a profitless one, it is hard to say. As the public have a long line of stocks, it is quite likely that steady trading may prevail, but it does not seem probable, at present writing, that values will be enhanced, save in the special stocks that may be hung up as a lure to the gambling public.

SAN FRANCISCO, January 6th.—(*By telegraph.*)—The opening quotations to-day are as follows: Best & Belcher, $1.30; Bodie, 25c.; Belle Isle, 15c.; Bulwer, 15c.; Chollar, 70c.; Consolidated California & Virginia, $1.85; Gould & Curry, 85c.; Hale & Norcross, $1; Mexican, $1.25; Mono, 15c.; North Belle Isle, 10c.; Navajo, 15c.; Ophir, $1.80; Savage, $1.05; Sierra Nevada, $1.20; Union Consolidated, $1.10; Yellow Jacket, 75c.

MEETINGS.

Barker Mining and Milling Company, at the office of James F. Fleetwood, No. 1117 Seventeenth street, Denver, Colo., January 14th at 3 P. M.

Black Bear Mining Company, at the office of the company, in Telluride, San Miguel County, Colo., January 9th, at 12 o'clock noon.

Diamond B. Silver Mining and Milling Company, at the Colorado Mining Stock Exchange, Denver, Colo., January 10th, at 3 P. M.

Gold Rock Mining and Milling Company, at the office of the company, 619-620 Mining Exchange Building, Denver, Colo., January 10th, at 10 A. M.

Golden Treasure Mining Company, at the office of Wm. B. Root, 429 Mining Exchange Building, Denver, Colo., January 20th, at 2 P. M.

Oro Mining and Milling Company, at the office of the company, No. 1624 Curtis street, Denver, Colo., January 12th, at 10 A. M.

Scientific Publishing Company, at the office of the company, No. 27 Park Place, New York, January 18th, at 12 o'clock noon.

Warren Chemical and Manufacturing Company, at the office of the company, No. 81 Fulton St., New York, January 17th, at 11 a. m.

DIVIDENDS.

Napa Consolidated Quicksilver Mining Company, dividends No. 50 and 51 of ten cents per share, aggregating $20,000, payable January 2d at the office of the company, No. 86 State street, Boston, Mass.

Seven Stars Gold Mining Company, dividend No. 1 of three and three-quarters (3¾) per cent., payable January 18th, at the office of the Industrial and Mining Guaranty Company, No. 41 Broadway, New York. Transfer books close January 13th and reopen January 19th.

Thomson-Houston Electric Company, the coupons of this company's collateral trust 5 per cent. bonds, due January 1st, will be paid on and after that date at the office of the Holland Trust Company, No. 33 Nassau street, New York.

ASSESSMENTS.

COMPANY.	No.	When levied.	D'l'nq't in office.	Day of sale.	Amt. per share.
Alpha Cons., Nev...	10	Dec. 20	Jan. 24	Feb. 14	.10
Challenge, Nev.	13	Nov 16	Dec. 31	Jan. 25	.25
Commonwealth, Nev.	10	Nov. 23	Dec. 28	Jan. 24	.10
Confidence, Nev...	22	Dec. 21	Jan. 26	Feb. 15	.75
Con. Cal. & Va., Nev	.	Dec. 13	Jan. 21	Feb. 10	.50
Con. Imperial, Nev.	34	Nov. 22	Dec 29	Jan. 19	.03
Crown Point, Nev.	59	Dec. 20	Jan. 21	Feb. 14	.25
Del Monte, Nev....	7	.....	Dec. 23	Jan. 24	.10
E. Best & Bel., Nev.	3	.....	Dec. 24	Jan. 18	.20
Eclipse, S. Dak.....	7	Nov. 18	Jan. 3	Jan. 23	.001½
Evening Star, Nev.	7	.....	Jan. 12	Jan. 31	.01
Gold Mountain, Cal.	4	Dec. 21	Jan. 28	Feb. 15	2.00
Gould & Curry, Nev	70	Nov. 22	Dec. 28	Jan. 20	.25
Gray Eagle, Cal....	31	Dec. 15	Jan. 23	Feb. 16	.17
Martin White, Nev.	28	.....	Jan. 16	Feb. 20	.25
North Gould & Curry, Nev.....	14	Nov. 21	Dec. 24	Jan. 16	.10
North Belle I., Nev.	21	Nov. 14	Dec. 20	Jan. 17	.01
Russell, Cal	8	Nov. 14	Dec. 19	Jan. 16	.01
Siskiyou Con., Cal.	5	Dec. 16	Jan 20	Feb. 19	.01
Utah Con., Nev....	16	Dec. 13	Jan. 19	Feb. 9	.10
Yellow Jacket, Nev.	53	.....	Jan. 6	Feb. 14	.30

METAL MARKET.

NEW YORK, Friday Evening, Jan. 6, 1893.

Prices of Silver per Ounce Troy.

Dec.	Sterling Exch'nge.	London Pence.	N. Y. Cents.	Value of sil. in $1.	Jan.	Sterling Exch'nge.	London Pence.	N. Y. Cent.	Value of sil. in $1.
31	4·87½	38 1/16	82⅝	·629	4	4·87½	38⅛	82½	·628
Jan.									
2	.....	36 15/16	*	....	5	4·87¼	38 3/16	82¾	·630
3	4·87¼	38⅛	82½	·628	6	4·87¼	38¼	83	·632

*Holiday.

The year opens with restored confidence in silver at present prices in London circles, based upon the demand from the East which is large. Silver is readily absorbed at current rates and the surplus which accumulated the latter part of December, after the Government had retired from the market has been placed, It looks as if we would have no potent fluctuations, either up or down, for the present, or until some new factors make their appearance.

The United States assay office at New York reports the total receipts of silver for the week to be 91,000 ounces.

Government Silver Purchases.

The government has purchased during the week ending January 7th, the following quantities of fine silver at the accompanying prices per fine ounce:

January 4th, 868,000 oz., 83c. to 83.25c.
January 6th, 280,000 oz. at 83.48c.
Total for month to date 1,118,000 oz.

Gold and Silver Exports and Imports at New York for Week Ending December 31st, 1892, and for Years from January 1st, 1892, 1891.

	Gold.		Silver.		Excess of
	Exports.	Imports.	Exports.	Imports.	Exports.
Week....	$ 587,312	$ 30,5 6	$ 718,288	$ 8 824	$ 1,266,220
1892.....	71 330,533	8,520,819	23,3 1 500	3,059,584	83,041,636
1891.....	76,065,818	32 (68,927	20,961,478	3,082,586	61,875,863

During the week ending January 7th the exports and imports, so far as ascertained, have been as follows: Exports, gold, $1,148,240; silver, $697,020. Imports, gold, $5,400; silver, none. Of the gold exported $1,000,000 went to Havre. Of the silver exported $572,550 in American bullion and $121,870 in Mexican coin went to England.

During the year 1892, the excess of exports of the precious metals over the imports for the port of New York was $83,047,636 of which $62,809,684 was gold and $20,241,952 was silver. During 1891 the excess of exports was $61,875,863, of which $43,996,921 was gold and $17,878,942 was silver. The net excess of exports of gold in 1892 over 1891 was $18,812,763. The net excess of silver exports was $2,363,010.

NOTES OF THE WEEK.

During the week Senator Allison and Congressman McCreary, of the International Monetary Conference, have returned to this country. A representative of the ENGINEERING AND MINING JOURNAL met Senator Allison and had with him an extended interview on the silver question. When shown the plan of the ENGINEERING AND MINING JOURNAL he said:

"This is an excellent plan. Some parts of it were presented to the conference by several delegates, but by none was it presented as a conerete whole. The plan was conceived by one thoroughly conversant with the silver question. It merits attention and if it be worked out in detail I will take pleasure in presenting it to the Conference when it meets in May. Mons. Montefiore Levi remains President of the Conference and as soon as the plan is presented to me in detail, I will send it to him, in order that it may be translated into the languages of the delegates."

Senator Allison said further, in answer to the question what do you thiuk of the ratio proposed? "I am in favor of any ratio, whether it be 15½, 16 or 20 to 1, which will open a more extended use for silver. The question of importance now is not the mere adoption of a ratio, but the opening of the mints of the world to silver, and if a 20 to 1 ratio will accomplish it, I am in favor of it."

Congressman McCreary when seen, said: "You must excuse my not expressing an opinion on the plan of THE ENGINEERING AND MINING JOURNAL, as the incoming administration will take action on the silver question, and under the circumstances I can say nothing."

Mr. McCreary is of the opinion that in the near future International bimetalism will be an accomplished fact. When asked about the ratio, he said: "I am in favor of 16 or 15½ to 1, and do not believe that any other is possible."

At the conference no one spoke in favor of 20 to 1, while many of the foreign delegates said that 15½ was the logical ratio. It is quite clear that no European country will aecept a high ratio, for the loss on the recoinage of their silver would be great. On the contrary, if the United States adopts 15½ to 1, we gain some 3% in the recoinage of our stock of the white metal."

This would be very satisfactory if it were possible, but it seems to us quite clear that if the Brussels Conference made anything clear, it was that bimetallism on the old ratios of 15½ or 16 to 1 is impossible, Mr. Carl Meyer, the representative of the Rothschilds at Frankfort, in a recent lecture upon the conference said: "Nobody open to conviction can doubt any longer that universal bi-metallism is dead. The great nations can not be brought to agree upon any plan having bi-metallism in view."

Since the failure of the Conference to re-establish silver great opposition has developed to the Sherman act of 1890, and a number of bills have been introduced into Congress which either repeal or suspend it. Petitions have been sent to Congress from various parts of the country asking for its repeal, and it is hoped that favorable action will be taken. It is doubtful, however, if anything can be done during the present session of Congress.

Mr. Bland, the Chairman of the Coinage Committee, is in a position to block any bill repealing the Sherman act, and it is reported that he will do this unless free coinage or a modification of the Bland bill is substituted for the one repealed.

The bullion held by the principal banks of Europe on December 30th, 1892 and 1891, was as follows:

	1892.	1891.
England: Gold.....	£24,397,928	£22,295,403
France: Gold	6[illegible]47,806	53,563,000
Silver.....	50,832,614	50,169,000
Germany: Gold.....	33,080,250	33,820,500
Silver	11,026,750	11,273,500
Austria-Hungary: Gold.....	10,546,000	5,454,000
Silver.....	16,839,000	16,663,000
Netherlands: Gold.....	3,187,000	3,241,000
Silver.....	7,104,000	6,542,000
Belgium: Gold.....	3,057,333	2,731,333
Silver	1,528,667	1,365,667
Spain: Gold.....	7,611 000	6,400,000
Silver.....	5,213,000	4,257,000
Total gold.....	150,227,317	127,445,236
Total silver.....	92,574,031	90,270,167

Values of Foreign Coins.

R. E. Preston, Acting Director of the Mint, has issued a statement showing the following changes in the values of foreign coins from October 1st, 1892, to January 1st, 1893:

	Value Oct. 1, 1892.	Value Jan. 1, 1893.
Boliviano of Bolivia	$0.616	$0.613
Peso of Central American States	.616	.613
Shanghai tael of China	.909	.906
Haikawan tael of China	1.013	1.01
Peso of Colombia	.616	.613
Sucre of Ecuador	.616	.613
Rupee of India	.293	.292
Yen of Japan	.664	.661
Dollar of Mexico	.669	.666
Sol of Peru	.616	.611
Rouble of Russia	.492	.491
Mahbub of Tripoli	.555	.553
Bolivar of Venezuela	.123	.193

Year's Coinage at the Philadelphia Mint.—The coinage at the Philadelphia mint for the calendar year 1892 exceeds that of 1891 in point of value, but is less in number of pieces. The report of Chief Coiner Steel, compiled to-day, shows that there were delivered to Superintendent Bosbyshell during the year 74,188,646 pieces, with a valuation of $18,052,936.17. Last year's report showed 92,198,459 pieces coined, having a valuation of $13,900,342. The falling off in the total number of pieces coined is largely due to the great diminution in the coinage of the silver dollars, in accordance with the act of Congress. This year there were 1,037,245 dollars coined, as against 8,694,200 during the year 1891. Following is the report in detail of the work done during the year:

Denomination.	No. of Pieces.	Value.
Double eagles	4,523	$90,460.00
Eagles	797,542	7,975,500.00
Half-eagles	703,572	3,767,860 00
Quarter-eagles	2,545	6,352.50
Total gold	1,558,192	$11,840,202.50
Dollars	1,037,245	$1,037,245.00
Half-dollars	965,245	487,622.50
Columbian half-dollars	950,000	475,000.00
Quarter-dollars	8,217,245	2,059,311.25
Dimes	10,121,245	1,212,124.50
Total silver	23,280,080	$5,251,303.25
Five cents	11,639,542	$284,982.10
Cents	37,649,832	376,498.32
Total base	49,349,374	$961,480.42
Recapitulation.		
Gold	1,558,192	$11,840,202.50
Silver	23,280,980	5,25[illegible],303.25
Base	49,349,375	961,480.42
Totals	74,189,746	$18,952,986.17

Domestic and Foreign Coin.

The following are the latest market quotations for the leading foreign coins:

	Bid.	Asked.
Mexican dollars	$ .65	$ .66
Peruvian soles and Chilian pesos	.59	.61
Victoria sovereigns	4.85	4.88
Twenty francs	3.85	3.88
Twenty marks	4.71	4.78
Spanish 25 pesetas	4.78	4.81

Copper.—The metal is rather quiet, with very little doing. Lake is obtainable at 12¼, but at this only from second hands. Casting is firmly held for 11½, while for Arizona pig most producers ask 10¾, but some export sales are reported at less. Lately exports to Europe have been rather heavy, and this has had an appreciable effect on the statistical position there, which shows an increase in stocks during the second half of December of 1,700 tons. In Europe business evidently is rather dull, and prices have given away all around. Lake is freely offered there at £56 c. i. f. Continental ports without finding buyers, as good electrolytic copper is to be had at about £2 less. G. M. B.'s close at £46 7s. 6d. for spot, and £46 15s. for three months prompt, while refined and manufactured we quote, as follows: English Tough, £49@$49 10s.; Best Selected, $50 10s. @£51; Strong Sheets, £59@£59 10s.; India Sheets, £51@£54 10s.; Yellow Metal, 5¼d.

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

To Liverpool—	Copper Matte.	Lbs.	
S. S. Gallia	3,725 bags	391 189	$18,000
" Bovic	5,247 "	592,576	26,000
To Liverpool—	Copper.	Lbs.	
S. S. Gallia	248 pigs	70,924	$8,500

Tin.—In this a large business has been done here at rather depressed prices, which are still one-quarter to three-eighths of a cent a pound below the foreign parity. Of late the deliveries have not been up to the average, due, no doubt, to the interruption caused by the holidays and annual inventorying, etc. Shipments from the East continue to be made at a pretty heavy rate, and we have to quote prices here at 19·65@70 for January, 193·14@80 for February, and 19·90 for March. At the beginning of the week the London market showed much firmness, opening at £91, 5s., and advancing to £91 15s., but this has now been lost, and the closing prices are £9, 7s. 6d. for spot, and £91 for three months prompt.

Lead has been in good demand, but prices are rather irregular. Farly in the week, when the offerings were small, some sales were made at up to 3·875 New York, but afterward sellers came out more freely and the market closes at 3·85, with sellers over. The foreign mzrket is cabled as being very flat, with but little doing; Spanish lead being obtainable at £9 17s. 6d.@£9 18s. 9d., and English at £10.

Chicago Lead Market.—The Post-Boynton-Strong Company telegraph us as follows: "Market is dull, with price at 3 60c. Offerings are light, but consumers show no disposition to anticipate requirements."

Spelter continues to be very quiet and while the demand is light there is no pressnre to sell, the producers generally being pretty fully engaged for the current month. We have still to quote 4.40@42½ New York. The English market is flat at £18 2s. 6d. for ordinaries, and £18 5s. for specials.

Antimony is dull and prices somewhat easier, especially for the finer grades. Cookson's is reported as selling at 11¼@11c., L. X. at 10½, and Hallet's at 10¼c.

Nickel is irregular in price: the finer grades and special brands are held for 57@58c., but other sorts are obtainable at 49@50c.

Quicksilver.—There is nothing of interest to report in this market. In London the price dropped to £6 2s. 6d. but recovered and closed at £6 5s. New York quotations are $37.50.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 6th, 1893.

Pig Iron Production.—The following table gives the number of furnaces in blast and the estimated production of pig iron in the United States during the week ending Saturday, December 31st, 1892, and for the corresponding week ending Saturday, December 26th, 1893. Also the total estimated production from January 1st of each year to these dates. This table has been corrected by the official returns of the American Iron and Steel Association for the first six months of this year. The figures are in gross tons:

Pig Iron Production During Weeks Ending December 26th, 1891, and December 31st, 1892, and During Both Years to These Dates.

Fuel used.	Week ending Dec. 29, '91.		Week ending Dec. 24, '92.		From Jan., 91.	From Jan., '92.
	F'cs.	Tons.	F'cs.	Tons.	Tons.	Tons.
Anthracite.	86	35,250	69	33,500	1,863,949	1,733,513
Coke.	162	143,710	135	133,000	5,873,635	6,870,350
Charcoal	53	11,890	42	9,700	580,518	531,988
Total	301	190,850	246	176,200	8,318,162	9,135,851

There is no special movement in iron indicative of changing prices. We enter upon the new year with hopefulness born rather of desire than of reason. So far as can be seen there is nothing in the immediate outlook that justifies the opinion, expressed by some dealers, of a substantial advance. We do not think it will come now, or indeed within the next few months, unless there should arise an active demand which will create its own supply. So long as present conditions are maintained, and we really see no good reason for anticipating any marked change therein, we need not expect a betterment in the market.

Prices here are as last week: Southern, ex steamer No. 1 F., $15.26; No. 2 F., $14.26; No. 3 F., $13.76; Gray Forge, $13 01. Northern, tide-water, No. 1X, $15; No. 2X, $14; No. 2 plain, $13.50; Gray Forge, $13. Southern irons are quoted, nominally, 26c. higher than Northern.

Spiegeleisen and Ferromanganese.—Ferro is dull at $60. Spiegel, $26.50 with no special movement.

Steel Rails.—The market is dull at $20.

Rail Fastenings.—Prices rule as follows: Fish and angle plates, 1·55@1·65c. at mill; spikes, 1·90@2c.; bolts and square nuts, 2·40@2·70c.; hexagonal nuts, 2·70@2 80c. delivered.

Merchant Iron and Steel.—Prices stand: Mushet's special, 48c.; English tool steel, 15c. net; American tool steel, 6½@7½c.; special grades, 13@18c.; crucible machinery steel, 4·75c.; crucible spring, 3·75c.; open hearth machinery, 2·25c.; open hearth spring, 2·30c.; tire steel, 2·25c.; toe calks, 2·25@2·50c.; first quality sheet, 10c.; second quality sheet, 8c.

Structural Iron and Steel.—We quote: Beams, 2·3@2·55c., except for 20-in. beams which are 2·75c.; angles, 1 95@2·15c.; sheared plates, 1·90@2·10c.; tees, 2·30@2·60c.; channels, 2 35@2·50c.; universal plates, 2@2·10c.; bridge plates, 2@2·10c.; steel hoops, 1·90@8c. All on dock.

Buffalo. Jan. 4.

(Specially Reported by Rogers, Brown & Co.)

No opportunity for a marked change in market conditions has been offered since our last report, as it has been essentially a continuation of the holidays, further intensified by very general inventorying. The same careless independence of each other still continues to characterize both buyer and seller, with, however, a little feverishness on the part of the weaker furnaces. Prices are practically unchanged, with a slight inclination toward weakness in spot delivery, but with a very satisfactory outlook ahead. We quote on the cash basis f. o. b. cars Buffalo: No. IX foundry strong coke iron Lake Superior ore, $15.25; No. 2 X foundry strong coke iron Lake Superior ore, $14.25; Ohio strong softener, No. 1, $15.25; Ohio strong softener No. 2, $14.25; Jackson County silvery No. 1. $17.30; Jackson County silvery No. 2, $16.80; Lake Superior charcoal, $17 25: Tennessee charcoal, $18; Southern soft, No. 1, $14.40; Alabama car wheel, $19; Hanging Rock charcoal, $20.50.

Chicago. Jan. 5.

(From our Special Correspondent.)

Business during the past week in crude iron and indeed in all the departments of the finished iron and steel trades has been characterized by the dullness incident to the holiday season. While the general buying movement for the past month does not compare favorably with that of a year ago, there has been a fair amount of business going, though it has been made up of small quantities to cover present require ments only. This is more noticeable in pig iron, and as foundries in city and neighborhood are well supplied with work and stocks in their yards small, the outlook for a more active movement in the very near future is regarded as very favorable. Stocks at furnaces are being decreased and there is small prospect for any radical change in prices either upward or downward.

With regard to the finished material the tendency is evidently toward a lower range of values, not that quotations have been materially changed, but there is an elasticity about them which does not augur well for Eastern or Northern manufacturers. Still there is a vast amount of work in some branches to be given out and the reaction may steady then.

Pig Iron.—The business of the past week, with probably one or two exceptions, has been confined to orders for carloads or 50 to 100 tons, and were for prompt shipment. An order for 500 tons of local coke iron was placed early in the week, all delivered by December 31st, and was the largest amount for any one order. There is, however, a very fair volume of inquiry for medium sized lots up to round blocks of several thousand tons, some of which are for deliveries running through the year. Several of the larger foundry concerns here have taken a heavy tonnage of rough castings for the foundation work of elevated railways, and some of the inquiry referred to is for that purpose. Concessions in the way of deliveries are being made by Southern furnaces covering shipments up to July, but there is some evidence of further weakness in price, in spots here and there. Lake Superior charcoal iron is quiet, but firm as quoted.

Quotations per gross ton f. o. b. Chicago are Lake Superior charcoal, $16.07@$17.25; Lake Superior coke No. 1. $13.75@$14.25; No. 2, $13.50@14; No. 3, $13.25@$13.75; Lake Superior Bessemer, $14.50; Lake Superior Scotch, $14.50@$15; American Scotch, $16 50@$17; Southern coke, foundry No. 1, $14.50; No. 2, $13.60; No. 3, $13.10; Southern coke, soft, No. 1, $13.35; No. 2, $13.10; Ohio silveries, No. 1, $17; No. 2, $16.50; Ohio strong softeners, No. 1, $17; No. 2. $16 50; Tennessee charcoal No. 1, $17; No. 2. $16.50; Southern standard car wheel, $20@$21.

Steel Billets and Rods.—The mills here are out of the market for 60 to 90 days, and prices are merely nominal at $24.50 for the former and $33 for the latter.

Structural Iron and Steel.—The severe weather has caused a suspension of outside structural work. Demand is light, but there is a large amount to be placed. Quotations, car lots, f. o. b Chicago, are as follows: Angles, $2@$2.20; tees, $2.35@$2.45; universal plates, $1.95@$2; sheared plates, $1.95@$2; beams and channels, $2.35@2.50.

Plates.—Continue in fair demand from warehouse, but mill business is dull in this vicinity, though active toward the head of the lakes in Minnesota. Steel sheets, 10 to 14, $2.30@$2.40; iron sheets, 10 to 14, $2.20@$2.30; tank iron or steel, $2.05@$2 15; sheet iron or steel, $2 50@$2.75; firebox steel, $4.25@$5.50; flange steel, $2.75@$3; boiler rivets, $4@$4.15; boiler tubes, all sizes, 65% and firm.

Merchant Steel.—Small mill lots, in the way of supplementary orders to contracts already placed, have been a feature of the week; in other respects business in quiet. We quote: Tool steel, $6.50@$6.75 and upward; tire steel, $2@$2.10; toe calk, $2 30@$2.40. Bessemer machinery, $2.10@$2.20; Bessemer bars, $1.70@$1.75; open hearth machinery, $2.30@$2 40; open hearth carriage spring, $2.10@$2.20; crucible spring, $3.75@$4.

Galvanized Sheet Iron.—There is very little doing and orders are light from all sources. Discounts are now easy at 70% and 10% off on Juniata and 70 and 15% off on charcoal, and jobbing quantities at 70 and 5% off on the former and 70 and 10% off on the latter.

Black Sheet Iron.—Some demand is noted from implement makers; in other respects the market is quiet and prices on iron sheets at 2 85c. for No. 27 common; steel sheets are 3c. Jobbers quote 3@3·10c. for iron and 3·10@3·15c. for steel, same gauge.

Bar Iron.—About the only consumers taking iron in any quantity are the car builders, demand from whom is fair in lots of 300 to 500 tons. Mill quotations are easy at 1·60@1·62½c., half extras, f.o.b. Chicago. Jobbers now quote 1·75@1·85c. for iron or steel bars, and business is light.

Nails.—Wire nails continue to show weakness and $1.57½, base Chicago, is being shaded by some mills. Jobbers quote $1.65 from stock. Steel cut nails are in light demand at $1.60, 30c. average. Jobbing price is $1.65 in less than carloads.

Steel Rails.—The Union Works here of the steel company as also the Joliet plant have closed down

for repairs, etc. So far there is no inquiry of any moment for standard sections, though some movement on the part of railroads is looked for this month. Rails are quoted at $30, which is equal to the price fixed by Eastern mills with the difference in freight added to all competing points.

Scrap.—Demand is exceedingly light from consumers and the present outlooks discouragingly to dealers. Prices are nominal. No. I railroad, $15.50, No. I forge, $15; No. 1 mill, $9.50; fish plates, $16.50; axles, $19; horseshoes, $16; pipes and flues, $7; cast borings, $6; wrought turnings, $8; axle turnings, $9.50; machinery castings, $10; stove plates, $6 50; mixed steel, $10.50; coil steel, $15; leaf steel, $15.50; tires, $14.50.

Old Material.—This market is very quiet, some inquiry is noted for steel rails for relaying, but iron rails and car wheels are dull. Quotations are nominal at $18.50 for iron rails, steel rails $12.25@$14.75 as to length and condition. Car wheels $14.50.

Louisville. Dec. 31.

(Special Report by Hall Bros. & Co.)

There has been no change of importance to note in iron circles during the past week. Buying still continues to be on a very light scale, with no apparent indication of early change from this state of affairs. There is no doubt but round purchases could be made from various sources at concessions in price; but with a few companies, whose product is taken for probably 60 days ahead, prices are being held firm. We make no change in quotations:

Hot Blast Foundry Irons.—Southern coke No. 1, $13.50@$13.75; Southern coke No. 2, $12.50@$12.75; Southern coke No. 3, $12@$12 25; Southern charcoal No. 1, $16@$17; Southern charcoal, No. 2, $15.50@$16.

Forge Irons.—Neutral coke, $11.50@12; Mottled, $11@$11.25.

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

Philadelphia. Jan. 5.

(From our Special Correspondent.)

Pig Iron.—The expected activity in foundry iron has not developed. Brokers have started out their salesmen to catch the larger orders, and some large sales will probably be announced on a basis of $15.25 for No. 1. The market has weakened, through offers of inferior No. 1 at 50c. less. The sales for No. 2 have been larger than usual this week. Two or three large transactions were closed for forge, but the conditions do not warrant very general activity. Selling prices, $13 to $13.25.

Muck Bars.—The idle mills have not yet resumed; manufacturers are endeavoring to get some business.

Steel Billets.—Renewed offers were made yesterday for several large lots of steel billets by buyers, who it appears are more anxious than they have been to secure supplies for the next month or two. Makers claim that they will be able to name their own prices very soon.

Merchant Iron.—Only a partial resumption has taken place this week. Orders are very scarce. Great activity is expected when the car builders send in their orders. Quotations, 1·60 to 1·70.

Nails.—Nailmakers think the market is in better condition than for two months. The agreed-upon restriction will be maintained.

Skelp Iron.—Inquiries have just been received for considerable skelp, but no sales yet. Price, 1·60.

Wrought Iron Pipe.—Negotiations are pending for a large amount of pipe. The buyers are asking for quotations which probably will not be granted, in consideration of placing large orders just now for convenient delivery between now and April 1st.

Sheet Iron.—It is probable that some large contracts will be placed by stove manufacturers this month. Inquiries are now in hand, and some shadings have been made, which point to a low range of prices for all kinds of sheets.

Plate and Tank.—The week's business has been unimportant. Prices are based on 1·80 for tank. There is no doubt a good deal of business near at hand, but the condition of things is such that buyers will not make long contracts.

Structural Material.—There is a general expectation of large orders this month. There are transactions going through now which will absorb some 20,000 tons, if rumors are correct. A great deal of work is in sight. No change in prices.

Steel Rails.—Those who are supposed to know what is being done in steel rails decline to give any information. Sales have been heard of within a few days amounting to 13,000 tons, but it is not known what mills have secured them.

Old Rails.—Within the past week or two a great many old rails have been offered on the market, but not taken. Brokers are offering sellers 50c. less.

Pittsburg. Jan. 5.

(From our Special Correspondent.)

Raw Iron and Steel.—Trade since our last was not very active, still it might have been worse. The new year has just opened, it will require sometime to regulate affairs in order to start up the trade of 1893. In regard to the future there is a wide difference of opinion, there are always two sides to a matter of this kind, of course, each party believes their view is the correct one. The majority, however, contends that the present year will beat all previous ones. The past year will be known as one remarkable for strikes, accompanied by loss of life and millions of dollars. Capital and labor contended for supremacy from July to January. It is to be hoped that both sides have learned something in the past that will be avoided in the future, and for the benefit of all let strikes be avoided during 1893. For the present sales will be confined to limited amounts. Dealers, generally, find very little to occupy their attention in the way of new business.

Since our last there has been an increased inquiry for round lots of Bessemer, Billets and Grey Forge for late deliveries, transactions will be consummated later. Reports of low-price sales are current which, if true, do not figure as establishers of rates, because this is the off time of the year. In a short time the change will come, active conditions will favor a return of better prices and the new campaign will start off in better shape than the one just ending assumed at its outset, still confident that an improvement will be inaugurated early in the new year. What a leading Eastern dealer has to say about the situation: "Pig iron, while there has been a number of inquiries for this years supplies, no actual business of any moment has been done, and buyers are likely to continue, for the present, their policy of purchasing just the amount of material actually needed for pressing wants. Offerings continue to be made for good grades of iron at concessions of 25 cents on the prices in force about the 1st of December, but without stimulating buyers. consumers are showing great cautionsness in placing of any large orders, and are desirous of preventing their experiences of the earlier month's of the year where they made heavy purchases, only to find that they could have done better by waiting. Nothwithstanding the weakness in prices and the close competition for business, there are a number of bright spots in the pig iron situation. Consumption has been heavy and in excess of the increased production, and while the temporary stoppage of many of the largest consumers will increase their stocks, there will be a more urgent demand when they resume operations. Stocks in consumers' yards are invariably small, so that active buying cannot be much longer postponed."

Coke Smelted Lake and Native Ore.

1,500 Tons Bessemer, Jan., Feb.	$13.75 cash.
1,500 Tons Grey Forge, next three months.	12.40 cash.
1,500 Tons Bessemer, Jan. to April	13.60 cash.
1,000 Tons Bessemer at valley furnace	13.20 cash.
1,000 Tons Grey Forge, next two months.	12.35 cash.
500 Tons Bessemer, Jan. to April.	13.60 cash.
500 Tons Bessemer, Jan., Feb.	13.60 cash.
500 Tons Grey Forge, Jan., Feb.	12 50 cash.
500 Tons Bessemer, Feb.	13.65 cash.
500 Tons, Jan., Feb.	13 60 cash.
500 Tons Grey Forge, Jan.	12.25 cash.
500 Tons No. 2 Foundry.	13.25 cash.
150 Tons No. 1 Foundry.	14 50 cash.
150 Tons No. 2 Foundry.	13.50 cash.
100 Tons No. 1 Silvery.	16 25 cash.
50 Tons No. 2 Silvery.	15.25 cash.
50 Tons All ore mill iron.	13,00 cash.

Charcoal.

100 Tons Cold Blast, Extra	30.00 cash.
100 Tons No. 2 Foundry.	19.00 cash.
50 Tons Cold Blast.	26.50 cash.
50 Tons No. 4 Foundry.	19.00 cash.

Steel Blooms, Billets and Slabs.

1,500 Tons Billets, Jan., Feb.	22.00 cash.
1,200 Tons Steel Nail Slabs, Jan., Feb.	22 25 cash.
500 Tons Billets prompt.	22.50 cash.
500 Tons Billets, first three months.	22.00 cash.

Muck Bar.

500 Tons Neutral, spot.	24.50 cash.
300 Tons Neutral, this month.	24.25 cash.

Ferro-Manganese.

100 Tons 80%, delivered.	60.00 cash.

Iron Skelp.

500 Tons Sheared Iron, delivered	1.75 4 m.
400 Tons Narrow Ground, delivered.	1.55 4 m.
300 Tons Wide Ground, delivered.	1.55 4 m.

Steel Skelp.

350 Tons Wide Ground, advanced.	1.42½ 4 m.

Sheet Bars.

600 Tons Sheet Bars at Mill, delivered	28.00 cash

Blooms, Billets and Rail Ends.

500 Tons Bloom Ends, Delivered.	16.00 cash.

Spelter.

125 Tons Spelter.	4.25 cash.

Old Iron and Steel Rails.

1,000 Tons American Ts, Youngstown.	20.00 cash.
500 Tons American Ts, Pittsburgh.	20.25 cash.
500 Tons Spliced Steel Rails.	16.00 cash.

Scrap Material.

400 Tons No. 1 W. R. R. Scrap, Net.	16.25 cash.
300 Tons Steel Scrap, Net.	21.00 cash.
300 Tons Cart Scrap, Gross.	12.00 cash.
300 Tons Cart Borings, Gross.	8.00 cash.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 6.

PRODUCTION OF COKE on line of Pennsylvania, R. R. for the week ending December 31st, 1892. and year from January 1st, in tons of 2,000 lbs.: Week, 92,947 tons; year 5,425,068 tons; to corresponding date in 1891, 419,583 tons.

PRODUCEION OF BITUMINOUS COAL for week ending December 31st, and year from January 1st.

EASTERN AND NORTHERN SHIPMENTS.

	1892. Week.	1892. Year.	1891. Year.
Phila. & Erie R. R.	1,289	98,033	156,398
Cumberland, Md.	60,457	3,836,284	4,091,137
Barclay, Pa.	1,282	67,520	198,685
Broad Top, Pa.	13,872	656,238	513,071
Clearfield, Pa.	61,268	4,007,610	3,981,511
Allegheney, Pa.	12,499	1,284,161	1,215,166
Beach Creek, Pa.	33,172	2,221,159	2,663,137
Pocahontas Flat Top.	36,378	2,678,596	2,273,020
Kanawha, W. Va.	70,728	2,757,564	2,395,562
Total.	290,895	17,607,465	17,187,722

WESTERN SHIPMENTS.

	1892. Week.	1892. Year.	1891 Year.
Pittsburg, Pa.	19,338	1,267,697	1,252,254
Westmooreland, Pa.	35,155	1,805,653	1,921,740
Monongahela, Pa	12,238	672,381	595,780
Total.	67,031	3,745,731	3,76 ,774
Grand Total.	357,926	21,353,196	20,957,496

Anthracite.

At last the final testimony has been taken, and the Congressional Committee will render its report on the combine. The last witness was Mr. John C. Haddock, of the Plymouth Coal Company, an independent miner and shipper. In the course of his examination Mr. Haddock gave the committee more valuable information than all of the other witnesses together. It is not every coal man, however independent, who will testify against a combination of this sort. There is needed a great deal more of "grit" than most people possess to face such an ordeal, and Mr. Haddock is entitled to the thanks of the entire community for his manly, intelligent and discriminating testimony, which was to the effect that the coal combine had restricted output, and increased the price by limiting the car supply, that his own production of about 500,000 tons per annum had been distinctly interfered with by the Delaware, Lackawanna & Western Railway (one of the roads in the combine), and that the prices and tonnage were practically determined at the meetings of the coal sales agents.

Mr. Haddock said further that the Delaware, Lackawanna & Western Railway had offered to take all of his coal at $4.48 per ton when the price at Hoboken was $4.35. Out of the $4.48 he would have to pay $1.90 for freight, and although this would leave him a good margin for profit he refused the offer.

In reply to a direct question as to whether the coal carrying roads are trying, by establishing excessive freight rates, to force independent producers either to sell out to them or do business at a loss, Mr. Haddock replied:

"The coal-carrying roads are trying to squeeze out independent producers by putting up freight and then offering to buy at a higher price at the mine than the producers can now net after paying their exeessive freight rates."

Considering all the evidence that has been submitted to the committee and regarding the entire state of trade during the past year, we are clearly of the opinion that this attempt to control prices was unjustifiable. It is known that the combine offered more for coal at the mines than it was worth at tide water, less the freight to tide, but the independent operators were heavily handicapped by the freight rates and were unable to compete with the railroads that were mining their own coal.

If a transportation company owns coal mines and wishes to market its coal, what does it matter to an outsider whether his competition is scotched by lack of cars or excessive freight rates? During the past year not only has there been a scarcity of cars with those who were not of the combine, but even when they had cars the freight rates brought profits down to that idyllic condition of the metaphysical mathematician—a minus quantity.

Mr. Haddock's suggestion that the decisions of the Inter State Commerce Commission should be made full legal judgments, instead of being as they are a basis for a suit at law, is much to the point. Until something is done to clothe the commission with more authority it will continue to be merely an advisory board.

If the decisions of the commission were given the force of legal judgments, to be enforced as other judgments are, we would hear less of combines and all the attendant evils of such attempts to plunder the public.

The present coal combine has certainly shown the necessity for some radical change in the relations of the general government to commerce between the States. Its operations have been oppressive, unjustifiable, and we are constrained to believe illegal.

The relinquishment of the Lehigh & Wilkes-Barre by the Reading does not mean anything so long as they continue to "work in harmony." But at any moment the present condition of affairs may change, and then this action of the Reading would be in line with the assertions that everything is not as lovely as it appears.

The Reading seems to have awakened to the fact that the Pennsylvania is playing the part of the mountain in the famous but spurious story of Mahomet. At one time the Reading seemed to fancy itself all-powerful, and to pose before its disciples as "a bigger man than old Grant," to say nothing of the Eastern prophet. But in spite of threats and awful forebodings of the evil that would befall those who either could not or would not say shibboleth, the Pennsylvania kept along its chosen course. Mahomet commanded, but in the end Mahomet obeyed, and had to trump up some excuse for the trip that would satisfy his friends. He said, we suppose, that the air of the plains was not good for his health, and his physician had ordered him to go to the mountains for rest and recreation. It is a good story and applicable to other things than would-be miracles.

The local market is in good condition, owing to the protracted cold weather. The coldest Christmas in a number of years, followed by snow, a veritable blizzard to-day, has kept prices at a satisfactory figure. The retail cost of free burning coal has

been advanced since January, 1892, to 75 cts., from $5.25 to $6, while the advance in wholesale rates has been: 85 cts., $4.05 to $4.90, on stove; and $1.15, $3.65 to $4.80, on nut.

Bituminous.

An apparent error in last week's issue makes us give the soft coal output of Ohio at about 6,000,000, when the meaning was that the combine on foot would affect about this quantity. The total output of Ohio is above 13,000,000 tons.

As regards the outlook of the trade here we will reproduce a letter from Mr. H. B. Needham, of the Maryland Coal Company. He says:

"1892 was the largest year in soft coal production in the history of the trade, though one or two regions fell behind last year's large tonnage from lack of transporting facilities. The shippers by some lines of railroad have been hampered to a considerable extent all through the year from this cause. Many new mines have been opened during the year.

"Low ocean freights on the Atlantic seaboard have ruled by coastwise vessels to the eastern receiving ports, and there has followed a low cost of coal to consumers, with small profits to the producers. Small and steam sizes of anthracite have competed sharply for steam-producing purposes in some sections of the country. There was no labor disturbances of consequence during the year. The understanding between the companies delivering coal to the Atlantic seaboard during the previous year was not continued in 1892, each company working by itself, contracts and spot sales being made at close figures.

"Rumors that the Reading Railroad was buying soft coal property to fight the Pennsylvania Railroad's soft coal properties because this company had not entered into the Reading's anthracite policy have been rife, but have resulted in nothing. Considerable hope was felt at the beginning of the year that the anthracite combination, by its affiliation of interests, would help the bituminous trade, but these hopes were not realized.

"During the latter part of the year considerable has been said regarding the result of a reduction or abolition of the tariff on foreign coals. Great difference of opinion exists on this subject, but the predominance seems to be that taking the tariff off entirely would injure the trade to some extent.

"It is to be hoped during the coming year some understanding may be had by companies delivering on the Atlantic seaboard that will bring about the realizing of fair profits from their product."

The car famine is still a feature of the trade. It is understood that large stocks of anthracite coal held in cars have prevented the railroads from distributing them to the soft-coal men.

Charter rates are: New York to New Bedford, Providence and Sound ports, 50 to 55 cts.; to Boston and Portland 55 to 80 cts.

From Philadelphia and Baltimore rates have advanced 10 to 15 cts.

Boston. Jan. 5.

(From our Special Correspondent.)

Boston papers have published articles on the dissolution of the coal "combine," but the men in the coal trade smiled knowingly. The older members of the coal trade believe the Lehigh and Wilkes Barre Coal Company, is doing just what it is obliged to according to the decrees of the New Jersey legislature. The price of coal will in all probability be as completely dictated as it has been. As for the market at present there is very little doing. The yards are all quite well filled and consequently dealers are not disposed to make purchases.

Quoted prices are on a f. o. b. basis New York: Stove, $4.75; egg, $4.40; free broken, $4; chestnut, $4.65. Lykens Valley (at Philadelphia) broken, $4.85; egg, $5.45; stove, $6; chestnut, $5.

The bituminous coal situation is unchanged. Supplies are hard to get and prices are very firm. This is greatly owing to the great firmness in freight rates. George's Creek coal on cars here is worth $4 @$4.05 and Clearfield, $3.70.

Freight rates are: From New York to Boston, 60@70c; from Philadelphia, $1.25; to Bath, $1.35@ $1.40; to Providence, 85c.; from Baltimore, $1.25@ $1.30; from Newport News, $1.

In a retail way there is a very fair business doing. Prices are strongly maintained. Stove, $6.25; nut, $6.25; egg, $6; furnace, $5.75; Franklin, $7.50; Lehigh egg, $6.25.

The receipts of coal at this port for the week ending December 31st were: 30,825 tons of anthracite, and 19,402 tons of bituminous, against 47,332 tons of anthracite and 16,420 tons of bituminous for the corresponding week last year. The total receipts for the year 1892 were 2,065,536 tons of anthracite and 875,910 tons of bituminous, against 2,088,717 tons of anthracite and 977,272 tons of bituminous for the same time last year.

Buffalo. Jan. 5.

(From our own Correspondent.)

The anthracite coal market active for home consumption in consequence of severe weather. No change in quotations, and none expected for some time. Small orders from near-by points coming in quite freely.

There is good business in bituminous coal, with quotations strong but unchanged. Supplies are ample for all requirements. The lack of cars is not alluded to, therefore the inference is that there is no trouble between Buffalo and the mines on that score. From all accounts the car building establishments are very busy throughout the country filling orders.

Large coal storage plants are being built along the lines of the Reading system.

There is a rumor that Mr. W. K. Niver is to be appointed vice-president of the Boston & Maine Railroad, and that Mr. Peter C. Doyle, of Buffalo, for many years with the Lehigh company, will be his successor as the Reading's general agent at this port.

Mr. Charles K. Corsant, the promoter of the gigantic scheme for docks, canals, breakwater, etc., at this port from Storey Point to the present Government breakwater, says that a company will be formed before January 15th, and that contracts for the proposed works will be given out immediately (including the construction of the breakwater and docks and the dredging of the harbor and canals). It is further stated that the works will be completed before the opening of navigation in 1894.

During the year ending the 30th of June, 1892, the exports to Canada of bituminous coal from the United States were 1,390,067 net tons, on which a duty of 60% per ton was paid; also during the same period 1,617,108 net tons of anthracite, on which no duty was paid

It is reported that the coal rate war is ended between the Pennsylvania and Reading companies.

Chicago. Jan. 5.

(From our Special Correspondent.)

The year and the week open well, and there is and has been latterly a good volume of small orders from the country, which are scattered through Illinois, Iowa, the Missouri River and the northwest generally. The shippers have been well favored by the cold weather we have been experiencing lately, and have got rid of lots of coal at very remunerative figures.

Some of the shippers report a heavy increase in their daily tonnage delivered from their dock yards to city dealers this week as well as last week. Retail trade continues very active, and it even surprises the dealers themselves.

Not a few of the great public reading the head lines in the various newspapers indicating a disintegration of the "combine" by the withdrawal of the Lehigh & Wilkes Barre, have been sadly disappointed on attempting to place orders for their present wants, to find that the prevailing impression out here is that the said withdrawal is simply a beautiful "stiff" with which the Eastern managers hope to pull the wool over the eyes of the dear people and the great Congressional Committee. Coal has *not* been reduced in price one mill per ton.

Anthracite coal is now being offered at $6 here and at Milwaukee, for shipment to Sioux City or Sioux Falls. This is either a cut in the circular price or a cut in the freight rate: it is hardly the latter as it apparently affects other Missouri River points.

Bituminous coal continues active, and new contracts for steam sizes of Indiana black have been made at 10@20c. above the circular.

The Christmas and New Year's holidays have been celebrated this year in great style by almost all the mines and miners tributary to this market. We hear of a number of instances where the men have not yet recovered from the effects of the festivities, and very little, if any, coal is being shipped from these mines. This has resulted in an unusual shortage, and many of the large dealers have found it impossible to fill their orders satisfactory to themselves or customers. The continued cold weather in the North and West has made unexpected demands upon the resources of operators. The persistent efforts on the part of dealers and manufacturers to accumulate a stock of coal and use the coal cars as storehouses during this condition of affairs has resulted in another scarcity of cars on most of the coal-carrying roads, and it will require very stringent measures on the part of the interested roads during the next two weeks to prevent a very serious shortage in the daily supplies of bituminous coal in the market. Medium block coal, for instance, has found ready sale on track at Chicago in large quantities to dealers, having their own mines, tracks and cars, at $2.65 per ton on track here, with no prospect at present of any abatement or amelioration of this condition of things. Mill owners in the Wilmington, Ill., district last week confirmed the price of $2 at mills for January.

Coke is in quiet demand and will be until foundries fully resume. Crushed coke (domestic) is making a record for itself as an excellent substitute for anthracite.

Quotations are: $4.65 furnace; $5.05 foundry, crushed; $5.40 Connellsville; West Virginia: $3.90, furnace, $4.10 foundry; New River foundry, $4.75; Walston: $4.65 furnace, $5 foundry.

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

Prices of bituminous per ton of 2,000 lbs., f. o. b. Chicago, are: Pittsburg, $3.40; Hocking Valley, $3.20; Youghiogheny, $3.25: Illinois block, $2; Brazil block, $2.60@$2.75.

Pittsburg. Jan. 5.

(From our Special Correspondent.)

Coal.—The coal situation shows no special alteration. The beginning of the year does not find the coal trade in any too good a condition. Not alone did the unusually long-day season interfere with the volume of business in the lower markets, but when the first run was made the price offered was somewhere in the neighborhood of cost to the shippers. This in itself was unprecedented, the price of coal in the lower markets always having risen during a dry spell, and being maintained at a remunerative figure when the first coal of the new season arrived.

The report that Pittsburg coal was being displaced by the inferior products of the Kanawha Valley and kindred fields, owing to the cheaper figures at which the latter was capable of being placed on the market, has been decried as magnified; but, from the point of view of the Pittsburg operator, they have too much truth in them. That he finds this to be the case is the reason the Pittsburg operator has decided he cannot any longer pay the 3½ rate for mining.

The shipment of railroad coal for the past twelve months has been largely in excess of 1891.

Connellsville Coke.—The demand was light. The operators have come to the conclusion there is no use in trying to boom the coke product just now. Last week there was a slightly increased production over the previous week, but this only marked the market fluctuations. There was a decided slump in western shipments, while those eastward were increased; the cause was probably due to the slowness of the iron trade. For the past few weeks business in pig iron has been quiet. None of the furnace men are inclined to push the market until there are signs of a better trade. The shipments for the week aggregated 6,781 cars, consigned as follows: To Pittsburg and river points, 1,796 cars; points west of Pittsburg, 3,298 cars; points east of Connellsville, 1,687; total, 6,781 cars. Compared with the shipments of the previous week, this is an increase of 568 cars. In the Pittsburg shipment there was a decrease of 239 cars and a decrease in the Western shipments of 369 cars. The Eastern shipments increased 40 cars. The output for this week shows 13,149 ovens in blast and 4,107 idle, with a total estimated production of 121,560 tons, a decrease compared with the preceding week of 1,562 tons. Prices are unchanged.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Jan. 6.

Heavy Chemicals.—The demand for the various heavy chemicals has been only fair. Stocks are light, with few exceptions, and business on the spot has been limited. Generally speaking, we can report no change from last week.

Our quotations to-day for goods on the spot are as follows: Caustic soda, 60%, 3·17½@3·27½c.; 70%, 2·95 @3·12½c.; 74%, 2·97½@3·15c.; 76%, 3·12½@3·25c.; 77%, 3·12½@25c. Carbonated soda ash, 48%, 1·57½@1·60c.; 58%, 1.45@1·50c. Alkali, 48%, 1·45@1·50c.; 58%, 1·35@ 1·40c. Sal soda, English, on the spot, ·95@1c.; American, ·90@·95c.; bleaching powder, 2·30@2·50c.

Acids.—There has been a steady demand for acids and a good business was done during the week, both for spot and for future delivery. Prices show no change. We quote: Acid, per 100 lbs. in New York and vicinity, in lots of 50 carboys or more: Acetic, $1.60@$2, according to quality; muriatic, 18°, 90c.@ $1.10; 20°, $1@$1.25; 22°, $1.25@$1.50; nitric, 40°, $4; 42°, $4.50@$4.75; sulphuric, 90c.@$1.10; mixed acids, according to mixture; oxalic, $6.50@$7.25. Blue vitriol is quoted all the way from $3.25 to $3.75; glycerine for nitro glycerine, 11½@12½c., according to quality and quantity.

Brimstone.—This market is very quiet. During the past 10 days the arrivals at New York, Philadelphia and Baltimore have amounted to about 10,000 tons; this has made easier prices and a quiet spot market. Futures are strong. Quotations are as follows: Best unmixed seconds, on the spot, $22; to arrive, future shipments, $20.75. Thirds are 75c. less.

Fertilizing Chemicals.—The past week has been one of good demand for fertilizers. The volume of business done is in excess of the corresponding period last year. The present season bids fair to be prosperous to fertilizer makers. Stocks are light, and the market is firm. Prices have not changed much since our last report. We quote this week: Sulphate of ammonia, $2.90@$2.95 for bone goods and $2.95@$3 for gas liquor. Dried blood, $2.45@ $2.50 per unit for high grade and $2.40@$2.45 for low grade; acidulated fish scrap, no stocks on hand; dried scrap, $2.50 f.o.b. fish factory; Azotine, $2.40@ $2.45. Tankage, high grade, $25@$26; low grade, $22@$24. Bone tankage, $22.50@$23.50; bone meal, $24.50@$25.50. The price of double manure salts for 1893, for orders placed prior to January 31st, has been fixed by the syndicate as follows: New York and Boston, $1.10; Philadelphia, $1.12½; Charleston and Savannah, $1.15 cwt., basis 48@50% in 50 ton lots on foreign weights and analysis. Sulphate of potash, 90% to 96%, basis 90%: New York and Boston, $2.05; Philadelphia, $2.07½; Charleston and Savannah, $2.10. Sulphate of potash, 96-99%, basis 90%, is 4% higher.

Prices on orders placed after January 31st will be at the rate of 2c. per 100 lbs. higher on double manure salt and 3c. per 100 lbs. higher on sulphate of potash. Buyers have the option of increasing the quantity by 25%, such option to be decided on or before September 1st, 1893.

Muriare of Potash.—There has been a fair demand for muriate. Arrivals during the past week amounted to 400 tons, and new sales, 250 tons. Prices for 1893 on orders placed prior to January 31st are as follows: New York or Boston, $1.75; Philadelphia, $1.77½; Southern ports, $1.80. Prices on orders placed after January 31st will be 3c. higher per 100 lbs. Buyers have the option of increasing the quan-

tity by 25%, such option to be decided on or before September 1st, 1893.

Nitrate of Soda.—This market is quiet. Quotations are as follows: On the spot, $2.15@$2.17½. To arrive in January or early part of February, $2.12½@$2.15. Future shipments, $1.90@$1.95. Messrs. Mortimer & Wisner send us the following interesting statistics; issued under date of January 3d.

	1892.	1891.	1890.
	Bags.	Bags.	Bags.
Imported into Atlantic ports from West Coast S. A. from Jan. 1, 1892, to date	641,165	63?,536	688,124
Imported into Atlantic ports from Europe	5,862	18,802	.....
	647,027	651,338	688,124
Stock in store and afloat Dec. 31, 1892, in New York	14,034	50,685	33,954
in Boston	420	900	.....
in Philadelphia	.....	.....	.....
in Baltimore	1,000	2,000	2,500
To arrive, actually sailed	164,000	188,000	155,000
Visible supply to April 1, 1893	179,454	241,585	191,454
Additional charters	210,500	210,000	367,046
Total supply, when shipped.	389,954	451,585	558,500
Stock on hand, Jan. 1, 1892	53,585	36,454	22,009
Deliveries past month	35,280	36 098	46,573
Total yearly deliveries	685,1?8	631,207	673,679
Prices current Dec. 31, 1892	2.15	2.07½	1.70

Phosphates.—Phosphate rock, Florida, 60@70%, is quoted from Punta Gorda at $4.50 per ton of 2,240 lbs. Charleston rock is quoted at $4.50@$5 f. o. b. Charleston.

Messrs. Couper, Millar & Co. send us the following report on the phosphate market of the United Kingdom, dated London, Dec. 16th, 1892. Since the issue of our last circular there has been little or no change in the phosphate market, and, with the Christmas holidays so near, no improvement can be expected for sometime. We must say that this year has been a very bad one for the raisers and for the phosphate trade all round. Manufacturers have not had a brilliant time of it, either, for although they have been able to buy raw material at low figures, they had on the other hand to cut their prices so close, owing to the keen competition, that scarcely any margin of profit remained. In short, the only man who has gained anything by the depressed state of the market is the farmer, who has bought his manures very cheaply; but, from what has been said at the Agricultural Conference, this does not seem to have been a great help to him! We hope next year will prove better for everyone, and that prices will go up to a normal level. Mineral Phosphates—Canadian phosphates; shipping season over. South Carolina has been sold at 6d. per unit and is still offering thereat for early delivery, 6¼d. for forward. Florida hard rock 75% offered at 8d. while river pebble 60% is strongly held for 7d. and land pebble testing about 68% would come at same figure. Ground Somme 10¼d. for 70% and 11¼d. for 75%, basis c. i. f. London, would mean business. Ground Belgian steady at about 5d. per unit. f. o. b. Osso we hear of no sales in the United Kingdom. Cambridge and Bedford Coprolites, in our opinion, cannot be raised to pay."

Liverpool. Dec. 21.

(Special Correspondenc of Joseph P. Brunner & Co.

A dull market for heavy chemicals generally, and in view of the near approach of the holidays business may he said to be practically over for the year 1892. Soda Ash.—Quotations are unreliable, makers asking for bids. Nominal values for January are about as follows: Caustic ash 48%, £5 to £5 6s. 3d. per ton; 57-58%, £6 per ton; carb. ash 48%, £5 2s. 6d. per ton and upward; 58%, £6 2s. 6d.; ammonia ash 58%, £6 per ton, net cash. A reduction of 5s. to 7s. 6d. per ton for contracts over 1893. Soda crystals are in moderate request at £3 3s. 9d. to £3 5s. per ton, less 5%. Caustic soda seems to be almost unsalable and large stocks reported accumulated at works. The Alkali company has issued instructions to close down all castic soda plants from 28th inst.; and although there is always more in less of a stoppage of plant during the Christmas holidays, there is an impression that this will meau for a longer period than usual. Prices are reduced, but quite nominal, as follows: 60%, £8 15s. per ton; 70%, £9 15s. per ton; 74%, £10 15s. per ton: 76%, £11 15s. per ton and upward, net cash. For certain export markets concessions on these figures are offered. Bleaching powder steady at £4 15s. to £8 per ton, net cash, for hardwood packages, and there is a talk of advancing prices. On the Tyne the price is up 5s. per ton. Bicarb. soda is without change at £6 15s. per ton, less 2½% for 1-cwt. kegs, with usual allowances for larger packages. Chlorate of potash has had a bit of a spurt again, and a fair number of second-hand parcels for January delivery have been bought up at 8d. Quotations are irregular and range about as follows: January, 8½d. down to 8d.; February-March, 8d. down to 7¾d.; April-December, 7½d. to 7d. Sulphate of ammonia has declined, holders being more disposed to meet buyers. On the spot we quote: Good gray, 24%, £10 3s. 9d. to £10 5s. per ton; and 25%, £10 7s. 6d. to £10 10s. per ton, both in double bags, less 2½%, f. o. b. here. Nitrate of Soda is active at £9 6s. to £9 7s. 6d. per ton, less 2½%, in double bags, f. o. b. here. Carbonate of Ammonia—Lump, 2⅝s. to 3s. per lb.; powdered, 3⅛s. to 3¼s. per lb., net cash.

Liverpool. Dec. 23.

(From Geo. G. Blackwell's Report.)

Minerals.—Our market has ruled quiet on account of approaching holidays. Manganese; Prices advancing, with a strong demand. Borate, 7½d. per lb.; sulphate, £21 10s.; oxalate, 1s. 6d. per lb.; chloride, £15; carbonate, £12 10s., steady. Magnesite (raw lump): Good demand: raw ground, £6 10s., and calcined £12 10s. Bauxite (Irish Hill brand): Great demand for time of the year, and prices firm; lump, 20s.; seconds, 16s.; thirds, 12s. French chalk: Arrivals small; large orders are being booked for the new year at advanced figures. "Angel White" brand and "Silvery," 90@95s. 6d.; prime quality, 90@95s.; and superfine, 105s. Barytes: carhonate, best lump, scarce; nuts, 70@80s.; finest white sulphate is in demand. "Angle White," No. 1, 70s.; No. 2, 60@65s.; No. 3, 45s. Pumicestone quiet. Iron ore flat, Bilbao, Irish and Cumberland easy. Santander and manganiferous quiet. Emerystone: Good demand, and prices are firm; No. 1 lump, £5 10s.@£6; smalls, £5@£5 10s. Fullers' earth continues quiet; hest lump, 55s.; fine impalpahle ground, £7; "Emerald" ground, 80s. Scheelite, wolfram, tungstate of soda, and tungsten metal continue to he much sought after, and prices unaltered. Chrome ore is in good demand for best qualities, and prices firm. Antimony ore steady at £12, and metal £43@£44. Asbestos very firm. Potters' lead ore, smalls, £10 10s.@£11. Calamine strontia sulphate (celestine) quiet. Limespar steady, especially for English manufactured; old G. G. B. brand in demand at 50s. (ground). Felspar quiet. Fluorspar: Best quality scarce. Ferromanganese in better demand. Plumbago: Spanish, £5; best Ceylon lump at last quotations; Italian and Bohemian. £4@£12 per ton; "Founders," £5@£6; Blackwell's "Mineraline," £10. French sand 20s.@22s. 6d. Ground mica, £45@£50. China clay steady, common, 18s. 6d.; good medium, 22s. 6d.@25s.; best, 30s.@35s. (at Runcorn). Irish moss: Common rather freely offered at low prices, while the best is scarce at advanced figures; medium, £12 10s. Bog ore (oxide of iron) scarce; finest quality 25s.@30s.

CURRENT PRICES.

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

Acid—Acetic, chem. pure .16@.17
Commercial, in bbls. and cbys .015@.017
Carbonic, liquefied, ℔ lb .18@.25
Chromic, chem pure, ℔ lb 1.00
for batteries .40
Hydrobromic, dilute, U. S. P .25
Hydrocyanic, U. S. P .45
Hydrofluoric .20
Alcohol—95%, ℔ gall $2.30@$2.40
Absolute $3.80
Ammoniated $2.80
Alum—Lump, ℔ cwt $1.75@$1.80
Ground, ℔ cwt $1.85@$1.90
Powdered, ℔ lb .04½@.05
Lump ℔ ton, Liverpool £5
Aluminum Chloride—Pure, ℔ lb. $1.25
Amalgamating solution, ℔ lb. .60
Sulphate, ℔ cwt $1.90@$2.50
Ammonia—Sul., in bbl. lots, ℔ lb. .02½@.03
Carbonate, ℔ lb., English and German, .07½@.07¾
Muriate, white, in bbls., ℔ lb .08½
Aqua Ammonia—(in cbys) 18° ℔ lb. .03@.04
20°, ℔ lb .04@.05
26°, ℔ lb .05@.05½
Antimony—Oxymur, ℔ lb .04@.06
Regulus, ℔ lb .10@.11½
Argols—Red, powdered, ℔ lb .15
Arsenic—White, powdered ℔ lb. .03@.03½
Red ℔ lb .065@.07
Yellow .08@.09
White at Plymouth, ℔ ton £12 2 6
Asbestos—Canadian, ℔ ton $50@$300
Italian, ℔ ton, c. i. f. L'pool £18@£60
Ashes—Pot, 1st sorts, ℔ lb 4.75@5
Pearl .06@.06¼
Asphaltum—
Prime Cuban, ℔ lb .04@.05
Hard Cuban, ℔ ton $28.00@$30.00
Trinidad, refined, ℔ ton $30.00@$35.00
Egyptian and Syrian, ℔ lb .05@.07½
Californian, at mine, ℔ ton $12.00@$26.00
at San Francisco, ℔ ton. $15.00@$29.00
Barium—Carbonate, pure, ℔ lb .45
Carbonate, commercial, ℔ lb .03@.10
Chlorate, crystal, ℔ lb .75
Chloride, commercial, ℔ lb .05@.10
pure, ℔ lb .16
Iodide, ℔ oz .40
Nitrate, ℔ lb .06½@.07½
Sulph., Am. prime white, ℔ ton $17.50@$19
Sulph., foreign, floated, ℔ ton $21@$23
Sulph., off color, ℔ ton $11.50@$14.00
Carb., lump, f. o. b. L'pool, ℔ ton £6
No. 1, Casks, Runcorn, " " £4 10 0
No. 2, bags, Runcorn, " " £3 15 0
Bauxite—℔ ton $10.00
Bichromate of Potash—Scotch, ℔ lb .11@.12
American, ℔ lb .11@.12
Bichromate of Soda—℔ lb .06½@.10
Borax—Refined, ℔ lb., in car lots .08@.09
San Francisco .08@.08½
Concentrated, in car lots .07½@.08
Refined, Liverpool ℔ ton £2
Bromine—℔ lb .15@0.2
Cadmium Minion—℔ lb $2.00
Cadmium Iodide—℔ lb $5.50
Chalk—℔ ton $1.40@$1.75
Precipitated, ℔ lb .05@.06
China Clay—English, ℔ ton $13@$18.00
Domestic, ℔ ton $9@$11
Chlorine Water—℔ lb .10
Chrome Yellow—℔ lb .10@.25
Chrome Iron Ore—℔ ton, San Francisco $10.00
Chromalum—Pure, ℔ lb .40
Commercial, ℔ lb .12
Cobalt—Oxide, ℔ lb $1.90@$2.00
Copper—Sulph. English Wks. ton £20@£21
Vitriol (blue), ordinary, ℔ lb. 03¼@.04½
" " extra .04½
Nitrate, ℔ lb .40
Copperas—Common, ℔ 100 lbs. .90@$1.00
Best, ℔ 100 lbs $1.35@$1.50
Liverpool, ℔ ton, in casks £2@£2 10s.
Corundum—Powdered, ℔ lb. .04½@.09
Flour, ℔ lb .03
Cryolite—Powdered, ℔ lb., bbl. lots. .07
Emery—Grain, ℔ lb. (℔ kg.) .04½@.05
Flour, ℔ lb .02½@.10
Epsom Salt—℔ lb .01@.01½
Feldspar—Ground, ℔ ton $6.00@$10.00
Crude $2.00@$3 00
Fluorspar—Powdrd, No. 1, ℔ ton. $20@$30
Lump, at mine $6@$8
French Chalk—
Fuller's Earth—Lump, ℔ ton. $18@$20
Glauber's Salt—in bbls., ℔ lb. .01@.01¼
Glass—Ground, ℔ lb 10
Gold—Chloride, pure, crystals, ℔ oz. $12.00
pure, 15 gr., c. v., ℔ doz. $5.40
liquid, 15 gr., g. s. v., ℔ doz $5.50
Chloride and sodium, ℔ oz $6.00
15 gr., c. v., ℔ doz. $2.88
Oxide, ℔ oz $27.25
Gypsum—Calcined, ℔ bbl. $1.25@$1.50
Land Plaster
Iodine—Resublimed $3.30@$3 35
Iridium—Oxide ℔ lb $90
Iron—Nitrate, 40°, ℔ lb .01@.01½
47°, ℔ lb .02@.02½
Kaolin—*See China Clay.*
Kieserite—℔ ton $9@$10
Lead—Red, American, ℔ lb .06¾@.07½
White, American, in oil, ℔ lb. .06½@.07½
White, English, ℔ lb., in oil .08½@.08¾
Acetate, or sugar of, white .06@.06½
Granulated
Nitrate .09@.10
Lime Acetate—Am. Brown .90@.95
" Gray $1.75@$1.87½
Litharge—Powdered, ℔ lb. .06¾@.07½
English flake, ℔ lb .09@.09½
Magnesite—Crude, ℔ ton of 1,015 kilos $14.75
Calcined, ℔ ton of 2,240 lbs $22.00
Brick, ℔ ton of 2,240 lbs $47.50
Manganese—Ore, per unit .23@.23
Oxide, ground, ℔ lb .02½@.06½
Mercuric Chloride—(*Corrosive Sublimate*) ℔ lb .60@.64
Powdered, ℔ lb .50
Marble Dust—℔ bbl $1.25
Metallic Paint—Brown ℔ ton. $20@$25
Red $20@$25
Mineral Wool—Ordinary slag .01½
Ordinary rock .02½
Ground, ℔ ton
Mica—In sheets according to size.
1st quality, ℔ lb .25@$6.00
Naphtha—Black
Nitre Cake—℔ ton $10.00
Ochre—Rochelle, ℔ lb $1.10@$1.50
Washed Nat Oxf'rd, Lump, ℔ lb. .06½@.08¾
Washed Nat Oxf'rd, Powder, ℔ lb. .07@.07½
Golden, ℔ lb .03@.05
Domestic, ℔ ton $12@$20
Oils, Mineral—
Cylinder, light filtered, ℔ gal .14@.16
Dark filtered, ℔ gal .10@.13
Extra cold test, ℔ gal. .20@.24
Dark steam refined, ℔ gal. .09@.12
Phosphorus—℔ lb .50@.55
Precip., red, ℔ lb .82@.85
white, ℔ lb .85@.90
Platinic Chloride—℔ oz $7
Plumbago—Ceylon, ℔ lb .04@.05
American, ℔ lb .05@.07
Potassium—Cyanide, ℔ lb., C. P. 67%, ℔ lb .70
fused .45
Bromide, domestic, ℔ lb .40
Chlorate, English, ℔ lb .25@.28
Chlorate, powdered, English, ℔ lb. .14@.15
Carbonate, ℔ lb., by casks, 82% .04½@.05
Caustic, ℔ lb., pure slick .06@.06½
Iodide, ℔ lb $2.58@$2.80
Nitrate, refined, ℔ lb .06@.08
Bichromate, ℔ lb .10@.11½
Yellow Prussiate, ℔ lb .23
Red Prussiate, ℔ lb .42@.45
Pumice Stone—Select lumps, lb 03½@.15
Original cks., ℔ lb .01½@.02
Powdered, pure, ℔ lb .01½@.01¾
Pyrites—Non-cupreous, p. units .12@.15
Quartz—Ground, ℔ ton $6.00@$10.00
Rotten Stone, Powdered, ℔ lb .03¼@.03½
Lump, ℔ lb .06@.07
Original cks, ℔ lb .04½@.05½
Rubbing stone, ℔ lb .03½@.04
Sal Ammoniac—lump, in bbls., ℔ lb. 80½
Salt—Liverpool, ground, ℔ sack .70
Domestic, fine, ℔ ton $7@$7.50
Common, fine, ℔ ton $4.50@$5
Turk's Island, ℔ bush .03@.25
Salt Cake—℔ ton $10.00@$15.00
Saltpeter—Crude, ℔ lb .03½@.04
Soapstone—Ground, ℔ ton $5@$
Block and slab according to size.
Sodium—Prussiate, ℔ lb .22@.24
Phosphate, ℔ lb .04@.05
Stannate, ℔ lb .06@.12
Tuugstate, ℔ lb
Hyposulphite, ℔ lb., in casks .0235@.024
Strontium—Nitrate, ℔ lb .03¾@.09
Sulphur—Roll, ℔ lb .02½
Flour, ℔ lb .02¾
Sylvinit, 27@35%, S. O. P., per unit .40
Talc—Ground French, ℔ lb .01¼@.01½
American No. 1, ℔ lb .01¼@.01½
American No. 2 .006
Terra Alba—French, ℔ lb .65@.80
English, ℔ lb .6?@.80
American, No. 1, ℔ lb .68@.70
American, No. 2, ℔ lb .46@.56
Tin—Crystals, in kegs or bbls .14@.10
feathered or flossed. .20
Muriate, single .07@.05
Double or strong, 54° B .10@.15
Oxymur, or nitro .19
Vermilion—Imp. English, ℔ lb. .85@.90
Am. quicksilver, bulk .57 @.6?
Am. quicksilver, bags .58 @ .6?
Chinese .85 @$1.00
Trieste .90 @ .95
American .11½@ .12
Zinc White—Am., Dry, ℔ lb .04½@ .05
Antwerp, Red Seal, ℔ lb .06?@.07
Paris, Red Seal, ℔ lb .07½@.08
Muriate solution .06
Sulphate crystals, in bbls., ℔ lb. .03¾

THE RARER METALS.

Aluminum—℔ lb .50@.65
Arsenic—(Metallic), per lb .40
Barium—(Metallic), per gram $4.00
Bismuth—(Metallic), per lb $2.25
Cadmium—(Metallic), per lb $1.00
Calcium—(Metallic), per gram $10.00
Cerium—(Metallic), per gram $7.50
Chromium—(Metallic), per gram $1.00
Cobalt—(Metallic), per lb $6.00
Didymium—(Metallic), per gram $9.00
Erbium—(Metallic), per gram $7.50
Gallium—(Metallic), per gram $140.00
Glucinum—(Metallic), per gram $12.00
Indium—(Metallic), per gram $9.00
Iridium—(Fused), per oz $12.00
Lanthanum—(Metallic), per gr. $10.00
Lithium—(Metallic), per gram $10.00
Magnesium—(Powdered), per lb. $4.00
Manganese—(Metallic), per lb $1.10
Chem. pure, per oz. $10.00
Molybdenum—(Metallic), per gm .50
Niobium—(Metallic), per gram $5.00
Osmium—(Metallic), per oz $65.00
Palladium—(Metallic), per oz $55.00
Platinum—(Plate), per oz $11.00
Potassium—(Metallic), per lb $28.00
Rhodium—(Metallic), per gram $5.00
Ruthenium—(Metallic), per gm. $5.50
Rubidium—(Metallic), per gram $2.00
Selenium—(Metallic), per oz $1.80
Sodium—(Metallic), per lb .50@.75
Strontium—(Metallic), per gm .60
Tantalium—(Metallic), per gram $9.00
Telurium—(Metallic), per lb $5.00
Thallium—(Metallic), per gram .20
Titanium—(Metallic), per gram $3.20
Thorium—(Metallic), per gram $17.00
Tungsten—(Metallic), per lb .8 0
Uranium—(Oxide), per lb $5.00
Metallic, per gm .20
Vanadium—(Metallic), per gm $22.00
Yttrium—(Metallic), per gram $9.00
Zirconium—(Metallic), per oz $35.00

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Dec. 31 H.	Dec. 31 L.	Jan. 2. H.	Jan. 2. L.	Jan. 3. H.	Jan. 3. L.	Jan 4. H.	Jan 4. L.	Jan. 5 H.	Jan. 5 L.	Jan. 6. H.	Jan. 6. L.	SALES.
Adams, Colo.													
Alice, Mont.													
Amador, Cal.													
Atlantic, Mich.													
Belcher, Nev.													
Belle Isle, Nev.													
Bodie Cons., Cal.	.30						.25						300
Bos. & Mont., Mont													
Breece, Colo.													
Bulwer, Cal.	.20												400
Caledonia, S. Dak.													
Cataipa, Colo.													
Chrysolite, Colo.	.22												1,000
Colorado Central, Colo.													
Commonwealth, Nev.													
Comstock T. bonds, Nev.									.15				1,000
" scrip., Nev.													
Cons. Cal. & Va., Nev.							2.20				1.90		200
Crown Point, Nev.													
Deadwood, Dak.													
Enterprise													
Eureka, Cons., Nev.													
Father de Smet, Dak.													
Freeland, Colo.													
Gould & Curry, Nev.	1.05						1.10				.90		400
Grand Prize, Nev.													
Hale & Norcross, Nev.	1.05						1 40				1.05		300
Homestake, Dak.													
Horn-Silver, Utah.					3.30	3.25							200
Independence, Nev.													
Iron Hill, Dak													200
Iron Silver, Colo													
Leadville Cons., Colo.							.21		.20		.30		2,500
Little Chief, Colo.													
Martin White, Nev.													
Mono											20		200
Mt. Diablo, Nev.													
Navajo, Nev.													
N. Belle Isle, Nev.													
Ontario, Utah.					15.25						15.00	14 13	375
Ophir, Nev	2.00												100
Overman, Nev.													
Plymouth, Cal.									.65	.60			300
Quicksilver, Pref., Cal.													
" Com., Cal.													
Quincy, Mich.													
Robinson Cons., Colo.													
Savage, Nev.													
Sierra Nevada, Nev.	2.00												100
Silver Cord, Colo.													
Silver King, Ariz.									.30				100
Silver Min. of L. Valley													
Small Hopes, Colo.													
Ward Cons., Cal					.10								100
Yellow Jacket, Nev.	65						55				.80		400

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Dec. 31 H.	Dec. 31 L.	Jan. 2 H.	Jan. 2 L.	Jan. 3 H.	Jan. 3 L.	Jan. 4. H.	Jan. 4. L.	Jan 5. H.	Jan 5. L.	Jan. 6. H.	Jan. 6. L.	SALES.
Alpha., Nev.													
Alta, Nev													
American Flag, Colo.													
Andes, Cal.													
Astoria, Cal.													
Augusta, Ga.													
" bonds.													
Barcelona, Nev.					.08								100
Belmont, Cal.	.30									.24		.30 .28	500
Best & Belcher, Nev.	1.50												125
Bonanza King, Cal.													
Brunswick, Cal.										.10	.09		700
Bullion, Nev.													
Butte & Bost., Mont.													
Castle Creek, Idaho.													
Choilar													
Comstock T., Nev.	.06										.08		320
Con. Imperial, Nev.													
Con. Pacific, Cal.													
Crescent, Colo.													
Del Monte, Nev.													
El Cristo, Rep. of Col.	.22								.20		.20	.23	2,400
Emmett, Colo													
Exchequer, Nev.													
Hollywood, Cal.													
Julia, Nev.									.15				500
Justice, Nev													
King. & Pembroke, Ont.										.20			100
Lacrosse, Colo.													
Lee Basin, Colo.													
Mexican, Nev.	1.45												100
Middle Bar, Cal.													
Monitor, Colo.													
Mutual S.& M.Co., Wash.													
Nevada Queen, Nev.													
N. Standard, Cal.													
N. Commonwealth, Nev.													
Occidental, Nev.													
Oriental & Miller, Nev.													
Phœnix Lead, Colo.													
Phœnix of Ariz.											.61	.60	500
Potosi, Nev.													
Rappahannock, Va.													
S. Sebastian, S. Sal.													
Santa Fe, N. M.													
Scorpion, Nev.													
Seg. Belcher, Nev.													
Shoshone, Idaho.													
Silver Queen, Ariz.													
Sullivan Con., Dak.													
Sutro Tunnel, Nev.													
Syndicate, Cal.													
Tornado Con., Nev.													
Union Cons., Nev.	1 25												100
Utah, Nev													

*Ex-dividend. †Dealt at in New York Stock Ex. Unlisted securities. ‡Assessment; a d. ‖Assessment unpaid. Dividend shares sold, 8,075. Non-dividend shares sold 5,425.
Total shares sold, 13,500.

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY.	Dec. 30.	Dec. 31.	Jan. 2.	Jan. 3.	Jan. 4.	Jan. 5.	SALES.
Atlantic, Mich.						10.00	100
Bodie, Cal.							
Bonanza Development.				.39			100
Bost. & Mont., Mont.	34.00	33 75	34.00	33 88	33.75	33.50	33.38 32.75 32.63 32 25	1,351
Breece, Colo.							
Calumet & Hecla, Mich.	297		297		298		296	109
Cataipa, Colo.							
Central, Mich.							
Coeur d'Alene, Id							
Con. Cal. & Va., Nev.							
Dunkin, Colo.							
Eureka, Nev.							
Franklin, Mich.	13.13	13.00	13.13		13 50	13.5	13.50 13.00	542
Honorine, Utah.							
Horn Silver, Utah.							
Kearsarge, Mich.					12.25	12 00	12 00 11.75 12 00	410
Lake Superior, Iron.	25.00				25.00		25 00	210
Little Pittsburg, Colo.							
Minnesota Iron, Minn.							
Napa, Cal.					5 50		5 75	300
Ontario, Utah.							
Osceola, Mich.	35 50						35.75 35.00 35.75	230
Quincy, Mich.			143½	143			143 142	9
Ridge, Mich.							
Sierra Nevada, Nev.							
Silver King, Ariz.							
Stormont, Utah.							
Tamarack, Mich.	159½		159		160		* 155	209
Tecumseh, Mich.							

NAME OF COMPANY.	Dec. 30.	Dec. 31.	Jan. 2.	Jan. 3	Jan. 4.	Jan. 5.	SALES.
Allouez, Mich.					.90			6
Arnold, Mich.							
Aztec, Mich.							
Brunswick, Cal.							
Butte & Boston, Mont.	11.00	10.75	11.00			11 25	11 50 11.25 11 25	760
Centennial, Mich.	8.00					7 75	8 00	7.75	530
Colchis, N. Mex.							
Copper Falls, Mich.							
Crescent, Colo.							
Dana, Mich.							
Don E rique, Mex.							
Geyser, Colo.							
Hanover, Mich.							
Humboldt, Mich.							
Hungarian, Mich.							
Huron, Mich.							
Mesnard, Mich.							
National, Mich.						1 00	1.00	33
Native, Mich.							
Oriental & M., Nev.							
Phœnix, Ariz.							
Pontiac, Mich.							
Rappahannock, Va.							
Santa Fe, N. Mex.							
Shoshone, Idaho.							
South Side, Mich.							
Tamarack, Jr, Mich.	20.00							65
Washington, Mich.							
Wolverine, Mich.						1 75	1.63 1.50 1 50	475

*154.75, ex dividend. Dividend shares sold, 3,570. Non-dividend shares sold, 1,978. Total shares sold, 5,548

DIVIDEND-PAYING MINES.

	Name and Location of Company.	Capital Stock.	Shares. No.	Shares. Par	Assessments. Total levied.	Assessments. Date and amount of last	Dividends. Total paid.	Dividends. Date & amount of last.	
1	Adams, s. L. C.	Colo.	$1,500,000	150,000	$10	*	$637,500	Jan.. 1892	.05
2	Alaska-Treadwell, g.	Al'ska	5,000,000	200,000	25		1,450,000	Oct. 1892	.37½
3	Alice, s.	Mont.	10,000,000	400,000	25	*	975,000	Nov.. 1891	.06¼
4	Alma & Nel Wood., g	Idaho	300,000	30,000	10	*	60,000	Jan.. 1889	.50
5	Amador, g.	Cal.	1,250,000	250,000	5	*	31,250	Aug.. 1890	.12½
6	American, g.	Colo..	3,000,000	300,000	10	*	225,000	Mar.. 1892	.05
7	American Belle, s.g.c	Colo..	2,000,000	400,000	5	*	50,000	April 1891	.12½
8	Americ'n & Nettie, g.s	Colo..		300,000			175,000	Mar.. 1892	.05
9	Atlantic, c.	Mich..	1,000,000	40,000	25	280,000 April 1875	$1.00	700,000	Feb.. 1891 1.00
10	Argenta, s.	Nev..	10,000,000	100,000	100	335,000 July. 1889	.10	40,000	Feb.. 1880 .20
11	Argyle, g.	Colo..	1,000,000	1,000,000	1	*		20,000	Mar. 1892 .01
12	Aspen Mg. & S., s. L.	Colo..	2,000,000	200,000	10	*		764,000	Sept. 1892 .10
13	Aurora, I.	Mich..	2,500,000	100,000	25			454,000	June 1892 1.00
14	Badger, s.	Ont..	250,000	50,000	5	*		37,500	Mar. 1890 .25
15	Bald Butte	Mont.	250,000	250,000	1	*		72,500	Mar.. 1892 .03
16	Bates Hunter, s. g.	Colo..	1,000,000	1,000,000	1				Dec.. 1891 .00¾
17	Belle Isle, s.	Nev..	10,000,000	100,000	100	220 00 Aug. 1892	.10	300,000	Dec.. 1879 .25
18	Belcher, s. G.	Nev..	10,400,000	104,000	100	3,16 (00 May 1892	.25	15,397,000	April 1876 1.00
19	Bellevue, Idaho, s. L.	Idaho	1,250,000	125,000	10	1. 000 Dec.. 1889	.2	200,000	Jan.. 1890 .10
20	Best Friend	Colo.	1,000,000	1,000,000	1			90,000	Feb.. 1892 .01
21	Bi-Metallic, s. G.	Mont.	5,000,000	200,000	25			2,140,000	Dec. 1892 .20
22	Bodie Con., g. I.	Cal..	10,000,000	100,000	100	0,000 June 1890	.2	1,602,572	April 1885 .50
23	Boston & Mont., g.	Mont.	2,500,000	250,000	10	*		520,000	June 1886 .15
24	Boston & Mont., c. s.	Mont.	3,125,000	125,000	25	*		2,075,000	Nov.. 1891 1.00
25	Brooklyn Lead, L. s.	Utah.	500,000	50,000	10			127,000	July. 1887 .05
26	Bulwer, g.	Cal..	10,000,000	100,000	10	30,000 Aug.. 1889	.25	190,000	Oct.. 1892 .05
27	Bunker Hill & S. s. L.	Idaho	3,000,000	300,000	10	*		150,000	Oct.. 1888 .06¾
28	Caledonia, g.	Dak..	10,000,000	100,000	100	505,000 May. 1885	.15	192,000	Oct. 1890 .08
29	Calliope, s.	Colo..	1,000,000	1,000,000				140,000	Jan.. 1891 .00½
30	Calumet & Hecla c	Mich..	2,500,000	100,000	25	1,200,000		38,850,000	Dec. 1892 5 00
31	Centen'l-Eureka, s. L.	Utah.	1,500,000	30,000	50			577,500	Dec 1892 .50
32	Central, c.	Mich..	1,500,000	20,000	25	100,000 Oct.. 1861	.65	1,970,000	Feb.. 1891 1.00
33	Champion, g	Cal..		34,000	10			114,900	Dec 1892 .10
34	Chrysolite, s. L.	Colo..	10,000,000	200,000	50	*		1,650,000	Dec.. 1884 .25
35	Clay County, g.	Colo..	200,000	200,000	1	*		56,000	Nov.. 1891 .02
36	Clinton Con, g.	Cal..	5,000,000	100,000	5			80,000	Nov.. 1891 .10
37	Coeur D'Alene, s. L.	Idaho	5,000,000	500,000	10	*		310,000	Nov. 1891 .02
38	Colorado Central, s. L.	Colo..	2,750,000	275,000	10	*		502,500	Jan.. 1892 .05
39	Commonwealth, s.	Nev..	10,000,000	100,000	100	190,000 Sept. 1892	.10	20,000	Nov.. 1890 .20
40	Confidence, s. L.	Nev..	2,496,000	24,960	100	1,589,550 Aug. 1892	.50	199,680	April 1889 1.00
41	Cons. Cal. & Va., s. G	Nev..	21,600,000	216,000	100	108,000 Jan.. 1885	.20	3,682,800	Aug. 1891 .50
42	Contention, s.	Ariz..	12,500,000	250,000	50			2,637,500	Aug. 1892 .20
43	Cook's Peak, s	N. M..	2,000,000	200,000	10			114,532	Nov 1892 .05
44	Cop. Queen Con., c.	Ariz..	1,400,000	140,000	10			1,260,000	Nov. 1892 1.00
45	Coptis	Nev.	10,000,000	100,000	100			67,000	July.. 1892 .12
46	Cortes, s.	Nev..	1,500,000	300,000	5	*		687,000	Mar.. 1892 .50
47	Crescent, s. L. G.	Utah.	15,000,000	600,000	25	60,000 Oct 1892	.10	238,000	Oct.. 1888 .03
48	Crown Point, G. S.	Nev..	10,000,000	100,000	100	2,700,000 Sept. 1892	.25	11,896,000	Jan.. 1875 2.00
49	Cumberland, L. S.	Mont.	5,000,000	500,000	10	*		15,000	Nov. 1889 .06
50	Daly, s. L.	Utah.	3,000,000	150,000	20			2,612,500	Dec 1892 .25
51	Deer Creek, s. G.	Idaho	1,000,000	200,000	5	*		20,000	June 1889 .05
52	Deadwood-Terra, g.	Dak..	5,000,000	200,000	25	*		1,150,000	Oct 1892 .05
53	DeLamar, s. G.	Idaho	2,000,000	400,000	5	*		550,000	Oct.. 1892 .25
54	Derbec E. Grav.. G.	Cal..	10,000,000	100,000	100	100,000 Sept. 1892	.10	60,000	Aug.. 1891 .10

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.	Capital Stock.	Shares. No.	Shares. Par	Assessments. Total levied.	Assessments. Date and am't of last.
1	Alliance, s. G.	Utah.	$100,000	100,000	$1	$120,000 Feb.. 1891 .25
2	Allouez, c.	Mich.	2,000,000	80,000	25	737,000 Jan.. 1890 .75
3	Alpha Con., G. S.	Nev..	3,000,000	30,000	100	209,000 Sept. 1892 .10
4	Alta, s.	Nev..	10,080,000	100,800	100	3,369,880 Jan. 1892 .10
5	American, c.	Idaho	5,000,000	500,000	10	
6	American Flag, s.	Colo..	1,250,000	125,000	1	300,000 June 1887
7	Amity, s.	Colo..	250,000	250,000	20	
8	Anchor s. L. G.	Utah.	3,000,000	150,000	5	410,000 June 1890 .20
9	Anglo-Montana, Lt.	Mont.	600,000	120,000	125	
10	Appalachian, g.	N. C	1,750,000	1,400,000	20	
11	Arizona, c.	Ariz	3,575,000	160,000	2	
12	Astoria, G.	Cal..	200,000	100,000	5	
13	Atlanta, g. s.	Idaho	3,250,000	650,000	25	
14	Barcelona, G.	Nev	5,000,000	200,000	5	*
15	Bear Creek	Idaho	100,000	20,000		
16	Belmont, G.	Cal..	500,000	500,000	100	*
17	Belmont, s.	Nev..	5,000,000	50,000	100	735,000 April 1886 .10
18	Best & Belcher, s. G.	Nev..	10,080,000	100,800	10	2,405,275 Aug.. 1892 .25
19	Black Oak, G.	Cal..	3,000,000	300,000	100	*
20	Boston Con., G.	Cal..	10,000,000	100,000	1	170,000 Nov.. 1883 .25
21	Brownlow, G.	Colo..	250,000	250,000	5	
22	Brunswick, G.	Cal..	2,000,000	400,000	2	
23	Buckeye, s. L.	Mont.	1,000,000	500,000	100	
24	Bullion, s. G.	Nev.	10,000,000	100,000	100	2,890,000 Aug 1892 .25
25	Burlington, g. s.	Cal..	10,000,000	100,000		
26	Butte & Boston, c. s.	Mont.	5,000,000	200,000	10	
27	Butte Queen, G.	Cal..	1,000,000	100,000	1	6,000 Jan.. 1892 .04
28	Calaveras, G.	Cal..	500,000	500,000	5	
29	Calaveras Con., g.	Cal..	800,000	160,000	10	
30	California, c.	Cal..	1,000,000	100,000	5	9,000 Mar.. 1892 .03
31	California Con. I. Q.	Cal..	2,250,000	450,000	10	
32	Camille, g.	Ga	1,500,000	150,000	5	
33	Carisa, G.	Wy..	500,000	100,000	2	*
34	Carupano, G. S. L. C.	Ven..	200,000	100,000	2	*
35	Cashier, G. S.	Colo..	500,000	250,000	100	*
36	Challenge Con., g. s.	Nev..	5,000,000	50,000	10	
37	Cherokee, G.	Cal..	1,400,000	150,000	100	
38	Chollar, s. G.	Nev..	11,200,000	112,000	2	1,820,000 May.. 1892 .50
39	Cleveland, T.	Dak.	1,000,000	500,000	10	*
40	Colchis, s. G.	N. M..	500,000	150,000	5	
41	Colorado, s	Colo..	1,625,000	325,000	1	
42	Comstock, s	Utah.	1,250,000	250,000	100	
43	Comstock Tun.	Nev..	10,000,000	100,000	100	35,000 Mar.. 1887 .15
44	Con. Imperial, G. s	Nev..	5,000,000	50,000	50	2,062,500 Jan.. 1892 .25
45	Con. New York, s. G.	Nev..	5,000,000	100,000	100	110,000 Mar.. 1892 .10
46	Con. Pacific, G.	Cal..	6,000,000	60,000	10	198,000 June 1890 10
47	Con. Silver, s.	Mo...	2,580,000	250,000	3	
48	Cordova Union, g.	Cal..	1,000,000	200,000	10	
49	Crescent, s. L.	Colo..	3,000,000	300,000	100	*
50	Crocker, s.	Ariz.	10,000,000	100,000	1	165,000 Aug. 1892 .05
51	Crowell, G.	N. C..	500,000	500,000	1	
52	Dahlonega, G.	Ga....	250,000	250,000	10	*
53	Dandy, s.	Colo..	5,000,000	500,000		
54	Decatur, s	Colo..	1,800,000	300,000		

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total Levied.	Date and amount of last			Dividends. Total paid.	Date & amount of last.		
55	Dexter, g. s	Nev..	1,000,000	100,000	10					80,000	Aug..	1892	.25
56	Dunkin, s. L.	Colo..	5,000,000	200,000	25	*				390,000	Oct..	1889	.05
57	Elkhorn, s. L.	Mont.	1,000,000	200,000	5	*				885,545	Dec.	1892	.50
58	Enterprise, s.	Colo..	100,000	10,000	10	*				700,000	Dec.	1892	.10
59	Eureka Con., s. L., G.	Nev...	1,000,000	50,000	100	550,000	June	1889	.50	5,017,500	Jan	1892	.25
60	Evening Star, s. L.	Colo..	500,000	50,000	10	*				1,450,000	Dec.	1889	.2
61	Father de Smet, G.	Dak..	10,000,000	100,000	100	200,000	Nov..	1878	1.00	1,125,000	Dec..	1885	.20
62	Franklin, C.	Mich..	1,000,000	40,000	25	220,000	June	1871		1,100,00	July	1892	2.00
63	Freeland, s. G.	Colo..	5,000,000	200,000	25	*				190,000	July.	1886	.10
64	Garfield Lt., G. s.	Nev..	500,000	100,000	5					90,000	April	1888	.12½
65	Glengarry	Mont.	1,000,000	100,000	10					10,000	June	1891	.10
66	Gold Rock	Colo..	500,000	500,000	1						Dec..	1891	.01
67	Golden Reward	S.Dak	1,250,000	250,000	5					65,000	Dec.	1892	.02
68	Gould & Curry, s. G.	Nev...	10,800,000	108,000	100	4,591,200	June	1892	.25	3,826,800	Oct..	1870	10.00
69	Grand Prize, s.	Nev...	10,000,000	100,000	100	785,000	Jan..	1890	.30	495,000	Mar.	1884	.25
70	Granite, s. L.	Idaho	500,000	500,000	1	*				83,400	Nov.	1890	.02
71	Granite Mountain, s.	Mont.	10,000,000	400,000	25					12,120,000	July.	1892	.20
72	Great Western, L. Q.	Cal..	5,000,000	50,000	100					394,861	Dec.	1892	.25
73	Green Mountain, G.	Cal...	1,250,000	125,000	10	*				212,000	Nov..	1881	.07½
74	Hale & Norcross, G. s.	Nev...	11,200,000	112,000	100	5,534,800	Aug.	1892	.50	1,822,000	Aug.	1888	.50
75	Hecla Con., s. G. L. C.	Mont.	1,500,000	90,000	50					1,920,000	Dec	1892	.50
76	Hel'a Mg.& Red, s.L.G.	Mont.	3,315,000	663,000	5	*				197,970	July.	1886	.06
77	Helena & Frisco, s.L.	Idaho	2,500,000	500,000	5					170,000	July..	891	.02
78	Helena & Victor	Mont.	1,000,000	200,000	5					80,000	May..	1891	.05
79	*Holmes, s.	Nev...	10,000,000	100,000	100	370,000	May.	1890	.25	75,000	April	1886	.25
80	Homestake, G.	Dak..	12,500,000	125,000	100	200,000	July.	1878	1.00	4,928,750	Dec..	1892	.10
81	Honorine, s. L.	Utah.	500,000	250,000	2	37,500	April	1889	.05	125,000	Sept.	1887	.05
82	Hope, s.	Mont.	1,000,000	100,000	10	*				358,252	Jan.	1893	.25
83	Horn-Silver, s. L.	Utah.	10,000,000	400,000	25	*				4,650,000	Dec.	1892	.12½
84	Hubert, G.	Colo..	1,000,000	1,000,000	1	*				247,000	Dec.	1889	.00½
85	Idaho, G.	Cal..	310,000	3,100	100					5,419,250	Dec.	1892	2.50
86	Illinois, s.	N. M..	100,000	100,000	1	*				45,000	April	1889	.20
87	Iron Hill, s.	Dak..	2,500,000	250,000	10	134,000	July.	1889	.03	156,250	Nov.	1887	.07½
88	Iron Mountain, s.	Mont.	5,000,000	500,000	10	*				215,000	Aug.	1892	.03
89	Iron-Silver, s. L.	Colo..	10,000,000	500,000	20	*				2,500,000	April	1889	.20
90	Jack Rabbit, G	Cal..	10,000,000	100,000	100	100,000	Sept.	1892	.10	260,000	Aug.	1891	.10
91	Jackson, G. s	Nev..	5,000,000	50,000	100	237,500	Nov..	1880	.20	60,000	Jan.	1891	.10
92	Kearsarge, C.	Mich..	1,000,000	40,000	25	190,000	Oct..	1887	1.00	80,000	Jan.	1890	2.00
93	Kennedy	Cal...	10,000,000	100,000	100					387,000	May..	1892	.15
94	Kentuck, s. G	Nev..	3,000,000	30,000	100	454,180	Oct.	1891	.15	1,350,000	Dec.	1886	.10
95	La Plata, s. L.	Colo..	2,000,000	200,000	10	*				610,000	Sept.	1882	.30
96	Leadville Con., s. L.	Colo..	4,000,000	400,000	10	*				304,000	May..	1892	.03
97	Lexington, G. s.	Mont.	4,000,000	40,000	100	*				609,000	Jan..	1890	2.00
98	Little Chief, s. L.	Colo..	10,000,000	200,000	50	*				820,000	Dec..	1890	.05
99	Little Rule, s.	Colo..	500,000	500,000	1					220,000	Dec...	1891	.02
100	Maid of Erin	Colo..	3,000,000	600,000	5					557,757	April	1892	.25
101	Mammoth, s. L. C.	Utah.	10,000,000	400,000	250	110,000		1882	.25	1,040,000	Dec...	1891	.10
102	Martin White, s.	Nev..	10,000,000	100,000	100	1,275,000	Jan..	1892	.25	140,000	Dec..	1886	.25
103	Mary Murphy, s. G.	Colo..	350,000	3,500	101	*				175,000	May..	1888	5.00
104	Matchless, s. L	Colo..	500,000	500,000	1	*				15,000	Feb...	1890	.00½
105	Maxfield	Utah.	3,000,000	300,000	10					117,000	April	1892	.03
106	Mayflower, D. gravel	Cal..	1,000,000	100,000	10					100,000	Dec	1892	.25
107	May Mazeppa, s. L.	Colo..	1,000,000	100,000	1					205,000	Oct..	1891	.03¾
108	Minas Prietas, G. s.	Mex..	1,000,000	100,000	10	*				350,000	Dec...	1890	.50
109	Minnesota, C.	Mich..	1,000,000	40,000	25	420,000	April	1886	1.00	1,820,000	Mar.	1876	
110	Mollie Gibson, s.	Colo..	5,000,000	1,000,000	5					2,850,000	Jan	1893	15
111	Monitor, G.	S.Dak	2,500,000	250,000	10					45,000	Oct.	1890	.03
112	Mono, G.	Cal...	5,000,000	50,000	100	760,000	Sept.	1890	.25	12,500	Mar	1886	.25
113	Montana, Lt., G. s.	Mont.	3,300,000	660,000	5	*				2,619,075	June.	1891	12½
114	Morning Star, s. L.	Colo..	1,000,000	100,000	10					925,000	April	1891	.25
115	Morning Star Drift, G	Cal..	240,000	2,400	100					111,800	Dec...	1892	3.00
116	Moulton, s. G.	Mont.	2,000,000	400,000	5	*				410,000	Nov.	1892	.07½
117	Mt. Diablo, s.	Nev..	5,000,000	50,000	100	137,500	June	1880	2.00	210,000	July.	1891	.20
118	Napa, Q.	Cal..	700,000	100,000	7					520,000	Jan..	1893	.20
119	Navajo, G. s.	Nev..	10,000,000	100,000	100	520,000	May.	1891	20	229,950	April	1889	.10
120	Newton	Cal..	10,000,000	100,000	100					10,000	May..	1891	.05
121	New California, G.	Colo..	800,000	160,000	5	*				48,800	May..	1890	.12½
122	New Guston, s.	Colo..	550,000	110,000	5					1,877,500	April	1892	.75
123	North Banner Con	Cal..	1,000,000	100,000	10					20,000	July..	1891	.05
124	North Commonw'th	Nev..	10,000,000	100,000	10					25,000	June.	1891	.25
125	N. Hoover Hill, G. s.	N. C.	300,000	120,000	2½					30,000	Dec..	1885	.06½
126	North Belle Isle, s.	Nev..	10,000,000	100,000	100	474,689	Nov.	1892	.10	230,000	May.	1888	.50
127	North Star, G.	Cal..	1,000,000	100,000	10					350,000	Dec.	1892	.50
128	Omaha Cons., G.	Cal...	2,400,000	24,000	100					30,000	May..	1892	.15
129	Ontario, s. L.	Utah	15,000,000	150,000	100					13,175,000	Oct..	1892	.50
130	Ophir, G. s.	Nev..	10,000,000	100,000	100	4,210,640	April	1890	.50	1,595,800	Jan..	1880	1.00
131	Original, s. C.	Mont.	1,500,000	60,000	25	*				138,000	Jan..	1889	.05
132	Oro, s. L. G.	Colo..	500,000	100,000	5					95,000	July,	1890	.20
133	Osceola, C.	Mich..	1,250,000	50,000	25	480,000	April	1876	1.60	1,697,500	Dec.	1892	1.00
134	Pacific Coast, B.	Cal..	1,500,000	15,000	100					360,000	Dec.	1892	1.00
135	Parrot, C.	Mont.	1,800,000	180,000	10					1,405,385	Dec.	1892	.10
136	Petro	Utah.	10,000,000	10,000	100					17,500	July.	1891	.75
137	Plumas Eureka, G.	Cal..	1,406,250	140,625	10					2,643,559	April	1892	.18
138	Plymouth Con, G.	Cal..	5,000,000	100,000	50	*				2,280,000	Feb.	1888	.40
139	Poorman, G. s	Idaho	375,000	300,000	125	*				68,260	Sept	1892	
140	Quicksilver, pref., Q.	Cal..	4,300,000	43,000	100					1,828,911	June	1891	1.25
141	" com., Q	Cal..	5,700,000	57,000	100					643,867	July.	1882	.40
142	Quincy, C.	Mich..	1,250,000	50,000	25	200,000	Dec..	1862		6,320,000	Aug..	1892	8.00
143	Red Cloud	Idaho	1,000,000	200,000	5					153,000	Dec.	1892	.10
144	Reed National, s. G.	Colo..	500,000	500,000	1	*				50,000	Dec..	1890	.01
145	Retriever, L.	S.Dak	1,250,000	250,000	5					20,000	Aug..	1891	.03
146	Rialto, G.	Colo..	300,000	300,000	1	*				50,250	April	1892	.01½
147	Richmond, s. L.	Nev..	1,350,000	54,000	25	*				4,346,325	Aug..	1891	.25
148	Ridge, C.	Mich..	500,000	20,000	25	219,939	Mar.	1886	.50	99,785	Feb..	1880	.50
149	Robinson Con., s. L.	Colo..	10,000,000	200,000	50	*				585,000	Mar.	1886	.05
150	Running Lode, G.	Colo..	1,000,000	1,000,000	1	*				86,000	May.	1892	.00 1-10
151	Savage, s.	Nev..	11,200,000	112,000	100	6,772,000	Feb..	1892	.50	4,460,000	June	1869	3.00
152	Sheridan, s. G.	Colo..	300,000	3,000	100	*				300,000	Oct..	1891	2.50
153	Shoshone, G.	Idaho	150,000	150,000	1					7,500	April	1888	.01
154	Sierra Buttes, G.	Cal..	2,225,000	122,500	10					1,529,307	Oct.	1892	.18
155	Sierra Nevada, s. G.	Nev..	10,000,000	100,000	100	6,411,910	June	1892	.25	102,000	Jan..	1871	1.00
156	Sierra Nevada, s. L.	Idaho	1,000,000	1,000,000	1	*				40,000	May..	1889	.02
157	Silent Friend	Colo..	500,000	500,000	1					60,000	Aug..	1891	.02½
158	Silver Cord, s. L. G.	Colo..	4,500,000	450,000	10					265,000	April	1889	.10
159	Silver King, s.	Ariz..	10,000,000	100,000	100	130,000	Nov.	1890	.30	1,950,000	July	1887	.25
160	Silver Mg. of L.V., s.L.	N. M..	500,009	500,000	1					300,000	Dec..	1891	4.05
161	Slide	Colo..	500,000	5,000	100					20,000	Nov..	1891	4.00
162	Small Hopes Con., s.	Colo..	5,000,000	250,000	20	*				32,00,000	Nov.	1892	.15
163	Spring Valley, G.	Cal..	200,000	200,000	1	50,000	Oct..	1886	.25	50,000	Jan.	1881	.25
164	Standard, G. s.	Cal..	10,000,000	100,000	100	100,000	June	1890	.50	3,645,000	Dec..	1892	.10
165	Stormont, s.	Utah.	500,000	500,000	1	*				155,000	Nov.	1881	.05
166	St. Joseph, L.	Mo..	1,500,000	150,000	10	*				1,974,000	Dec..	1890	.02
167	Swansea, g. s	Colo..	600,000	60,000	10					27,000	Mar.	1892	.10
168	Tamarack, C.	Mich..	1,250,000	50,000	25	520,000	April	1885	3.00	3,160,000	Oct	1892	.00
169	Teal & Poe	N. M..	150,000	150,000	1					9,000	Nov.	1891	.01½
170	Tombstone, G. s. L.	Ariz..	12,500,000	500,000	25	*				1,250,000	April	1882	.10
171	United Verde, C.	Ariz..	3,000,000	300,000	10	*				207,500	Jan..	1892	.10
172	Viola Lt., s. L.	Idaho	750,000	150,000	5					337,500	Nov.	1888	.37½
173	Ward Con., s.	Colo.	2,000,000	200,000	10					20,000	Dec.	1889	.05
174	Woodside, s. L.	Utah	100,000	100,000	10					25,000	Oct..	1889	.25
175	W. Y. O. D	Cal..	30,000	15,000	2	22,500	May.	1891	.10	42,000	Dec.	1892	.10
176	Yankee Girl, s.	Colo.	1,300,000	260,000	5					1,405,000	April	1891	1.50
177	Yellow Jacket, G. s.	Nev	12,000,000	120,000	100	5,808,000	Sept	1892	.2	2,184,000	Aug.	1871	1.50
178	Yosemite No. 2	Utah.	1,000,000	100,000	10					25,000	Oct..	1891	.05
179	Young America, G.	Cal..								175,000	Jan..	188?	1.00

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total levied.	Date and am't of last		
55	Denver City, s.	Colo..	5,000,000	500,000	11	*			
56	Denver Gold, G.	Colo..	300,000	60,000	5				
57	Dickens-Custer, s.	Idaho	2,100,000	420,000	5				
58	Durango, G.	Colo..	500,000	500,000	1	*			
59	Eastern Dev. Co., Lt	N. S..	1,500,000	150,000	10	990,000	Mar.	1886	1.00
60	El Dorado, G.	Cal..	1,000,000	250,000	4	*			
61	El Talento, G.	U.S.C.	1,000,000	500,000	2				
62	Emma, s	Utah.	625,000	500,000	125				
63	Emmons, s. L.	Colo..	2,000,000	2,000,000	1				
64	Empire, s.	Utah.	10,000,000	100,000	100				
65	Eureka Tunnel, s. L.	Nev...	10,000,000	100,000	100	*			
66	Exchequer, s. G.	Nev...	10,000,000	100,000	100	940,000	Jan..	1892	.25
67	Found Treasure, G. s.	Nev...	10,000,000	100,000	100	130,500	Jan..	1892	.50
68	Gogebic I. Syn., I.	Wis..	5,600,000	200,000	25				
69	Gold Bank, g. s	Colo.	250,000	250,000	1	*			
70	Gold Cup, s.	Colo..	500,000	500,000	1	*			
71	Golden Era, s.	Mont.	2,000,000	200,000	10	*			
72	Gold Flat, G.	Cal...	1,000,000	100,000	10	5,000	Mar..	1892	.05
73	Gold King, g	Colo..	1,650,000	350,000	5				
74	Gold Rock, G.	Cal...	1,000,000	500,000	2				
75	Golden Feather Co., g	Cal...	900,000	180,000	5				
76	Goodshaw, G.	Cal..	10,000,000	100,000	100	*			
77	Goodyear G. s. L	Mont.	1,000,000	200,000	5	13,000	Feb..	1892	.01
78	Grand Belt, C	Tex..	12,000,000	120,000	100				
79	Grand Canyon, s.	Ariz..	375,000	75,000	5				
80	Grand Duke, s.	Colo..	800,000	80,000	10				
81	Gregory Con., G.	Mont.	3,000,000	300,000	10				
82	Harlem M. & M. Co., G.	Cal...	1,000,000	200,000	5				
83	Hartery Con., G.	Cal...	1,000,000	100,000	10	22,000	Oct..	189?	.05
84	Hartshorn, g s. l.	S.Dak	1,250,000	250,000	5	8,750	Sept.	1891	.00½
85	Head Cent. & Tr., s. G	Ariz..	10,000,000	100,000	100	16,981	Mar..	189.	.03
86	Hector, G.	Cal...	1,500,000	300,000	5	45,000	Jan..	188?	.15
87	Highland, C.	Mich..	500,000	25,000	20				
88	Himalaya, g. s l	Utah.	1,800,000	180,000	10	12,800	Oct	1892	.00½
89	Holywood	Cal...	200,000	100,000	2				
90	Hortense, s.	Colo..	2,000,000	200,000	10				
91	Huron, C.	Mich..	1,000,000	40,000	25	280,000	May.	188?	3.00
92	Idaho, g. s	Idaho	1,250,000	250,000	5				
93	Inez, s. L	Idaho	1,000,000	1,000,000	1				
94	Ingalls, g	Colo..	100,000	20,000	5				
95	Ironton, I.	Wis..	1,000,000	40,000	25				
96	Iroquois, C.	Mich..	1,250,000	50,000	25				
97	Kentuck Con	Nev..	10,500,000	105,000	00	57,750	July.	1892	.10
98	J. D. Reymert, s.	Ariz..	10,000,000	100,000	100				
99	Julia Con., G. s.	Nev...	11,000,000	110,000	100	1,463,000	Jan..	1884	.10
100	Justice, g. s. c	Colo.	500,000	500,000	1	*			
101	Lacrosse, G.	Colo.	1,000,000	100,000	10	*			
102	La Cumbre, g. s	Mex..	150,000	3,000	50	*			
103	Lee Basin, s.	Colo..	5,000,000	500,000	10	*			
104	Little Josephine, s.	Colo..	250,000	50,000	5				
105	Lone Star Cons., G.	Cal...	500,000	500,000	1	10,000	April	1892	.00½
106	Lynx Creek, g.	Ariz..	237,500	147,500	5				
107	Madeleine, G. s. L.	Colo..	750,000	50,000	1	4,500	Feb.	1892	.00½
108	Mammoth Gold, G.	Ariz..	245,000	49,000	5	*			
109	Mayflower Gravel, G.	Cal...	1,000,000	100,000	10	*			
110	Medora, G.	Dak..	250,000	250,000	1	585,000	Mar.	189?	.56
111	Merrimac Con., G. s.	Colo..	5,000,000	500,000	10				
112	Mexican, G. s.	Nev...	10,000,000	100,000	100	2,917,560	Oct..	1892	.50
113	Michigan, g s	Mich..	2,500,000	100,000	25	40,000	Mar.	1892	
114	Middle Bar, G.	Cal..	400,000	200,000	2	*			
115	Mike & Starr, s. C.	Colo..	1,000,000	200,000	5	*			
116	Milwaukee, s.	Mont.	500,000	500,000	1	*			
117	Minah Cons.	Mont.	1,250,000	250,000	5				
118	Modoc Chief, l s. g.	Idaho	1,000,000	200,000	5	5,000	Jan.	1892	.00½
119	Monitor, G.	Colo..	100,000	100,000	1	12,500	May.	1891	.0
120	Montreal, G. s. L.	Utah.	750,000	150,000	5	4,500	Feb..	1892	.00½
121	Mountain Ledge, g	Cal..	500,000	100,000	5				
122	Mount McClellan	Colo.	1,500,000	300,000	5				
123	Mutual Mg. & Sm.	W'sh.	100,000	100,000	1	*			
124	Native, C.	Mich..	1,000,000	40,000	25				
125	Neath, G.	Colo..	1,000,000	100,000	10				
126	Nelson	Cal..	50,000	10,000	5				
127	Nevada Queen, s.	Nev...	10,000,000	100,000	100	200,000	Oct..	188?	.25
128	New Germany, G.	N. S..	100,000	100,000	1	*			
129	New Gold Hill	N. C	1,750,000	350,000	5				
130	New Pittsburg, s. L.	Colo..	2,000,000	200,000	10	*			
131	New Queen Gold, s.	Colo..	800,000	160,000	5				
132	North Standard, G.	Cal..	10,000,000	100,000	100	20,000	Nov		
133	Occidental Con., g. s		10,000,000	100,000	100	245,000	April	1892	.25
134	Oneida Chief, G.	Cal...	500,000	125,000	100	*			
135	Oriental & Miller, s.	Nev...	10,000,000	400,000	100				
136	Original Keystone, s.	Nev..	10,000,000	100,000	100	250,000	Mar..	1892	.10
137	Osceola, G.	Nev...	5,000,000	500,000	10	*			
138	Overman, G. s.	Nev...	11,520,000	115,200	100	4,001,840	May.	1892	.10
139	Park, s.	Utah.	2,000,000	200,000	10				
140	Parker, g.	N. C..	750,000	180,000					
141	Pay Rock, s.	Colo..	1,000,000	200,000	5				
142	Peer, s.	Ariz..	10,000,000	100,000	100	190,000	Feb..	1892	.10
143	Peerless, s.	Ariz..	10,000,000	100,000	100	405,000	Oct..	189?	.15
144	Pennsylva'a Cons., G	Cal...	5,150,000	515,000	10	36,050	Feb..	1892	.10
145	Phoenix, g	Ariz..	500,000	500,000	1	*			
146	Phoenix Lead, s. L.	Colo..	100,000	100,000	1	*			
147	Pilgrim, G	Cal..	600,000	300,000	2	*			
148	**Pioche M.&R., s.G.L.	Utah.	20,000,000	2,000,000	10				
149	Poorman, Ltd., s. L.	Idaho	250,000	50,000	5				
150	Potosi, s.	Nev...	11,200,000	112,000	100	1,573,000	Mar..	189?	.50
151	Proustite, s.	Idaho	250,000	250,000	1	*			
152	Puritan, s. G.	Colo..	1,500,000	150,000	10	*			
153	Quincy, C.	Colo..	3,000,000	300,000	10				
154	Rainbow, g.	S.Dak	1,250,000	250,000	5	4,250	July.	1892	.00½
155	Rappahannock, G. s.	Va..	250,000	250,000	1	*			
156	Reo Elephant, s.	Colo..	500,000	500,000	1	*			
157	Red Mountain, s.	Colo..	300,000	60,000	5				
158	Ropes, G. s.	Mich..	2,000,000	80,000	25	167,200	Feb.	1891	.30
159	Ruby & Dun., s. L. G.	Nev..	25,300	506	50				
160	Russell, G.	N. C..	1,500,000	300,000	5				
161	Sampson, G. s. L.	Utah.	10,000,000	100,000	100	288,15?	July.	188?	1.08
162	Seal of Nevada, g. s.	Nev..	5,000,000	100,000	50				
163	Silver Age, s l. g.	Colo..	2,000,000	200,000	10	*			
164	Silver Bell, s.	Ariz..	850,000	170,000	5				
165	Silver King, s.	Cal..	2,000,000	400,000	5				
166	Silver Queen, C.	Ariz..	5,000,000	200,000	25	*			
167	Silverton, s.	Colo..	300,000	60,000	5				
168	Siskiyou Con., L.	Cal...	2,000,000	200,000	10	13,000	May..	1892	.01½
169	South Bulwer, G	Cal..	10,000,000	100,000	100	100,000	May.	1881	.2
170	South Hite, g.	Cal..	10,000,000	100,000	100	195,000	Jan..	188?	.05
171	South Pacific, g.	Cal..	500,000	100,000	5				
172	Stanislaus, G.	Cal..	2,000,000	200,000	10				
173	St. Kevin, s. G.	Colo..	100,000	100,000	1	*			
174	St. Louis & Mex., s.	Mex..	,000,000	500,000	10	*			
175	St. Louis & St. Elmo.	Colo..	000,000	200,000	10				
176	St. L. & St. Felipe, G. s.	Mex..	[illegible],000	150,000	10				
177	St. L. & Sonora, G. s.	Ariz..	3,000,000	300,000	10	*			
178	Stemwinder, l. s.	Idaho	500,000	500,000	1				
179	Sunday Lake, I.	Mich..	1,250,000	50,000	25				
180	Sullivan Con., G.	Dak..	600,000	200,000	3	*			
181	Sylvanite, s.	Colo..	5,000,000	500,000	10	*			
183	Taylor-Plumas, G.	Cal..	325,000	65,000	5	3,575	Mar..	1892	.01½
184	Telegraph, g. s.	Cal..	325,000	65,000	5	3,575	Mar.	1892	.01½
185	Telegraph, G. s.	Mex..	100,000	100,000	1	70,000	Feb..	1892	.10
186	Teresa, G. s.	Cal..	1,000,000	200,000	5	10,000	Feb..	188?	.10
187	Tioga Con., G	Nev...	10,000,000	100,000	10	295,000	May.	188?	.25
188	Tornado Con., G. s.	Nev...	100,000	100,000	1	*			
189	Tuscarora, s.	Nev...	10,000,000	500,000	20	385,000	Jan..	1892	.25
190	Union Con., G. s.	Nev...	10,000,000	100,000	100	370,000	June	1892	.25
191	Utah, s.	Nev..	10,000,000	100,000	100	245,000	Aug..	1891	.25
192	Ute & Ulay, s. L.	Colo..	1,000,000	500,000	2	1,500	Mar..	1892	.0018
193	Valley, g	Cal..	575,000	460,000	125				
194	Wall Street, G. s. L.	Colo..	500,000	500,000	1				
195	Washington, C.	Mich..	1,000,000	40,000	5				
196	West Argentine, s.	Colo..	750,000	150,000	5				
197	West Granite Mt., s.	Mont.	500,000	100,000	5	*			
198	Whale, s.	Mont.	5,000,000	500,000	10	*			
199	Wood River, g.	Idaho	2,000,000	200,000	10	3,000	Aug.	1891	.00½
200	Yuma, C. s. G.	Ariz..	10,000,000	400,000	2				
201	Zelaya, G. s.	C. A.	600,000						

G., Gold. S., Silver. L., Lead. C., Copper. B., Borax. * Non-assessable. † This company, as the Western, up to December 10th, 1881, paid $1,400,000. ‡ Non-assessable for three years. § The Deadwood previously paid $275,000 in eleven dividends and the Terra $75,000. Previous to the consolidation in August, 1884, the California had paid $31,320,000 in dividends, and the Cons. Virginia $42,390,000. ** Previous to the consolidation of the Copper Queen with the Atlanta, August, 1885, the Copper Queen had paid $1,350,000 in dividends. ¶ This company paid $190,000 before the reorganization in 1880. ** This company acquired the property of the Raymond & Ely Company which had paid $3,075,000 in dividends. *** Previous to this company's acquiring Northern Belle, that mine declared $2,400,000 in dividends against $125,000 in assessments

COAL, RAILWAY AND OTHER STOCKS.

Names of Stocks.	Dec. 30. H.	Dec. 30. L.	Jan. 2.* H.	Jan. 2.* L.	Jan. 3. H.	Jan. 3. L.	Jan. 4. H.	Jan. 4. L.	Jan. 5. H.	Jan. 5. L.	Jan. 6. H.	Jan. 6. L.	Sales
Adams Express	153	152½			153	152½							40
Albany & Susq.													
Alton, pf.													
Am. B'k Note													
Am. Cotton Oil.	44⅛	43¾			44¼	43¼	43⅝	42½	43	42⅛	43⅛	42⅝	8,470
do. pref.	82½	82			82¾	82½	82		82				1,808
Am. Express	119	117½			117								15
Am. Dist. Tel.					58¾	58			57				200
Am. Sugar Ref.	111⅜	110⅜			113⅞	111⅜	115	112¾	114⅛	112⅜	114¼	112¾	176,433
do. pref.	99½	99			100⅜	99½	101¼	100	101½	101	102	101	18,498
Am. T. & C. Co.					86		86½		87				532
Am. Tobacco					121	120	120¼	119½	120¼				1,775
do. pref.					110¼	110	110⅛		110¼				125
Atch., T. & S.F.	34	33⅜			34⅛	33½	33⅞	33⅜	33¾	33	33½	33⅛	19,739
Atlantic & Pac.					4⅝				4				225
Balt. & Ohio.					94	93⅞	93⅞		93⅞		93¾		1,500
do. pfd.					5¾								25
B., C., R. & N.							60						14
Bos. A. L. pfd.													
Buff. R. P.									36				100
do. pref.													
Cambria Iron													
Canad'n Pacific													
Canada South.	56¾	56½			56¼	56	56½	56	56⅛	55¾			2,630
Cen. Iowa													
do. pref.													
Central Pacific	27½												100
Ches. & Ohio	22⅝	22¼			22⅞	22½	22⅞	22⅛					2,770
do. 1st pref.													
do. 2d pref.													
Chic. & Alton.					142		141⅝		143				283
do. pfd.							170						150
Chic., Burl. & Q.	97¾				98¼	97¼	97¾	97⅜	98¾	97	97⅝	96¾	16,225
Chic. & East Ill.													
do. pref.													
Chic. Gas Trust.	90	89⅜			90	88⅛	89⅛	87⅝	88⅜	85⅞	87⅝	85⅞	70,547
Chic., Mil. & S.P.	77⅞	77⅛			77¾	76⅞	77¼	76⅛	77⅞	76⅛	76¾	76¼	31,850
do. pref.					123		122¾		122½		122⅜	122¼	919
Chic. & N'west.	112	111¾			112⅛	111½	111⅞	111½	111¾	111⅜	111¾	111⅛	6,401
do. pref.					143								150
Chic., R.I. & Pac.	83	82¾			83	82½	83⅛	82⅛	83⅛	82¼	82¾	82¼	13,020
Chi. S.P., M. & O.											47⅛		200
Chi. Stock Yds.	101												200
do. pref.													
Clt. Gas, Bklyn.													
C., C., C. & St. L.					59⅛	59	59⅜	58⅞	58⅞	58¼	58¼	57¾	5,916
do. pref.	92¼						93⅛		92¼				282
Clev. & Pitts													
Col. C. & I.					22¾		22¾	22½			36½	34¼	2,820
Col. Coal					39½	38½	38	37⅞	37⅛	37			2,820
Colorado Fuel.					63¼	63	62¾	62⅛	62	61			984
do. pref.					110		111¼	111	110				443
Col., H. V. & Tol.					29⅞	28½	29½	29	28¾				2,936
do. pfd					71½								145
Col. & H. Coal.	20½	19½			20¼	19½	20¾	20	20⅝	20	20⅛	19¼	8,277
do. pfd					45								12
Commer. Cable.													
Cons. Coal													
Cons. Gas.	126	125½			125¾	124¾			125	124½	124⅜	124¼	2,100
Del. & Hud. C.	134½	134¼			134	132	132⅝	132	132¼	132	131⅞	131⅜	4,488
Del., L. & West.	154				154	152⅝	152⅛	151¼	149¾	149⅝	150	148⅞	5,722
Den., M. & W. D.							7½						25
Denv. & Rio. G.	16¾	16⅝							16⅞	16¾			5,100
do. pref.	53⅜	53½			53⅞	53⅜	53⅞	53⅜	54¼	53¼	53	52⅛	9,270
Dis. & C.F. Tr'st	66⅛	65⅝			66⅛	64⅞	65¾	61½	63⅜	61½	63⅜	61¾	117,130
do. ex-div.													
Dul., S. S. & A.					11⅛		12	11⅛	11⅞	11¾			834
do. pref.							29		29				200
E. T., Va. & Ga.							3⅜		3¾				380
do. 1st pref.													
do. 2d pref.							6						4
Edison Ill. Co of N. Y.									115⅛	115⅝			1,250
Edison E.L. Co.					115		114⅞	114½					
Edison Gen. El.	112	111½			112⅜	111⅞	113	112	112½	111	111½	111	10,698
Erie & West.													
do. pref.													
Evans. & T. H.	149½												200
Flint & P. M.													
do. pref.													
Gt. Nor. pref	134				135								640
Green B. & W.													
do. t. r.	15⅞	13¼			1⅝		15⅝				14½	13¾	4,510
G. B. & W., pref													
do. t. r.							27½						
Hunt. & B. Top.													
do. pref.													100
Ill. Cent.	99¾	99			99½	99¼			99		99		1,058
Iowa Central							31		9				400
do. pref.					3 ⅝	30¾			30½	30			1,175
Kan'wha & Mich							13½						100
Keokuk, D. M.													
Laclede Gas					23⅜		23¼		23¼				800
do. pref.													
Lake Erie & Wes	22½				22½		22⅛		22⅛				530
do. pref.	76¼				76¼	76	76		75¾				1,435
Lake Shore	127½				128½	127½			127½		127¾	127⅝	1,510
Lehigh C. & N.	53	52⅞					53	52¾	52⅞				330
Lehigh Valley	58¼	58⅛					57½	57	57⅝	57⅜			1,177
Long Island					105½		106	105½	105⅞				330
L. Erie & St. L.													
do. pref.													200
Louisv'le & N'sh	71⅞	71½			72⅛	71⅛	72¾	71⅝	72⅝	71⅜	72⅛	71¾	18,478
Louis., E. & St. L.							24		23⅜		24	23⅛	1,351
do. pref							49						55
L., N. A., & C.					24	23⅝	24		23		24½		50
L., St. L. & T.									24⅛				100
Mahoning Coal.													
do. pref.													
Manhattan Con.	156¾	154			158	153¾	156	153½	155¾	153	154½	155	39,243
Maryland Coal.													
Memphis & Char.													
Mexican Cent													
Michigan Cent.	104⅜	104¼			104½								300
Minnesota Iron.							70						85
do. pref.	48				47								203
Minn. & St. L.	17¾				17⅜		47¾						203
do. pref.													
M., L., S., & W.													
do. pref.													
M., Kan. & Tex.					14⅝		13⅞						60
do. pref					25½	25⅛	25⅞	25½					1 0
Missouri Pac	57	56⅝			57¼	56¼	57	56¼	56⅞	56¾	56⅞	55¾	23,490
Mobile & Ohio					34				35⅞				126
Morris & Essex.					151½								10
Nat. Cord Co.	138¾	138			138⅝	138	138½	138	137½	137	138½	137½	4,258
do. pref.	112½	112			112¾	112½	112½	112	112½	112	112½	112	2,328
Nat. Lead Co.	46⅛	46			46⅜	45¾	46	45¼	45¼	44½	45	44½	8,105
do. pref.	93½				93⅜	93	93⅜	93	93	92¾	93	92¼	1,733
Nat. Linseed Oil					41	40½	40	38½	38½	38	39		2,128
Nat. Starch	33½	33			31⅞	31			31⅛		32		743
do. 1st pref.					102				192				165
do. 2d pref.	103	100			102		102						48
New Cent. Coal.													
N. C. & St. L.													
N. J. Central					126	125½	124½	123½	123⅝	122⅞	123½	122⅞	1,850
N. Y. Central	109¼	108⅝			109⅛	108⅞	108⅞		109	106½	108½		3,195
N.Y., Chi. & St. L.					18⅜								100
do. 1st pref.													
do. 2d pref.									35				100
N. Y., L. E. & W.	24	23⅞			24	23⅜	23⅞	23½	23⅛	23⅛	23⅝		6,115
do. pref					54½	54	54½	54¼					577
N.Y., N.H. & H'rt									260				8
N. Y. & N. Eng.	45⅞	45½			45⅞	44⅞	45½	44¼	45¼	44⅜	45⅞	44⅝	31,325

COAL, RAILWAY AND OTHER STOCKS.

Name of Stock.	Dec 31. H.	Dec 31. L.	*Jan. 2. H.	*Jan. 2. L.	Jan. 3. H.	Jan. 3. L.	Jan. 4. H.	Jan. 4. L.	Jan. 5. H.	Jan. 5. L.	Jan. 6. H.	Jan. 6. L.	Sales.
N.Y., Susq. & W.	18				18⅜	17⅞	17¾	17⅝					1,300
do. pref.	70⅛				71½	71	71						878
N.Y. & North.													
do pref.	27¼	27			26⅝	26	26⅞	26	26½	25¾	26½	26¼	2,700
Norfolk South.													
N. & West.													
do. pref.							37¼						100
Nor. Amer. Co.	10⅛				10¼	10	10⅜	10	10⅛		10⅜		1,557
North. Pacific.	16¼				16		17	16¾	16¾	16½	16⅞	16⅞	11,252
do. pref.	47⅝	47⅛			47¼	46	47	46¼	46⅝	45⅝	46⅝	45¼	27,936
Ohio & Miss.									22				100
Ohio Southern.					48	47	45						310
Ontario & West.	18½				18⅛	18	18¼	18⅛	18⅛	18	18⅛	18	2,830
Oregon Imp.	19½												130
Ore. R. & N.					74½		75		77	76⅞			820
Ore., St. L. & U. N.					21½		23¼	22					500
Pacific Mail.					27½		27¼	26½					2,540
Penn. R. R.	54⅛	54⅜					54⅛	54⅜					1,300
Peoria, Dec. & Ev. R.	17	16⅛			16¾	16½					16⅛		750
Phil. & Reading.	53¼	52½			52⅞	50¼	51	49⅜	50⅞	49¼	51	50⅜	303,895
Pitts., F.W. & C.													
Pitts. & W., prf.					33		34						600
P., C., C. & St. L.					19								342
do. pref.					61⅛	60⅝	60¾						200
Pullman P. C. Co.					198	196			196½	196½			130
Rich. & W. P.	7¼				7⅜	7¼	7½	7	7¼	7			1,945
do. pref.					32								100
Rio Grnde & W.													
do. pref.							62						150
Rome, W & O.					111¼		111		112				255
So. Cotton Oil.													
So. Pacific.	33⅞	33¾			34½	33¾	34¾	34¼	35	34½	34½	34⅜	2,600
St. L. & San. Fe.													
do. pref													
St. L. & Southw.					6¼	6	5⅜						810
do. pref.							12½	12	12¾				606
St. P. & Duluth.							42						20
do. pref.													
St. Paul, M. & M.									113	112½			60
St. Paul & Omaha	47¾	46½			47⅞	47⅛	47⅝	47⅛	47⅛				2,220
do. pref.							117		117				364
Tenn. C. & I.					37	35⅞			35¾	35¼	35½	35	2,560
do. pref.									97½				40
Tol. & O. Cent.													
do. pref													
Texas Pacific.					9⅜		9¼	9½	9¼	9¼			700
Tol., A.A. & N.M.	38½	38¼			38⅞	37⅞	38⅛	37⅝	38⅛	37¾	39¾	38¼	11,880
Union Pacific	38⅝				40	39	40⅝	39½	40	39¼	39⅛	39¼	83,315
do. Den. & G.					16¼		17½	16⅝	16⅞	16⅝	16⅜	16¼	2,100
U. S. Express.					58	57½							115
U. S. Rubber.	46¼	43¼			45	45	45				43⅛		2,668
do. pref.	98	97			99	98	98		97½	97			1,566
Wab., St.L. & P.	11										11		580
do. pref.	24⅛	24⅜			24¼	24⅛	24⅛	23¾	23⅞	23⅜	23⅝		2,015
Wells, Fargo Ex					140								2
Western Union.	96¼	95¼			96½	95¼	96	95⅛	95¾	94¾	96	95	35,477
do. ex-div.													
Wheel. & L. E.	22⅛						21½	21½	21¼				270
do. pref.	64⅛				64		64	62⅝	63⅛	63	63⅛		7·8
Wisconsin Cent.					14⅞								150

* Holiday. Total shares sold, 1,401,161.

San Francisco, Cal.

Names of Stocks.	Closing Quotations. Dec. 30	Dec. 31.	Jan. 2	Jan. 3.	Jan. 4.	Jan. 5.
Alpha						
Alta	20	.20		.20	.20	20
Belcher	1.65	1.65		1.65	1.65	1.45
Belle Isle						
B. & Belch	1.35	1.50		1.50	1.50	1.25
Bodie	.25	.20		.20	.20	.25
Bulwer	.15	.15		.15	.15	.15
Chollar	.65	.70		.80	.80	.70
Com'w'lth						
Con. C. & V.	1.90	2.00		2.10	2.10	1 85
Con. Pac.						
Crown Pt.	.60	.65		.60	.60	.55
Del Monte						
E'reka Con						
G'ld & C'y	.95	1.03		1.00	1.00	1.00
Hale & N.	1.00	1.15		1.35	1.35	1.00
M. White						
Mexican	1.30	1.35		1.40	1 40	1.30
Mono	.15	.15		.20	.20	.15
Mt. Diablo						
Navajo						
Nev. Qu'n.	.05	.05		.05	.05	.05
N. B'lleIsle						.10
N. Co'w'th						
Ophir	1.90	1.95		2.00	2.00	1 80
Potosi	1.95	2.00		2.35	2.35	2.20
Savage	1.10	1.20		1.35	1.35	1.05
Sierra Nev	1.90	1.35		1.30	1 30	1.25
Uni'n Con	1.10	1.10		1.10	1.10	1.20
Utah	.05	.05		.10	.10	05
Yel. Jack.	.55	.55		.85	.55	.55

STOCK MARKET QUOTATIONS.

Aspen, Colo. Dec. 31.

The closing quotations were as follows:

	Bid.	Asked.
Argentum Juniata	$0.56	$0.57
Aspen Contact	1.25	1.75
Aspen Deep Mining	.10	.11
Best Friend	.10	.12
Bimetallic	.12	.14
Bushwacker	.20	.23
Delia S.	1.90	2.00
Empire Champion	....	.2
Gold Valley Placer	...	.10
Little Annie	.10	.11
Mollie Gibson	7.75	8.50
Pontiac	.13	.15
Smuggler	16 50	17.00
St. Joe & Mineral Farm	.14	.15
U. S. Paymaster	....	.20

Colorado Springs, Colo. Dec. 31.

	Bid.	Asked.
Anaconda Gold	.15	16
Buena Vista	..	.12½
Calumet	.04	.05
Cleopatra	..	.20
Fanny Rawlins	..	.08½
Gold King	..	.25
Gold & Globe	..	.07½
Isabella	..	.19
Jack Pot	..	.01
Jeff Davis	..	.05
Lemhi	...	.20
Manitou Park	...	.10
Matoa	..	.12
Ophir	..	.07
Orphan Bell	..	.05½
Pharmacist	.26	.27
Summit M. & M.	.19	.21
Work	.06	.07

Foreign Quotations.

London. Dec. 24.

	Highest.	Lowest.
Alaska Treadwell	£2¼	£2
Amador, Cal	1s. 3d.	9d.
American Belle, Colo.	3s.	2s.
Can. Phosphate, Can.	£½	£¼
Colorado, Colo	£⅛	....
De Lamar, Idaho	£17-16	£15-16
Dickens Custer, Idaho.	6d.	3d.
Eagle Hawk	6d.	....
Eberhardt, Nev	9d.	3d.
Elkhorn, Mont	£1⅝	£1½
Emma, Utah	1s. 3d.	9d.
Esmeralda, Nev	6d.	5d.
Flagstaff, Utah	1s.	9d.
Golden Feather, Cal.	8s.	7s.
Golden Gate, Cal	3s. 3d.	2s. 9d
Golden Leaf, Mont	1s.	6d
Jay Hawk, Mont	9s.	8s.
La Luz, Mex	1s. 9d.	1s. 3d.
La Plata, Colo	1s.	6d.
Maid of Erin, Colo	£⅞	£⅝
Mammoth Gold, Ariz.	....	....
Mount McClellan	4s.	3s.
Montana, Mont.	2s. 3d.	1s. 9d.
New California, Colo.	...	....
New Consolidated	....	....
New Gold Hill, N. C.	1s.	6d.
New Guston, Colo	£11-16	£9-16
New Hoover Hill, N.C.	2s. 6d.	....
New Russell, N. C	....	....
New Viola, Idaho	1s.	6d.
Old Lout, Colo	2s.	1s.
Parker Gold, N. C.	4½d.	1½d.
Pittsburg Cons., Nev.	2s. 6d.	1s. 6d.
Poorman, Idaho	8s. 6d.	7s. 6d.
Plumas Eureka, Cal.	£$\frac{7}{16}$	£$\frac{7}{16}$
Richmond Con., Nev.	15s.	10s.
Ruby, Nev	6s.	3s.
Sierra Buttes, Cal	£⅜	£¼
" Plumas Eur., Cal.	£⅝	£½
Silver King	£⅜	£¼
United Mexican, Mex.	£3-16	£1-16
Yankee Girl, Colo	5s.	4s. 6d.

Paris. Dec. 22.

	Francs.
Belmez, Spain	660.00
East Oregon, Ore	....
Golden River, Cal	130.00
" " parts	30.00
Laurium, Greece	685.00
Lexington, Mont	108.75
" parts	2.40
Nickel, New Caledonia	880.00
Rio Tinto, Spain	407.50
" " oblig.	517.00
" " " 2d	512.00
Tharsis, Spain	123.50
Vieille-Montagne, Belgium	513.75