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A MINING engineer and metallurgist, with some practical experience and good literary abilities, may hear of a desirable situation by addressing R. P. ROTHWELL, Editor of the ENGINEERING AND MINING JOURNAL.

THE annual meeting of the American Institute of Mining Engineers will be held in this city, beginning Tuesday, February 17th. The local committee, of which Mr. DAVID WILLIAMS is chairman, and WILLIAM H. WILEY is secretary, is perfecting arrangements that promise to make it an attractive and memorable gathering.

BENJAMIN SILLIMAN.

By the death of Prof. BENJAMIN SILLIMAN, of Yale College, on the 14th inst., American science has lost one of its most active, faithful, and useful representatives. The brief sketch of his career, given in another

column, indicates but imperfectly the extent and variety of his unwearied industry. Hosts of professional colleagues can bear witness to his lively interest in whatever was connected with scientific inquiry or the practical applications of science.

The Transactions of the Institute of Mining Engineers, of which he was an early and always an active member, contain many contributions from his pen, the latest of which is even now in press. We refer to a paper on the Siemens gas-furnace, as applied to the manufacture of glass, with special reference to the utilization of natural gas. Members who attended the Philadelphia meeting in September last will recall the animated manner of Professor SILLIMAN as he presented this subject, and also engaged with vigor in the discussion of other papers of that meeting. It was difficult for men a generation younger than he to imagine that he was not in his prime, or that his vital force was so near exhaustion.

It was very soon after that meeting, and very probably in consequence of the fatigues of that and the contemporaneous meeting of the American Association—both held in a "heated term," and attended with much exertion and excitement—that he was prostrated by the illness which proved to be his last. He had carried back to New Haven, for completion, the manuscript of his Institute paper; and, some weeks later, he sent to the Secretary an apology for delaying it, promising to finish it as soon as he should recover sufficient strength. In reply, he was urged not to worry himself about such matters; to allow the paper to be withheld for any convenient time; even to let it be withdrawn altogether. His answer to these friendly remonstrances was the manuscript itself, which, beginning in his characteristic vigorous hand, growing more and more feeble and illegible, and ending with several pages in the hand of an amanuensis, presented pathetic evidence, both of the weakness of his body and of the strength of his will. It is not unlikely that this was his last work; and its pages will bring to his associates many sad yet pleasant recollections of his genial presence and his ever-youthful spirit.

THE PROPOSED ANTHRACITE MINE LAW OF PENNSYLVANIA.

The full abstract of the proposed act that we published week before last has made our readers familiar with its provisions. It is most elaborate and voluminous, and while its provisions are in general well considered and their faithful execution would certainly conduce to the safety of persons employed in mines, yet it appears to us that the proposed act will, from its very multiplicity of detail, in a measure defeat its object.

It is true the feeling of opposition to inspection that existed among the mine-owners when the first "ventilation law" was enacted has now in a measure disappeared; but it is, nevertheless, highly inexpedient to impose duties on the inspector that will oblige him to take such an active part in the actual management of the mines as to make him practically a superintendent.

Most of the stipulations of the proposed act would be appropriate and useful in general colliery rules; but we believe the law should not enter into these details, but cover the ground with general stipulations, putting upon those whom it may concern the onus of securing the desired ends. No doubt it would be well to stipulate that each colliery should have special rules such as are given in the proposed act; but the effort to cover the conditions of every colliery in one set of rules is impracticable, and at the same time so overloads the rules that there is great danger that the few that are essential will be neglected, because a great many of the official rules among which they occur are inapplicable to the colliery in question.

Moreover, the proposed act seems to us to interfere too much with the management of the mines, it imposes duties upon the inspectors that would in effect make them superintendents, and it would require an army of inspectors to do what is required. Where the law is so detailed in its stipulations, there is always the danger of neglect of points that are not distinctly specified, but which are important, and would be covered by fewer and more general terms in the act.

This is the most important objection to the proposed act. There are also a number of details open to criticism. Why, for example, should the links, etc., of "bride chains" be limited to iron, and what is the standard of "best quality"? There is nothing requiring any strength per square inch of section, nor any total strength for the chain itself. And if the necessary strength were obtained by the use of steel, the law would not be complied with. Then, again, who is to be the judge of practicability when the law says, "The following rules shall be observed as far as practicable," etc.?

It would be easy to fill a column with specific conditions that encumber the proposed act and detract from its practical usefulness. Yet, as already stated, the provisions of the act are in general judicious, though they seem to bear too heavily on the employer and too lightly on the employé, and they do not sufficiently protect the employer from the results of the negligence or willful or malicious acts of his men.

## CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Mr. Howe's Table.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In regard to the table in the report of the Director of the Mint for 1883, for which you have now twice lashed me, it is but fair to say that it is but an insignificant appendix to my paper; that I prepared it for my own use while writing the paper; and that printing it at all was an after-thought, about the propriety of which I had serious doubts. However, as it would only occupy two pages in a book of 858 (to my surprise, it actually takes four), I thought it would certainly do no harm, and might be of service to those reading the paper, as containing a condensed statement of the chemical reactions that are there constantly referred to.

Now, to have the main paper, which competent judges inform me has much merit, slurred over in five almost contemptuous lines in your criticism, and to be twice castigated at inordinate length for an error in form in an appendix-table, which forms an insignificant, minute, and wholly unessential part of that paper, is indeed annoying; especially as this accurate and intelligible, though unimportant, table is misquoted and twisted in your columns so as to appear grossly inaccurate and ridiculous.

From very careful study of its proof-sheets, I believe that the table is almost if not wholly free from typographical errors. Yours truly,  
HENRY M. HOWE.  
BOSTON, MASS., Jan. 12, 1885.

## REMOVING RED-SHORTNESS FROM IRON.

Written for the Engineering and Mining Journal.

The iron ore of Cornwall, Pennsylvania, is rich in copper and sulphur. The greater portion of the latter is removed by roasting; but the copper remains, and, in smelting, alloys the iron with from 0.75 to 1.25 per cent, according to analyses made by a prominent steel-works chemist. It is very red-short or brittle at a red-heat—a fact so well established that the trade-mark of the North Cornwall Furnaces is C. R. S., standing for Cornwall Red-Short. This metal is used in the Bessemer process, mixed with good hematite pig-iron to some extent; but until recently it has never been used in the open-hearth process, as the product has been too red-short for hammering or rolling. The iron being in large and cheap supply, it became desirable to remove the red-short property in a simple and economical manner; and with that end in view, some was sent during the last summer to Bellefonte, Pennsylvania, to be experimented with in the open-hearth furnace there. The first trial, conducted in accordance with the plan of Mr. James Henderson, was made with one half weight of Cornwall No. 3 pig-iron, half rail crop-ends, and 5 per cent of iron ore, charged upon silica brick at the rate of 60 pounds of brick per ton of metal. The brick were burnt, and were composed of 95 parts of sand and 5 parts of lime by weight. The brick were charged on the hearth, which was highly heated and ready for charging the pig-iron. The latter was placed on them, and the crop-ends on the iron. By the time the pig melted, the brick became partly fused and stuck fast to the bottom and remained there, and gradually melted away during the decarbonization of the metal on top of them, and passed up through the metal, removing the red-shortness. The second trial was without the silica brick, and the metal was too red-short to be of use. The trials with the silica brick were continued over several weeks, using several car-loads of this metal with uniformly satisfactory results, whether all pig and ore without scrap was used, or pig ore and scrap. When sand alone was used, it removed the red-shortness, but a portion adhered to the hearth and gradually raised it, so that it became necessary to cut it out afterward with lime. The better way is, therefore, to mix the lime with the sand at the start, and keep the hearth from rising by accumulation.

A brick made of 95 parts of sand and 5 parts by weight of lime, mixed with water containing glucose, in the proportion of 20 parts to one by bulk and air-dried, is the most suitable for the use, as the brick insures the hearth being kept at its normal state. The ingots made from the metal rolled directly into shapes equally well, and tested as well as others that had been previously bloomed. The Allentown Rolling-Mill Company rolled some of these ingots, and reports the elastic limit 42,867 pounds and the tensile strength 66,289 pounds per square inch, with 25 per cent elongation in 8 inches. This metal, when rolled into plates, punches cold without cracking, and doubles over upon itself at all temperatures without any crack at the bends, and for boiler plates is in every way equal to those made from the most costly materials.

From this, it appears that, while silica in excess prevents removal of phosphorus, it acts in a contrary way when used with iron containing copper, and removes the copper.

**Coal for the Navy.**—Secretary Chandler reports to the Senate that a special board has reported that semi-bituminous coal is the best for naval purposes.

**Mineral Lands on Indian Reservation.**—A bill recently introduced in the House by Mr. Cassidy, of Nevada, to throw open mineral lands on Indian reservations, bears with importance on coal deposits in Turtle Mountain, Chippewa Reservation. The bill declares free and open to exploration and purchase all valuable mineral deposits in lands situated within the limits of Indian reservations, both surveyed and unsurveyed, and the lands in which they are found to occupation and purchase by citizens of the United States and those who have declared their intention to become such under the usual regulations prescribed by law, and according to the local customs or rules of miners in mining districts, so far as the same are applicable and not inconsistent with the laws of the United States.

## NEW PUBLICATIONS.

**HISTORY OF THE MANUFACTURE OF IRON IN ALL AGES, AND PARTICULARLY IN THE UNITED STATES FOR THREE HUNDRED YEARS, FROM 1585 TO 1885.** By JAMES M. SWANK. Published by the Author, 261 South Fourth Street, Philadelphia. 8vo, 428 pages, with Index. Price, \$5.

Mr. Swank, whose long and intimate connection with the iron and steel trades has given him special facilities of which he has thoroughly availed himself, here publishes the results of many years of patient, intelligent, and persistent labor. His high standing as the historian of the iron trade is generally acknowledged as the outcome of the publication of historical sketches and of more elaborate treatment of some of the principal periods in the development of special branches of the iron and steel business in the country. He gives us now a full and detailed history of that great industry, whose growth Americans may well be proud of as a striking proof of their business enterprise and their technical skill. Mr. Swank rapidly traces the general outlines of the history of iron-making in the world, and then takes up in detail the events, in their chronological order, that contributed to the utilization of the mineral resources of the different States. The greater part of the work is, of course, devoted to the history of the manufacture of pig-iron, covering, as it does, a far longer period, while the making of steel in its different forms is an industry that belongs practically to the present generation. The record of the early struggles to fill the requirements of a limited market, comparatively speaking, the effect of gradual improvements in methods, of increased transportation facilities, of the competition of one section upon the local industry of other districts, are admirably traced. Particularly in the earlier period, before the present century, Mr. Swank's book gives evidences of that thorough and exhaustive search of records that is so much needed. He has not always succeeded in removing the haze of tradition; but it is no mean accomplishment to have thrown so much light on the history of many enterprises long forgotten, even the localities where they once had often only a short life, and where there were so few to preserve the records of the past. Tied as they naturally were to remote localities where ore and charcoal happened to be abundant, and having only the short life that local conditions made possible, the early forges and charcoal furnaces left only a passing imprint upon the records of their time, which the crowding events of later generations blurred or even entirely effaced. The labor of tracing the history of these early attempts will, therefore, be fully appreciated. It has been performed by Mr. Swank with earnestness, zeal, and, we may add, with signal success. He has presented his facts in that clear manner that characterizes his writings, and we are convinced that his work will prove to others, as it did to us, fascinating reading.

**ANNUAL REPORT OF THE COMMISSIONER OF MINERAL STATISTICS OF THE STATE OF MICHIGAN FOR 1883.** By A. P. SWINEFORD. Marquette, Mich. 117 pages.

The annual report of the Commissioner of Mineral Statistics of Michigan, usually quite a volume, is shorn of much of its matter and of some of its value, because it has appeared so late. The delay, we understand, is due to the fact that an unusual and unlooked-for demand was made upon the time of Mr. Swineford through the work growing out of his appointment as Commissioner for the State at the New Orleans Exhibition. The usual review of the work at the iron mines of the Marquette and Menominee iron mines, which Mr. Swineford is personally so thoroughly acquainted with, has been omitted, although we are promised a full description of them in the report for 1884, which we are led to believe will quickly follow in the footsteps of this belated review. Mr. Swineford has an introductory chapter on the history of the copper mines of Isle Royale, which he claims "never had a fair show." This may be so, but we question whether much enthusiasm will be developed during the next few years in opening out their resources, with the wrecks of Lake Superior copper companies as the result of the unprecedented decline of the metal still lingering in the memory of investors. The larger part of the volume, covering as it does more than 70 pages, is a review of the copper mines of Lake Superior, from the pen of Mr. J. Parke Channing, a young mining engineer, who has been specially assigned to that duty, for which, we may add, he shows decided fitness. Much of the space, of course, is taken up by reprints of the annual reports of the leading companies, which, being nearly a year old, have lost their interest; but we note, nevertheless, that Mr. Channing appears to possess judgment, and seems to know what information to look for, and how to get it. His descriptions of underground work done, of plant and appliances, his indications concerning conditions affecting successful work, give promise of good work for the future, when he is not affected by the flavor of staleness that naturally pervades the report.

The review of the copper mines is followed by a description of the Agogebic Iron Range, which has attracted so much attention during the last two years, but on the future of which Mr. Swineford is judiciously reticent. The last chapter in the report is on the gold and silver discoveries on Lake Superior, of which the Ropes mine is the leading representative.

**Remarkable Escape.**—An extraordinary accident is reported as having occurred at Treharris Colliery, near Pontypridd, Wales. The colliery is known as the Harris Deep Navigation Pit, and its greatest depth is 789 yards. About 1000 colliers are engaged in it. Operations were conducted for getting coal from the lower or down-cast shaft, and at three o'clock in the morning, five men descended in a bucket. When they had descended about thirty yards, the rope attached to the bucket suddenly snapped. Down dashed the bucket a distance of over 700 yards, carrying with it all the occupants except one named Dodd. The men fell into the drainage-sump, in which there were eight feet of water. They must have been killed before reaching the bottom. Dodd held on to the guide-rope, and remained suspended in the shaft, which was now closed at the top. He was able to lower himself down by degrees to within about 100 yards of the level, and, marvelous to say, retained his hold seven hours. He was rescued without having suffered serious injury. The colliery has hitherto been remarkably free from accident. The cause of the breakage of the rope is inexplicable, as it had been on the drum for the past twelve months, and was equal to a strain of 55 tons, while the total weight on the day of the disaster including the five men, did not exceed 30 cwt.



## NOTES ON COAL-DUST IN COLLIERY EXPLOSIONS.\*

By E. S. Hutchinson, Newtown, Pa.

(Continued from page 25.)

These experiments were, without doubt, conducted with all that conscientious skill for which the distinguished author of this report is celebrated. Professor Abel summarizes as follows:

That it appeared:

1. "That coal-dust in mines not only much promotes and extends explosions in mines, by reason of the rapid inflammability of the finely divided combustible, and of the readiness with which it becomes and remains suspended in air-currents; but

2. "That it may also itself be readily brought into operation as a fiercely burning agent, which will carry flame rapidly as far as its mixture with air extends, and will operate even as an exploding agent, through the medium of a proportion of fire-damp in the air of the mine, the existence of which, in the absence of the dust, would not be attended by any danger.

3. "That dust from coal mines, quite apart from any inflammability that it may possess, can operate in a distinct manner, as a finely divided solid, in determining the ignition of mixtures of only small proportions of fire-damp and air, and consequently in developing explosive effects.

4. "That a particular dust in a mine may, therefore, be a source of danger, even though it contain only a small portion of coal or combustible matter. Although the explosion, which may occur through the agency even of a non-combustible powder, in the manner described, may be of very mild or feeble character in the first instance, it may be almost at once increased in magnitude and violence by coal-dust, which the first ignition will raise and bring into action.

5. "The proportion of fire-damp required to bring dust in a mine into operation as a rapidly burning or an exploding agent, even upon a small scale, and with the application of a small source of heat or flame, is below the smallest amount that can be detected in the air of a mine, even by the most experienced observer, with the means at present in use.

6. "With dusts of a highly sensitive or dangerous character, in the presence of a source of considerable heat and flame, such as a blown-out shot or an over-charged hole would constitute, a small proportion of fire-damp, the possible existence of which in the mine might not be in the least suspected, may serve as the inciting cause to the development of an explosion of coal-dust.

7. "In air containing from 2 to 2.75 per cent of fire-damp, and traveling with a velocity of 600 feet per minute, different coal-dusts suspended in the air produced explosions. Air containing 2.75 per cent of fire-damp, and traveling at the same velocity, was ignited through the agency of a perfectly non-combustible powder. The same result was obtained by dust in an air-current of 100 feet per minute, and containing only 1.5 per cent of fire-damp.

8. "In the complete absence of fire-damp, coal-dust exhibits some tendency to become inflamed, when passing a very large lamp-flame at a high velocity; if exposed to the action of a large body of flame, such as produced by the explosion of freely exposed gunpowder or gun-cotton, it exhibits in addition a decided tendency to carry or propagate flame. But, so far as can be determined by experiments on a moderate scale, this tendency is of limited nature, and very different, indeed, from the property of carrying or propagating flame, which even comparatively non-sensitive dusts possess in the presence of a very small quantity of fire-damp.

9. "It may be admitted as possible that, with the large volume of flame and the great disturbing effect of a blown-out shot, as the initiatory cause of the ignition of dust, and its suspension in the surrounding air, such inflammation may, in the complete absence of fire-damp, be propagated to a greater distance than the results of small experiments would warrant one in assuming. But it can scarcely be maintained that the air of a mine in which the coal gives off gas at all can be at any time free from fire-damp; and as the existence of very small and unsuspected quantities of that gas in the air of a mine may suffice to bring about the ready propagation of flame by coal-dust, and thus to develop violent explosive effects, it would appear needless to assume that coal-dust may, in the entire absence of fire-damp, give rise to explosions, even of only limited character, in coal mines, in order to account for casualties which can not be ascribed to the existence of accumulations or sudden outbursts of fire-damp."

By way of explanation of the peculiar phenomena exhibited by some dusts examined by him, Professor Abel states that, while the richness of a dust in coal influences the rapidity and consequent violence of the explosion of dust and fire-damp, the physical character and mechanical condition evidently contribute more than the richness in coal of the dust-sample, to determine the comparative readiness with which it brings about the inflammation of a gas-mixture, not susceptible of ignition *per se* under otherwise similar conditions. The ignition of dust and gas-mixture is most probably ascribable to the influence of a few small dust particles, which, having been instantaneously raised to incandescence by the flame, must have the effect of localizing and consequently intensifying the heat at those points.

"From certain phenomena observed in the experiment with non-combustible powders, it appears not improbable, however, that another quite distinct mode of action of the finely divided and heated solid may operate very importantly, and, at any rate, contribute in determining the ignition of gas-mixtures that are not susceptible of inflammation by the application of flame alone."

He concludes: "This subject will receive, at the hands of the Royal Commission on Accidents in Mines, the further investigation that it demands."

At the Seaham Colliery inquest, April 12th, 1881, Professor Abel gave testimony† that is, perhaps, more specific than some of the general statements of his report just cited.

Air containing 3½ per cent of fire-damp was just explosive in currents ranging from 600 to 1000 feet per minute. Air containing 4½ per cent of fire-damp just bordered on the explosive when the current had a velocity

of 100 feet per minute. He could not obtain any indication of either the enlargement or taking up of the flame from exploded gunpowder or gun-cotton by coal-dust alone, even in considerable quantities, in an air-current with a velocity of 100 feet per minute; but when the velocity was increased to 1000 feet per minute, a considerable flame was produced.

Coal-dust, in the absence of fire-damp mixed with air, will carry flame to a very limited extent only. He was confident that, in all his experiments in which he obtained the carrying along of flame by coal-dust to a considerable distance, the quantity of gas present was considerably below 1 per cent.

If the dust were always exactly of the same character, and the conditions were always the same, he was of the opinion that the conclusion that, if coal-dust alone would have exploded, every colliery would have been exploded long ago, would be quite correct; but the dusts vary very greatly with regard to sensitiveness and to the tendency they have to promote the ignition of these explosive mixtures; so that the result, after all, is comparatively exceptional.

With regard to the manner in which the dusts for these experiments were collected, he thought that perhaps the importance of merely skimming the dust had not been sufficiently realized; that he could only speak of the samples as they arrived; that the results furnished by them were put forward with the greatest reserve; and that he did not consider that the indications of burning afforded any thing like a decided evidence as to the extent to which the dust took part or entered into the action of this explosion.

The verdict of the jury neither gave an opinion as to the point of origin of the explosion nor as to its cause. It should be added that this colliery was exceptionally dry and dusty, and especially so immediately before the explosion. Considerable blowers had been known to occur, and small issues of fire-damp were not uncommon in many places.

In a third paper read by Mr. Galloway before the Royal Society, June 16th, 1881, and revised by him February 10th, 1882,\* he describes a new series of coal-dust experiments, began by him at Llwynypia Colliery, in September, 1880, with a larger apparatus than he had formerly used. In this, the explosion-chamber was 6 feet long and 2 feet in diameter, and the gallery 126 feet long by 2 feet square inside, divided into seven sections, one side of each of which could be opened like a door. He showed that in the absence of coal-dust, "the flame of the fire-damp explosion travels along the gallery to an average distance of 12 feet."

In the presence of coal-dust, however, it is important to note "that, if the whole of the sections are closed, making the gallery continuous throughout its whole length of 126 feet, the flame of the coal-dust arising from the fire-damp explosion does not reach farther than 50 or 60 feet from the origin; but if the sides of the fourth and fifth sections are open, making the closed portion only 54 feet long, and leaving 36 feet with only three sides" (allowing plenty of air), "the flame will, as a rule, be 70 feet, and sometimes 80 and 90 feet long. The flame of the coal-dust appears to be self-supporting in pure air, but it can not get much beyond the point to which the more energetic action of the fire-damp explosion has extended."

This conclusion, it will be observed, does not appear to be quite in harmony with Mr. Galloway's previous statement that coal-dust is capable of extending indefinitely throughout a mine a local explosion of fire-damp.

He also says that he "does not find that heating the air to a temperature of 70 or 80 degrees makes any difference," which is in opposition to the conclusion of Professor Abel from his Seaham experiments.

Mr. Galloway refers also to the accident at Penygraig, which took place December 10th, 1880, three months after the one at Seaham. Having been intrusted with the exploring operations connected with the opening of the mine, he had an excellent opportunity of acquainting himself with the details of that disaster. He noted that "the flame of the explosion had passed through or penetrated into every part of the workings except one wet heading at the foot of the down-cast shaft," and that "there were deposits or crusts of coked coal-dust in every working place where the coal-dust was comparatively free from impurities; while, on the other hand, the same kind of deposits were very rare in the main roadways, where the coal-dust was largely mixed with shale-dust and other impurities;" and he concludes that, as a very large amount of fire-damp was constantly given off along the face of the solid coal, so that the air as it passed into the up-cast shaft always contained rather more than 2 per cent of fire-damp, this fire-damp, acting in conjunction with the coal-dust, was a most important factor in promoting and intensifying the explosion.

Mr. Galloway's next paper was read before the British Association at York, September 7th, 1881; but as it refers to a series of experiments more particularly described in a communication to the Royal Society five months later, it will require no further notice here.

In his paper No. IV., read before the Royal Society, December 29th, 1881,† he gives the details of 63 experiments made during the warm weather between the 14th and 21st of the preceding July, and with the apparatus mentioned in his paper No. 3. About 10 per cent of fire-damp was introduced into the explosion-chamber, and the fresh-air current passing through the gallery had a velocity of 1000 feet per minute. The coal-dust used had been deposited in a still atmosphere within a building in which coal had been ground for coke-making. He states that he could not obtain the results that he had previously obtained with dust taken from screens, nor from mine road-ways, thus showing a marked difference between his determinations and those of Professor Abel.

In his previous experiments, the longest flame was obtained from coal-dust when the doors of the gallery were open, free access of fresh air being permitted; but his present experience was, that the more nearly air-tight the gallery, the greater the prolongation of flame. The results of 34 experiments may be summarized as follows:

1. The average length of 14 fire-damp flames was 12 feet 6 inches.
2. The average length of 15 flames of coal-dust, fire-damp, and air was 118 feet 5 inches.
3. The average length of 5 flames of coal-dust, fire-damp, and air, augmented by the explosion of heaps of from 2 to 4 ounces of gunpowder, placed on shelves and on floor of gallery, was 145 feet.

In the first series, the 15th experiment gave no tabulated result.

\* A paper read at the Chicago Meeting of the American Institute of Mining Engineers, May, 1884.

† Blue-Book, "Seaham Colliery Explosion," p. 146 et seq.

\* Proc. Roy. Soc., 1881, vol. xxxii., p. 490.

† Proc. Roy. Soc., 1881, vol. xxxiii., p. 437.



In the second series, 15 were omitted from the computation (though all but 8 gave tabulated results) by reason of the seams in the gallery being open; and 8 others of the series gave no tabulated results.

Of the third series, 6 only gave tabulated results, one of which, showing the shortest flame, was not taken into account, for the reason that the flame came out of the open section before reaching the end of the gallery.

The experiments with coal dust and closed or open boxes showed:  
Average length of flame in 5 experiments, closed box, 140 feet 7 inches.  
Average length of flame in 4 experiments, one section open, 132 feet 9 inches.  
Average length of flame in 10 experiments, two sections open, 114 feet 6 inches.

Average length of flame in 1 experiment, three sections open, 122 feet. Which seem to warrant Mr. Galloway's statement, given above, that the more nearly air-tight the gallery, the longer the flame. It should be noted, however, that, in all the four experiments with closed galleries, except one, heaps of gunpowder were placed on shelves and on the floor. The single experiment without powder gave a flame only 108 feet long. In the experiment giving the next to the longest flame, two of the three heaps of powder were not burned.

No table is given in this paper showing the results of other chemical or microscopical examination of the dust used, from which we may infer that Mr. Galloway did not consider this important; which agrees with his testimony given before the Royal Commission.

Mr. Galloway considers that the experiment described in his first paper seemed to show that a mixture of air and coal-dust was not inflammable at ordinary pressure and temperature without the presence of a small proportion of fire-damp; but those described in the fourth paper showed conclusively, he thought, that fire-damp is altogether unnecessary when the scale on which the experiments are made is large enough, and when the fineness and dryness of the dust are unquestionable. This is somewhat different from his reply to Professor Abel, one of the Royal Commission, that his experiments in coal-dust, of one and the same description, but of different degrees of dryness, seemed to give very much the same results.

The Royal Commission on Accidents in Mines\* was sitting in 1879 and 1880, and much of its work was contemporaneous with that of Messrs. Galloway and Abel, and also of the Committee of the Chesterfield and Derbyshire Institute of Engineers, whose labors will receive attention farther on.

The report of the Commission, presented in 1881, was a preliminary one; the commissioners stating that, as some time must necessarily elapse before the experimental inquiries were in a sufficiently complete condition to allow of the results and the conclusions to be derived therefrom being reported, they had deemed it desirable to present the whole of the evidence given before the commission. In submitting their summary of the evidence, they pointed out that it had been framed only with the object of presenting a concise review of the information elicited, and not with the object of conveying any definite conclusions arrived at by themselves upon any of the numerous subjects included in their inquiry, desiring to reserve the expression of such conclusions until the completion of the experimental and other investigations upon which, as already stated, they were still engaged.

The report in itself is brief; but the evidence is voluminous, consisting of about 15,000 answers to questions, and several pages in which the testimony of each of the witnesses was collated for easy reference. The final report, though anxiously looked for, is not expected for some time to come.

The report treats of the subject under sixteen different heads on which information has been elicited. With regard to the influence of coal-dust, they say:

"The proportion of fire-damp required to bring dust in a mine into operation as a rapidly burning or an exploding agent, even on a small scale and with the application of a small source of heat or flame, is below the smallest amount that can be detected in the air of a mine, by the most experienced observer, with the means at present in use. In air traveling at a velocity of 600 feet per minute, different coal-dusts suspended in the air containing from 2 to 2.75 per cent of fire-damp produce explosions. At a velocity of 100 feet per minute, the same result was obtained with air containing only 1.5 per cent of gas; and ignition of dust approaching explosions, and extending to considerable distances, was obtained with dust in air containing much smaller proportions of gas. Mixtures of fire-damp and air bordering on those that will ignite on the approach of flame, were instantaneously inflamed by a lamp when they contained only a few particles of dust in suspension, and it was found that these need not be combustible, but that some perfectly non-combustible dusts possessed the property of bringing about the ignition of mixtures of air and gas by a lamp-flame, which were otherwise not inflammable."

It is interesting to give the individual views of a few witnesses before the commission on the effect of coal-dust.

Mr. Joseph Dickinson (Inspector of Mines) states that hundreds of explosions had come under his observation; but he never knew of an instance where the explosion could be attributed to coal-dust alone.

Mr. Thomas Wynne (Inspector of Mines) says: "There must have been gas before the coal-dust ignited. I have never known a case, nor do I think there has ever one occurred, in which an explosion has been traced to coal-dust alone."

Mr. Frank Wardell (Inspector of Mines), while considering that an explosion is carried farther through the mines by coal-dust, thinks it is doubtful whether its force is increased by the dust.

Mr. James Willis (Inspector of Mines) thinks dust may largely increase the damage done by an explosion of gas.

Mr. Thomas E. Wales (Inspector of Mines) considers that only in extensive explosions of gas would coal-dust add very much to the intensity, and would not look upon coal-dust as being inflammable to any serious extent. He instanced a recent disaster, in which the gas-flame extended over 150 yards, yet in which the coal-dust had not been touched, though it was very dry and 4 or 5 inches deep in the place.

Mr. Thomas Cadman (Inspector of Mines) stated that while instances had come to his knowledge where dust had contributed to the violence of

an explosion, he had never had an accident which could be ascribed to dust independently of gas.

Mr. Richard Foster (Manager of Hilton Collieries) had never seen a case in which the dust was fired by a blown-out shot. He believed dust would add to an explosion, but could not cause it.

Mr. William Lishman (Mining Engineer) could conceive that coal-dust might intensify an explosion, but it would not cause one without the presence of gas; and he thought a great deal more had been made of coal-dust than was warranted.

Mr. Alfred Hewlett (Manager Wigan Coal and Iron Company) had no doubt that coal-dust greatly aggravates an explosion of gas or with a blown-out shot. But there is not much fear from dust if gas has not been ignited.

Mr. William Pickard (Wigan) did not think it possible for a blown-out shot, without the presence of gas, to explode or ignite the coal-dust itself.

Mr. Bryam (Manager of Rosebridge Colliery, Wigan) considered from his experience that dust simply extends the flame and does not add much to its force.

Mr. Richard Bedlington (Past-President of the South Wales Institute of Engineers) was of the opinion that the effects of an explosion might be extended to great distances by fine dust, more or less incandescent, but could not believe that a continuous flame had been carried so far.

Mr. Thomas Joseph (Merthyr Collieries, South Wales) thought the coal-dust would never produce an explosion; but as there is a good deal of gas lodged in dust, it would add to the explosion.

Mr. John Nixon (Navigation Collieries) believed that dust adds to the inflammability of the atmosphere, when present with gas.

All those whose testimony has been cited appear to be in accord that, while dust is not in itself explosive, it is abundantly able to intensify an explosion initiated by gas.

The most complete series of experiments, the results of which have yet been published in England, are those made by a committee of the Chesterfield and Derbyshire Institute of Engineers, appointed in April, 1879; their very extensive report appearing in Vol. X. of their Transactions for 1882.

(TO BE CONTINUED.)

**Galvanizing Wire by a New Process.**—The New Haven (Conn.) Wire Company has lately exhibited and submitted to test a wire galvanized by a new process, in which, it is claimed, by means of a thorough union of the coating with the body of the wire, scaling is prevented, and a smooth, firm surface secured under all circumstances. Softness and tensile strength and uniformity of temper are obtained to an extraordinary degree. In samples twisted after galvanizing, the single strand showed 28 and the double strand 48 twists to the lineal foot without a break or flaw in the coating. In this method, much less acid is used. To wires for telegraphic or telephonic purposes, the process is equally applicable.

**The Color of Ozone.**—MM. Hautefeuille and Chappuis have found that ozone is a blue gas, the color appearing sky-blue even when only so much ozone is present as is obtained in the ozonation of the oxygen contained in a tube a meter in length by the silent discharge. Furthermore, they found that under very great pressures the condensed gas became indigo blue. If the pressure is increased to 75 atmospheres and then suddenly relieved, a dense white cloud is formed, showing the beginning of liquefaction, while the same phenomenon does not take place with pure oxygen until a pressure of 300 atmospheres is attained. The ozone must be compressed slowly and with constant cooling, otherwise it will explode with evolution of heat and light. By mixing the ozone with carbon dioxide, and then submitting the mixture to great cold and pressure, Hautefeuille and Chappuis succeeded in obtaining a deep-blue liquid, the blue color being due to the liquefied ozone. The same observers have studied the absorption spectrum of ozone, and accurate measurements of the same have been made by W. N. Hartley. The latter has extended the research to the absorption of certain parts of the sun's rays by atmospheric ozone. By this new optical method, he has arrived at the conclusions: (1) That ozone is a constant constituent of the upper atmosphere. (2) That it is present in larger amounts in the upper than in the lower part of the earth's atmosphere. (3) That it is the cause of the blue color of the sky.

**The Membership of Trade Organizations.**—An estimate, partly on official figures, is given in the current number of the *North American Review* by Richard J. Hinton, of the trades and labor organizations in the United States, with the following result—(o) official; (e) estimated:

INTERNATIONAL BODIES.		Trades Organizations.	
	Membership.		Membership
Iron and steel-workers.....	42,000 (e)	Metal workers.....	8,000 (e)
Engineers (British).....	5,000 (e)	Ship-carpenters.....	2,000 (o)
Carpenters (British).....	7,000 (e)	German Typographical Union.....	3,000 (e)
Typographical Union.....	11,930 (o)	Telegraphers, operators, and linemen.....	10,000 (e)
Seamen's Union.....	14,000 (o)	Coal miners, State and national.....	60,000 (e)
Cigar-makers' Union.....	7,000 (e)	Progressive cigar-makers.....	9,000 (o)
Coopers' Union.....	12,000 (o)	Mule-spinners (cotton factories).....	5,000 (e)
Bricklayers and masons.....	12,000 (o)	Cotton weavers (cotton factories).....	5,000 (e)
Granite cutters.....	6,000 (o)	Silk weavers.....	1,200 (e)
Glass-workers.....	7,000 (e)	Tailors, N. U.....	18,000 (e)
Furniture-workers.....	9,000 (o)	Upholsterers.....	3,500 (e)
Locomotive engineers.....	12,200 (o)	Harness-makers.....	1,500 (e)
Locomotive firemen.....	12,000 (o)	Paper-hangers.....	3,500 (e)
Railroad conductors.....	7,000 (e)	House-painters.....	10,000 (e)
Railroad brakemen and employes.....	18,000 (e)	Shoemakers, lasters, etc.....	12,000 (e)
Knights of Labor (federation).....	150,000 (e)	Bakers.....	2,500 (e)
International Workingmen's Ass.....	20,000 (e)	Brewers.....	2,000 (e)
NATIONAL BODIES.		There are small trades, locally organized, chiefly in the large cities, whose number is difficult to ascertain, and many of whom are federated with trade associations and Central Labor Unions. They may be understated at.....	
Iron molders.....	14,000 (e)		75,000 (e)
Brotherhood of Carpenters and Joiners.....	7,000 (e)	The Socialist Labor party (American) and the Social Democrats may be estimated at.....	25,000 (e)
Plasterers.....	7,000 (e)		
Plumbers.....	3,000 (e)		
Tinsmiths.....	3,000 (e)		
Laborers (chiefly building trades).....	25,000 (e)		
Horse-shoers (includes blacksmiths).....	19,000 (e)		
Boiler-makers and iron ship-builders.....	17,000 (e)		
Stationary engineers.....	1,700 (e)		
		<b>Total estimate.....</b>	<b>611,530</b>

\* Preliminary Report Royal Accidents Commission, 1881.



## THE "TRIUMPH" CONCENTRATOR.

The "Triumph" concentrator, of which the Joshua Hendy Machine Company, of San Francisco, is the builder, and Messrs. Montgomery & Cory, of Denver, are the agents, belongs, as will be seen by reference to the accompanying engraving, to the class of belt tables that has conquered such general recognition in our mills and concentrating-works. The pulp passes from an amalgamating bowl above, and is distributed by a riffle apron to the upper end of an endless rubber belt to which a longitudinal or end-shake motion is given. The frame carrying the belt is mounted on springs. The heavy metallic particles of the pulp are carried up and along the belt to a point of discharge in a trough, below which the slimes are discharged at the lower end. The peculiar movement of the frame and endless belt upon the springs, already mentioned, is considered in particular the improved feature of the concentrator.

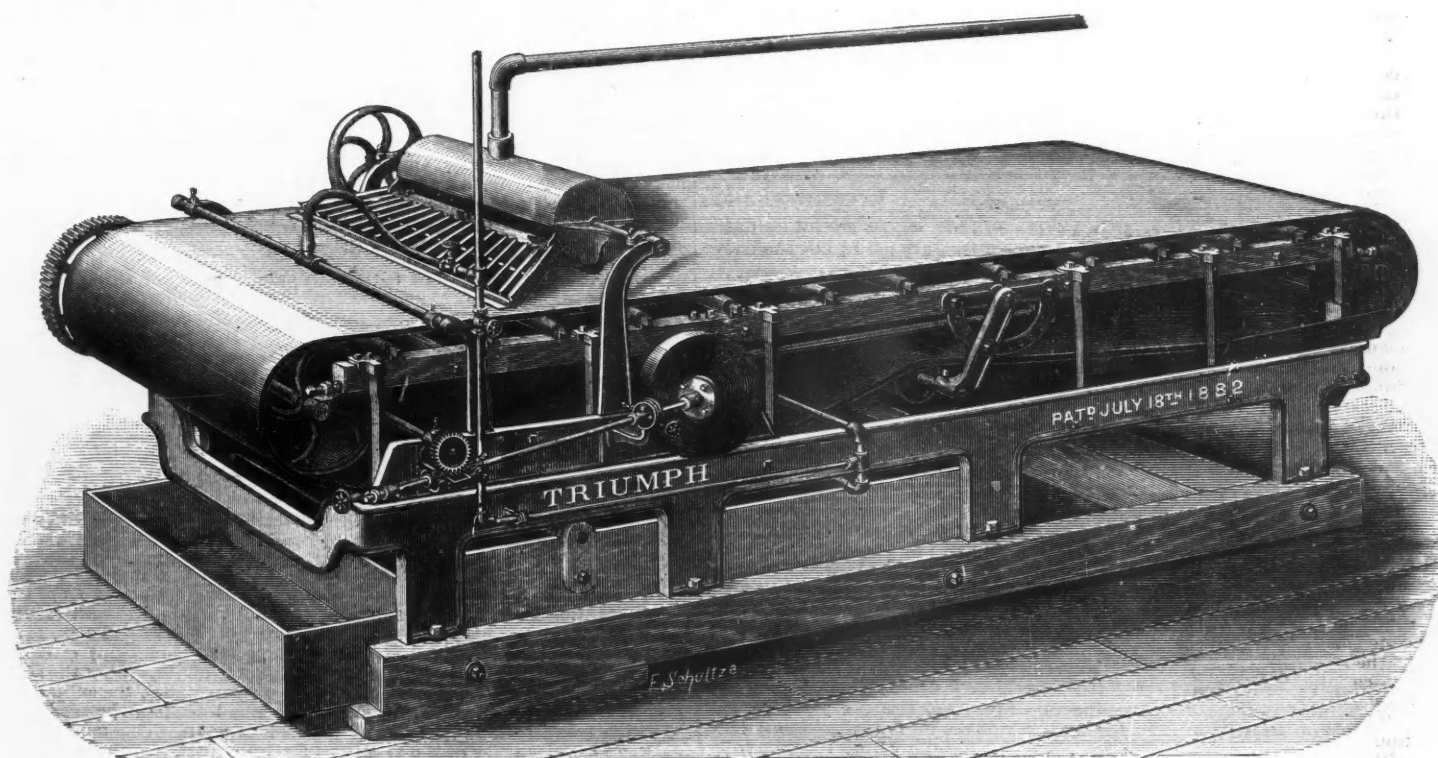
Special attention has been given to the design of the vanner, with the object of building it as compactly as requisite strength will permit. The manufacturers state that three of these concentrators are sufficient to take the delivery of pulp from and to thoroughly concentrate the sulphurets and valuable metallic particles from two batteries of five stamps each, when the percentage of sulphurets and metallic particles does not exceed three per cent of the gangue matter; six for a twenty,

## ELECTRO-DEPOSITION OF COPPER.

Mr. Edward P. Thompson, M.E., in an article on the Excelsior electro-plating dynamos, published in the *Electrical World*, gives some interesting details concerning the electrolytic process:

The Hochhausen dynamo has shown its success above all primary batteries for electro-deposition, and competes favorably with the other forms of electro-plating dynamos. For two years, it has reduced from copper cast from the furnace in smelting-works large masses of chemically pure sheet-copper, which has been largely sold with fair profit at only one cent more per pound than the ordinary impure copper of commerce. More recently, a second establishment has been founded where the Hochhausen machine is employed, and where the details of the steps of the process are kept secret, in order that others, after hearing of the large profits made from selling electrolytic copper, may not destroy the monopoly by following in the newly made footsteps. The pure copper is so highly valued that up to the present day of dullness in the metal industry its sale has been increasing at a rapid rate, and it could easily have been sold as cheaply as ordinary copper, and yet with much profit.

These two establishments, together with one using the Keith process of desilverizing base bullion, and worked at Rome, New York, with the Edison electro-plating dynamo, are the only ones in America. In Europe,



THE "TRIUMPH" CONCENTRATOR.

and twelve for a forty stamp gold quartz mill. A larger percentage of sulphurets and metallic particles will, of course, require a large number of concentrators to insure perfect concentration. They can be conveniently set in pairs for easily adjusting and operating. The mill space required for each machine when set up is 10 by 20 feet; that is, each pair will require 20 by 20 feet. This allowance affords ample room between and around each machine for adjusting any of its parts, and for drawing concentrations and tailings at the ends. The water required for the proper concentration of sulphurets and valuable metallic particles from ordinary gold quartz rock is 60 gallons per hour (exclusive of battery-water delivering pulp).

The weight of machine (boxed) is 2270 pounds; the weight of belt, 220 pounds; and the weight of heaviest part of machine, 80 pounds.

For uniform and close concentration, the speed of the driving-pulley of each machine should be adjusted and maintained at 235 revolutions per minute, or as nearly that as possible. The power required for driving each machine has been carefully determined by an indicator to be less than one half of one horse-power.

**Suez Canal.**—A cable dispatch announces that the Anglo-French engineering commission has decided to give the Suez Canal a breadth of 230 feet and a depth of 27 feet. The cost is estimated at \$40,000,000.

**Water for Power and Fire Purposes.**—The New York City Water Company, with \$1,500,000 capital, has been incorporated by Edward L. Hedden, William E. Tefft, Daniel H. Johnson, Theodore W. Davis, and Frederick Van Lennep, for accumulating, conducting, and supplying water for power and fire purposes.

**Ohio Institute of Mining Engineers.**—The fifth annual Institute of Ohio Mining Engineers was held at the office of the inspector of mines, Columbus, Wednesday, January 14th. The programme included a paper by Andrew Roy, of Glen Roy, on the Pocahontas Explosion, with samples of coal-dust from the Pocahontas mine; one by R. S. Paul, of Akron, on Mining Engineers as Witnesses in Coal Mine Cases; one by R. S. Weitzell, of Logan, on Construction of Mine Maps; and one by Thomas Cole, of Glen Roy, on an Experiment with Coal-Dust.

however, electro-metallurgy in the refining of metal, and especially of copper, has been practiced with wonderful success, and the pure copper is sold for many departments of industry, but principally for electrical purposes. One of the reasons why it has not earlier been common to carry on this process in America is, that manufacturers and purchasers have not heretofore recognized the importance of employing pure copper wire for electro-magnets and for ocean cables.

An inspection of ordinary wire shows splinters protruding through the insulation. Further inspection by breaking the wire at various points discloses holes or oxidized poorer metals, or poorer metals not alloyed with the copper. All these defects increase the resistance at that point, so that the insulation is in danger of burning off and allowing a short circuit, or else the protruding splinter itself will cause a short circuit. What amateur experimenter ever wound an electro-magnet without immediately unwinding it again on account of a leak? And how often is it necessary to re-wind an armature or the field magnets on account of leaks? Often the short circuit is caused by cuts in the insulation made by careless winding, but it is as often due to the bad effects of protruding splinters, and the reason why a coil leaks after using with the maximum current intended for it, is that there are impurities contained in the wire.

To refine copper, a large plate of the cast metal is placed in an electrolyte of cupric sulphate, in a vertical position, while opposite is hung an insulated plate covered with graphite, to form a conducting surface. The distance between the surfaces is made as little as possible, it being generally about one inch. Several cells made up in this way are put in series, and the current passed so as to produce a reguline deposit. The anode is seen to become covered with a dark film of the impurities, consisting mostly of silver, lead, iron, and their oxides. Occasionally the plates are raised and this film removed by a brush. A gang of men, two men to every one hundred cells, is kept busy cleaning the plates.

Lifting out the plates and replacing them has a useful effect, second only to that of cleaning them; to wit, that the liquid becomes agitated so as to keep the specific gravity or degree of saturation always uniform.\* The cathode becomes thicker and thicker to the depth of one half an

\* This is generally done in Europe by having a forced circulation of the electrolyte.—  
EDITOR ENGINEERING AND MINING JOURNAL.

inch, when it is removed and used for commercial purposes. The anodes at the commencement are three inches thick, so that several plates of the refined metal are made with only one change of anodes. Again, the use of such thick anodes saves in the amount of metal it is necessary to recast, for at last the anode becomes a mere skeleton, which must be melted up and recast with other metal.

It has been a question, heretofore, from a theoretical stand-point, whether silver is not deposited with the copper, at least in part. Lately, four plates, two by three feet by one half inch in thickness, were deposited by the Excelsior Electric Company with the Hochhausen machine, and analyzed by a chemist. No silver, not even a trace, was discovered. The solution of cupric sulphate was kept slightly supersaturated, and the current was so adjusted as to deposit reguline. Under these two conditions, it is believed to be impossible to deposit silver with the copper. The film scraped off as described above is saved, and being remelted in a cupel, is so reduced as to yield the silver.

To connect up the dynamo with the cells in series; to cleanse the anodes occasionally; and to prepare the cathodes with graphite, etc., seems not to involve very much engineering experience and skill; but there are necessary, in works for the purpose, many appliances for transporting the heavy copper; for preventing, automatically, the deposit from growing unevenly; for cleaning the copper so as not to lose any of the material in the brush itself; for connecting the cells conveniently and quickly; and for subdividing the current from a large dynamo or from a series of dynamos.

An analysis of the black film shows, on an average, the following composition:

Lead	9.83	Iron	1.77
Silver	3.89	Nickel	1.23
Copper	41.49	Earthy matter	1.32
Oxygen and water	16.94	Gold	.36
Antimony	5.77	Platinum	.44
Arsenic	4.96	Loss	.20
Sulphur	7.50		
Tin	4.00		
			100.00

The nature of the composition of the residue varies according to the base bullion copper and sulphate of copper that are used; but the above is an average of many analyses.

**Water-Gas Company.**—The certificate of incorporation of the American Water-Gas Works Construction Company, of New York, capital stock \$1,000,000, was filed in the office of the Secretary of State on December 19th, and the company was organized with William C. Bucklin, Treasurer, and Joseph H. Devoe, Secretary. The object of the company is the erection of water-gas works under some new patents recently issued.

**Some Results of the Meech Process Applied to Refractory Ores.**—Our "Traveling Correspondent" says: Recognizing the interest that the illustrated article in our issue of November 1st, 1884, would awaken among mining engineers and metallurgists, I have taken pains to secure reports of actual tests made with the Meech & Co. plant at Cleveland, Ohio, and append the following as representative tests. Allowance should, however, be made for the fact that, in working large quantities of ore instead of a few hundred pounds as samples, more favorable results would undoubtedly be obtained. The following is a copy of a report from E. A. Hare, assayer and refiner, of Cleveland, to the Utah Mining and Reduction Company, 121 Superior street, Cleveland, Ohio, H. M. Claffin, Vice-President: "I have made the following assay of gold and silver ore from the Jordan mine in Utah. No. 1 is the assay of the original ore from mine. No. 2 is the assay of the tailings containing some floured quicksilver. No. 3 is the assay from tailings after being fully treated by the Meech process:

Assay No. 1, per ton, gold 0.5 oz., value	\$25.00
" " silver 13.20 oz., value	13.50
Total over value per ton	\$38.50
Assay No. 2, gold 0.5 oz., value	5.00
silver 1.0 oz., "	1.00
Total over value per ton	\$6.00
Assay No. 3, gold, nothing	
per ton silver, value	.06

The above ore is of a very peculiar and complicated character, having baffled all previous attempts to treat successfully. I have examined the working of the Meech machinery, and am of the opinion that the process can treat successfully any kind of refractory ore, extracting therefrom a very high per cent of the precious metals."

The following is the result from a sample lot of 350 pounds of telluride ore from Boulder County, Colorado:

Ore—gold per ton, value	\$157.71
Tailings—gold per ton, value	5.70

A sample lot of 360 pounds of silver sulphuret ore from the Excelsior mine, Park County, Colorado, worked in the presence of the owner, Mr. Thomas F. Wright, of Cleveland, and who selected his own samples of both the crushed ore and the tailings, the latter being dipped up from the tub with a hoe, showed the following results on being assayed by Prof. W. E. Judson:

Ore—gold, 1.1 ounces per ton, value	\$22.73
silver, 34.4 ounces per ton, value	35.17
Total	\$57.90
Tailings—gold, per ton, a trace	
silver, per ton, 1½ ounces, value	\$1.68

From Mr. Wright I learned that steps would be immediately taken to secure the consent of the company to erect a Meech plant to work the ore of the Excelsior mine, and a number of practical mine men, representing different districts, who have investigated and witnessed its working, have personally declared a favorable opinion. I am not sufficiently versed in metallurgical methods to pass any judgment on the process; but from what I have seen and know of the Meech process as demonstrated by the plant in Cleveland, Mr. Meech's claims certainly deserve the candid investigation of all who are interested in the treatment of refractory ore.

## THE DISTRIBUTION OF SAN JUAN COUNTY ORES.—VII.

By Theodore B. Comstock.

### The Mineralogy of the Six Radial Zones.

6. *The Sulphuret (Mount Sneffels) Zone.*—The remaining territory, lying between the trends S. 86° W. and N. 26° E., with the central parent fissure running approximately N. 30° W., must be passed over somewhat briefly, not because of its minor importance, but on account of the difficulty of discussing such a wide area of complicated structure without closer investigation than the writer has yet been able to give this district. However, there is an appropriateness in thus hastily disposing of the greater part of the zone, arising from the facts that its commercial relations are different from those of the remainder of the territory under consideration, and that such an able investigator as William Weston resides in this belt, which he has made familiar by his writings. But our review would certainly be incomplete without a few broad generalizations showing the relations of this tract to the five other zones; and, besides, a considerable area in the Red Mountain region must also be regarded as structurally and industrially connected with Silverton as much as with Ouray. The future commercial relations of all the belts are determinable chiefly by circumstances much more artificial than natural, and it is now quite impossible to predict whether one or the other town will eventually become the market for much of this zone.

There may be reason to divide this zone, but it is more probable that our present classification is correct, and that there have been only three great lines of maximum uplift across the country. I have shown that zones 1 and 3 are nearly continuous in the trends of their parent fissures, and this feature is almost as characteristic of the axes of zones 2 and 4, while it is even more marked with respect to zones 3 and 6.

The distinctive peculiarities of the sulphuret zone are just such as the experienced field geologist might predict from a knowledge of the geology of the area. With a smaller number of veins, there are not a few that are very prominent and very rich. With a region of excessive folding and contortion of strata, showing extreme effects of the agencies of erosion, there is an intensification of all the minor volcanic phenomena, and a consequent complication of vein structure, that render the district in many respects unique, and cause it to present new practical problems in mining engineering.

Continuing our plan of naming the zone from the general character of its richest silver-bearing ores, I have styled this the *sulphuret zone*, because the most prominent veins usually carry their silver chiefly in the form of a sulphide, more or less modified, however, by the presence of other ingredients. The exceptions are commonly found in such deposits as have been materially affected by secondary causes, as by the superficial action of hot springs and geysers, which effects are more pronounced in this district than in any other similar area in the world. It is quite impossible to work economically the properties that lie within the old crater in this zone, without a clear understanding of the nature of these deposits; hence it will be advisable to discuss them here with more detail than would otherwise be appropriate in such a series of papers.

The central parent fissure of this zone follows the high divide between the waters of the San Miguel and Uncompahgre rivers, starting from the margin of the Red Peak Crater and passing outward northwestwardly through Big Elephant Basin up to the head of Marshall Basin, near Mount Sneffels and beyond. The topography upon this slope is characterized by an abrupt transition from mountain to plains, so that the area of vein outcrop is, as it were, crowded into narrow limits, the subjacent formations being crumpled and forced to occupy less space horizontally than their compeers on other sides of the crater region. This may partly account for the paucity of the veins and the intensified manifestations of those that do exist. It will also explain, in a measure, the occurrence of an interesting *pseudo-contact* deposit upon the now famous Mineral Farm, not far from Ouray. The principal vein of the district—the "mother vein"—is in the axis of the belt, and upon it are located some of the richest mines of Southwestern Colorado, as the Virginus, Mendota, Sheridan, Smuggler, Seventy-Six, Cimarron, etc. The ore is scattered rather evenly in grains through a tough quartz, with some patches of more solid galena. The richest portion is usually a silver sulphuret, commonly *polybasite* (orthorhombic silver and copper sulph-antimon-arsenide). There are a few parallel veins that carry some free gold, and others yielding the silver in minerals of different character. The Flora mine, in Big Elephant Basin, as well as the neighboring Cincinnati and others, are examples in point. The Pandora and some cross-veins also carry more or less of varieties suitable for concentration, but these products also accompany the rich streak in the "mother vein."

That portion of the old crater area that forms the apex of this wedge is almost completely covered by the superficial deposits from extinct hot springs and geysers. These consist of a vast number of pools, mounds, and hillocks, in every respect similar to the existing excrescences in the Yellowstone National Park, except that the Red Mountain deposits are upon a scale of far greater magnitude. Here we have remains of single geyser chimneys from fifty to one hundred feet in height and many hundreds of feet in circumference, and not a few walled depressions indicating the former existence of thermal springs of enormous dimensions. The epoch of activity, though comparatively recent, geologically speaking, must have been very remote as measured by years; for dense forests now cover the whole area, upon which a heavy soil has accumulated. The oldest extinct springs within the Yellowstone Park District are apparently as young as the latest of the Red Mountain crater.

This is not the place to discuss the history of these very interesting relics, though it is evident that they are most intimately connected with the ore-deposition of the district. Hitherto the mines that have been opened in this section have been worked without much regard to any preconceived system of exploitation, in the belief that nothing could be determined beforehand concerning the probable positions of the ore-bodies. This is an error that has, perhaps, been somewhat justified by the lack of knowledge of the geology of the district; but there is now no reason to look upon these formations as indefinable problems to be attacked only in a hap-hazard manner. The skilled geologist, familiar with the phenomena and results of secondary volcanic action, can lay out a scheme for the economical development of these deposits with as much



success as in the case of properties of other kinds. There are hundreds of localities that have all the indications of the presence of ore-bodies of no less importance than those already uncovered, and it may be as well to remember, in developing such claims, that the large amount of irregular work already performed has invariably proved that regular methods would have accomplished more with much smaller outlay. The amount of "gophering" in some of the best properties has been so great as to seriously interfere with the mining when it has come to be necessary to adopt correct methods.

In the crater region, but few surface indications of fissure-veins must be anticipated. There is a system in the arrangement of the ore-masses that bears a generalized relation to the radial vein-distribution beyond; but this feature will not be apparent without closer examination than can be given by ordinary investors. It is equally difficult to determine where the best deposits lie, without such knowledge as can come only as the result of special exploration in each individual case. However, it is not impossible to arrive at some general idea of the limits within which one may safely trust to appearances. To this extent, it will be wise to remember the following facts:

1. The deposits are usually in mounds, but sometimes may be expected in depressions that form the centers of elevated tracts.
2. In most cases, the larger mounds, and those with the least rugged outlines, have yielded the greater quantities of ore.
3. The richest ore is associated with the heaviest deposits, as a rule.
4. The ores nearest the surface are liable to be most highly charged with arsenic, antimony, and other undesirable ingredients, usually with low percentages of the precious metals.

The special minerals afforded by these deposits are of one general type, comprising an almost endless series of complex composition, shading one into another by imperceptible degrees. There is, as it were, a tendency toward the assertion of supremacy on the part of the true silver minerals, which is frequently overcome by the preponderance of the baser metals. Thus, in the Yankee Girl, and the neighboring mines, acanthite (silver sulphide, orthorhombic) is not infrequent, and this gradually merges through stromeyerite (orthorhombic silver and copper sulphide) and sternbergite (orthorhombic silver and iron sulphide) into stephanite (orthorhombic silver and antimony sulphide), and polybasite (silver, copper, antimony, and arsenic sulphide, orthorhombic), then, with admixtures of galena and bismuth glance, exhibiting a considerable variety of the possible combinations of two or more of the above-named ingredients. This complexity is even more marked in those associated minerals that carry but meager proportions of the precious metals, and the transition is very easy to the enargite, epigenite, jordanite, bournonite, stylopyrite, etc., which, though characteristic of other zones, occur in the apices where the separation is not locally well marked. It is usually difficult to secure perfect crystalline forms for accurate determination, and it is probable that the bulk of the ore is made up of grains of different closely allied minerals. But, in some cases, fine cabinet specimens of perfect crystallization are attainable. Thus, the Congress mine (arsenical zone) yields excellent prisms of enargite, the Zuffi (antimonial zone) produces good bournonite crystals, the Excelsior furnishes beautiful imbedded prisms of stylopyrite, and some fine specimens of the silver minerals have come from the Yankee Girl.

It is noteworthy that galena is almost invariably present among the ores of the crater area, regardless of the presence or absence of other compounds, and it may be observed that lead is not usually a constituent of the complex sulphides, except where arsenic and antimony predominate over sulphur. This statement will be superfluous, of course, to those of my readers who are familiar with chemical geology, as it is simply the expression of the fact that sulphur combines more readily with lead than with arsenic, antimony, and other metals. But it is well to bear this fact in mind while considering the relations of the ore-deposits to their metallurgy.

CLEVELAND, OHIO, Jan. 3, 1885.

**Explosion in a French Coal Mine.**—A dispatch announces an explosion in the great coal mine at Lievin, France, January 15th. At the time of the calamity, there were fortunately only forty-eight men in the mine. Twenty-eight dead bodies have so far been brought up from the mine. An explosion of fire-damp caused 800 meters of the galleries to fall.

**Benjamin Silliman.**—Benjamin Silliman was born in New Haven on December 4th, 1816, and entered Yale College with the class of 1833, being graduated in the regular order in 1837. He was at once employed as teacher in the departments of chemistry, mineralogy, and geology in the college. In 1838, he became an associate editor of *Silliman's Journal of Science*, which was conducted by his father, and he remained in that position until 1845. In the following year, he was made Professor of Applied Chemistry at Yale, and, in 1854, he succeeded his father in the chair of chemistry, the place that he retained until his death. In 1847, with Prof. John P. Norton, he established the Yale Scientific School, which has since become the Sheffield Scientific School. From 1849 to 1854, he filled the chair of Medical Chemistry and Toxicology in the University of Louisville, and was a director in the departments of chemistry, mineralogy, and geology in the Crystal Palace World's Fair in New York. On May 14th, 1840, he married Susan H. Forbes. They had seven children.

Professor Silliman was a voluminous writer. His first work, which was published in the year when he entered upon his duties as professor at Yale, was *First Principles of Chemistry*. In 1858, he published *First Principles of Natural Philosophy or Physics*. In 1851, he made a visit to Europe with his father, and subsequently edited his father's work, *A Visit to Europe*, and wrote many articles on various scientific and practical subjects. In connection with his work at the Crystal Palace, he and Charles R. Goodrich edited *The World of Science, Art, and Industry*, and in 1854 he recorded the chief results of the exhibition in *The Progress of Science and Mechanism*. He was one of the fifty original members named in the Act of Congress in 1863 incorporating the National Academy of Sciences. He was also one of the trustees of the Peabody Museum of Natural History. For a number of years, he was the State Chemist of Connecticut, and was a member of several scientific societies in this country and in Europe.

#### THE WELSH COPPER SMELTING PROCESS.—IV.\*

By A. M. Levy, Namur.

Since the smallest details are important in refining, let it be supposed that the furnace is empty and cold, and let us describe the entire series of operations. Slag in large pieces is thrown in the grate until a layer of from 20 to 25 centimeters in thickness is obtained, followed by wood, and finally by burning coal. When the fire is well started, slack is charged until the fire-place is full. The fire-bridge is closed with a slab, and the working-door removed. The draught is, therefore, slight, and the temperature increases slowly, as it should, to avoid fissuring the bottom or damaging the roof, which might possibly not be entirely dry. When that part of the roof that is above the fire-bridge becomes red, the draught is increased a little, until the whole furnace is bright red. This temperature is kept up for two or three hours, so that the bottom is thoroughly heated. It takes at least twenty-four hours to carry the furnace up to the right temperature, provided it has not undergone any important repairs. If any part of the masonry is fresh, it is necessary to proceed much more slowly. While the heating of the furnace is going on, and it is to receive a full charge, a dam is built up at the working-door. It is true that the bottom might be given a sufficiently great depth to render this dam unnecessary, but then the lading becomes exhaustive work toward the end of the casting. The dam is made of iron bars, protected by refractory material.

When the furnace is hot enough, the blister copper is charged. First, two or three shovelfuls of slack coal are scattered over the bottom, and then the bars are piled in as closely as possible. After scattering slack coal over them, the side door is luted, while the working-door is left open. The charge gradually reaches the temperature of the furnace, and when the bars near the fire-bridge commence to melt, the working-door is closed and the firing pushed. The beginning of melting is indicated by the brilliancy of the hottest bars, this brilliancy being caused by a small quantity of melted oxide of copper, which covers the surface of the bars like a varnish. A moderate fire is kept up until the entire hearth is covered with molten metal. Care must be taken that no air enters the fire-place during melting. Copper furnaces, like puddling-furnaces, have no fire-door. It is filled up with slack and lump coal. It takes five or six hours of firing to melt the charge, according to the quality of the coal and the draught. For refining, a dry, long-flame coal is wanted, which sinters comparatively little and burns readily.

When the copper seems well melted, the bottom is probed with a rabble, to make sure that no pasty metal adheres to it. Then it must be ascertained that the bath has a sufficiently high temperature, which is done by immersing in it a casting-ladle covered with clay. When the copper that at first adheres to it is difficult to melt, the copper is too cold, and must be made hotter. When, on the contrary, it does not, the removal of the slag with a rabble is proceeded with. It is absolutely necessary that the surface of the bath be clean. An excellent way of arriving at that result consists in throwing some shovelfuls of ashes on the metal, which dry the slag and make it easier to draw it out. The side door is then opened, depending on the draught of the furnace. If it is too strong, half of it can be opened without running the risk of cooling the bath too much. With a lighter draught, the opening must be made smaller, and in some cases, even, if the stack is not high, it is necessary to be content with introducing the air through two small openings provided in the roof above the fire-bridge. It is evident that oxidation will be all the more rapid, the greater the opening can be made. The copper must, however, be kept perfectly liquid.

In order to bring all parts of the charge into contact with atmospheric oxygen, it is necessary to stir vigorously. This is done by introducing into the bath a pole of green wood, the harder varieties being the best. The metal is violently thrown against the roof and sides of the furnace, and oxidation goes on rapidly. When the metal is more or less impure, and the feeble draught of the furnace does not admit of opening the side door, the scorification of the impurities is hastened by throwing a few handfuls of nitrate of soda on the surface of the bath. I have always made use of this substance, not only to gain time, but also because we have been led to believe that it improved the quality of the metal. In some works, a mixture of equal parts of slacked lime and of nitrate of soda is used for the same purpose.

In the beginning of the operation, the copper has a fine gold-yellow color; but as the oxidation proceeds and a greater quantity of cuprous oxide is dissolved, the bath has more and more the appearance of oil. It reflects light only feebly, and the yellow color has entirely disappeared. As fast as the pole of wood is consumed, it is pushed farther into the furnace, and when it has become too short, it is replaced by another; and so on, until the oxidation has progressed far enough. From time to time, the refiner takes a sample of the metal, cools it in water, and breaks it. The first samples have a fibrous structure and possess some tenacity. As copper dissolves more oxide, the grain becomes finer, the clear copper darkens and becomes reddish, and the metallic luster disappears. Finally the metal becomes very brittle. Those who have experience do not need to take a large number of samples. The aspect of the bath gives sufficient indications, and one or two tests toward the end of the operation are sufficient. Small patches of oxide are seen forming in places on the surface of the bath, which disappear rapidly in dissolving in the metal. Soon these patches become more numerous, disappear more slowly, and finally end in covering the entire surface when the pole is withdrawn. The copper is then saturated with oxide, and the fracture of a sample shows the characteristic brick-red color. It is much easier to carry this part of the refining to a good end when the draught of the furnace makes it possible to open the side door. Then the progress of the oxidation may be more easily followed. When the door is closed, samples must be taken, being guided all the time by a knowledge of the character of the blister copper treated.

The impurities gather on the surface of the bath in the form of a slag, which is very liquid and accounts for the large quantity of cuprous oxide it contains. It must be admitted that, commercially speaking, the metal is at this point completely purified, so far as foreign metals are concerned. A small quantity of arsenic and an excess of cuprous oxide remains, however. The slag is stiffened with ashes and withdrawn.

\* *Revue Universelle des Mines*, Vol. 26, No. 2, p. 286.



It must be completely removed, for fear of its mixing with the metal during casting. A branch of wood is introduced by the side door, by which the surface of the bath is skimmed and the slag is pushed toward the working-door.

During these operations, the metal cools pretty strongly, and it may happen that the temperature is lowered so much as to make the copper difficult to refine. All the openings are luted after throwing a stick of wood on the bath to prevent further oxidation. However well the furnace may be built, there are always fissures through which air enters. Firing is continued from 10 to 20 minutes, according to the quality of the coal and the draught. The workmen take advantage of this period to clean the grate and coal. During the rest of the operation, the fire must be touched as little as possible, the only point being to see that the firing opening is well stopped up by slack coal, in order to prevent air from entering. As the working-door is open during the casting, the draught is weak and the fuel is slowly consumed. It will be seen, therefore, how necessary it is to have a fuel that burns easily and sinters little, so that it offers only a slight resistance to the passage of the air. A sufficient quantity of heat must be stored up in the metal, the side walls, and the bottom of the furnace, to keep the bath liquid during the rest of the operation, with the aid of the fire.

The refining or oxidation period does not remove from the metal all the arsenic it contains. Cuprous oxide seems incapable, even when present in excess, of scorifying the last traces of it. Oxide of lead gives better results, and acts more energetically. It may be stated, however, that, when the copper holds any quantity of arsenic, it is almost impossible to eliminate it entirely.

#### PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

##### GRANTED DECEMBER 2D, 1884.

- 308,642. Amalgamator. Sylvanus L. Trippe, Denver, Colo.  
 308,652. Boiler Furnace. Zalmon B. Church, May, Mich.  
 308,657. Amalgamator. James M. Dyer, San Francisco, Cal., Assignor of one third to the Globe Iron-Works, same place.  
 308,665. Cupola-Furnace. Frederick W. Gordon, Pittsburg, Pa.  
 308,673. Compensator for Wire Ropes or Cables. Richard B. Ireland, Trenton, N. J.  
 308,714. Composite Fuel. Carl von Gülpfen, San Francisco, Cal.  
 308,715. Metal-Planing Machine. Edward P. Walter and Henry C. Walter, Bridgeport, Conn.  
 308,716. Metal-Planing Machine. Edward P. Walter and Henry C. Walter, Bridgeport, Conn.  
 308,723. Gold-Saving Apparatus. Charles P. Wilson and Leonard G. Gifford, Candelaria, Nev.  
 308,766. Spark-Arrester. Laman C. Hartsough, Cleveland, Ohio.  
 308,796. Gas-Machine. Newman A. Ransom, Chicago, Ill.  
 308,800. Sheet-Metal Pipe. David A. Ritchie, Chelsea, Mass.  
 308,827. Metal Column, Pilaster, or Girder. Edward M. Butz, Alleghany, Pa.  
 308,828. Structural Shape for Columns, Pilasters, and Girders. Edward M. Butz, Alleghany, Pa.  
 308,829. Metal Column, Pilaster, or Girder. Edward M. Butz, Alleghany, Pa.  
 308,856. Machine for Shaping Sheet Metal. Alexander M. Rusland, Little Britain, Ontario, Canada.

##### REISSUE.

- 10,538. Steam-Boiler Furnace. Byron Sloper, New York City, Assignor, by mesne assignments, to the American Combustion Company.

##### GRANTED DECEMBER 9TH.

- 308,874. Anti-Friction Metal. William M. Burnham, Chicago, Ill.  
 308,877. Automatic Hydrocarbon-Feeding Apparatus for Carburetors. Charles F. Copeland, Boston, Mass., Assignor to Joseph Harris, Trustee, same place.  
 308,902. Apparatus for the Separation of Tin from Tin-Scrap. John H. Kolb, Brooklyn, N. Y., Assignor of one third to William J. Matheson, same place.  
 308,903. Method of and Apparatus for Concentrating Metallic and other Salts. John H. Kolb, Brooklyn, N. Y., Assignor of one third to William J. Matheson, New York City.  
 308,908. Means for Electrically Locating Mineral Veins. August P. Lighthill, Boston, Mass.  
 308,943. Steam-Pipe and Boiler Covering. La Fayette Aldrich, Milwaukee, Wis.  
 308,947. Rock-Drilling Machine. Bror F. Bergh, New York City, Assignor to Edward J. N. Stent, Bayonne, N. J.  
 308,948. Tank for the Reception and Transportation of Natural Gas. John M. Bruce, Pittsburg, Pa.  
 308,951. Furnace for the Combustion of Wet Fuel. Augustus W. Colwell, New York City.  
 308,963. Converter for the Manufacture of Iron and Steel. George Hatton, Hagley, County of Worcester, England.  
 308,984. Manufacture of Refractory Linings for Bessemer Converters, etc. Henry D. Pochin, Barnes, County of Surrey, England.  
 308,986. Converter. Jacob Reese, Pittsburg, Pa.  
 309,011. Composition of Metals. John A. Tobin, Nayatt Point, R. I.  
 309,012. Electric-Arc Lamp. Sylvanus F. Van Choate, New York City.  
 309,014. Spark-Arrester. James R. Werth, Richmond, Va.  
 309,027. Apparatus for Condensing Naphtha and other Vapors. Charles A. Burg-hardt, Manchester, County of Lancaster, England.  
 309,037. Brick Machine. Charles A. Tarragon, Portland, Oregon.  
 309,043. Apparatus for Grading the Particles of Crushed Stones, Ores, etc. Watson A. Goodyear, New Haven, Conn.  
 309,073. Drilling-Machine. Perrin G. March, Cincinnati, Ohio.  
 309,078. Dust-Collector for Mills. Charles O. Mook, Jackson, Mich.  
 309,095. Miner's Squib. George S. Reese, Plymouth, Pa.  
 309,096. Combined Furnace, Boiler, and Evaporating Pan. Elijah F. Reser, Oronogo, Mo.  
 309,100. Rolling-Mill. Edward Samuel, Philadelphia, Pa.  
 309,101. Metal-Cutting Machine. Edward Samuel, Philadelphia, Pa.  
 309,134. Metal Roofing-Plate. Charles B. Cooper, New York City, Assignor to the National Sheet-Metal Roofing Company, same place.  
 309,148. Amalgamator. John Knoche, Clancey, Mont.  
 309,160. Rock-Drilling Machine. Henry F. Parsons, Jersey City, N. J., and Bror F. Bergh, New York City, Assignors, by mesne assignments, to Edward J. N. Stent.  
 309,163. Hot-Air Engine. Arnold E. Robinson and Horace Robinson, Manchester, County of Lancaster, England, Assignors, by mesne assignments, to the Victor Caloric Engine Company, Jersey City, N. J.  
 309,168. Process of Preparing Ores for Amalgamation and Desulphurizing the Same. Charles R. Squire, Brooklyn, N. Y., Assignor of one half to James F. Hotchkiss, Plainfield, N. J.  
 309,175. Metal Roofing. John Walter, Nashville, Tenn., Assignor to the National Sheet-Metal Roofing Company, same place.  
 309,180. Support for Rock-Drills. De Volson Wood, Boonton, N. J.

##### REISSUE.

- 10,541. Method of and Apparatus for Sinking Shafts, etc., through Quicksand and other Water-Bearing Strata. F. Hermann Poetsch, Aschersleben, Prussia, Germany.

##### GRANTED DECEMBER 16TH.

- 309,187. Machine for Pulverizing Ores, etc. John C. Blevney, Newark, N. J.  
 309,188. Machine for Pulverizing Ores, etc. John C. Blevney, Newark, N. J.  
 309,189. Machine for Pulverizing Ores, etc. John C. Blevney, Newark, N. J.  
 309,225. Coal-Mining Machine. John A. Hohn and Samuel Y. High, Morristown, Tenn., Assignors of one half to Simon B. Benson, Waterford, Pa.

- 309,226. Smoke-Consuming Furnace. James W. Hueber, San Francisco, Cal., Assignor of one half to Abram Altmayer, same place.  
 309,277. Turbine Wheel. John Humphrey, Paris, O.  
 309,250. Manufacture of Highly Refractory Silica Brick. Isaac Reese, Pittsburg, Pa.  
 309,251. Process of and Apparatus for Producing Gas. Jacob Reese, Pittsburg, Pa.  
 309,255. Wire-Nail Machine. George H. Ryan, Taunton, Mass., Assignor to L. A. Rounds, same place.  
 309,270. Plant for and Process of Making Lime. Samuel T. Wellman and George W. Goetz, Cleveland, Ohio.  
 309,278. Duplex Compound Engine. Charles C. Worthington, Irvington, N. Y.  
 309,280. Soldering-Iron. August F. Zimmerling, Milwaukee, Wis.  
 309,281. Soldering-Iron. August F. Zimmerling, Milwaukee, Wis.  
 309,290. Apparatus for making Hydrogen Gas. William H. Bradley, New York City.  
 309,295. Machine for Bending Wire Springs. Gustav Dentgen, Düren, Prussia, Germany.  
 309,296. Rotary Engine. John C. Edmunson, Salinas, Cal., Assignor of one eighth to Ira B. Tucker, same place.  
 309,309. Miner's Safety-Lamp. Jean Baptiste Marsaut Bessèges, Assignor to Compagnie Houillère de Bessèges, Nîmes, France.  
 309,366. Oven. William H. Thompson, Queen Square, Leeds, County of York, England.  
 309,367. Brick-Machine. Joel Tiffany, Hinsdale, Ill.  
 309,432. Metal-Punching Machine. Anders Andersen, Copenhagen, Denmark, Assignor to the Kjöbenhavn Hest-skofabrik, same place.  
 309,446. Wire-Nail Machine. Rudolph Egli, Rapperschwyl, Switzerland, Assignor, by mesne assignments, to Lewis M. Loss, Rochester.  
 309,467. Apparatus for Enriching Coal-Gas. Ira James, Mattoon, Ill.  
 309,468. Manufacture of Compound Wire. Irving A. Kilmer and Melvin D. Kilmer, Schenectady, N. Y.  
 309,492. Hardening Steel. Ludlem B. Rockwell, Sunbury, Pa.  
 309,507. Process of Manufacturing Articles of Steel and Steely Iron. Samuel Johnson, Brockport, N. Y.  
 309,509. Compound Wire. William Paul and Thomas J. Wood, Ansonia, Conn., Assignors of one third to Felix Chillingworth, New Haven, Conn.  
 309,513. Amalgamator. Edwin A. Hare and Aaron Higley, Cleveland, Ohio.

##### GRANTED DECEMBER 23D.

- 309,540. Bessemer Plant. William Hainsworth, Pittsburg, Pa.  
 309,549. Brick-Machine. Joseph J. Kulage, St. Louis, Mo.  
 309,556. Open-Hearth Lead-Furnace. Elliott R. Moffet, Joplin, Mo.  
 309,557. Safety-Gear for Starting Engines. John Musgrave and Arthur Walsh, Bolton, County of Lancaster, England.  
 309,584. Wire-Barbing Machine. Henry M. Vaughan, Newton, Iowa, Assignor to the Washburn & Moen Manufacturing Company, Worcester, Mass., and Isaac L. Ellwood, De Kalb, Illinois.  
 309,587. Fuel. Friedrich W. C. Waldeck, Hague, Netherlands.  
 309,589. Brick-Machine. George J. Weber, Boonville, Mo.  
 309,591. Regulating Steam-Supply to Compound Engines. George Westinghouse, Jr., Pittsburg, Pa.  
 309,592. Regulating Steam-Supply to Engines. George Westinghouse, Jr., Pittsburg, Pa.  
 309,595. Furnace for Generating Illuminating and Heating Gas. John D. Averell, New York City.  
 309,629. Mold for Making White-Metal Castings. John R. Kinsley, Cincinnati, Ohio.  
 309,637. Miner's Implement. Isaac A. Martin, Urday, Colo.  
 309,642. Hydraulic Air-Compressor. Charles Moore, Philadelphia, Pa.  
 309,613. Regenerative Gas Furnace. John Morrison, Pittsburg, Pa.  
 309,652. Rotary Engine. Dudley E. Saltousta, Toledo, Ohio.  
 309,663. Spark-Arrester. James A. Stout, Belleville, Ill., Assignor to the Harrison Machine-Works, same place.  
 309,679. Roller-Mill. William S. Bacon, Tiffin, Ohio.  
 309,688. Wire-Drawing Apparatus. Jean Marie Buisson, Belmont, France.  
 309,712. Bessemer Plant. William Hainsworth, Pittsburg, Pa.  
 309,729. Apparatus for the General Reduction and Separation of Ores, etc. Thomas W. B. Mumford and Robert Moodie, Victoria Docks, County of Essex, England.  
 309,734. Rotary Engine. Emil Oehlmann, Berlin, Germany.  
 309,749. Apparatus for Burning Liquid Hydrocarbon Fuels. Thomas Urquhart, Borissolebsk, Tambov, Russia.  
 309,758. Wire-Barbing Machine. Frank W. Brainerd, Chicago, Ill., Assignor to Washburn & Moen Manufacturing Company, Worcester, Mass., and Isaac L. Ellwood, De Kalb, Ill.  
 309,766. Apparatus for Preparing Clay for Molding Bricks, etc. John Christiansen, Chicago, Ill., Assignor of one half to Edward H. Callaway, same place.  
 309,787. Explosive Compound. Egbert Judson, San Francisco, Cal.  
 309,797. Duplex Steam-Pumping Engine. Philip Pistor, Philadelphia, Pa., Assignor to the Southwark Foundry and Machine Company, same place.  
 309,801. Machine for Forming Sheet Metal. Harry Rayner, Alleghany City, Assignor of one half to George Zieg, Pittsburg, Pa.

##### REISSUE.

- 10,545. Air-Gas Machine. James P. Clifford, New Haven, Conn.

##### GRANTED DECEMBER 30TH.

- 309,830. Nail-Plate Feeder. Junius H. Dunbar, Youngstown, Ohio.  
 309,839. Oil-Cup. Frank Fink, Springfield, Ohio.  
 309,840. Oil-Cup. Frank Fink, Springfield, Ohio.  
 309,845. Valve for Air-Brakes. Charles W. Green, Scranton, Pa.  
 309,874. Method of and Apparatus for Treating Wood for the Manufacture of Charcoal. Henry M. Pierce, Chicago, Ill.  
 309,876. Ratchet Drill. Caspar Reising, Plantsville, Assignor to the Peck, Stow & Wilcox Company, Southington, Conn.  
 309,887. Ratchet-Brace. Amos Shepard, Plantsville, Assignor to the Peck, Stow & Wilcox Company, Southington, Conn.  
 309,895. Speed Governor. Harris Tabor, Alleghany, Pa., Assignor to the Tabor Manufacturing Company, New York City.  
 309,904. Blowing-Engine. Peter L. Welmer, Lebanon, Pa.  
 309,916. Method of and Apparatus for Manufacturing Gas. Augustus L. Allen, Poughkeepsie, and George W. Harris, Rondout, N. Y.  
 309,920. Machine for Hoisting, Delivering, and Screening Coal. Morgau Bird, Plainfield, N. J.  
 309,924. Barbed Fence-Wire. William Burtis, New Egypt, N. J.  
 309,927. Drill for Sinking Well-Tubing. Matthew T. Chapman, Aurora, Ill.  
 309,956. Saw-Hanging Device for Stone-Sawing Machines. Phillip Jaeger and John W. Barnes, Baltimore, Md.  
 309,964. Apparatus for Separating Dust from Air. Ernest Kuehne, Chicago, Ill.  
 309,965. Apparatus for Separating Dust from Air. Ernest Kuehne, Chicago, Ill.  
 309,967. Soldering-Iron. Thomas A. Mayes, Phillipsburg, Pa.  
 309,968. Apparatus for Charging Liquids with Gas. W. Maynard, New York City.  
 309,977. White-Lead Pot. Charles T. Palmer, New Brunswick, N. J.  
 309,989. Ratchet-Drill. Thomas P. Somes, Revere, Mass.  
 310,007. Chill for Casting Car-Wheels. J. Hill Whiting, Detroit, Mich.  
 310,012. Apparatus for Extracting Gases from Molten Metals. Rosell Aitken, Westminster, County of Middlesex, England.  
 310,013. Hydrocarbon Vapor-Fuel Generator and Burner. Augustin I. Ambler, Washington, D. C., Assignor to Roseline N. Ambler, same place.  
 310,018. Oiling Apparatus for Vertical Engines. Alexander T. Ballantine, Geneva, Ohio, Assignor to Ella B. Ballantine, same place.  
 310,039. Spark-Arrester, Conductor, and Consumer. M. L. Flynn and Albert F. Bull, St. Thomas, Ontario, Canada.  
 310,056. Machine for Manufacturing Barb Fence-Wire. James Hogg, Chicago, Ill., Assignor, by mesne assignments, to the Washburn & Moen Manufacturing Company, Worcester, Mass., and Isaac L. Ellwood, De Kalb, Ill.  
 310,062. Amalgamating Apparatus. William A. Koneman and Hiram H. Scoville, Chicago, Ill.  
 310,066. Means for Regulating the Flow of Artesian and Gas-Wells. James J. McTigue, Freeport, and Joseph G. Beale, Leechburg, Pa.  
 310,110. Self-Feeding Gas-Burning Furnace. A. Worthington, Chicago, Ill.  
 310,127. Roller-Mill. James Dawson, Wilmington, Del.  
 310,147. Manufacture of Anhydrous Sulphuric Acid. Alfred B. Nobel and George Fehrenbach, Paris, France.  
 310,148. Automatic Air-Compressor. Walter J. Morris, Scranton, Pa.  
 310,156. Smoke-Consumer. William Vogel, Chicago, Ill.



## FURNACE, MILL, AND FACTORY.

The Baldwin Locomotive-Works, of Philadelphia, have issued a very handsomely printed and illustrated book descriptive of their exhibit at the New Orleans Exposition, giving details of the locomotives built by them, chiefly for Southern roads, and of their performances.

The Lincoln Iron-Works, successors to T. Ross, of Rutland, Vermont, have issued a catalogue describing and illustrating their specialties in stone-working and wood-working machinery. Among the former, we note the Merriman screw gang-saw for sawing stone, the Merriman stone planer, their stone-jointing machine, derricks, rubbing-beds, and quarry hoisting-machines. They illustrate the Ingersoll Eclipse rock-drill, show how it is used in connection with a quarry bar for top and bottom hole gadding and broach channeling, the Ingersoll stone channeling machine, Saunders's patent, and the Ingersoll-Saunders gadding machine.

A stock company is forming at Baltimore for the establishment of extensive plow-works at Hagerstown. It is proposed to absorb a company now in operation at Maugansville, Washington County, Md.

The prospective sale of the Hall rolling-mill in Hubbard, Ohio, to Sharon capitalists has fallen through.

The receiver of Brown, Bonnell & Co. has filed his report for November, which shows: Balance on hand, November 1st, 1884, \$18,037.27; receipts, \$98,293.40; disbursements, \$103,498.70; balance on hand, December 1st, \$12,851.97.

A co-operative company is forming for the purpose of purchasing the rolling-mill of the Westlake Iron Company in Warren, Ohio, which is to be sold in a short time.

The American Oxygen Gas-Light Company has been incorporated at Newark, New Jersey, with a capital stock of \$100,000.

The Excelsior Iron-Works of Stovering & Fleming, at Cleveland, Ohio, were destroyed by fire January 8th. The loss was \$65,000, of which about \$20,000 is on valuable patterns. Little manufactured ware was on hand, the concern having only recently started up with large orders after a shut-down.

The Rockaway Electric Railroad Company, recently incorporated for the purpose of building a road from Far Rockaway to the west point of Rockaway Beach, a distance of five miles, will soon award the contract for building the road.

The Indianapolis Rail Rolling-Mill Company, Ind., has decided to convert the property into a merchant iron-mill. Not a wheel turned during last year, and the depreciation in the value of the property is estimated at \$30,000.

The Douglass Furnace, at Sharpville, Pa., which had been in blast continuously for five years, has been banked on account of the scarcity of orders.

The Emma Blast-Furnace, at Cleveland, Ohio, which is repairing, will begin February 1st. Several departments in the plate-mill will resume work.

The demand of the Pittsburg iron and steel manufacturers has at last been granted by the Trans-continental Freight Association. A big reduction has been announced in rates from that city to points in California. The rate on bar-iron has been reduced from \$1.50 per hundred weight to \$1.15; cast-steel from \$2.71 to \$1.35; common glassware and lamp chimneys, from \$2.50 to \$1.35; and fancy glassware from \$3.62 to \$2.50. The announcement caused great satisfaction among business men.

In the suit of F. Marion Davis against the Philadelphia Iron and Steel Company, in Philadelphia, for personal injuries while in the company's mill, a verdict has been rendered for \$20,000. The accident occurred in 1878.

The mills of the North Chicago Rolling-Mills, at Chicago, will be reopened on January 19th. The manager has stated that, at the present price of steel rails, there was no profit for the manufacturers, but with a fair amount of orders on hand, they had decided to give their men employment. The mills will give employment to 1000 men.

Proposals will be received until January 20th by the Boston Water Board for 470 tons 30-inch pipe, class A; 1450 tons 30-inch pipe, class B; 900 tons 24-inch-pipe, class B; 50 tons 18-inch pipe, class B; 100 tons special castings. The delivery of the pipes to begin on or before April 1st, 1885, and to be completed on the first day of August, 1885.

Pursuant to an order of the court, the Merrill &

Houston Iron-Works, at Beloit, Wis., were sold at auction for the benefit of the creditors, January 7th. That portion of the plant known as the Parker & Stone part was bid in by C. H. Bessley, of Chicago, for \$10,800, which amount covers a mortgage held on said property by the purchaser. The highest bid for the remainder of the plant, including all real and personal property, was \$20,000, and was made by J. D. Rexford, of Janesville, in behalf of all creditors. If the court accepts the bid, it is thought that a new company will be immediately organized and the iron works kept running. The property sold was figured in the assets of the company at about \$200,000.

Kimberley's Rolling-Mill at Sharon, Pa., which was closed several weeks ago, owing to financial embarrassment, has resumed operations.

The Crawford furnace, in Newcastle, which has been idle for several months, has been put in blast again.

The suspension of Oliver Brothers & Phillips, of Pittsburg, Pa., was announced January 15th.

## LABOR AND WAGES.

The Farrell Foundry and Machine Company of Ansonia, Conn., has reduced wages from ten to fifteen per cent.

A reduction of ten per cent in wages of all the employes of the Mahanoy Valley mill at Exchange, Pa., except those governed by yearly contracts, went into effect January 12th.

The strike at Struthers's iron-works, at Youngstown, Ohio, has ended in favor of the Amalgamated Association, and work has been resumed.

At Youngstown, Ohio, the reduction of ten per cent among employes not governed by the Amalgamated Association went into effect January 12th, except at Brown, Bonnell & Co.'s. No resistance to the reduction was made, and the mills are all running more steadily than they have for several months.

Seventy-five coal miners left Pittsburg, Pa., this week, to work in the Saskatchewan mines, which are in the province of Assiniboin, 800 miles west of Winnipeg, Manitoba.

The National Tube Works, McKeesport, Pa., have resumed, with a general reduction of about ten per cent in all the departments.

At the Shawnee furnace, at Columbia, Pa., a reduction in wages of ten per cent after February 1st is announced.

The McCullough Iron Company's works, at Northeast, Md., have started up with a reduction of from ten to twelve per cent.

The Hagerstown Steam-Engine Company, Hagerstown, resumed operations January 19th, with seventy employes, leaving about half of the former force off. A reduction of 10 per cent will be made in the wages of all employes receiving over \$1 a day.

The striking miners at Angus, Ia., started a riot January 8th, and drove all the miners who were at work out of the town, beating and kicking them badly. One man was killed, and six others are reported to be seriously wounded. The trouble has since ended, and the miners have started work at  $\frac{1}{2}$  cent advance and other concessions.

The employes at the Wood's Run Mill, belonging to Oliver Brothers & Phillips, at Pittsburg, Pa., refused to accept any reduction, and the mill is closed down.

The employes of McKity & Hammond's Iron City Chain-Works have struck against a 10 per cent reduction of wages.

The West End Coal Company's miners, who are on a strike at Moccasin, Pa., have resolved to return to work at the reduction of 19 cents on each car of coal mined.

The Coal Trade Tribunal at Pittsburg, after a futile attempt to fix a rate for mining on the railroad pits, has referred the matter to Umpire Bradley.

The Western Iron Manufacturers' Protective Alliance held its third annual meeting in Pittsburg, January 14th. All the districts west of the Alleghany Mountains were represented. It was the largest gathering of the Alliance since its organization. It was unanimously concluded that, at the close of the scale year, May 31st, the rate for puddling shall be \$4 a ton. The present rate is \$5.50. The wages in the finishing-mills will be reduced in a like proportion. The Amalgamated Association will this month

begin the consideration in the lodges of next year's scale.

Reports from the Hocking Valley, Ohio, indicate that every thing is quiet, though a general fear exists that trouble may occur at any moment. A bill has been introduced in the lower branch of the Ohio Legislature to prevent the intimidation of laborers. The bill, which is intended to provide for the protection of the working miners, fixes the penalty for interference at imprisonment in the penitentiary for not more than three years nor less than one. The bill was passed by a vote of 52 to 18.

## RAILROAD NEWS.

The stockholders of the Philadelphia & Reading Railroad Company held their annual meeting at Philadelphia, Pa., January 12th. The attendance was not as large as in previous years. The most important statement in the annual report was that pertaining to the relation of the floating debt to the net earnings of the company. At the close of the year, the indebtedness was: Floating debt of railroad, including receiver's certificates, \$12,086,241; current liabilities, \$7,770,815; total debt, \$19,857,056; floating debt of Coal and Iron Company, \$2,003,253; current liabilities, \$1,657,314; total, \$3,660,567. Total of both companies, \$23,517,623. The statement of earnings and expenses showed: Gross earnings, \$47,450,848; gross expenses, \$34,654,314; net earnings, \$13,396,534. The following ticket was elected without opposition: President, George D. B. Keim; Managers, J. B. Lippincott, J. V. Williamson, Franklin A. Comly, Joseph Wharton, John Wanamaker, Robert H. Sayres; Secretary, Albert H. Foster; Treasurer, William A. Church.

Brady's tunnel, the heaviest piece of work on the Hempfield extension of the Baltimore & Ohio Railroad, is near completion. In a few weeks, with the bed from Little Washington to the tunnel, it will be ready for the ties.

The American & Mexican Pacific Railroad Company has closed a contract for the construction and equipment of the first section of its road, beginning at the harbor of Topolobampo, on the Gulf of California.

The Manhattan Railroad Company, of this city, has consented to permit a practical test to be made on the Second Avenue Elevated Railroad of the electric motors proposed in the patents of the different companies embraced in the American Electric Railroad Company pool.

The Pennsylvania & New York Railroad and Canal Company's annual report for the fiscal year ended November 30th shows: Gross earnings, \$2,151,377; operating expenses, \$1,541,795; and net earnings, \$609,582. The coal tonnage of the com any for the fiscal year was 1,653,508 tons, of which 1,351,408 tons were anthracite, and 302,100 tons bituminous, an increase of 52,157 tons, as compared with the preceding year.

Articles of incorporation of the Ishpeming, l'Anse & Ontonagon Railroad Company, with a capital stock amounting to \$1,000,000, have been filed at Lansing, Mich. The stockholders are James McMillan, Hugh McMillan, George Hendric, William B. Moran, John S. Newberry, Francis Palms, and F. E. Driggs, all of Detroit. The company proposes to build a railroad from Ishpeming, through the counties of Marquette, Baraga, Houghton, and Ontonagon, to the town of Ontonagon, on Lake Superior, a distance of eighty miles.

The Bangor & Portland Railroad has made a proposition to the citizens that, if they will give the right of way, the company will connect the road at Bethlehem or Freemansburg with the Lehigh Valley Railroad. The connection would shorten the distance from 10 to 20 miles between the slate regions and the different towns along the Lehigh, and would bring all the places in Northampton County into closer communication.

Arrangements have just been made for building the Northern Railroad of Guatemala, which is to run from Port Barrios, on the Atlantic, to Guatemala City, 230 miles. The contract was given to the Land and Construction Company of Guatemala. Work is to be started soon, and the road is to be finished within two years. The road will run through land rich in iron, tin, copper, coal, and some gold and silver. When built, it will make direct communication between the Atlantic and Pacific oceans, as there

is a road from Guatemala City to San José, and it will shorten the journey between New York and Guatemala five days.

At a meeting of the stockholders of the Hocking Coal and Railroad Company, held at Columbus, Ohio, the following directors were elected: Charles Hickox, Stevenson Burke, William J. McKinnie, and M. M. Greene. The directors elected the following officers: President, M. M. Greene; Vice-President, Stevenson Burke; Secretary, William M. Greene.

#### COAL TRADE NOTES.

##### CANADA.

###### PROVINCE OF MANITOBA.

Experiments made with the anthracite coal discovered recently on the lands of the Canadian Pacific Railroad near Crow Foot Crossing show that it fully answers the purpose of fuel for locomotives, equally with the American hard coal. It is thought that the saving to the Canadian Pacific Railroad by the use of this coal on the western division, in place of American coal, will reach about \$8 per ton on every ton used. It is calculated that the Crowfoot coal can be delivered at any point on the western division at \$3 a ton.

###### PROVINCE OF ONTARIO.

The Cumberland Railroad and Coal Company has mined and shipped from its Springhill collieries during the past year 243,050 tons of coal. This is by far the largest output ever attained by any colliery in the Dominion. During the year, another new pit has been sunk and equipped with powerful machinery. A new pumping set of great capacity has also been started. The workings have been greatly extended, and the collieries are now in a position to mine and ship two thousand tons a day.

##### MARYLAND.

The grand jury, at Cumberland, January 12th, found an indictment against the new Central Coal Company for a violation of the mining law, for not weighing all the coal mined before it is taken from the mine cars; also against Robert Russell, weighmaster of the company, for not keeping a list of the coal weighed in some place where the miners may inspect it daily, and also for not using proper weights. The cases grew out of the removal of the scales at the company's Koontz mine at Lonaconing from the mouth of the mine to the dump, two and a quarter miles distant. It is claimed much of the coal is shaken off in transit from the mine to the dump, and that the list, being at the dump, is not accessible to the miners. Mine Inspector Sheridan ordered Superintendent Sinclair, of the company, to replace the scales at the mouth of the mine, but he refused, and hence the legal step. The penalty is from ten to five hundred dollars' fine.

At a meeting of the stockholders of the Blaen Avon Coal Company, at Cumberland, the following officers were elected: President, Andrew Spier; Vice-President, Dr. G. E. Porter; Secretary, J. B. Hart; Directors, John Sheridan, W. L. Shaw, J. K. Shaw, Dr. G. E. Porter, A. Spier, F. Mertens, Sr.

##### MISSOURI.

The Age of Steel prints the following statement of the receipts of coal and coke at St. Louis:

Months.	Coal.		Coke.	
	1884.	1883.	1884.	1883.
January.....	173,904	92,585	3,794	5,145
February.....	151,440	74,193	9,375	4,144
March.....	167,040	84,098	9,118	5,191
April.....	145,060	87,813	8,888	9,145
May.....	140,796	73,806	10,328	18,808
June.....	159,067	101,283	6,019	9,239
July.....	159,185	69,191	5,060	15,628
August.....	169,243	123,488	2,087	15,590
September.....	180,566	100,809	2,332	13,287
October.....	162,379	110,945	2,718	32,927
November.....	157,065	100,432	1,516	21,886
December.....	160,554	99,592	2,568	8,132
Total.....	1,926,299	1,747,695	63,803	139,121

One of the most unpleasant facts presented in connection with these tables is the decline to be observed in the receipts of coke. Coke is strictly a manufacturer's fuel; hence, the significance that attaches to a decrease of receipts. In 1882, no less than 201,732 tons of coke were received at this market; in 1883, the receipts were 139,121 tons; and in 1884, only 63,803 tons. These figures speak for themselves. While going over the receipts of fuel, it is comforting to find that the indicated consumption of coal for 1884 is larger than the actual consumption could have been the year before. Despite the idleness

of many manufacturing establishments here during the greater part of 1884, the receipts rose from 1,747,695 tons in 1883 to 1,926,299 tons. In 1882, they were 1,756,556 tons, or something more than in the following year. The increase for the past year was undoubtedly due to the growth of the family demand, and not to a larger consumption on the part of manufacturers.

##### NEW YORK.

###### OIL.

The Standard Oil Company has absorbed another opposition concern at Buffalo, the Solar oil-works, which the Standard people buy of the Tidewater Pipe Line Company for \$60,000. It is doubtful whether the works will again be operated.

###### OHIO.

The Columbus & Hocking Valley Coal and Iron Company's mine No. 5, at Straitsville, was burning January 11th, having been set on fire the night previous. The mine has not been in operation for some time, although it is one of the largest in the country, having a capacity of about 125 cars a day. The entrance to the mine has been closed.

At Weathersfield, the Leadville shaft has shut down for an indefinite time, throwing a number of men out of employment. The Pine Hill shaft has been idle one week on account of breaking their pump. The pump has been repaired and work will be resumed.

Following the example of the Hocking Valley operators, the Sunday Creek men have formed a combination for mutual benefit and to advance the interests of those concerned. The parties to the combination are the Sunday Creek Coal Company and the Sunday Creek Mining Company, which have consolidated under the name of the former, with a capital stock of \$250,000. The consolidation was effected on January 1st. The officers of the company are: President, J. S. Morton; Vice-President and General Manager, G. G. Hadley; Secretary and Treasurer, J. Derthick. The company has two mines in full operation, with a daily capacity of 2000 tons, and recently purchased 1000 acres of additional coal lands.

##### PENNSYLVANIA.

###### ANTHRACITE.

The Crystal Ridge and South Sugar Loaf collieries, operated by A. Pardee & Co., have suspended operations, owing to the depressed state of the coal market.

The Silver Brook Coal Company is about to apply for a charter, intending to begin operations between Summit Station and Honey Brook. The company is made up of Mauch Chunk parties.

The collieries of the Red Ash Coal Company have suspended work. The mines of the Alden Coal Company at Alden, employing 300 hands, will also close down, but may resume next week. The Lehigh Valley Coal Company, it is also said, is about to close several of its collieries, the Maltby, Pleasant Valley, Midvale, and Exeter mines being the ones mentioned.

###### BITUMINOUS.

The Barclay Coal Company reports rent of railroad and royalty on coal for the month of December as \$7308. Total receipts for 1884, \$84,954.

###### COKE.

The coke pool entered into by the Pennsylvania, Baltimore & Ohio, and Pittsburg, McKeesport & Youghiogheny railroad companies, the latter backed by the Pittsburg & Lake Erie and New York, Pennsylvania & Ohio roads, expired January 7th. Several attempts have been made to reorganize it, but without avail. The Pittsburg, McKeesport & Youghiogheny has been allowed from twenty-seven to thirty-five per cent of the shipments, while its line only touches about seven per cent of the ovens. The Pennsylvania and Baltimore & Ohio roads are opposed to allowing this percentage. Hence the failure to arrive at an agreement.

John D. Boyle, President of the Coke Producers' Association, has entered suit against McClure & Co., one of the members of the syndicate, to recover \$7399, which he alleges to be due him for his half-share of the output of the Boyle works, handled by the syndicate, the proceeds whereof were received and not accounted for by his joint partners in the ownership of the works, the defendants named. On account of these troubles, it is rumored that Boyle will resign the presidency of the association.

The following works in the Connellsville region

are wholly idle, being counted in the pool shut-down: Of the Frick works, Warden, Tip Top, and White; the Sterling works of J. M. Schoonmaker; the Enterprise works of McClure & Co.; the Clinton works of B. F. Keister; and the Star works of A. C. Cochran & Co. Standard is running 138 ovens, the product of which is consumed in making crushed coke. Kyle, Percy, and Ferguson are idle on account of slack market; Colvin, because of fire in its mines. Alice is still running 25 out of 200 ovens.

###### NATURAL GAS.

The Consolidated Natural Gas Company has reduced the price of gas for domestic purposes to 12½ cents per 1000 cubic feet. The action was taken to meet the cut made by the Alleghany Heating Company last week. The Consolidated Company announces that after a careful test it has been found that natural gas at that price is somewhat cheaper than coal.

The Penn Fuel Company has arranged for a very important test, which is to be made on its high-pressure mains at Hiland and Penn avenues, Pittsburg. The Chapman valve, which has been in use by the Pennsylvania Railroad Company for some time on the gas pipe in its passenger cars, will be tested with the view of determining its efficiency in controlling and regulating the flow of natural gas.

The several natural gas companies of Western Pennsylvania are about to consolidate their interests, and, assisted by Eastern capitalists, will organize the Seaboard Natural Gas Company. It is proposed to transport natural gas to Philadelphia, New York, and other Eastern cities. Work will begin not later than on May 1st. A report from Greensburg says that in the last few days a great amount of gas territory has been bought up. At present, at least three fourths of a tract of 500,000 or more acres of gas-producing territory in Western Pennsylvania are tied up in leases held by enterprising companies. Leases for 10,000 acres are weekly placed in the office of the Register and Recorder of Westmoreland County, and charters are secured in the different States into which the new company's lines will enter.

The Westinghouse Company has struck a large gas-well on the King farm, Murraysville region, at a depth of 1328 feet, and the gas dry.

At the iron-works of W. D. Wood, McKeesport, Pa., natural gas has been introduced into two puddling-furnaces, and has proved entirely satisfactory.

The Consolidated Penn Fuel and Fuel-Gas Company is operating seven producing gas-wells.

#### GENERAL MINING NEWS.

##### ALABAMA.

The total iron ore production for 1884 is estimated at 650,000 tons.

##### ARIZONA.

###### GILA COUNTY.

OLD DOMINION.—Wages have been reduced to \$3 a day for surface work, and \$3.50 for underground mining. The furnaces have been closed, owing to a scarcity of coke.

###### PIMA COUNTY—QUIJOTOA DISTRICT.

Another strike is reported, and Western exchanges are giving glowing reports. At the Peerless Company's mines, the machinery is in place and running satisfactorily.

###### YAVAPAI COUNTY.

UNITED VERDE.—The company's production during the past year shows 3,682,336 pounds of copper and 163,987 ounces of silver. The furnaces, which are now closed down, will probably not start up before July next, by which time it is expected a railroad will be constructed to Jerome, where the company's works are situated.

##### CALIFORNIA.

###### INYO COUNTY.

CERRO GORDO.—Thomas C. Boland has leased this mining property, including mines and furnace. Work will begin immediately.

CLIFF.—Work has been resumed at this mine, which has been idle for a year.

###### MONO COUNTY—BODIE DISTRICT.

There is nothing of interest to report from the different mines. The work of development continues as usual.

###### SAN BERNARDINO COUNTY.

ALHAMBRA CONSOLIDATED.—Bullion shipped from the company's ten-stamp mill during the year just



closed was valued at \$387,000. The mines at present worked are the Bismarck, Cuba, Odessa, and Richmond. During the year, the following mines, located in East Calico, were purchased by the company: Cuba, Silveretta, Richmond, Hawkeye, and Dunderberg.

**ORO GRANDE.**—The gross value of bullion produced during the past year amounted to \$450,000. The mine is developed to a depth of 550 feet. A narrow-gauge railroad from Calico to the mill and thence to Daggett is to be built.

SIERRA COUNTY.

**MARGUERITE.**—The company has brought suit against Charles Quirillo to restrain him from so operating his placer mine at Loganville that the debris therefrom will flow into their ditch and flume. The plaintiff asks for \$10,000 damages, and a perpetual injunction enjoining him from continuing work in such a manner as to injure his property.

COLORADO.

ARAPAHOE COUNTY.

**BOSTON & COLORADO SMELTING COMPANY.**—The report from these smelting and refining works for 1884 is as follows:

LOCALITIES.	Gold.	Silver.	Copper.	Total.
Gilpin Co.....	\$683,000	\$170,000	\$108,000	\$961,000
Clear Creek Co...	210,000	652,000	56,000	918,000
Boulder Co.....	138,000	59,000	.....	197,000
Lake Co.....	.....	68,000	.....	68,000
Summit Co.....	.....	124,000	.....	124,000
Park Co.....	11,000	108,600	1,000	120,600
Gunnison Co.....	.....	83,000	.....	83,000
Custer Co.....	3,000	4,000	.....	7,000
Hinsdale Co.....	2,000	1,000	7,000	17,000
Saguache Co.....	.....	11,000	.....	11,000
San Juan Co.....	2,000	6,000	3,000	11,000
Ouray Co.....	1,000	4,000	2,000	7,000
Chaffee Co.....	.....	11,000	.....	11,000
California.....	2,000	39,000	3,000	41,000
Idaho.....	.....	4,000	2,000	6,000
Nevada.....	2,000	5,000	.....	7,000
New Mexico.....	45,000	59,000	11,000	115,000
Arizona.....	.....	30,000	11,000	41,000
Utah.....	3,000	45,000	23,000	71,000
Montana.....	46,000	432,000	220,000	698,000
Mexico.....	.....	37,000	1,000	38,000
*Miscellaneous...	211,000	619,000	38,000	868,000

The totals being, for gold, \$1,359,000; silver, \$2,566,000; copper, \$486,000; grand total, \$4,411,000. [These are the totals of the Georgetown Courier.]

\* This includes purchases from smelters, sampling-works, and ore-buyers, and it is impossible to tell from what district it comes. A large portion of it was purchased through ore-buyers in Denver. Some of it has been shipped for sale from different portions of the State, and from other States and territories.

The report for 1883 shows that the works produced \$3,907,000, showing an increase in 1884 of \$504,000.

CLEAR CREEK COUNTY.

There is a movement on foot at Silver Plume to organize a stock company for the purpose of buying the mill at that place and purchasing ore.

**DUNDERBERG.**—The company is preparing to work the mine extensively during the coming summer. The engines will be put up soon, and the mine placed in good working order.

CUSTER COUNTY.

**BULL-DOMINGO.**—The claims against the company are collecting for suit, the company having failed to settle as promised.

DOLORES COUNTY.

**PASADENA.**—The smelter blew in for a continuous six months' run on January 5th. The reserve quantity of ore on hand is about 600 tons, with a daily increase of about thirty tons.

**RICO TUNNEL COMPANY.**—This company has been incorporated with a capital of \$200,000, to operate mines in this county.

HINSDALE COUNTY.

**GLADIATOR.**—Developments are progressing satisfactorily.

**PLUTARCH.**—Mineral has been struck in the lower level, which is now in about 250 feet.

LAKE COUNTY.

**CHRYSOLITE.**—The total product for 1884 amounted to 123,094 ounces of silver.

**WOLFE TONE.**—A Knowles compound condensing duplex steam-pump has been placed in the mine and put in operation. It is stationed 460 feet from the surface, and has a lifting capacity of 750 gallons a minute, which can be forced to 875 gallons. The discharge-pipe is ten inches in diameter. A duplicate of this pump will be put in at 685 feet from the surface. The cost of the two pumps in place will be about

\$25,000. The Knowles Pump Company guarantees the draining of the mine, with six months' trial before payment. This is said to be the largest pump in Colorado.

**VENTURE.**—H. C. Dillon, Alexander McArthur, Sidney Goldsborough, and L. C. Goldsborough give notice that they will not be responsible for any debts contracted on behalf of this mine, and that no person whosever has any authority to make contracts or contract debts that may in any way bind them or their interests in said mine.

**FORTUNA.**—A body of ore four feet in thickness has been encountered, returning 50 ounces of silver and 56 per cent lead to the ton.

**SMUGGLER CONSOLIDATED.**—In the suit of J. N. Eisendrath against the company, the court has granted the injunction asked for in bill of complaint, restraining the lessee Slockett from working the property, setting aside the lease made by the company, and enjoining the officers from leasing the company's property hereafter without proper notice being given by the directors of such letting, inviting bids for same. The court, in deciding, gave as his opinion of gross neglect and wrong-doing of the directors and officers of the Smuggler Company permitting leases to be granted to this same lessee Slockett without his accounting and paying over the royalties due to the company since August, 1883, as against the stockholders of said Smuggler Company.

PARK COUNTY.

**SUSQUEHANNA AND JUNIATA.**—The owners of these mines, adjoining the Nestor, Dauser, and other mines, are endeavoring to raise funds to enable them to construct a mill upon the ground. Both of the lodes mentioned show good bodies of free gold ore, especially the Susquehanna, where the vein-matter is twenty feet in width.

PITKIN COUNTY.

Mr. H. B. Gillespie, manager of the Spar Consolidated mine, together with several other gentlemen of Aspen, it is said, has agreed to subscribe \$500,000 toward connecting Aspen and Grand Junction with a railroad, provided the remaining needed capital can be raised.

**VALLEJO.**—The mine has been sold for \$70,000. This property has been idle for several months, owing to litigation, and it is thought that a compromise will soon be arranged and the property worked.

SAGUACHE COUNTY.

UNITED STATES.—The mill is in operation.

DAKOTA.

LAWRENCE COUNTY.

**FATHER DE SMET.**—Report for the week ended January 8th shows ore extracted from first, second, and third levels, 1995 tons. Ore milled, 1985 tons. West cross-cut, third level, advanced 10 feet; total length, 40 feet.

MICHIGAN.

Mr. Charles E. Wright, of Marquette, has been appointed Commissioner of Mineral Statistics, in the place of Mr. A. P. Swineford, whose term expired January 1st. Mr. Wright was the first commissioner appointed under the act creating the office.

COPPER MINES.

The product of mineral of the prominent mines of Lake Superior was as follows:

	Tons.		Tons.
Calumet & Hecla....	24,997	Copper Falls (about).....	600
Quincy.....	3,447	Hancock.....	461
Franklin.....	2,302	Wolverine (about).....	440
Osceola.....	2,508	Phoenix (about).....	400
Atlantic.....	2,199	Grand Portage (5 months in 1884)....	154
Allouez.....	1,371	Pewabic.....	141
Central (about).....	1,000	Other sources, including Ontonagon County (about)....	500
Huron.....	1,193		
Peninsula.....	865		
Conglomerate.....	841		
Total product for 1884 (about).....	43,419		
1883.....	37,483		
Increase in 1884.....	5,936		

**CONGLOMERATE.**—The owners of this mine have concluded to sink one of the deepest shafts on the conglomerate lode. During the winter, a certain amount of surface prospecting will also be carried on in connection with the mineral-bearing belts on the south part of the property.

**PEWABIC.**—This property has been sold on an execution in favor of James H. Seager and Graham Pope, to whom the company owed some \$15,000 for supplies. The property was bought for S. D. North,

of the Quincy Company, subject to redemption for one year from January 31 by the Pewabic Company.

IRON MINES.

**AGOGEEBIC IRON AND PINE LAND COMPANY.**—This company owns several thousand acres of land in Ontonagon County, on the Agogeebircion range, in town 46, 47, and 48, ranges 41, 42, 43, 44, 45, and 46. The corporation is now prepared to grant options and leases. All information will be furnished by Mr. Towar, Hancock.

**LAKE SUPERIOR.**—Work has been resumed at the A shaft at Ishpeming. The shaft, which is down 200 feet, will be put down to reach the ore cut by the diamond drill some three years since. It is thought that but a short distance will have to be sunk before the deposit will be reached.

MONTANA.

BEAVERHEAD COUNTY.

**HECLA CONSOLIDATED.**—During the month of October, 1884, the company produced 50,070.79 ounces of silver, and 17.66 ounces of gold; 345,185 pounds of lead, and 13,737 pounds of copper. During November, 53,808.37 ounces of silver, and 20.18 ounces of gold; 393,250 pounds of lead, and 14,400 pounds of copper.

JEFFERSON COUNTY.

**BOULDER CHIEF.**—This mine, which has recently been bonded for one year to a Butte company, is producing some good ore, which is free milling and easily extracted.

**FOURTH OF JULY.**—After an idleness of three years, operations have been resumed. A tunnel is running south from the east drift. It is expected that the main vein will be met at a distance of about 50 or 75 feet from where work was resumed, and at a depth of about 100 feet.

SILVER BOW COUNTY.

**BELL.**—The smelter has been undergoing repairs, and is now ready to resume operations. A strike has been made in the Bell mine that promises to be richer than any thing heretofore discovered.

**CLARK'S FRACTION.**—W. A. Clark is putting up hoisting-works at this mine, situated just west of the Magna Charta. Mr. Clark intends sinking the shaft six hundred feet.

**LIQUIDATOR.**—Operations have not been resumed since the ore contract with Eastern parties ran out. Over 25,000 tons of third-class ore lie on the dump, and will in all probability be treated next summer. The entire mass of ore will assay 18 per cent copper and some silver. The company contemplates and is preparing to erect a concentrator for the treatment of the ores here.

**MOLLIE MCGREGOR.**—The property has been bonded for \$65,000. An indemnity bond of \$68,000 to insure the owners against damage has been given.

NEVADA.

EUREKA COUNTY.

The White Pine Bank, at Eureka, has been closed. Reports state that depositors will lose but little, if any thing.

STOREY COUNTY—COMSTOCK LODGE.

The work of prospecting the upper levels of the north end mines has not fairly begun, for the reason that drifts and workings that have long remained untouched require extensive repairs.

The Cornish pump in the Combination shaft is running all right. The new hydraulic pump will be started January 5th.

UTAH.

JUAB COUNTY.

**BULLION, BECK & CHAMPION VS. EUREKA HILL.**—The Bullion, Beck & Champion Company has begun a suit in the District Court at Provo against the Eureka Hill Company for \$150,000 damages, and another suit against J. Q. Packard for \$500 and an injunction to restrain the defendants in both cases from working the ground in conflict.

VERMONT.

WINDSOR COUNTY.

**ROOKS.**—At the annual meeting, the following directors were elected: Charles Gay, William H. Garfield, H. L. White, A. D. Bennett, and Anthony Blum. The old President, Secretary, and Treasurer were re-elected. Since this mine has recently been connected with the mill by a tunnel, whereby the output can be increased to one hundred tons of ore daily without mining from the mine's ore-reserves,

hoisting neither ore nor water, and since the present capacity of the mill is only about six tons daily, it was resolved to erect a larger plant, and a committee was appointed to make arrangements to erect a new mill of one hundred tons daily capacity.

WYOMING.

The erection of a reduction plant at Laramie is spoken of.

FINANCIAL.

NEW YORK, Friday Evening, Jan. 16.

The week under review shows a decided improvement in the business of the mining markets, and the dealings touched a number of stocks that have received no attention for weeks. The tone of the market has been firm, tending toward higher prices. The sales amounted to 50,180 shares, against 37,350 shares for the preceding week, showing an increase of sales of 12,830 shares.

As usual, the largest business has been done in Horn Silver. The prices have not been as low as the previous week, but fluctuated between \$2.80@3, closing at \$2.85; the sales amounted to 5810 shares. Sales of Ontario, amounting to 300 shares, were made at from \$18.25@18.50.

Nevada stocks received considerable attention, and quite a large business was done in Consolidated California & Virginia at from 33@40c. Savage, which opened at \$1.75, went as high as \$2.20 during the week. Mexican ranged from 50@55c. Sierra Nevada, from 55@75c. Suro Tunnel sold at 10c.

Navajo was the leading Tuscarora stock; 2800 shares were sold at from \$1.65@2. North Belle Isle shows sales amounting to 1300 shares at from 9@10c. Albion's sales amounted to 1400 shares at from 10@14c. But little attention has been given to Colorado stocks. The largest sales were made in Red Elephant, and Chrysolite, Bassick, Amie, and others record a small business, with steady prices.

The financial statement of the Bodie Consolidated Mining Company for the month of December shows: Receipts, \$170,462, and disbursements, \$65,016, leaving cash on hand, December 31st, \$105,446. The sales this week have amounted to 925 shares, at from \$2.15@2.25. Consolidated Pacific has been dealt in to the extent of 1400 shares. Plymouth Consolidated has been active at irregular prices, ranging from \$15.13@15.63; the sales amounting to 2075 shares. There have been sales of Father de Smet, Homestake, Silver King, Alice, and others. A complete summary of the market will be found elsewhere.

The stock of the Peer, Peerless, and Crocker mining companies has been listed at the San Francisco Exchange. These companies were incorporated about a year ago by the Bonanza firm; since then, work has been pushed vigorously at the mines, which are situated in Arizona, and the most glowing reports have been disseminated from time to time. The stocks will, no doubt, receive considerable attention, and, since the parties who placed them on the market understand the art of booming, some lively dealings may be looked for. It is probable that these stocks in time will also be listed at the Mining Exchange in this city.

MEETINGS.

The annual meetings of the following companies for the election of trustees and the transaction of business will be held at the times mentioned:

American Copper Mining Company, No. 2 Wall street, New York City, special meeting, January 20th, at ten o'clock A.M., to determine whether or not the capital stock shall be increased to the amount of \$1,500,000; to consist of 150,000 shares of the par value of \$10 a share.

Butler Coal Company, No. 125 South Fifth street, Philadelphia, Pa., January 21st, at twelve o'clock M.  
Crane Iron Company, No. 224 South Fourth street, Philadelphia, Pa., February 11th, at twelve o'clock M.  
Edison Ore Milling Company, No. 65 Fifth avenue, New York City, January 20th, at twelve o'clock M.

Inyo Consolidated Mining and Milling Company, Room 13, No. 167 Broadway, New York City, January 17th, at two o'clock P.M., special meeting for the purpose of raising funds necessary to pay for the property lately acquired.

New York Coal-Tar Chemical Company, No. 10

Warren street, New York City, January 21st, at two o'clock P.M.

New York & Philadelphia Coal and Stone Transportation Company, No. 285 Broadway, New York City, January 21st, at eleven o'clock A.M.

Oxford Gold Mining Company, No. 43 Exchange Place, New York City, February 3d, from twelve M. to two o'clock P.M.

Spring Valley Hydraulic Gold Company, No. 61 Broadway, New York City, February 3d at twelve o'clock M.

Uncompahgre Mining Company, No. 97 Pine street, New York City, January 19th, at three o'clock P.M.

Union Steel Company, Room 36, Portland Block, Chicago, Ill., January 21st, at twelve o'clock M.

Vermont Marble Company, Room 20, No. 63 Broadway, New York City, January 22d, from twelve o'clock M. to one o'clock P.M.

Standard Consolidated Mining Company, Room 29, Nevada Block, San Francisco, Cal., February 2d, at one o'clock P.M.

Veta Madre Milling and Reduction Company, No. 71 Broadway, New York City, January 21st, at one o'clock P.M.

DIVIDENDS.

Adams Mining Company, of Colorado, has declared a dividend of \$18,750, or twelve and a half cents a share, payable on and after January 20th.

Consolidation Coal Company, of Maryland, has declared a dividend of one dollar a share, payable on and after January 29th.

Father de Smet Consolidated Gold Mining Company, of Dakota, has declared a dividend of twenty cents a share, payable January 31st.

Homestake Mining Company, of Dakota, has declared a dividend (No. 77) of twenty-five cents a share, payable January 26th. Total dividends to date, \$2,625,000.

Moulton Mining Company, of Montana, has declared a dividend (No. 4) of \$30,000, or 7½ cents a share, payable on and after February 1st.

ASSESSMENTS.

COMPANIES.	No. States.	Amount per share.	Delinquent in office.	Day of sale.
Alaska Mining & Mill	9 Alaska.	\$0.50	Jan. 11	Jan. 31
Black Bear Quartz	2 Cal.	.25	Jan. 26	Feb. 20
Caborca	9 Mex.	.05	Jan. 3	Feb. 2
Excelsior Water and Mining	7 Cal.	.50	Dec. 31	Jan. 22
Eintracht Gravel	17 "	.05	Feb. 7	Feb. 26
Hale & Norcross	83 Nev.	.50	Jan. 13	Feb. 3
Happy Valley Blue Gravel	5 Cal.	.08	Jan. 21	Feb. 9
Silver Lining	1 Nev.	.07	Jan. 24	Feb. 19
Summers Consolidated	2 Cal.	.05	Jan. 19	Feb. 12
Union Consolidated	28 Nev.	.50	Dec. 30	Jan. 19
Utah	52 "	.50	Jan. 24	Feb. 14
Virginia Creek Hydraulic	1 Cal.	.20	Jan. 25	Mar. 2

The Carborca Mining Company has rescinded its assessment levied in July last. It had been postponed several times, the last date expiring January 3d. It was decided finally to rescind.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

The past week has witnessed a steady and continuous decline in the price of oil, from 73½, the highest, Saturday last, to 69½, the highest (and closing) yesterday. The statistical situation encouraged holders at the beginning of the year, but heavy selling of long oil, high carrying rates, and several large failures in Wall street and elsewhere, have served to break prices. The failure of the Producers' Association to agree on their policy of restricting production, which for the past six months has applied to the old districts, also contributed to the feeling of weakness. At or below 70 cents, oil is both relatively and intrinsically cheap. There are several wells drilling southeast of the McBride, on Thorn Creek, and their size and character will be important in determining the extension of the Thorn Creek pool.

The following table gives the quotations and sales

at the New York Mining Stock and National Petroleum Exchange:

Jan.	10.	12.	13.	14.	15.	16.	Sales.
10.	10.73½	10.73½	10.71½	10.72½	10.72½	10.72½	2,075,000
12.	.72½	.72½	.70¾	.70¾	.70¾	.70¾	3,515,000
13.	.70	.71½	.70	.70¾	.70¾	.70¾	4,318,000
14.	.71	.71	.70	.70	.70	.70	3,587,000
15.	.70	.70¾	.69	.69¼	.69¼	.69¼	3,592,000
16.	.68	.69¾	.68	.69¼	.69¼	.69¼	3,960,000
Total sales							20,047,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	Jan. 9.	Jan. 10.	Jan. 12.	Jan. 13.	Jan. 14.	Jan. 15.
Albion	..	..	..	..	..	..
Alpha	..	..	..	..	..	..
Alta	.25	.25	.30	.30	.30	.35
Argenta	..	..	..	..	..	..
Bechtel	.60	.65	.80	..	..	..
Belcher	..	..	..	..	..	..
Belle Isle	1.12½	1.12½	1.12½	1.12½	1.25	1.12½
Best & Belcher	2.00	2.00	2.00	2.00	2.00	2.00
Bodie	..	..	..	..	..	..
Bullion	..	..	..	..	..	..
Bulwer	..	..	..	..	..	..
Chollar	1.75	1.87½	1.75	2.00	2.00	2.00
Con. Pacific	1.12½	1.00	1.00	1.00	..	.85
Con. Cal & Va.	.25	.30	.30	.30	.30	.25
Crown Point	.85	.80	..	.30	.90	.90
Day	..	..	..	..	..	..
Elko Cons.	..	..	..	..	..	..
Eureka Cons.	1.50	..	..	2.00	2.12½	2.25
Exchequer	..	..	..	..	..	..
Gould & Curry	1.12½	1.12½	1.12½	1.12½	1.12½	1.12½
Grand Prize	..	..	..	..	..	..
Hale & Norcross	4.25	4.37½	4.50	4.87½	4.87½	5.00
Independence	..	..	..	..	..	..
Martin White	..	..	..	..	..	..
Mexican	.50	.40	.45	.50	.50	.45
Mono	..	..	..	..	..	..
Mount Diablo	3.50	3.62½	3.50	3.50	3.50	..
Navajo	2.00	2.00	2.00	1.75	1.75	1.75
Northern Belle	..	..	..	..	..	..
North Belle Isle	..	..	..	..	..	..
Ophir	.45	.40	.50	.45	.50	.45
Overman	..	..	..	..	..	..
Potosi	.75	..	.75	.80	.85	.80
Savage	1.75	1.87½	1.75	1.87½	2.00	2.00
Scorpion	..	..	..	..	..	..
Sierra Nevada	.60	.50	.60	.60	.70	.60
Silver King	..	..	..	..	..	..
Tip-Top	..	..	..	..	..	..
Union Cons.	.50	.50	.55	.60	.60	.55
Utah	.15	.20	.15	..	.15	..
Wales Cons.	..	..	..	..	..	..
Yellow Jacket	1.25	1.25	1.25	..	1.25	1.37½

The following were the financial balances of the various mining companies on January 1st:

CASH ON HAND.	
Alpha Con.	\$4,781.42
Bodie Con.	105,446.19
Bulwer	77.82
Best & Belcher	34,538.14
Belcher	15,094.31
Chollar	34,541.10
Crown Point	21,867.46
Exchequer	1,938.82
Gould & Curry	\$43,635.05
Mono	19,018.83
Mexican	11,863.98
Ophir	7,883.47
Occidental	2,862.88
Sierra Nevada	27,494.85
Standard	20,107.51
Savage	15,878.58

INDEBTEDNESS.	
Day	\$87,209.12
Grand Prize	22,287.53
Hale & Norcross	37,351.56
Potosi (overdraft at bank)	\$2,107.66
Argenta (overdraft)	55.86

\* Indebtedness \$957 and December expenses.  
† Due Suro Tunnel Company, \$10,920.  
‡ Indebtedness \$1:5 and December expenses.

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Jan. 15.

The market for copper stocks the past week, although generally dull, has shown a tendency to higher prices. This is due in a measure to the improved tone to ingot copper, and to a belief in mining circles that prices have touched bottom, and ought to show a considerable advance in the near future. It is noticeable also that the small lots of stock that have been hanging over the market the past few weeks have been quietly absorbed, and a better demand created for the lower-priced shares, such as Atlantic, Franklin, and Osceola, while the dividend-payers are decidedly strong, and show a good advance. Calumet & Hecla steadily advanced from \$137½@145, at which latter price some 200 shares were taken yesterday; and to-day, \$147½ was bid without bringing out any stock. Quincy also advanced from \$27@30½, reacting to \$30, and closed at \$30 bid, \$32 asked. The advance brought out but little stock, there being less than one hundred shares sold all told. Atlantic and Franklin sold in small lots at \$6, which is bid for them, with none to sell under \$7. Osceola sold at \$8, same as last sale (December 24th), none offered under \$8½. The statistics of copper products recently published show



that, so far as the gross value of the product is concerned, the Lake Superior companies, taken as a whole, have made up in increased production what was lost in the decline in the market price of copper in 1884.

In silver stocks, we note small sales of Harshaw at 10c. Crescent, at 7½c. Bonanza Development, at 87½c.

At the Mining Exchange, there has been a fair amount of business the past week, the miscellaneous stocks coming in for a good share of the transactions. Bowman Silver was a little heavy early in the week, but stronger to-day at 12@13c. Dunkin, steady at 18@20c. Catalpa, 23@25c. Consolidated Pacific is neglected and offered at 90c. without bids. American Electric Illuminating Company, common stock, advanced to \$2½, with large sales. This stock within a few weeks sold as low as 85@90c., and is booked for still higher prices.

3 P. M.—At the afternoon Boards, Calumet & Hecla sold at \$147. Osceola, at \$8. Quincy, at \$30. Franklin, \$6½ bid. Atlantic, \$6 bid. Ca'umet & Hecla was a little heavy, and closed \$145 bid, \$146 asked. The rest of the market, unchanged

**BULLION MARKET.**

NEW YORK, Friday Evening, Jan. 16.

The market abroad and here seems to be in an expectant if not stagnant condition, and its future difficult to form any opinion of.

DATE.	London.	N. Y.	DATE.	London.	N. Y.
	Pence.	Cents.		Pence.	Cents.
Jan. 10	50	108¼	Jan. 14	49 15-16	108¾
12	50	108¾	15	49 15-16	108¾
13	50	108¾	16	49 15-16	108¾

**BULLION PRODUCTION FOR 1884.**

MINES.	States.	Month of December.		Year from Jan. 1st, 1884.
		\$	£	
Adams, L.	Colo.	200,000		200,000
*Alice, G. S.	Mont.	1,136,116		1,136,116
*Belmont.	Mont.	57,572		57,572
*Black Bear, G.	Cal.	19,600		19,600
Bodie, G.	Cal.	493,822		493,822
*Bonanza King, G.	Cal.	191,891		191,891
*Boston & Montana, G.	Mont.	391,132		391,132
*Caledonia, G.	Dak.	73,511		73,511
*Chrysolite, S. L.	Colo.	6,277		162,661
Colonel Sellers, S. L. Z.	Colo.			830,625
*Consolidated Bobtail, G.	Colo.			102,688
*Contention, S. G.	Ariz.			233,007
*Deadwood-Terra, G.	Dak.			423,918
*Denberc Blue Gravel, G. S.	Colo.			144,659
Denver City, S.	Colo.			67,000
*Father de Smet, G.	Dak.	38,823		470,131
*Grand Prize, S.	Nev.			111,778
*Head Center Cons.	Ariz.			1,273
*Head Center & Tranquility.	Ariz.	29,290		53,206
*Hecla Cons., G. S. L. C.	Mont.	†		1,106,725
*Helena, G. S. L. C.	Mont.	82,000		1,104,036
*Homestake, G.	Dak.			1,059,754
*Hope, S.	Mont.	18,500		89,000
Horn-Silver, S. L.	Utah.			2,371,087
*Iron Silver, S. L.	Colo.			606,472
*Kentuck, G. S.	Nev.	394		23,243
*Lexington, G. S.	Mont.	59,840		1,117,872
Little Chief, L.	Colo.			90,000
*Little Pittsburg, S. L.	Colo.	599		79,690
Maid of Erin, L.	Colo.			235,000
*Mammoth Bar, G.	Mont.	424		5,223
*Moulton, G. S.	Mont.	70,435		812,530
*Mount Diablo, S.	Nev.			24,820
*Murchie, G. S.	Cal.			19,000
*Navajo, G. S.	Nev.	58,790		496,171
*New Pittsburg, S.	Colo.	16,858		81,670
*North Belle Isle, S.	Nev.			5,874
*Ontario, S. L. C.	Utah.			2,008,000
*Original, S. C.	Mont.			29,724
*Oxford, G.	N. S.	3,848		38,972
*Paradise Valley, S. G.	Nev.			103,950
*Plymouth Consolidated, G.	Cal.	87,690		1,033,518
*Rooks, G.	Vt.			55,434
*South Yuba, G.	Cal.	645		22,753
*Stormont, S. L.	Utah.	6,199		152,836
*Syndicate, G. S.	Cal.	11,670		155,224
*Tombstone, S. L.	Ariz.			517,433
United Gregory, G.	Colo.			7,174

Total amount of shipments to date.....\$18,648,373

\* Official. † Assay value. ‡ Not including value of lead and copper; G., gold; S., silver; L., lead; C., copper; Z., zinc. — No bullion produced. Silver valued by the different companies from \$1.05@1.29@29 per ounce; gold, \$20.67.

Foreign Bank Statements.—The governors of the Bank of England, at the regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 5 per cent. During the week, the bank gained £378,487 bullion, and the proportion of its reserve to its liabilities was raised from

33½ to 40½, against 40½ per cent at this date last year. The weekly statement of the Bank of France shows a loss of 1,358,000 francs gold and 932,000 francs silver.

Silver for the Mints.—The Treasury Department, January 15th, purchased 400,000 ounces of silver for delivery at the Philadelphia and New Orleans Mints.

**METALS.**

NEW YORK, Friday Evening, Jan. 16.

Copper.—The market is undoubtedly firmer, both in Lake, for which 11½c. has been paid for a small parcel, and which may be quoted 11½@11¾c., and for other brands, pretty heavy sales of which have been made during the past few weeks at 10½c. We quote good ordinary to best brands from 10½@10¾c. Chili Bars are cabled to-day £48 12s. 6d., and Best Selected £53 10s. The English market seems to be getting over its panic.

The Anaconda and Montana smelters at Butte have resumed work at old prices for labor. The Copper Queen smelter has been idle for a week or two, on account of scarcity of coke, due to bad roads.

Messrs. James Lewis & Sons report as follows on January 1st:

The rapid fall in the early part of the month was mainly due to the reported sale of 7500 tons of Lake Superior copper for delivery in France during the year 1885 at a price based on that of Chili Bars at the time of delivery, plus £4 per ton; and of a quantity of Anaconda matte, representing about 4500 tons of fine copper, for delivery during the first four months of 1885 on similar terms, except that the basis is that of English Best Selected copper, the purchasers fearing that Chili Bars might be manipulated to their disadvantage. The terms of these sales had a very detrimental influence on the market, as it was at once seen that it had ceased to be the interest of the smelters to sustain the market in any way, but that, on the contrary, if they could sell English copper for forward delivery at the rates then current, the lower values fell, the more they would be benefited. Large sales of English and other copper followed the conclusion of the contract for Montana matte, which is undoubtedly the most favorable one for the eight or ten smelters among whom it is divided, as they practically smelt it on behalf of the producers at a fixed charge per ton, without risk of market. They are still open to make similar contracts. Sales of Montana argentiferous matte were made in the early part of the month, at the fixed price of 10s. per unit for the copper contents, for delivery up to June next, and recently at 9s. 6d. per unit for a quantity of Montana copper matte of good quality, for early delivery. On the 29th ult., the English smelters reduced their official quotation for sheet-copper from £63 to £60 per ton. India Sheets are obtainable at £57 per ton, and Best Selected at £53 per ton less 2½ per cent discount.

The sales of furnace material have been:

Tons.	Per cent.	Per unit.
200. Prec. Mason's	Sw.	10s 1½d
595. Ore. N. Quebrada (Ru.)	12	9s 4½d
100. Prec. Rio Tinto (B. S.)	90	Priv. terms
770. Ore. N. Quebrada (Ru.)	12	Sw.
330. Reg. " "	20	9s 3d
500. Ore. " (Yel.)	9	9s 0d
90. Reg. Rio Tinto	30	Sw.
77. Prec. Mason's	10	10s 0d
350. Ore. Italian		Liv. 8s 6d-0
100. " New Quebrada	10	" 9s 0d
420. " Peruvian	25	" 9s 3d
50. " New Quebrada	10	" 9s 0d
150. Prec. English		10s 0d
500. Ore. Cape	33	Sw. 9s 9d
500. Ore. " "	33	" 9s 9d
77. Prec. Mason's		" 9s 9d
25. " "		Liv. 9s 9d
50. " English		9s 9d

Imports of other than Chili copper into Liverpool and Swansea during the following years, tons fine:

	1882.	1883.	1884.
From United States	745	9,410	17,309
Canada	347	448	266
Mexico	372	489	291
Peru	821	426	408
River Plate	260	319	131
New Quebrada	3,164	3,960	3,675
Newfoundland	1,362	1,185	324
Spain	447	2,659	2,242
Portugal	17	129	117
Italy	1,386	1,091	1,310
Norway	446	286	289
Cape of Good Hope	5,298	5,670	6,042
Australia	112	160	446
Sundries	925	946	264
Precipitate	8,757	11,249	10,009
	24,459	38,437	43,023

Lead.—Contending influences are at work to move the market, and it appears that a determined effort is making to create the impression that it is higher. It is reported that a sale of 500 tons was made at 3'75c., but this statement apparently lacks confirmation. A few hundred tons have, however, been sold at 3'70, at which it is offered by some sellers without finding buyers.

Messrs. John Wahl & Co. send us the following dispatch to-day, from St. Louis:

There has been considerably more inquiry for both hard and soft lead, in consequence of which sellers have been asking a little more, but only a moderate amount of business has been transacted. Sales will probably foot up to 300 tons of Chemical lead at 3'50c. and 250 tons of Corroding lead at the same figure. Holders, anticipating better prices here, have withdrawn from the market at present, and refuse to make sales for future delivery at present quotations. They are willing only to fill retail spot orders at 3'50c.

Spelter.—The low offerings have been withdrawn, and Spelter, which has been sold as low as 4'07½c., is now held at 4'20@4'25. The spot stock is very light indeed.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, Jan. 16.

American Pig.—The great Pittsburg failure, while its effects have not yet developed, so far as its influence upon the market is concerned, can not but help destroying that first light indication of a more hopeful feeling that had been fostered with so much care. Business has been quiet. We quote \$18@18.50 for No. 1 Foundry; \$17@17.50 for No. 2; and \$16@17 for Gray Forge, standard brands, tide-water delivery. Bessemer pig is very quiet, with Foreign nominally quoted \$19. We quote Spiegeleisen \$30 for 30 per cent, \$26 for 20 per cent, and \$22 for 10 to 12 per cent.

Scotch Pig.—Business is very light. We quote ex ship and to arrive: Coltness, \$21.50; Langloan, \$21.50; Gartsherrie, \$21; Summerlee, \$20.50@20.75; Eglinton, \$19@19.25; and Glengarnock, \$20.

At the Metal Exchange, the following cables have been received: Coltness, 56s.; Langloan, 56s.; Summerlee, 52s.; Gartsherrie, 52s.; Glengarnock, 49s.; Dalmellington, 47s. 6d.; and Eglinton, 42s. 9d. Warrants were cabled 42s. 3d. to-day.

Steel Rails.—War appears to have broken out afresh, this time in the West, where rails are selling at \$29, equivalent to \$25.50 at Eastern mill. Here, very little is doing.

Old Rails.—The market has been very quiet, with quotations nominally unchanged at \$16.50@17.

Philadelphia, Jan. 16.

[From our Special Correspondent.]

Fig-Iron.—By dint of active work and still more inviting concessions, a few of the blast-furnace companies have succeeded in crowding several thousand tons of iron on to buyers this week, which has given the market the appearance of a little more activity. In a general way, founders and mill-men are not willing to do any heavy buying, for reasons heretofore given. The drop in coal has been disappointing, amounting to 25 cents instead of 50 cents. The result will be the filling of orders for perhaps thirty days. Two or three buyers have offers now on the market that will probably lead to business. The sales of the past few days were made on the basis of \$17 for No. 2, and \$17.50@18 for No. 1 Foundry. The sales of Forge iron have been made all the way from \$16@14.50. Several lots sold at \$15, and the best is offered at \$16; but there is a declining tendency at work even on the best makes.

Foreign Iron.—Bessemer Pig is offered at \$20@20.50. Spiegel 20 per cent is offered at \$25.50. No sales have been reported. Negotiations pending last week for one or two large lots were withdrawn.

Merchant Iron.—Three or four mills have increased their production, to fill a few orders that were secured, and some country mills have gathered up a fair amount of business for the month. Outside of this, there is nothing to report. Trade prospects are still dark. There is a great deal of mill capacity that will not start up this winter. Probably consumers of iron have very little on hand, and do not care to buy.

Nominal quotations are unchanged, and actual prices are very little below last week.

**Nails.**—There seems to be no movement among nail-makers to push business. Just now, the large buyers are waiting for a change in the situation. Inquiries are occasionally met with for car-load lots, and offers have been made at \$1.85. Very few nails are selling under \$2.

**Sheet-Iron.**—A good deal of sheet-iron was called for in small lots this week.

**Merchant Steel.**—The small buyers who have been in the market this week make more liberal purchases.

**Tin Plate.**—Boxes arrived, 20,000.

**Plate and Tank-Iron.**—Only small lots are selling, and manufacturers are not worrying themselves to secure business.

**Structural Iron.**—The situation has not changed, and there is no change in prices.

**Steel Rails.**—It is reported that there are offers in the market at \$26@26.50. No business has yet been done at such low prices. Small lots are firm at \$28@28.50.

**Old Rails.**—The supply of old rails is light, and there are buyers here ready to pay \$17 for immediate delivery.

**Scrap Iron.**—The supply is heavy and the demand very light, and prices are consequently weak, ranging from \$18.50@17, from No. 1 to Selected.

### COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 16.

#### Anthracite.

The unseasonable weather is having its effect upon the yard demand, and the market has been extremely dull, with no improvement.

The Pennsylvania Railroad Company has now officially declined to be a party to the combination, and the other presidents are to have a meeting on Monday. The action of the Pennsylvania can have caused no surprise to the other companies, who, it must be assumed, entered into the present arrangement with the perfect understanding that it would in all likelihood live up to its traditions. There would appear to be no occasion whatever for reopening the question of allotment, and any discussion would certainly be unwise. Unfortunately, the Lehigh Valley, Lehigh & Wilkes-Barre, and Reading companies and possibly the others, have already completed, or will complete, their quota for the month, and their good faith or ability to live up to the plan adopted will be put to the severe test of two full weeks of stoppage. This prospect is not likely to increase the forbearance of the managers, who, however, can not escape the conviction that adherence to the plan is the best, simply because the market will not take any more coal, even if prices are openly reduced further still. They had, therefore, better submit to the inevitable, keep production in bounds, irrespective of the Pennsylvania Company, and try to get the best prices they can.

A further proof of the tendency of values to lower figures during the current year, in spite of any combination, is offered by the following bids received for the 25,000 ton contract for the Commissioners of Charities and Correction: David Duncan & Co., the successful bidders, \$3.24; J. D. K. Crook & Co.; \$3.38; the Delaware & Hudson Company, \$3.49; S. G. French, \$3.53; A. Barber & Son, \$3.53; Winant & Terhune, \$3.53. This coal is to be delivered free at the following points, in the following quantities: Blackwell's Island, 4700 tons grate, 4000 tons egg, 300 tons stove; Ward's Island, 6000 tons grate; Randall's Island, 1500 tons grate, 1100 tons egg, 400 tons stove; Hart's Island, 2000 tons egg; Bellevue Hospital, 2900 tons grate, 100 tons stove; Steamboat Dock, foot of Twenty-third street, 2000 tons grate. The bulk of the contract is therefore for broken coal, and, as will be seen, it includes 7100 tons of egg and 800 tons of stove. Deducting the heavy towing charges on the bulk of it, insurance, etc., the coal will net \$3 f. o. b., which is a very low figure.

#### Bituminous.

There are rumors afloat that the New Haven Railroad contract, from 70,000 to 80,000 tons, has been taken at low figures by an Elk Garden firm. There has been considerable inquiry on the part of con-

sumers for figures on contracts, in anticipation of the completion of the pool arrangements between the Pennsylvania and Baltimore & Ohio railroads, which, it is said, the Vanderbilt-Reading road may possibly join. The final meeting, it is understood, is to be held to-morrow. It is rumored that the arrangement, on the basis of percentages already mentioned, is to be by monthly settlements, and is to extend only to tide-water coal. It is said that one feature of it is to be that the lowest prices for tide-water coals are to be \$2.70 at Baltimore, \$2.80 at Philadelphia, \$3.25 at New York, and \$3.50 at Boston and Sound points, practically an assumption on the part of the railroad companies of the right to regulate the lowest price of coal at tide-water points. It is, of course, too early to form any opinion concerning the effect of this agreement, if it is closed and is adhered to. It should be pointed out, however, that it leaves out of the reckoning the Pocahontas coal of the Norfolk & Western Company, which may become a great factor, notably in the East; the Chesapeake & Ohio coals; possibly the Reading-Vanderbilt coals; and the Rochester & Pittsburg cargoes that may drift into this market in the summer over the Erie Canal and the Hudson River, as they did last year. It would seem to ignore, too, the undoubtedly lower prices of steam sizes of anthracite coal.

#### Philadelphia.

Jan. 16.

[From our Special Correspondent.]

The action of the Reading Company, in reducing rates on toll 5 cents, and the price on coal 20 cents, making 25 cents a ton, instead of 50 or more, as was expected, has been a disappointment to manufacturing interests in this end of the State. The pig-iron men had expected something better, and they believe that better terms will be forced from the companies by the lack of demand on the one hand, and increased supply from other sources on the other. The coal trade is in a peculiar position just now, and both the anthracite and manufacturing interests are undecided. The current requirements are light. In the present unsettled condition of the market, it is not expected that any very large contracts will be placed, at least by local manufacturing interests. The iron trade demands greater concessions.

The Board of Directors of the Pennsylvania Railroad Company, at their Wednesday's meeting, decided a long-debated point of co-operation with the other companies, but, up to the present hour, have declined to make known their decision, before placing it before the companies. It is given out, however, that the company has not receded from its position taken some time ago, but has agreed to some minor points, which will go to harmonize somewhat its relations with other companies. The Pennsylvania Company thinks it can secure 15 instead of 8 per cent, and desires to have an opportunity.

The Pennsylvania Company, for 11 months in 1884, had a tonnage of 5,211,288 tons, of which 715,943 tons were shipped by individual operators. No heavy business is likely to be done in anthracite for some time to come, and in the mean time important changes in affairs are predicted and are probable.

The companies have shut down over 50 of their collieries in all. The Reading Company is working 36 of its collieries. The present restriction is the result of a very careful examination into the coal interests. This month's output is 1,500,000 tons.

Mr. Tillinghast, President of the Lehigh & Wilkes-Barre Coal Company, will continue all his collieries, provided the miners will accept the reduction. It is said that the reduction will be insisted upon throughout that region; but the matter will be handled very carefully, as the companies do not exactly understand the temper of the men, in view of their recent labor organization, which includes some thirty or forty branches. The laborers have not contemplated a strike, but one may be precipitated. The coal tonnage of the Philadelphia & Reading Company last week was 181,914 tons, against 111,587 tons for the corresponding week last year; total for the year, 1,246,119 tons, against 1,026,306 tons for last year, an increase of 219,813 tons. The Delaware & Hudson Canal Company's weekly shipments were 58,018 tons for the week, as against 43,863 tons for the corresponding week last year.

The reorganization of the Reading is looked upon as likely to develop new business arrangements. A

practical railroad man will probably be at the head. Committees are at work laying the foundation for radical reorganization. The long list of securities of the Reading Company, given by Mr. Gowen, are considered on the street not worth over \$5,000,000. Last year, they yielded \$800,000. The local demand is light, and there is but little going on in the line trade. Manufacturing demand is not likely to increase in this market, although there is more industrial activity, and greater activity is probable, but the manufacturing requirements will be met very slowly.

At the rate of production by the Reading Company last year, its full working capacity is 8,800,000 tons. For 1883, its full working capacity was 7,930,000 tons, showing an increase for 1884 of 950,000 tons.

The bituminous coal operators are dissatisfied with the present aspect of affairs, especially with regard to the uncertainty surrounding freight rates, and the probability of a renewal of sharp competition from Maryland and Virginia coals. This is the time when the Pennsylvania and the Baltimore & Ohio were to close, with reference to traffic; but the combination has no confidence in any arrangements that may be made. Last year, when the companies met, and made their vows to each other with all the fervor of plighted lovers, a good many in the coal trade did for a while believe they would amount to something; but Romeo and Juliet forgot, and the first thing the Philadelphia coal men knew was, their river business was swept away from them by the Cumberland operators. They think the same thing will occur again. There is hidden hostility between the companies, and it will break out on the slightest provocation. No large contracts are made at present. It is impossible to obtain rates. The Pennsylvania operators feel a little nervous lest the Baltimore & Ohio people may make secret rates that will let the Maryland and Virginia operators into Eastern markets. The sharpest competition in the coal trade is looked for this season. Wages will not be reduced in the Clearfield region, the operators feeling that wages are low enough, and a reduction would not benefit the trade.

#### Buffalo.

Jan. 15.

[From our Special Correspondent.]

The question of coal transportation seems to be the only topic of conversation at present. The disturbing elements are to be found apparently in the New York, Lake Erie & Western, Rochester & Pittsburg, and Buffalo, New York & Philadelphia railroad managers.

The one and only item of interest I have in my note-book is, that Mr. E. L. Hedstrom, who for the past year was President of the Merchants' Exchange of Buffalo, was nominated for re-election yesterday on both the tickets in the field, and, as a natural consequence, was unanimously elected for the current year to the same honorable position. Mr. Hedstrom, as many of your readers are probably aware, is the well-known dealer and shipper of coal and coke, as well as charcoal, American, and Scotch Foundry pig-iron.

There is nothing new in the coal or coke trade at this port. As an illustration of the sentiment prevailing at this end of the State, I append a couple of newspaper paragraphs from one of our cheap dailies:

**First—An Avaricious Pool.**—The coal combination held a meeting in New York yesterday, evidently for the purpose of screwing up the price of the article a little higher, and this in the face of the fact that the cost of all other household supplies is being reduced to meet the depressed condition of the times. With food, clothing, wages, rents, and freights going down, this monopolistic combination proposes to exempt its product from the general rule, and actually force it up a few notches higher than the rate at which it has been held. And this because it is winter, and the cold will compel a greater consumption of fuel. The hardship falls particularly heavy upon the poor, and, should the action of the combination result in raising the price of coal, this journal will be among the first to suggest a means for obtaining supplies of fuel at hard-pan prices.

**Second—Coal Must Come Down.**—With a general reduction of wages and a corresponding decrease in the cost of most living necessities, no good reason appears to exist why stiff rates should be maintained upon coal. News from the coal districts advises us that the wages of miners have been cut down to meet the general depression, and yet coal is no cheaper than it was last year or two or three



NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.	NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Jan. 10.		Jan. 12.		Jan. 13.		Jan. 14.		Jan. 15.		Jan. 16.				Jan. 10.		Jan. 12.		Jan. 13.		Jan. 14.		Jan. 15.		Jan. 16.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.			H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.								2.15	2.00	2.10	2.05	1,800	Albin			.14	.13									1,400	
Amie Con., Co.												900	American Flag														
Argentina												500	Barcelona, G.														
Bassick, Co.												450	Bechtel Con., G.														
Belle Isle, Ne.												925	Belvidere														
Bodie Cons., Ca.	2.20		2.20	2.15			2.25	2.15		2.20		100	Best & Picher, G. S.														
Breece, Co.	.10											500	Big Pittsburg, S. L.														
Bulwer, Ca.												1,700	Bradshaw, S.														
California, Ne.												6,000	Bull-Domingo, S. L.														
Cal. & Hecla, Mich.												750	Cal., B. H., G.														
Castle Creek												100	Central Arizona, S.				.10					.10				300	
Chollar							2.20					500	Climax, Co.													100	
Chrysolite, Co.			.80							.80		1,700	Colorado Central													100	
Cons. Cal. & Va., Ne.	.35	.33			.36	.34	.37		.40	.38		6,000	Cons. Imperial			.92	.85	.92		.93	.80			.85		1,400	
Cous. Va., Ne.												750	Con. Pacific														
Dunkin, Co.												100	Decatur														
Eureka Cons., Ne.	1.30		1.75							2.40	2.30	500	Durango, G.														
Father de Smet, Dk.									4.75			100	Eastern Oregon				.05									100	
Findley, Ga.												300	Jockshaw, G.														
Gold Stripes, Co.												500	Harlem M. & M. Co.														
Gould & Curry, Ne.	1.10						1.25					300	Hortense, S.														
Grand Prize, Ne.	.35											500	Lacrosse, G.														
Green Mountain, Ca.												620	Mariposa Pref., G.														
Hale & Norcross, Ne.	4.80		5.15	5.00			5.65			5.55		300	Mexican, G. S., G.			.52	.50			.50		.55	.50	.50		2,950	
Hall-Anderson, N. S.												350	Mono														
Homestake, Dk.					9.63				10.00	9.88		5,810	North Standard, G.														
Horn-Silver, Ut.	2.90	2.80	3.00	2.95	3.00	2.85	3.00	2.95	3.00	2.90	3.00	2.85	100	N. Horn-Silver, S. L.							.07	.06	.06				500
Independence, Ne.												100	O'Neil & Miller, S.							.05					.04	3,800	
Iron Silver, Co.					.65							1,000	Rappahannock, G.													2,000	
Leadville, Co.												300	Red Elephant, S.										.02				
Little Chief, Co.												100	Ruby, of Arizona														
Little Pittsburg, Co.												100	Silver Cliff, S.														
Martin White, Ne.												1,75	1.65	2,800	Sonora Con.												
Moulton												1,300	South Bodie, G.														
Navajo, Ne.	1.95	1.90	2.00	1.95	1.95							300	South Bulwer, G.														
Northern Belle												1,300	South Hite														
North Belle Isle, Ne.									.10	.09		300	South Pacific														
Ontario, Ut.			18.25		18.50				18.25	18.50	18.25	1,000	State Line, 1 & 2, S.														
Ophir	.48	.45				.50						2,075	Sutro Tunnel			.10						.10				2,000	
Plymouth	15.35	15.13	15.25		15.63	15.38	15.63	15.50	15.50	15.38	15.75	15.50	1,000	Taylor Plumas													
Quicksilver Pref., Ca.												3,400	Union, S.														
Robinson Cons., Co.							2.15		2.20			1,100	Union Cons., G. S.	.50		.50		.52		.65						850	
Savage, Ne.	1.80	1.75					.65		.75			750															
Sierra Nevada, Ne.												400															
Silver King, Ar.	5.00				5.00																						
Spring Valley, Ca.																											
Standard, Ca.							.44	.40			.40																
Stormont, Ut.																											
Tip Top, Ar.																											
Yellow Jacket					1.30																						

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 33,780. Non-dividend shares sold, 16,400.

years ago. This is not in accord with the spirit of fair dealing that should prevail, and is certain to lead to some method that will react to the disadvantage of those who are responsible for this policy. Coal is a commodity that is used by nearly every body nowadays. It is the fuel of the poor as well as the rich, and while it is an imposition on both to maintain the flush-times prices on the article, the matter falls especially hard upon the former, whose resources have been cut down very materially. The responsibility for this, of course, rests with the corporations that control the facilities for bringing the coal into the market, and Buffalo with a few other large cities appears to have been made the special object of their cold-blood avarice. In Chicago, for instance, situated four or five times the distance from the coal-fields that Buffalo is, the prices are far below those that prevail here. This is an unjust discrimination that our citizens will not submit to any longer than they can help, and the probable query of the coal monopolists as to what we are going to do about it may receive an effective answer long before they expect it. The price of coal must come down.

**Third—Cheap Coal.**—While the coal monopolists continue to disagree, the public will be able to obtain its fuel at live-and-let-live prices. And the prospects of a continued disagreement among the coal magnates bid well for fair rates through the winter.

The trouble with the coal combination is that which usually interferes with the success of most schemes for plundering the people. Each member of the conspiracy is bent upon getting an advantage over the other in the mutual arrangement between them; and while all are trying to overreach each other, the scheme collapses, as a matter of course.

It is a law of trade that prevents one class from imposing upon another for any great length of time, and the coal monopolists are not an exception to this rule. In mid-winter, when they reckoned upon a big coal consumption at high rates with the greatest certainty, they find themselves blocked, not by the consumers, but by themselves. Unless they can patch up a pool, the combination will fail to prevent the people from getting their fuel at the hard-pan prices that prevail with every other line of goods.

The outlook for next season's lake business is dis-

cussed by interested parties, to pass away the many days of idleness. It is early to speak of the prospects, but indications are favorable to an improvement over 1884. There are immense stocks of grain in the West that must be moved, and railroads can handle only a small portion of it to profitable advantage, although sharp competition will undoubtedly continue. Iron-works are resuming business, and will require, a few months hence, supplies of ore, etc., which will have to be conveyed by our Lake water route. But little new tonnage will be added to our marine this winter, as capitalists see no money in the venture worth the risking of seasons of low freights. The rapid growth of the West will necessarily cause an accompanying increase of the wants of civilization. Residents and manufactories will draw largely upon the Pennsylvania mines for hard and soft coal, which will help the up-freighting of vessels.

Boston. Jan. 15.

[From our Special Correspondent.]

The anthracite branch of the coal market remains in an unsettled state, and the outlook is not at all clear. It seems to be accepted as settled, in this market, that the Pennsylvania people will not go into the allotment arrangement. The reason, according to the theory of some, is not so much a want of harmonious feeling and satisfaction at their proposed allotment, as a desire not to enter into any combination. The relations of this road to the coal trade have already caused it some trouble, and it does not care to incite public sentiment against itself any further. The real difficulty in the whole arrangement, as viewed by the trade in Boston, lies not in the question whether or not the Pennsylvania Railroad will or will not unite with the others. That would only be a matter of four or five hundred thousand tons, any way. But both the Reading and the Lackawanna people have said that they would not enter any combination in which all the producers were not members. The vital question is, therefore, whether they propose to do this or not. The failure of either of these large companies to enter the combination would kill the whole scheme. It is only natural, then, under the circumstances, that trade should be very dull here, all rumors of harmony among the producers to the contrary. The mild weather also operates against any activity.

Prices, throughout the whole list of anthracite coal, are merely nominal. The f. o. b. prices that have been announced in New York are: Broken and Egg, \$3.35; Stove, \$4.05; Chestnut, \$3.60. The market has weakened materially from these figures, and agents here are selling at \$3.90 to \$3.95 for Stove; \$3.20 for Broken and Egg; and \$2.25 for Pea; but transactions have been slight. No f. o. b. prices are yet announced from Philadelphia, and that market is making no effort for trade. The fact that freights are at present, as they usually are at this time of the year, decidedly favorable to New York, is doubtless largely the cause of the Philadelphia inactivity with regard to this market. As for pea coal, some in the trade believe that, should the allotment plan prevail, this size will not be sold so low as now, because the companies will ship all the broken possible, to the neglect of pea, which comes in competition with bituminous.

We quote f. o. b. prices as follows:

At New York, Stove \$3.85@ \$4; Egg, \$3.20@ \$3.50; Broken, \$3.20@ \$3.40; Pea, \$2.25; Nut, \$3.45@ \$3.60. At Philadelphia, \$3.90@ \$4 for Stove; \$3.25@ \$3.50 for Egg; \$2 for Pea; \$3@ \$3.15 for Broken. Special coals, \$4.75@ \$5 for Broken, \$5.35 @ \$5.50 for Stove.

The bituminous trade is very quiet. Some of the dealers are taking the view that they would as soon wait a month before making contracts as not, since prices will be no lower then, and may be higher. Seeing that no one is disposed to buy now, this is a philosophical way of looking at the matter. It is hardly probable that there will be any advance, and any decline would mean a loss to producers. There may be some ground for a demand for liquidation in anthracite coal; but bituminous has already gone down to the bottom along with most other commodities. Coal that was selling at \$3.60 delivered to-day brought \$5 in 1883. Only a very severe competition will cause a further reduction in bituminous coal, and this is not considered very probable.

We quote cargo lots at \$3.55@ \$3.70 delivered.

There is a rather stronger feeling in freights, with the rates decidedly favorable to New York, as vessels do not like to go up the Delaware at this season. We

hear of \$1.50 being realized at Philadelphia. We quote:

New York, 95c. @ \$1.10; Philadelphia, \$1.30 @ \$1.50; Baltimore, \$1.25; Newport News, \$1.20 @ \$1.25; Richmond, \$1.25 @ \$1.35; Cape Breton, \$1.55 @ \$1.60; Bay of Fundy, \$1.30 @ \$1.40.

There is a small retail movement at unchanged figures. We quote:

White ash, furnace and egg	\$5.25 @ \$5.50
" " stove and nut	5.50 @ 5.75
Red ash, egg	6.00
" " stove	6.25
Lorberry, egg and stove	6.50 @ 6.75
Franklin, egg and stove	7.50
Lehigh, furnace, egg, and stove	5.50 @ 5.75
" nut	5.75

Wharf prices, \$4.50 for Broken, \$4.85 for Stove.

**STATISTICS OF COAL PRODUCTION.**

Comparative statement of the production of anthracite coal for the week ended January 10th, and year from January 1st:

Tons of 2240 LBS.	1885.		1884.	
	Week.	Year.	Week.	Year.
D. & H. Canal Co.	58,019	77,057	43,864	51,264
D. L. & W. RR. Co.	62,141	78,902	59,620	117,870
Penna. Coal Co.	27,644	33,533	13,481	20,011
L. V. RR. Co.	27,814	27,814	13,978	31,142
P. & N. Y. RR. Co.	4,049	4,049	2,869	6,364
North & West Br. RR.	14,953	14,953	.....	13,028
L. V. RR. Co.	95,983	95,983	54,057	107,979
S. H. & W. B. RR.	.....	.....	.....	425
P. & R. RR. Co.	199,408	199,408	119,352	239,340
St. Line & Sul. RR. Co.	1,356	1,356	1,480	2,397
<b>Total</b>	<b>491,367</b>	<b>533,055</b>	<b>307,701</b>	<b>589,720</b>
Increase				
Decrease		56,665		

\* Week ended January 3d.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1880	838,679 tons.
" " " 1881	638,560 "
" " " 1882	956,094 "
" " " 1883	990,793 "

Belvidere-Delaware Railroad Report for the week ended January 10th:

	Week.	Year 1885.	Year 1884.
Coal for shipment at Coal Port (Trenton)	578	578	.....
Coal for shipment at South Amboy	22,533	22,533	7,263
Coal for distribution	24,499	24,499	9,639
Coal for company's use	5,756	5,756	4,029
<b>Total</b>	<b>53,366</b>	<b>53,366</b>	<b>20,931</b>
Increase			32,435
Decrease			.....

**Comparative Statement of the Production of Bituminous Coal for the week ended January 3d, and year from January 1st:**

Tons of 2000 pounds, unless otherwise designated.

	1885.		1884.	
	Week.	Year.	Week.	Year.
<b>Cumberland Region, Md.</b>				
Tons of 2240 lbs. *50,979	50,979	.....	.....	.....
<b>Barclay Region, Pa.</b>				
Barclay RR., tons of 2240 lbs. .... 4,336	4,336	4,336	8,265	8,265
<b>Broad Top Region, Pa.</b>				
Huntington & Broad Top RR., of 2240 lbs. .... 5,790	5,790	5,790	2,649	2,649
East Broad Top.... 292	3,292	3,487	3,487	3,487
<b>Clearfield Region, Pa.</b>				
Snow Shoe..... 972	972	.....	.....	
Karthauss (Keating) 972	972	.....	.....	
Tyrone & Clearfield 45,909	45,909	37,996	37,996	
<b>Allegheny Region, Pa.</b>				
Gallitzin & Mountain..... 6,619	6,619	10,217	10,217	
<b>Pittsburg Region, Pa.</b>				
West Penn RR. .... 6,192	6,192	3,793	3,793	
Southwest Penn. RR. 1,317	1,317	1,934	1,934	
Pennsylvania RR. ... 3,881	3,881	4,482	4,482	
<b>Westmoreland Region, Pa.</b>				
Pennsylvania RR. ... 17,376	17,376	27,400	27,400	
<b>Monongahela Region, Pa.</b>				
Pennsylvania RR. ... 2,895	2,895	2,033	2,033	
<b>Total</b> .....149,558	<b>149,558</b>	<b>102,256</b>	<b>102,256</b>	
Increase		47,302	.....	
Decrease		.....	.....	

\* For week ended January 10th.

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 1,129 tons, as compared with the corresponding period of 1884.

**Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended January 3d, and year from January 1st:**

	1885.		1884.	
	Week.	Year.	Week.	Year.
Gallitzin & Mountain (Allegheny Region).....	3,086	3,086	2,316	2,316
West Penn. RR. ....	.....	.....	2,729	2,729
Southwest Penn. RR. ....	28,763	28,763	33,069	33,069
Penn. & Westmoreland Region, Pa. RR. ....	4,065	4,065	3,447	3,447
Monongahela, Penn. RR. ....	1,123	1,123	1,341	1,341
Pittsburg Region, Pa. RR. ....	.....	.....	.....	.....
Snow Shoe (Clearfield Region)....	443	443	440	440
<b>Total</b> .....	<b>37,480</b>	<b>37,480</b>	<b>43,342</b>	<b>43,342</b>
Decrease.....		5,862		

**FREIGHTS.**

**Coastwise Freights.**

Per ton of 2240 lbs. Representing the latest actual charters to January 16.

Ports.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria.....	.....	.....	.....
Annapolis.....	.....	.....	.....
Albany.....	.....	.....	.....
Baltimore.....	.....	.....	.....
Bangor.....	.....	.....	.....
Bath, Me.....	.....	1.00	.....
Beverly.....	.....	1.00	.....
Boston, Mass.....	1.50	1.25 @ 1.50	1.00
Bristol.....	.....	1.30	.....
Bridgeport, Conn.	.....	1.10	.60
Brooklyn.....	.....	1.05	.....
Buffalo, N. Y.....	.....	.....	.....
Cambridge, Mass.	.....	.....	1.00
Cambridgeport.....	.....	.....	1.00
Charleston, S. C.....	1.25 @ 1.50	1.25	.....
Charlestown.....	.....	.....	.....
Chelsea.....	.....	.....	1.00
City Point.....	.....	.....	.....
Com. Pt., Mass.....	.....	.....	1.00
E. Boston.....	.....	.....	1.00
East Cambridge.....	.....	.....	.....
E. Greenwich, R. I.....	.....	.....	.....
Fall River.....	.....	.....	.60
Galveston.....	.....	2.00 @ 2.10	.....
Gardiner, Me.....	.....	.....	.....
Georgetown, D. C.....	.....	.....	.....
Gloucester.....	.....	.....	.....
Halifax.....	.....	.....	.....
Hartford.....	.....	.....	.....
Hackensack.....	.....	.....	.....
Hudson.....	.....	.....	.....
Lynn.....	.....	.....	.....
Marblehead.....	.....	.....	.....
Medford.....	.....	.....	.....
Millville, N. J.....	.....	.....	.....
Milton.....	.....	.....	.....
Newark, N. J.....	.....	.....	.....
New Bedford.....	.....	.....	.80
Newburyport.....	.....	.....	.....
New Haven.....	.....	1.10	.60
New London.....	.....	.....	.75
New Orleans.....	.....	.....	.....
New Berne.....	.....	.....	.....
Newport.....	.....	.....	.75
New York.....	.....	1.00	.....
Norfolk, Va.....	.75 @ .80	.....	.....
Norwich.....	.....	.....	.75 @ .80
Norwalk, Conn.....	.....	.....	.....
Pawtucket.....	.....	.....	.....
Philadelphia.....	.....	.....	.....
Portland, Me.....	.....	.....	.....
Portsmouth, Va.....	.....	.....	.....
Portsmouth, N. H.....	.....	.....	1.15
Providence.....	.....	.....	.75
Quincy Point.....	.....	.....	.....
Richmond, Va.....	.....	.....	.....
Rockland, Me.....	.....	.....	.....
Rockport.....	.....	.....	.....
Roxbury, Mass.....	.....	.....	.....
Saco.....	.....	.....	.....
Sag Harbor.....	.....	.....	.....
Salem, Mass.....	.....	.....	1.00
Saugus.....	.....	.....	.....
Savannah.....	.....	1.50	.....
Somerset.....	.....	.....	.....
Staten Island.....	.....	.90	.....
Trenton.....	.....	.....	.....
Troy.....	.....	.....	.....
Wareham.....	.....	.....	.....
Washington.....	.....	.....	.....
Weymouth.....	.....	.....	.....
Williamsburg, N. Y.....	.....	1.05	.....
Wilmington, Del.....	.....	.....	.....
Wilmington, N. C.....	1.25	.....	.....
St. Thomas, W. I.....	.....	.....	.....

\* And discharging. † And discharging and towing. ‡ 3c. Per bridge extra. § Alongside. ¶ And towing up and down. † And towing. \*\* Below bridge.

**MAPS.**

**ARIZONA AND NEW MEXICO.**—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24x17 inches. Pocket form, \$1.

**COLORADO.**—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch: 10 miles. Size, 26x30 inches. Pocket form, \$1.50; as a wall-map, \$2.

**COLORADO.**—Topographical and Township Map of the State. Compiled from U. S. Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch: 10 1/2 miles. Size, 31x40 inches. Pocket form, \$1.50 on thick paper.

**COLORADO.**—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison and California Mining Regions. By Louis Nell. Substantially same as above. Post-offices, March 1st 1880. Scale, 1 inch: 10 miles, 1-570,240. Plain sheets for wall, 90 cents.

**IDAHO.**—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 5 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, \$1.

**MAP OF MINING CLAIMS ADJOINING LEADVILLE,** California Mining District, Lake County, Colo. By Edward Rollandet. 1879. Mounted on muslin, \$2.50. In cloth-bound covers, \$2.

**MEXICO.**—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads, Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26 2/3 Mexican Leagues to the degree, and 69-16 English Miles to the degree; also, Kilometrical Scale. 1881. Size, 53x41 inches. Printed in colors. Pocket form, \$5.

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