THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E.
ROSSITER W. RAYMOND, Ph. D. } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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AMERICAN INSTITUTE OF MINING ENGINEERS.

OFFICIAL BULLETIN.

MEMBERS and Associates, elected at the October meeting of the Institute, in Philadelphia, are hereby informed that prompt acceptance of election, accompanied by the payment of annual dues, is desired. Notification of election, with blank form of acceptance, was mailed, to all elected at this meeting, on November 1st. In case of acceptance not being received by the Secretary by November 30th, the sending of the ENGINEERING AND MINING JOURNAL will cease.

LAFAYETTE COLLEGE, EASTON, Pa. THOMAS M. DROWN, Secretary.

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"	XX	November 6
1876	XXI	1

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THE OUTLOOK IN COAL AND WAGES.

THE reduction of wages in the anthracite regions, that we several weeks ago intimated were inevitable, appears to assume more definite shape. Rumors are current that reductions of from ten to twenty per cent. in miners' wages have been decided upon, but, in fact, nothing definite has been arranged, though the companies are all satisfied that the reduction must be made, and that promptly. We may fairly assume the average prices obtained by the Delaware, Lackawanna and Western Railroad Co., and the Pennsylvania Coal Company, for their coal sold at auction during the past four months, as the actual market value the coal.

Delaware, Lackawanna and Western Railroad, average price, $3 23 per ton (2,240 lb.)
Pennsylvania Coal Company, average price 3 30* " "

These are the lowest prices at which coal has ever been sold, during a period of four months, in New York, and it is easy to see that after deducting the cost of, say, 150 miles of transportation, and shipping charges, there remains a balance for coal at the mines which will require the very closest economy to make profitable, or even to make ends meet. There is no probability whatever of any great increase in selling prices for months to come; indeed there are no wanting signs of even lower prices ruling between now and the opening of the Spring trade. It becomes, then, evident, without any special inspiration from the companies, that a heavy reduction in miners' wages—which are still far above those of other classes of labor—is inevitable; and the knowledge of this fact should guide the actions of the miners themselves.

A similar reduction will take place, though, probably, not so soon, in the Cumberland region. As there is every prospect of a long period of low prices in coal, the continuance of low wages will be correspondingly protracted.

This is certainly an ill outlook for the miners whose earnings during the year have been very small, owing to enforced idleness, and yet the prospects are that, even with the lower wages, there will not be full work. We would, therefore, repeat the advice we have given many times during the past year, and point out emigration of a large number from the coal regions as the best course for those who leave, and for those who remain. There is nothing in the near future that offers any inducement for remaining there, and we fear there will be great suffering when low wages and short work are combined.

Trade in every department is paralyzed by the alarming political condition of the country, and it certainly did not need this last straw to aggravate the present depression. Till the politicians learn patriotism, and think of their country before themselves, there is no prospect whatever of any revival in business.

* 15c. is added to Newburg prices for New York delivery.

THE PROPOSED NEW NOMENCLATURE FOR IRON AND STEEL.

WE purpose in the present article not to enter upon a discussion of this subject, but merely to put on record a few points brought out in the discussion at the October meeting of the Institute when the International Commission made its report. We do this because that discussion was so desultory, colloquial and hasty, that the gentlemen taking part in it have desired that it shall not be reported as expressing their deliberate views in mature form. The report of the Commission is to be the special order for debate at the next meeting of the Institute, and members interested in the subject will then doubtless speak "for posterity."

At the October meeting, pending the acceptance of the report, several members made inquiries and remarks, and Mr. HOLLEY explained and defended the recommendations of the Commission.

Mr. HOWE suggested that the proposed classification, being largely based on the properties given by fusion, the importance of which no one denies, ignored too far the very important properties given by carbon.

Prof. BLAKE referred to the commercial classification adopted at Creusot, as one already largely used, and employing well-known technical terms. This he thought should receive attention in any discussion of the subject.

Mr. RAYMOND spoke of the report as a compromise, and queried whether its effect would be to reconcile existing difficulties or to add a new complication. He pointed out also that the report contained, parenthetically, a very important definition as to the characteristic properties of steel—with regard to which, however, he did not wish to be understood at present as pronouncing an opinion. He questioned also the substitution of "ingot steel" for "cast steel," the two meaning the same thing.

Mr. HOWE reminded the preceding speaker that the proposed "ingot steel" would not include the softest Bessemer and Martin metals, which are now often called, and according to Mr. METCALF'S paper, just read, would be hereafter called "cast steel," but which the report classes as "ingot iron."

Mr. RAYMOND raised the question whether the term "ingot," as applied to malleable cast products only, was sufficiently descriptive. He thought a "pig" was also an "ingot," and that perhaps the name "ingot" came dangerously near the term "pig" or "cast iron."

Mr. HOLLEY thought "ingot" had always meant something malleable; and this difference of opinion remained unsettled, being recognized as, after all, only a matter of verbal criticism.

Mr. HOWE thought it was underrating the intelligence of the public to suppose that they would confound the terms.

Prof. EGLESTON recalled the fact that Bessemer metal was at first manufactured as iron; and thought there would be no confusion necessarily arising from the manufacture, now of iron and now of steel, in the Bessemer or the open-hearth process. With regard to the proposed nomenclature, he would say, as a member of the Commission, that it was of course advanced as provisional and tentative. It would be of course necessary that it should be generally adopted, if it were to be of any use. For his own part, while he might have been better pleased if the English terms proposed had been, so to speak, more English, yet it was a controlling argument with him, in assenting to the report, that it presented a set of synonymous names in three languages, and would therefore, if adopted, greatly facilitate international technical discussion and study. In the French and German languages the terms proposed were more familiarly recognized than in English. The French *fer fondu*, for instance, was already an adopted term.

Mr. RAYMOND remarked that the term *fer fondu* was more precise than "ingot iron," because the French had an entirely different word, *fonte*, to express pig-iron. The exact English translation of *fer fondu* would be the clumsy phrase "melted wrought-iron."

We believe this comprises the substance of the remarks made on the occasion referred to; and we have only to repeat that there was no pretense of a thorough discussion of the report, that being, by common consent, adjourned to the February meeting.

*

CONDITION OF MINING IN PENNSYLVANIA.

REPORTS OF THE PENNSYLVANIA INSPECTORS OF MINES FOR 1875.

THE annual reports of some of the Pennsylvania Mine Inspectors have, for years, formed the most extraordinary official literature this or any other civilized country has seen. Most of our readers are familiar with the idiosyncracies of M'ANDREW, "the Clerk of the Schuylkill District," and appreciate his inimitable faculty for the conversion of facts. In the volume before us we still recognize this familiar hand, and could readily fill up the space at our disposal with choice extracts of true M'Andrew literature. We may revert to this amusing theme again, but we desire now to refer to those portions of the volume which contain information of real value.

It seems that the inspectors are never allowed to read the proofs of their reports, and, in consequence of this singular neglect of the State authorities, the reports are full of typographical errors, and, as we are informed, there are many and serious omissions. This is the more to be regretted as there are few of the reports that have such superabundance of excellence that they can afford to be mutilated.

Leaving M'ANDREW aside for the present, we notice at once an improvement in the fact that the Schuylkill Inspectors make reports for themselves, instead of allowing their wisdom to go forth filtered through M'ANDREW.

Mr. PARTON, the new Inspector for the Pottsville District, introduces his report as though he were making a "stump speech," in which he addresses the operators, superintendents, miners and laborers successively. It is not very easy to trace the connection between the "spread eagle" talk about "this centennial year" and the prevention of accidents in mines, and we shall not attempt it, but we note, incidentally, that Mr. PARTON holds very sound views on the coal trade, and on the question of combinations, whether of labor or capital, to restrict production or regulate prices; indeed, his remarks in this connection may be considered as quite prophetic, having been written months before the collapse of the coal combination. We quote his closing paragraph:

"These combinations contain within their own structure the germs of their destruction, and the time is not far distant when this very self-interest which binds them so closely together now, shall be the cause of their dismemberment; then will commence an era of open competition, which, although disastrous for a while, will in the end prove beneficial, prices for a while will be so low that only such collieries as possess superior physical advantages will be able to work at a profit, the others will stop, and thus reduce the production. The tide of emigration of labor, that has been flowing so steadily, for a number of years, to the coal fields, will be diverted in another direction, where there is still ample room and need for it, and where, instead of producing, it will add to the consumption of coal. The trade will gradually arise from this depression, and mankind will be taught another lesson from the book of nature. That all combinations for the purpose of fixing an artificial price upon the value of any commodity are wrong in principle, such values being governed by a law of nature, which is as infallible as any mathematical law, and a thousand times more unalterable than those of the Medes and Persians—namely, the law of supply and demand."

Beyond this introductory flourish Mr. PARTON and his fellow inspectors, Messrs. ELTRINGHAM, GAY, and HEMINGRAY, confine themselves to a list of accidents and a brief description of the improvements at each colliery.

Mr. T. D. JONES, the Inspector for the Southern District of Luzerne and Carbon Counties, who was appointed in July, 1875, makes a brief report on the condition of the collieries in his district. He mentions, too briefly, the fires in the Stockton and Summit Hill (No. 6 tunnel) mines, and tells us that in the former mine, which took fire April 7, 1875, in the flue near an underground boiler, the method adopted to extinguish the fire was by walling-in the part on fire. At the date of the report the fire was still burning, but, we understand, is now extinguished. This, unfortunately, is not true of the fire in the No. 6 Tunnel, Summit Hill, which has now been burning since August 12, 1871, the company having tried carbonic acid gas, walling-off, and drowning-out, without any satisfactory result.

A plate, showing very curious foldings in the Mammoth and Wharton veins at the Beaver Brook colliery, is annexed to Mr. JONES' report.

This report bears the impress of careful, honest work, and it is, therefore, of considerable value; though we think there is still plenty of room for improvement in this as well as those of all the other inspectors.

The report of Mr. T. M. WILLIAMS, Inspector for the Middle District of Luzerne County, gives interesting and valuable information upon a number of points, which we shall now note.

Circular shaft Sinking.—The only circular shaft that we know of in the anthracite coal fields is the Maltby, near Wilkes-Barre, which was commenced in 1872, with the view of sinking through 160 feet of "wash," gravel and clay, to the solid rock. The shaft was 20 feet diameter, in the clear, with a circular brick wall 21 inches thick. It was thought that the weight of the wall would be sufficient to sink it as the ground below it was removed, but through uneven pressure, or over pressure, or bad workmanship, the wall commenced to crack when the depth attained was scarcely 70 feet. Cast iron tubbing was then adopted, being cast in full rings about 4 feet in width. This was forced down, by its own weight, inside the brick lining. Before reaching a depth of 100 feet a large body of water was encountered and the men were driven from the shaft. Since then the work has been continued by a kind of "Chaudron" process, the material being excavated and drawn from the shaft, which is always full of water, by an automatic shovel. The full description of this work is not given in Mr. WILLIAMS' report, but we are told that it "acts exceedingly well so far as tried," and the iron tubbing descends readily.

There are few places in the anthracite regions where shafts have to be put down through wet ground or "wash," but where such cases do occur we have no doubt the Chaudron process would be found as advantageous in cost and speed of sinking as it has proved itself in France and Belgium.

Mine Fires and Underground Boilers.—The Baltimore fire was still burning, though walled off, at the date of the report, and it was not known for certain whether the Empire fire was extinguished or not. It is walled off, and since it does not interfere with the regular working of the mine, it is really of little immediate importance whether it is out or not.

A notable improvement in the mines of this district is the general removal of boilers from below ground. In the case of one of the Empire mines a 9-inch diameter bore-hole was put down with the diamond drill, we believe about 300 feet, to the coal bed, and a steam pipe carried through it from the boilers on the surface to the engines underground, a distance of 1,500 feet. No statement is made of the cost of carrying steam to this distance, nor of the loss by condensation, but the enormous loss occasioned by the several fires, in the mines of the district, which originated with underground boilers, has convinced the companies of the inexpediency of this method of getting power. Whether compressed air may not, in some cases, be found preferable to steam, has not yet been determined in this field, but it is a subject that calls for the attention of the engineers of the companies.

Boiler Inspection.—Mr. WILLIAMS refers to a subject of very wide and urgent interest when he calls attention to the present exceedingly defective system of boiler inspection. It would be to the interest of all concerned to have a thorough system of inspection made by a competent expert at stated intervals. Such a system, for example, as that adopted by the Hartford Steam Boiler Inspection Company.

Mine Ventilation.—In no mining district in this country is the ventilation so good as in that under the inspection of Mr. WILLIAMS, a result due to his experience, good judgment, and strict enforcement of the Pennsylvania ventilation law. The practice of the district under so able an expert is consequently a type for the instruction and imitation of miners everywhere. We therefore make copious notes from this report.

The better ventilation in this district is modestly attributed, partly to the necessity growing out of the presence of greater quantities of fire damp, met with as the mines attain greater depths, and partly to the requirements of the mining law. Six years ago (1870) when Mr. WILLIAMS was first appointed inspector, he recommended the use of fans, the mines being then ventilated generally with furnaces, and some with natural ventilation only. The total number of fans then in use was sixteen. Now, with only a few exceptions, all the mines in his district are ventilated by means of centrifugal exhaust fans, sixty-two of which have been erected since 1870, and they are found very much more economical and effective than furnaces. The fans are of various patterns, several being of the Guibal type, others are open on the periphery, others are revolving disks. They vary in diameter from 5 feet to 24 feet, the most of them being from 15 to 20 feet diameter, and the center opening (most of the fans having an opening on each side) being generally equal to one-half the diameter.

The velocity is usually from 50 to 80 revolutions per minute, though some run as high as 160 revolutions, and the "drag," in the rare cases where recorded, is at a maximum 1¾ inches water gauge; 1 inch to 1¼ being as high as most of the fans give. The volume of air circulated varies greatly according to the requirements of the mines and the size of the fan, the maximum amount being 116,000 cubic feet per minute, under a drag of 0·8 inch water gauge, by two fans 10 feet diameter each, making 160 revolutions per minute. Two mines have a ventilation of 108,000 cubic feet per minute, in one case produced by a 12 feet fan running 130 revolutions, drag 0·47 inch water gauge; in the other case, by a fan 24 feet diameter, running 70 revolutions and creating a vacuum or drag of 1·4 inches water gauge. Most of the mines circulate from 25,000 to 60,000 cubic feet of air per minute.

Mr. WILLIAMS rightly points out the fact that good ventilation depends much more on the condition of the air-ways than on the nature of the ventilating machinery, since, as he shows by experiments made in some of the mines in his district, from 7 to 31 times as much power is expended in overcoming friction as in producing velocity, and as the friction increases as the square of the velocity the advantage of large air-ways is apparent. The improvement in the ventilation of the mines is due more to the increased size of the air-ways now in use and to the efficiency of the stoppings used throughout the mine than to any other causes.

The stoppings or bratticings formerly in use were generally of inch boards, or of piles of slate and coal dirt; now walls built of slate, rock, or brick, laid in lime mortar, are almost everywhere used, and it is universally conceded that they are more economical than the old style of wooden bratticing.

Check doors are used in each split or air current in the mines to regulate the amount of air passing. Main doors are hung on pieces of square timber, 8 or 10 inches square, niched into the roof, and all built around with stone laid in lime mortar. These doors are in pairs, or are "double doors," with sufficient space between them to contain a team and train of cars—a space depending somewhat, also, on the grade of the road—so that one door can always be closed before the other is opened. Mr. WILLIAMS gives drawings of his own designs for a system of double doors, in sections, to protect or keep the air current steady to the faces of all working places, and of an improved mode of opening new shafts or slopes, with proper arrangements of double doors, air crossings, etc., which are simple and effective, and have given general satisfaction. We shall revert to this subject on another occasion.

The following remark is so applicable to most of our mining districts that we quote it for the benefit of "whom it may concern": "Many of our old mines, and some not yet very old, are expensive monuments to the random system of mining that prevailed in our anthracite coal-fields in the past."

Mine Signals.—The Pennsylvania mine law requires every mine to have a speaking tube or other convenient signal from the surface to the foot of the shaft or slope.

Signals from the fan house on the surface to some point in the mines are a necessity in the collieries producing explosive gases, and they should be so simple that any miner can operate them. Electric signals are coming into use, a code of signals being arranged so that communication between the surface and the mine can be made, if anything should happen to the machinery requiring the men inside to be put upon their guard or withdrawn.

Speaking tubes exist in nearly all the shafts, and a pneumatic signal is also in use in some of the mines. It seems to us that a system of pneumatic pipes, with a few stations in the mine, might be readily worked by the fan engine or even by a hand fan, so as to carry written messages between the stations, just as telegrams are now delivered in this city, and as letters have long been distributed in London. The chief expense would be in the tube, and the advan-

tage would consist in its enabling those on the surface to communicate freely with those in the mines, whether in matters relating to the work, or in case of accident.

Mine Discipline.—No question which Mr. WILLIAMS has treated in his excellent report is of greater importance than that of discipline. He deplores the absence of any code of general or special rules at the collieries, and thinks such a change should be made in the law as would provide for this want. There can be no doubt but that the law should require every mine to have a set of rules for the government of those who work in it, and the framing of such a code is a matter requiring technical knowledge, practical experience, and good judgment. It should be left to a commission of the ablest experts, so that it may embody the experience of all. The British legislation on this subject, and the special rules in force in the English collieries, afford excellent foundation on which to build; not that the rules applicable there would in all cases suit the altered conditions at our mines, but the general principles remain the same.

Mr. P. BLEWITT, late inspector for the Eastern District of Luzerne County, makes an elaborate report, in tabular form. He indulges in no generalizations, nor does he discuss the facts which his observations have made apparent, but he simply confines himself to presenting, in excellent systematic tabular form, all the facts relating to the mines as they are; and lets each for himself learn from these in what respect they are deficient or how they could be improved.

We could wish that each of the inspectors had adopted a somewhat similar form for the statement of facts; but this, it seems to us, though an important part, is still but a part of the inspector's duty. If our inspector's were all men possessing that full knowledge of the art of mining which should characterize them, they would, from their official position, form the most efficient corps of instructors that it would be possible to have, and their reports would prove valuable additions to our technical literature. In this respect Mr. WILLIAMS' report is by far the ablest we have yet seen, and while we do not hold it up as the limit of perfection, it would certainly be matter for congratulation if those of the other inspectors had been nearly as good. Mr. WILLIAMS is far too sensible, too able, and too ambitious, to rest satisfied with any past achievement, and we trust his fellow inspectors will follow his example.

There is one very important defect in the reports of all our inspectors, and we call attention to it in the hope that it may be remedied.

There is no system or uniformity in the statistical information which the inspectors collect. Mr. BLEWITT has a most elaborate tabular statement, some of the items in which it would be of great value and interest to have given for the other districts, while some appear to be more curious than useful. We would suggest that the inspectors meet and draw up certain forms, and fix upon a a mode of securing correct information on the subjects covered by these forms. In this way the statistical information will become of value and can be compared. Since some of the inspectors have not had the advantages of a wide acquaintance with the literature of mining, we would further suggest that they invite to their councils a few of our most accomplished engineers, or the inspectors might request the Institute of Mining Engineers to invite two or three engineers to co-operate with them in devising such a plan as would enable them to make their labors and official position of the greatest possible benefit to the profession at large, and to those whose interests they are appointed to protect, in particular.

We shall refer to the accidents in the coal mines on another occasion.

TRIAL OF THE PUMPING ENGINES AT LAWRENCE, MASS., MAY, 1876.*

THE report of the trials of these engines, recently published, are of great interest to the engineering profession, and to all interested in the problem of the water-supply of large cities, particularly as it may be compared with that of the pumping engines at Lynn, Mass.

The engines in the two cases were of nearly the same size, and delivered almost exactly the same volume of water to nearly the same height. They were designed by the same engineer (Mr. E. D. LEAVITT, Jr.,) and erected by the same contractors. The experiments were made by the same gentlemen, in the same manner, and the records are sufficiently full in each case to give an intelligent understanding of the results.

A criticism of the report of the Lynn engine was published in the ENGINEERING AND MINING JOURNAL, in January, 1876. The object of this paper is to compare the results of this experiment with those deduced from the records of that at Lynn, and to see how far the one verifies the other.

The duty of the engine at Lynn, as computed by Mr. R. H. BUEL and the writer, by crediting the engine with the actual volume of water delivered, the pressure against which it pumped being that which it was supposed would have been indicated by a correct pressure-gauge† located at the level of the water in the pump-well, and connected with the force-main beyond the pump + one pound (being an allowance for the supposed resistance of the passages between the well and the pump), and charging it with the weight of the combustible portion of the coal actually consumed + one-fifth of that weight (being an allowance for the ashes and refuse usually found in commercial anthracite coal), was 87½ millions for 100 lb. of commercial anthracite.

The coal used in the experiments at Lawrence was "Cumberland," having 4 per cent. of ashes and refuse. A considerable number of experiments on anthracite and semi-bituminous coal, including "Cumberland," made by the United States Navy Department, and published in "Experimental Researches in Steam Engineering," by B. F. ISHERWOOD," and elsewhere, have shown that the effect of the combustible portion of these coals when burned in the furnaces of steam boilers, similar to those at Lawrence, are *sensibly equal*. If there is any advantage, it is in favor of the semi-bituminous combustible, and the engine at Lawrence will certainly not lose anything by assuming the combustible to have been equal to that at Lynn.

In the report of the experiment at Lawrence, the Board of Experts have quoted paragraphs from their letter of instructions from the Water Commissioners, and have explained how the experiments were made, and how the calculation of what was termed the *duty* in those instructions was made.

The instructions appear to have been (so far as the points to be criticised in this paper are concerned) briefly as follows:

1st. To measure the water actually delivered by the pump.

2d. To ascertain the pressure in the rising main, near to the pump, by a correct pressure gauge.

3d. To weigh the Cumberland coal supplied to the furnaces of the boilers during an interval of forty-eight hours, said interval to commence at any time they might choose, the engines having been previously running uniformly, and the fires in good condition.

4th. To compute the "duty" by crediting the pumps with the weight of water actually delivered + 5 per cent., with the height equivalent to the pressure shown by the gauge + the statical height of the gauge above the surface of the water in the pump-well + one pound, and by charging the engine with the weight of coal actually fed to the furnaces.

It is not necessary to point out that the quantity called the "duty," when computed in this way, does not resemble the duty as ordinarily understood in any way whatever. The duty as ordinarily understood is the useful work done by one hundred pounds of coal, the useful work being the weight of water delivered by the pumps, lifted to a height equivalent to the pressure in the pipe through which the pump delivers. The experts in this case were required to measure the volume of water delivered and the pressure resisting it, and then to declare that the pump had delivered 5 per cent. more water against one pound more pressure than their experiments showed.

One will not deny the propriety of an inspector cutting an inch off from the end of his yardstick before he measures a roll of cloth, provided the buyer and the vender direct him to do so, but care should be taken that the transaction is not placed on public record as an equal number of *standard yards*.

The allowance of 5 per cent. of the volume of water was ostensibly made to "allow for the loss of action" in the pump. In the experiment the pump delivered about 95½ per cent. of the piston displacement, and the allowance of 5 per cent. increased this to 100¼ per cent. of the piston displacement, so that there is in this case the anomaly of the pump being credited with more water than it could hold.

The allowance of "one pound" was ostensibly made to allow for the "friction of the pipe and bends" between the well and the pump. In this case there were no such pipe and bends. The pump had an open bottom and was set directly in the well, the water in the well surrounding the pump barrel and the surface being considerably above the suction valves in the pump. The gauge was placed in the air-chamber of the pump, and thus measured the pressure of the water before it had been reduced by any friction except those of the pump-valves and passages. There would appear to be no more reason for adding one pound than for adding one hundred.

In computing the "duty" according to the instructions already quoted, the board would appear to have made one slight error. The specific gravity of the water was determined to be, by experiment, 1·005, distilled water at 60° being 1·000. From this the board computed correctly the weight of a gallon to be 8·38 pounds, but in computing the hydrostatic head, equivalent to the pressure of 75·85 (being the pressure shown by gauge + pressure equivalent to height of gauge above surface of water + one pound), they neglected to consider the actual specific gravity of the water, but assumed the greater height corresponding to a liquid having a specific gravity of 1·000. The error from this cause is nearly one-half of one per cent.

The engines were a pair of compound beam engines, coupled at right angles to a crank shaft and having one fly-wheel for both engines. Each engine consisted of a high pressure and a low pressure cylinder at opposite ends of a working beam, and one "bucket and plunger" pump. Each engine had its own air pump, feed pump, and steam pipe, and the pumps delivered through separate water mains which united seventy-five feet from the engine-houre. It is presumed there was a stop valve in each of these branch mains. The pumps had open bottoms, and stood directly in the pump well, the water surrounding the pump barrel and rising up considerably above the suction valves. The steam cylinders were steam jacketed on the sides and lower heads, the water of condensation from the jackets returning (it is presumed) directly to the boilers after being measured in the feed water tanks. There were two boilers of the locomotive type, the products of combustion passing first through the tubes and then returning through a brick flue under, and in contact with, the lower part of the shell of the boiler. The pump valves were the "Cornish Double Beat" type.

The Board of Experts made two sets of experiments, the one for economy being two runs, one of 22 hours, the other of 35 hours, with an interval of of three hours between. The engine was stopped during one and a half hours of this time to repair "the pipe which had been inserted into the pump chambers for the taking of indicator cards" which had blown out. During these two runs the engines were uncoupled (it is presumed in such manner that all parts of the engine not in use, except the crank shaft and crank, were at rest) and one engine only run. A portion of the grate surface in each boiler was bricked off and both boilers were used. The water delivered by the pump was measured by a weir, and the pressure in the air chamber of the pump, together with the elevation of the gauge above the surface of the water in the well, which varied a little during experiment, noted every hour. The feed water (inclusive of that condensed in jackets) was measured in a tank, the coal fed to furnaces weighed, and indicator cards taken from the steam cylinders and various pressures and temperatures. The ashes withdrawn from the furnaces were also weighed.

The third experiment, being for capacity, was made with both engines and boilers (the bricks from the grates having been removed). That experiment lasted 35 hours, and was made in the same way, except that no indicator cards were taken from the steam cylinders.

The full details of the experiments, together with cuts of the engines, boilers, and plant, are given with commendable exactness by the Board in the report referred to, together with the calculations of the results in the manner already referred to. The *nominal duty*, as computed by the Board, was:

Economy test (average)	96,186,979
Capacity test	not computed.

If this result is reduced one-half per cent. to allow for error in computing height equivalent to pressure shown by gauge, the resulting figures (being a quantity computed as instructed and called in contract *the duty*) will be 95 7-10 millions.

There was an air cock on the suction pipe intended to admit air to the pump,

* New York, D. APPLETON & Co., 1876.

† There was a gauge, believed at the time to be correct, on the pipe, but as it did not agree with the other instruments, its reading is rejected.

but it is inferred from the language of the report that *this cock was not opened during these experiments.*

An extract from the report of the Board, giving details of dimensions of machines and means of observations and measurements taken during the experiments, will be found in the appendix to this paper. In that appendix the mean of the two experiments for economy is taken. Where quantities are not given in report of Board, or are estimated from insufficient data, they are marked with an interrogation (?).

Comments upon the details of the report, in their natural order, will be as follows:

COAL.—The coal was "Cumberland," said by the board to have been of good quality. Two kinds were used during the ecomony trial, the second kind being substituted in hopes of an improvement in the evaporation, but without success. The proportion of ashes and cinders were 3 8-10 per cent. Ordinary commercial Cumberland coal yields from 10 to 12 per cent. of ashes and refuse when burned in furnaces similar to those at Lawrence, tended by ordinarily skilled firemen.

RATE OF COMBUSTION.—The combustible portion of the coal was consumed at the rate of 16-100 of a pound per square foot of heating surface per hour in the economy trials. and 26-100 in the capacity trials. The temperature of the gas leaving the boilers was in the first case below the temperature of the steam, and in the second case varies from 20° cooler to 70° hotter than the steam. The low temperature of the gas may have been caused either by leakage of air into the flues or by radiation of heat; in either case the economy of the boiler in the first experiments would have been improved by an increase of the rate of combustion until the gas was as hot as the steam. One would expect that the evaporation would be better in the capacity trial than in the economy. The actual results were in pounds of water evaporated from 212° by one pound of combustible:

Economy trial	10·1
Capacity trial	10·3

The engine, therefore, did not have any advantage in using two boilers during the economy trial.

MEAN PRESSURES IN CYLINDERS.—The mean indicated pressure as given in the report in the high pressure cylinder during the economy trial was 53·74 pounds and on the low pressure 10·22 pounds. All of this pressure, except that necessary to overcome the friction of the engines and of the bucket and plunger of the pump, must be balanced by the pressure of the water in the pump cylinder. The experiments on the similar engine at Lynn indicated that 2 pounds per square inch on the low pressure piston was sufficient to overcome all friction of machine and to work the feed and air pumps. Making the same allowance here, the unbalanced pressure transferred to the pump bucket was 84·7 pounds per square inch of pump bucket, while the pressure shown by the gauge on the air chamber plus the statical head from the gauge to the level of water in the well was 74·84, showing that the pump required nearly 10 pounds per square inch of bucket to overcome the resistance of the valves and passages in the pumps, or 13 per cent. of the useful work.

FRICTION OF WATER IN MAIN.—A comparison of the hydraulic head as indicated by gauge and of the statical head shown by preliminary survey shows the friction of the whole length of main from the pump to the reservoir.

HEAD IN FEET.

	Hydraulic.	Static.	Difference.
Economy trial	172·0	168·7	3·3
Capacity "	176·4	169·7	6·7

The mean velocity of the water through the pipe in feet per second was, during the trial for economy, 1 57-100, and during that for capacity, 2 56-100. The loss of head from friction would theoretically be proportional to the squares of these numbers, or as 25 to 65.

CALCULATION OF FRICTION OF WATER IN MAIN.—The friction of the water in the short branch mains, 75 feet long, may be disregarded as insensibly small. The friction of the water in the long main during the capacity experiment, when the pipe was receiving 4 discharges from the pump each revolution, or 65 per minute, and the velocity therefore sensibly constant and 2 56-100 feet per second, may be computed from the formula given in RANKIN'S *Civil Engineering*, page 678, Edition 1867, and for both cases, will be found to be in feet of water:

Economy trial	= 2·2
Capacity "	= 4·2

being about ½ less than that found by experiment in each case. The difference being 2½ feet in the capacity experiment, and 1 1-10 feet in the economy, may have been absorbed in overcoming the friction of the bends and of two sets of gates in the main.

RESISTANCE OF VALVES.—This was found to be from difference of steam pressure on steam pistons and water pressure shown by gauge in air chamber very nearly 10 pounds acting on the whole area of the bucket during one-half a revolution, from which it would appear that the force required to drive the water through the pumps, including the resistance of valves, was nearly 7 pounds per square inch, or 3 pounds for each valve. In the engine at Lynn, by the same builders, this force was only about 2 pounds, or less than one pound for each valve. The dimensions of the valves are not given with sufficient detail to compute the force required to lift them, but it may be inferred that the annular area tending to lift the valve was at Lawrence 23 sq. in., and at Lynn 60 sq. in. If the valves should weigh 100 pounds in each case the force required to lift them would be 4¼ pounds at Lawrence and 1 2-3 pounds at Lynn. These figures serve to show that the additional resistance at Lawrence might be entirely due to the peculiar construction of valves.

The object in substituting "double beat valves" for disk valves was undoubtedly to obtain a greater opening for the passage of water, and thus allow it to pass through the pumps with less resistance. The construction of these valves entirely defeated that object, for the head required to open them (3 pounds) was sufficient to have forced all the water pumped through a single orifice 10 inches in diameter, being very much smaller than it would have been necessary to use with disk valves.

NOTE.—This condition of affairs appears to be not unusual in pumps using valves of this description. In the report of Citizens' Committee of Chicago, 1875, I find the pressure required to open valves (being the difference between the indicated pressure in the pumps and that shown by gauge outside) was 6 pounds for each set of valves. The valves in that case had almost identically the same dimensions as at Lawrence, namely, 15 11-16 inches diameter of outside of lower seat and 12⅞ inches diameter of inside of upper seat. The effect of this large resistance was to reduce the useful work nearly 25 per cent.

WATER CONDENSED IN JACKETS.—This was found to be by an experiment made afterward, when the steam in the boiler was from 70 to 75 pounds, at the rate of 339 pounds per hour. During the experiments on the engines the steam averaged 90 pounds. Probably the steam condensed during the experiments was at the rate of 360 pounds per hour.

DUTY.—I estimate the duty per pound of combustible, calculated on the actual volume of water delivered, on the pressure indicated by the gauge + the statical height of the gauge above the surface of water in well during test for *economy*: $27{,}650 \times 74{\cdot}85 \times 144 \div 3{\cdot}14 = 94\ 9\text{-}10$ millions, and during test for *capacity*: $45{,}200 \times 76{\cdot}73 \times 144 \div 5{\cdot}287 = 94\frac{1}{4}$ millions, the mean of both being 94 7-10 millions, from which it may be computed that with commercial anthracite coal having 1-6 ashes and refuse, the duty would be 78 1-10 millions. This is the actual *commercial duty* of the engine as shown by these experiments.

COMPARISON OF ENGINE AT LAWRENCE WITH ENGINE AT LYNN.—A careful comparison of the performance of the engine at Lawrence with the engine at Lynn will show as follows:

	Lawrence.	Lynn.
Pounds of water evaporated from 212° by one of combustible	10·1	12·2
Pounds of water per indicated horse power per hour	14·4	16·8
Pounds of combustible per indicated horse power per hour	1·64	1·60
DUTY.—Calculated on the actual volume and pressure of water and for 100 pounds commercial anthracite having 1-6 ashes and refuse (millions)	78 1-10	87 4-10

It appears that the boilers at Lynn were a little more economical than those at Lawrence, but that this advantage was nearly overcome by the economy of the engine at Lawrence being greater than at Lynn, (probably on account of the higher steam pressure and greater expansion) leaving the cost of an indicated horse power in combustible nearly the same in each case. The engine at Lynn only lost 9 per cent. of the useful power in overcoming all resistances of the engine and pumps, while the engine at Lawrence lost 18 per cent., the proportion of the indicated power utilized being, at

Lynn	92 per cent.
Lawrence	84 "

The engines and pumps (except the valves) were almost identical in each case. The chief cause of difference, therefore, was probably in the valves in the pumps.

THERON SKEEL, 149 Broadway.

APPENDIX.

Diameter of High pressure cylinder	18 inches.
" of low " "	38 "
" of pump-buckets	26¼ "
" of pump plunger	18½ "
" of high pressure piston rod	3½ "
" of low " "	4 "
Stroke of all pistons	8 feet.

CLEARANCES.

High pressure cylinder	2·44 per cent.
Low " "	1·67 "
Diameter and weight of fly wheel	30 feet—35,900 lb.

DISPLACEMENT OF PISTONS PER STROKE.

High pressure	13·9 cubic feet.
Low "	62·5 " "
Pump bucket	29·78 " "

DIMENSIONS OF BOILERS.

Two locomotive boilers each 25 feet 5¼ inches long, with 80, 3 inch, tubes 10 feet long, each boiler having two furnaces 2 feet 10 inches wide by 5 feet 3 inches long:

Heating surface (2 boilers)	2,000 square feet.
Grate "	56½ " "
Cross area of tubes "	7 " "
Ratio of heating surface to grate surface	47 : 1
" of cross section of flues to grate surface	8 : 1
Length and diameter of force main	5,000 feet—30 inches.

Records of experiments (see report of Board):

NUMBER OF EXPERIMENTS.

	I and II Average.	III.
Duration of experiment (hours)	57	34
Hourly quantities (average of whole experiment) pounds of Cumberland coal consumed	331·2	541·6
Pounds of ashes and refuse withdrawn	17·2	12·8
Pounds of combustible consumed	314·0	528·7
Pounds of feed water inclusive of water from steam jackets	2,754	5,400
Pounds of water from jackets	360	720
Pounds of water evaporated in boilers	2,754	5,400
Cubic feet of water delivered by pumps	27,650	45,200
Cubic feet equivalent to pump displacement	29,090	47,600

PRESSURES.

Boiler gauge (pounds)	90	90 3
Vacuum (inches)	27·4	27·5
Barometer	30·0	30·1
Gauge on air chambers (pounds)	64·19	66·93
Pressure equivalent to height of gauge above surface of water in well	10·60	10 80
Total pressure against pump (useful)	74·79	77·73
Equivalent height of column of water having specific gravity 1·005 (feet)	172·0	176·4
Difference of lever of surface of water in wier box and do. in well	168·7	169·7
Difference of last two being loss of head in friction, in pipe, etc., (feet)	3·3	6·7

BOILERS.

Pounds combustible per square foot of heating surface per hour	0·16	0·26
Pounds of water evaporated from 212° by one pound combustible	10 3	10·1

NOTE.—This is as good an evaporation as would be expected from this boiler. (See experiments on boiler of U. S. S. Swatara. Experimental Researches, Vol. II., page 82.)

ENGINES.

Revolutions per minute	16.28	13·72
Number of times steam was expanded	16	....

FROM INDICATOR CARDS DURING (I. & II.)

Mean total pressure	(High)	71·3	(Low)	12·36
Mean indicated pressure	"	53·74	"	10·22
Mean net pressure	"	53·74	"	8·22
Mean net pressure on low pressure increased in ratio of area pump bucket to area L. P.				17·3
Mean indicated pressure on high pressure increased in ratio area pump bucket to area H. P.				25·0
Twice the sum of the above, being unbalanced pressure on pump bucket				84·6
Pressure equivalent to gauge on main, plus height above surface of water in well				74·85
Difference of last two, being pressure lost by water in passing through pump passages and two sets of valves (pounds)				9·75

POWER.

Indicated horse-power	191·3
Total " "	219·7
Net " "	174·6

Cost of a horse-power in pounds of combustible per hour :

Total horse-power	1·43
Indicated " "	1·64
Net " "	1·79

Cost of a horse-power in pounds of steam per hour :

Total horse-power	12·6
Indicated " "	14·4
Net " "	15·8

DUTY.—Calculated on actual volume and pressure of water and for 100 pounds, of commercial anthracite having 1·6 ashes and refuse (average of all experiments) 78,100,000

FROM INDICATOR CARDS DURING EXPERIMENTS I. & II.

	High.	Low.
Initial pressure	101·0	27·4
At cut-off	101·2	.....
Terminal	34·2	5·87
At end of cushion	55·8	5·00
Point of cut-off	0·312	.....

FIRES IN MINES: THEIR CAUSES, AND THE MEANS OF EXTINGUISHING THEM.*

By Richard P. Rothwell, Mining Engineer, New York.

FIRES in mines are so serious in their consequences and of such frequent occurrence, that their causes and the means of extinguishing them are certainly questions of the greatest interest to a large part of the engineering profession. We have already, in this country, many mines which have been burning for years, and though our hard anthracite is so difficult to ignite that for a quarter of a century after it was first discovered it was not known how to burn it except with the aid of an artificial blast, yet most of the fires which have occurred underground have been in anthracite mines, and in the coal itself. The injury which these fires have caused to properties in various parts of the anthracite regions, and the cost of extinguishing them, would amount to many millions of dollars, and they have also occasioned the loss of many valuable lives. It is not surprising, therefore, that the subject has already attracted much attention, and the exercise of great ingenuity ; and the present communication is made less with the expectation of announcing anything new, than with the object of putting upon record the present state of our knowledge on this subject, or, in other words, of indicating how defective are the present means of combating underground conflagrations.

CAUSES OF MINE FIRES.

Even upon the surface fire is a terrible foe to contend with, and there is probably no other which inspires such thorough and well-founded alarm. With what feelings, then, must we look upon this destructive element, when its field is in the narrow galleries of a mine, where the poisonous products of combustion, spreading in every direction, protect, in the most effectual manner, the fire itself from the attacks of extinguishers, while, if the face of attack be ventilated so as to enable men to approach the seat of the fire, the air current simply increases the extent and violence of the conflagration.

Fires underground originate in as various ways as those on the surface, and it is scarcely necessary to say that, except in the rare cases where they are the result of design, they are invariably classed as "accidents," and most generally as "unavoidable accidents." In reality, by an intelligent understanding of their causes and with due precautions, they can almost always be prevented. Ignorance and carelessness are their chief causes, and they are generally "unavoidable accidents" only in so far as ignorance is an accident, or carelessness unavoidable. Moreover, what, according to the light we possess to-day, may be styled an "accident," will, it is to be hoped, be rendered avoidable as the increase of our knowledge gives us a better insight into causes now hidden.

We will mention some of the more common immediate causes of mine fires, and then speak of the means adopted to prevent fires, and those employed to extinguish them when they have occurred.

It is now happily a rare thing that a mine is ignited through malice or design. The most ignorant and vicious of those who work about them understand too well the enormous injury that is occasioned to all who live in the district by a mine fire to indulge in it as a measure of revenge for real or imaginary personal injury. It is not the owner of the mine who is the only, or in most cases the principal, loser. The efforts made to extinguish it are very frequently, we may say generally, accompanied by the loss of the lives of some of those engaged in the work ; and during its continuance, which, in cases, extends through many years, the regular work of the mine is suspended, and the workmen with those dependent, directly or indirectly, on their labor for the means of living are the chief sufferers. Still, rare cases do occur where a vicious individual is so blinded by what he considers injustice or oppression as to overlook the injury he brings upon innocent parties, and to seek revenge in this manner.

In the so-called "good old days," before the rights of our neighbor were as well defined, or as much respected, as they are to-day, fires from this cause were not unfrequent ; but as the mines were usually small, the extent of the injury done was limited. An example of one of these ancient fires, and, we believe, the only one in Belgium which continues burning from the olden time to the present day, is that in the vein known as the "*Grande Masse de Falizolle.*" This bed, PONSON tells us, was worked in a piratical way, above water level, in a hill near Falizolle, between Namur and Charleroi, by the inhabitants of the neighboring country. The quarrels that even in those early days sometimes existed between neighbors were not forgotten when they went below ground, so when the drifts in which they worked happened to meet, it was made the occasion for a regular battle, and those that heaven helped with a favorable wind were not slow in taking advantage of the blessing to smoke out their neighbors by burning pieces of old leather on a fire built in some *safe* place in the galleries. On one occasion, about the year 1822, while indulging in this harmless, but effective, method of disposing of their enemies, the coal in the mine became ignited, and has since continued to burn, excluding both sides of the fight from the benefits of free coal. Many attempts have been made to extinguish this fire, but owing to the position of the bed, near the surface and above water level, it has been found impossible to control it.

In this country, in the anthracite regions particularly, many fires whose origin is unknown, have been attributed to design. In the majority of cases the cause was probably carelessness, though in some rare instances the malice of men on strike, who have had, or thought they had, some grievance, has doubtless been the origin.

Among the mines that have been on fire for a great many years may be mentioned the Summit Hill mine, near Mauch Chunk, the Greenwood Company's mine, near Tamaqua, and some others in Schuylkill, Carbon, and neighboring counties. Some of these mines have now been burning upward of twenty years. The causes of most of these fires are shrouded in mystery, but they were probably due to carelessness or spontaneous combustion.

Carelessness is by far the most frequent cause of mine fires. A workman will leave his candle, or lamp, attached to a piece of timber in such a manner as to finally ignite it, as was the case in the great fire in the Yellow Jacket mine of the Comstock lode, in 1875. A fire basket will sometimes be hung so near the coal or timber as to set it on fire. Smoking in the stables underground has occasionally been the cause of conflagrations, by the fire from a pipe falling among the straw and litter. It was from a lamp igniting a bundle of straw in the shaft, that the West Pittston disaster occurred, by which 20 persons lost their lives. In a word, carelessness acts through about the same channels below ground that it follows above, though the field for its operation is more restricted in the mines and its effects are more disastrous. If a miner, going into a portion of the mine in which fire-damp has accumulated, with a safety lamp in his hand and *an open light on his hat*, as has been done on many occasions that have come under our notice, the resulting explosion and fire can scarcely be considered as accidental, any more than can the equally well authenticated case of a man blowing himself up by firing the open keg of powder from which he was filling a cartridge, by the burning oil dropping into it from the open lamp on his hat. Incredible as these cases of carelessness may seem, they are by no means isolated occurrences, but we have heard, from the very best authority, of several instances of each.

Ignorance is a scarcely less frequent cause of fires in mines than carelessness ; indeed, it is difficult to say just where the one ceases and the other begins. It is frequently not altogether carelessness that causes the fire when a miner hangs his lamp so near the coal that it finally ignites it ; he may not know that the heat of the lamp, not in itself sufficient to ignite the coal, may liberate and ignite highly inflammable gases, and thus communicate the fire to the solid coal. Nor is it always pure carelessness that causes a fire by throwing away among the "gob" the oil-saturated cloth, or the cotton "waste" that dropped from the oil-box of a mine wagon. He who threw it away among the fine coal may have been ignorant of the fact that the heating which comes from the decomposition of iron pyrites, and from the slow combustion of carbon in a comminuted state, though it may be insufficient to ignite coal alone, may be quite sufficient to ignite the oil-saturated "waste."

There are few of the mine superintendents, not to mention the miners, who have any knowledge of the very important influence which coal dust has upon the explosiveness of mixtures of fire-damp and air, or of the causes of spontaneous combustion of coal and wood ; and while exercising the utmost care required, as they believe, they may, in ignorance, be doing or leaving undone things which result in a fire—a fire that is then said to be "purely accidental," and which it was "impossible to foresee or prevent."

Nearly every fire that occurs in a mine is said to be an "unavoidable accident," and so far as an accident is "an event that takes place without one's foresight or expectation ; an event which proceeds from an unknown cause," most fires may be so designated ; but the ignorance which makes them, in this sense, "accidents," is not unavoidable, and should not exist.

We have frequently seen the fire-pot, or grate, that stands near the foot of almost every shaft in the anthracite coal regions in Winter, placed so close to the solid "rib" of coal as to heat it far beyond a safe temperature; and before leaving the mine, at the close of the day, coal would be piled upon it in order to have it burning well in the morning. A change in the direction of the wind, or in the temperature at the surface, is sufficient to increase the draught and fan up the fire to a furnace-heat ; is it surprising, then, that several fires in our mines have been traced to this cause?

Closely allied to this is the still more fruitful cause of mine fires—underground boilers. The number and extent of the conflagrations due to this kind of "accident," in Pennsylvania, are enormous. In the immediate vicinity of Wilkes-Barre, Pa., alone, they have cost the companies millions of dollars. One would suppose that the enormous losses inflicted by such fires would have absolutely prohibited the use of boilers or furnaces in coal mines, yet there are many of our mines still ventilated by furnaces, and not a few that have boilers underground. The fire in the Avondale Colliery, in which 110 persons lost their lives, was occasioned by a ventilating furnace. In lighting up the fire, wood was used, and the sparks from this were carried up into the woodbratticed upcast shaft, igniting it and the "breaker" building which stood over the shaft. As the mine had but this one outlet, the one hundred and eight persons at work in it, (and two volunteers who subsequently entered it,) were suffocated before they could be rescued. In this, as in nearly every case, the furnace was thought to be "perfectly safe ;" it was at some distance from the shaft, and had been in use for some time without "accident" of this kind. The mine did not produce fire-damp, and, consequently, one source of danger was eliminated. In fiery mines when the air for the furnace is taken from the return air courses, there is introduced a source of accident of a very serious character. It is probable that even when the return air is not, in itself, explosive, it may become so by the presence of a very small quantity of coal-dust ; and it is well known that, even without the presence of fire-damp, the finely comminuted carbon, whether soot or coal-dust, is very easily ignited, and this has, probably, been the cause of more than one of the mysterious fires that have occurred in our anthracite mines. Such a

* A paper read before the American Institute of Mining Engineers, at the Washington Meeting, February, 1876.

case was that known as the Empire mine fire (Lehigh and Wilkes-Barre Coal Company), near Wilkes-Barre, Pa. The fire originated in an abandoned chamber, from which the coal had been taken, and which was made to serve as a flue for the smoke from a set of underground boilers. It is supposed that the soot collected in this large chamber, and became ignited from a spark, or that pieces of wood, dried to tinder, caught fire in the same way; in either event, the furnace was considered "perfectly safe," and yet, it resulted in a fire that cost more than half a million dollars to extinguish. The great difficulty experienced in igniting anthracite coal, when it is desired to burn it, is relied on too implicitly as a safeguard against fire, and this misplaced confidence leads to the introduction of risks that would never be admitted in a bituminous coal mine. We have frequently seen both ventilating and boiler furnaces separated from the solid coal by but a thin brick wall, and a few inches of space. The boilers, which are always of the plain cylinder type, fired externally, are usually covered with a thin bed of sand, and a crack in the brickwork, or a hole through which the sand can run, may allow the fire free escape to the solid rib, or to the roof, that in some instances is a carbonaceous shale.

When the roof is not very solid it is frequently supported, over the boilers, on heavy timbers, and it is not unusual to find a mass of timber, that the heat has made as inflammable as tinder, supporting the roof only a few feet above the boilers. A single spark may ignite the mass, and the matter of surprise is, not how fires originate in such mines, but how these so often or so long escape being burnt up.

The fire which has now been burning in the Baltimore mine, near Wilkes-Barre, for two years, and the efforts to extinguish which are said to have cost already nearly three-quarters of a million of dollars, was caused from underground boilers. These were, as usual, "perfectly safe," but the blast of air occasioned by a heavy fall of the roof in the vicinity, forced the fire from under the boilers and ignited some timber under the fall. As the cave extended over several acres of ground, and as the vein was above water level and near the surface, to which the rock broke through, there was no means of getting at the fire, or of extinguishing it with water. That part of the mine had to be walled off by brick or earth walls, and, doubtless, the fire will continue in the portion "caved in" for many years to come.

Underground boilers and ventilating furnaces have probably occasioned more fires than any other cause, at least this is the case in the Anthracite mines of Pennsylvania.

Explosions of Fire-damp.—Not many years ago, while the Pennsylvania mines were worked along the outcrops of the coal beds, it was commonly stated that anthracite did not yield this dangerous gas, but as the mines were carried below water level to a constantly increasing depth, it was found that not only is fire-damp met with in anthracite, but that some of the most fiery mines in the world are in this hard coal.

The hardness of the coal is so great as to require the use of explosives to break it down, and it is not an uncommon thing for a vein to yield fire-damp in such enormous quantity as to ignite at every shot in headings driven out into the solid. At the Prospect shaft, near Wilkes-Barre—probably the most fiery mine in the coal field—the make of gas has been so rapid that with a current of air of from 20,000 to 30,000 cubic feet, per minute, passing through the gangway, (12 feet wide by 7 feet high), it was impossible to proceed more than ten feet beyond the cross-heading connecting the gangway and parallel airway, without putting in bratticing to carry the air up to the face—or with such bratticing (dividing the gangway into two parts, each 6 feet by 7 feet), the velocity of air current being from 500 to 600 feet per minute—the gas would ignite at the face when the distance from the face of the gangway to the bratticing was more than fifteen feet. With such a prodigious discharge of carbureted hydrogen almost every blast would ignite it, and if the promptest measures were not taken, the coal was quickly aflame. The heat of the burning gas always tends to draw still more from the coal, and the longer the fire continues the more fiercely it burns and the more difficult it becomes to extinguish it. A number of fires have occurred in this and other collieries in the same field from this cause, and that notwithstanding all the efforts that it was thought possible to make to extinguish them. With a sudden fall of the barometer, or the striking of an unusually strong blower, the fire would gain the mastery, and several of the mines have had to be filled with water to extinguish the conflagration.

There is still another and more mysterious cause of fires in mines, viz., spontaneous combustion. As this important cause of fires is but imperfectly understood by those in charge of our coal mines, and as it is a matter whose interest and practical application are not confined to fires in mines, I shall enter with some detail into the subject. We may remark, at the outset, that what is known as "weather waste," is but a mild form of spontaneous combustion, we may, therefore, treat this part of our subject under the title of

SPONTANEOUS COMBUSTION AND WEATHER WASTE OF COAL.

TO BE CONTINUED.

A HISTORY OF THE BESSEMER MANUFACTURE IN AMERICA.*

By R. W. Hunt, Troy, N. Y.

(*Concluded from page* 328.)

DISCUSSION.

MR. PEARSE.—I do not desire to detain the gentlemen present unnecessarily, for the dinner-call is paramount to all others. The paper just read by Mr. HUNT has given me great pleasure. Owing to my duties on the local committee, I have had no time to prepare any systematic statement of facts. There are, however, a few points in the paper which I desire to correct, and Mr. HUNT has just hinted that he won't get mad if I do take the liberty, as it is done in a friendly spirit. Indeed, the only need of correction at all arises from the defective vision of our human nature, which often prevents us from seeing but one side at a time, to the neglect of the other side of a matter.

In regard to the early history of the Bessemer manufacture in this country, it is due to the memory of Mr. J. EDGAR THOMPSON to say that he is entitled to the credit of *really introducing and acclimatising* the process in the United States. This is a wide statement, but it is true in every way. In the first place, when I was in England, in 1867, I found that while Mr. HOLLEY was negotiating the transfer of BESSEMER's interest in America, Mr. THOMPSON had actually secured it, and finally failed, only by one day, to become the actual purchaser. Mr. G. A. SMITH, who acted as agent in the matter, told me his papers were drawn up ready for signature, and in BESSEMER's hands, awaiting advice from America, but owing to some delay in forwarding, Mr. SMITH's instructions reached him a day too late, and after the transfer had been secured to the parties represented by Mr. HOLLEY. In the second place, the several railroads pursued very different policies respecting the introduction of steel rails in their tracks. But the Pennsylvania Railroad has, from the very first, pursued a consistent, far-seeing policy in encouraging the use of steel, in view of the now undoubted, but then somewhat unproved, superiority of the steel rails.

Our railroads would use in 1868 anything at all in the shape of an iron rail. They would put rails in the track that would not stand a ton weight falling one foot on a sixty-seven pound rail upon three feet bearings. They thought little or nothing of putting down rails with cold sheets or deep marks in the head every eighteen inches. I have known a rail in the track with ten feet of the flange split clean away from the web. Defects in flanges were even sometimes regarded as proving the good quality of the rail, and were very far from insuring its rejection. This is a true story of only ten years ago, and the roads had every confidence in these rails, and were not inclined to look at steel. If a flat locomotive driving-tyre broke steel as well as iron rails it was regarded as showing the steel unfit for the track, because it would not stand anything. But the Pennsylvania road investigated the value of steel and the cause of breakages in a systematic, practical manner, and its engineers put their results at the service of the only company then working systematically, namely, the Pennsylvania Steel Company. In my opinion, therefore, and the facts are accessible to prove it, JOHN EDGAR THOMPSON and the Pennsylvania railroad took the first steps in introducing steel rails at a time when this action was necessary for the existence of the manufacture in the United States. To them, therefore, the credit is due of encouraging that confidence in home manufacture which was necessary for the success of the process. Mr. THOMPSON did more than any other man in the country to this end. The New York lines, at one time, refused to use or buy Troy or American rails, and gave the manufacture no support whatever. The Baltimore and Ohio, when approached about building a steel works or using its rails when built, said it would wait and see what the new works and its successors did before acting, and I regret that it is waiting even yet.

Now, as respects the Pennsylvania Steel Company, the works were built and plans drawn in 1866-67. In respect to the work of that company, it seems to me that Mr. HUNT, from his western situation, far distant, and of his being afterward at Cambria, overlooks in his paper the scope and value of its work. It may be partly owing to the fact that afterward when he was at Cambria and rolling our steel we kept our operations a good deal to ourselves as to facts, but of course not as to results. So, when the steel worked badly, I remember Mr. HUNT was often cross and despairing, and when it was good he always wanted to know how it was done. We had a very hard time then, as he says, and if he had stated that the Pennsylvania Steel Works before it made steel successfully had been obliged to analyze and try about two hundred different brands of pig iron, he would have been very near the truth. For the Pennsylvania Steel Works were the only ones then working on a manufacturing scale. None of the others had been completed, and the Troy works had been burnt, and had done little but experiment with a few tons of rails before it was burnt. Indeed, I believe that Cambria rolled in 1869 about a hundred rails for Troy from steel made by Z. S. DURFEE.

Now, here I want to make my second point, which is, in my opinion, an important one. The Pennsylvania Steel works, by their success, *first made the Bessemer Process successful in this country* about the beginning of 1869. After that there remained only to find the best irons and to find cheap irons near home, and in that, too, the Pennsylvania Steel Works led, for it first made, in 1873, first-class Bessemer pig iron with less than 0·06 per cent. of phosphorus from mixed native ores of New Jersey and Pennsylvania (York County) magnetites. The experience of the experimental works was of no assistance whatever to the Pennsylvania Steel Company; it had to carve out its own history, and it had to shape its course through the great darkness then existing, by the sure guide of chemical analysis, without the widest application of which it would not have succeeded, nor would we have our present status in the Bessemer manufacture. The Pennsylvania works led in working up a consistent body of Bessemer steel metallurgy, and it often felt sore when, after it had *discovered*, so to speak, some iron pretty free from phosphorus, and fit for steel, another works would come in and share the discovery, or even utilize it altogether. This was notably the case with the Cornwall irons.

Now, with regard to improvements. The Pennsylvania Steel Works cost five hundred and fifty thousand dollars. It was, with that cost, built to make three blows per half day, or, at the most, six blows in a whole day. It was thus a matter of life and death with us to increase our product, because foreign plants cost seventy thousand dollars for the same product. That is, their first cost was one-fifth ours, and the interest they paid on capital much less. Our only way out, therefore, was to increase our product, which remained three blows per turn (half day) till the Summer of 1868. Mr. HUNT says four, but it was only three. The Pennsylvania Steel Works did not make an attempt at a night turn till 1869, for the vessel bottoms would not stand it, and gave out so irregularly that it would have been a losing matter. They did not last more than five blows, and we had no means of replacing soundly and quickly enough to enable us to work all night, though we could work part of the night. In 1869 the works made thirty-five to forty tons of steel per half day in eight blows; a product which was then the highest in this country, and, so far as we know, in the world. It was regarded as the leading works, and, of course, as is always the case, received the visits of the managers of the other works.

One reason why the earliest product was so small was the fact of using the McKenzie cupola. This cupola was successful as a part of a Bessemer works, but was not a success as a cupola, at least for our requirements. That is a curious statement to make, but it is a true one. The McKenzie cupola depends upon the air slot around the cupola. The slag soon rises and fills the slot up, or trickles down and sticks to its edges. The works, therefore, did not make more than three blows, because the cupola would not melt more. We could not actually get more than two and a half blows on account of the slag, and I therefore sunk the bottom deep, and put tuyeres in of most ample area. I remember the first time we made nine blows a day that we worked eighteen hours, from one Friday morning till two o'clock at night. We should have made another blow, but for a general suggestion that I was "hogging" it.

The next point is one of engineering, and one of very great importance. The most overwhelmingly important necessity is to keep metal for Bessemer conversion as hot as possible. I found this out from sad experience, and as soon as I turned everything to the one end of getting the metal hot, the turning point to success was reached. We had no further trouble, nor had any one else who followed. This point of skill actually made the process a success here. The early charges used in all works to "slop over" and boil out, and to make a great deal too much scrap. Whatever merits the eruption from the mouth of the converter might have as a pyrotechnic display—and sometimes it

* A paper read before the American Institute of Mining Engineers, at the Philadelphia meeting, June, 1876.

was grand—it was killing, in a commercial sense, for the percentage of steel ingots was at first 75 and under. Now, the introduction of a collecting ladle before the cupolas was, in this light, a very hazardous experiment, and undoubtedly did mischief till the metal was made very hot. The collection of 12,000 lb. often lasted from one hour to one hour and forty-five minutes, and all that time the metal was cooling. The effect was marked sufficiently to enable me to distinguish, by physical characters of specific gravity, quality, etc., each of the three successive blows from the other, and as the third melted slowest it was coolest and had the lowest yield. Hence at first the ladle was a risky appurtenance; but afterward, as soon as the cupolas melted quickly, became one of the highest utility. For we could collect two blows and store them, as it were, if anything was the matter with the vessels, and then convert them quickly afterward. The work of both the vessels and cupolas was thus rendered more easy and regular. When the charge of 12,000 lb. was melted in thirty-six to forty minutes, as it was in 1870, the cooling in the ladle seemed to have little or no effect, and a charge of very hot metal has lain two hours without any serious harm in conversion.

In regard to the ingots—that is the casting of small ingots—there is another important point which has not been discussed. The idea at first at the Pennsylvania Works was to roll the rail direct from a single eight inch rail ingot, or an ingot eight inches by eight and three-quarter inches on the sides. It was desired, too, to use bottom casting, so as to make the ingots exactly the same length, and thus save scrap. I found, under these circumstances, that we could not thus roll direct. One reason was that the bottom casting system then in use would not give a constant weight to ingots of constant length and section. The ingots made of the third conversion would weigh one hundred pounds less in seven hundred than those of the first conversion in the day, though externally exactly the same. The first heat would weigh seven hundred pounds and the last heat often less than six hundred. This was partly due to the loss of heat in the later charges.

Mr. HUNT—A center ingot was used on the bottom cast flask and it worked very badly.

Mr. PEARSE—Yes, center ingots did work very badly. To obviate that defect a sprue was substituted for the center ingot at a later period. But for a long time we could not get the ingots uniform, and of course could not work them direct. I found, what others have found, that the blow holes were distributed more around the outside of the ingot, making it like a sponge; whereas they should be distributed uniformly through the section of a good ingot. When these spongy ingots went into the rolls the walls of the blow holes would not weld at all, and you would have a series of parallel striæ. These would sometimes show very large on the head of the rail and be as much as the eighth of an inch deep.

In regard to hammers. One reason why we adopted hammering was on account of these striæ, and I would state as a second reason that, in an experimental works, hammering is often the only thing that will make the work successful. That is the reason why I supported hammering, and why I should do so were any experiments now necessary. I would not now advise any works to start without rolls, because I believe the rolls will make the highest product. I always did believe that, and do now, but I know from experience that with metal that was not of high grade the rolls gave the largest percentage of second class rails. When we used the singler-ail direct-rolled ingots we made often thirty per cent. of second class rails, and when I began to hammer from double-rail ingots we made less than one per cent. of second class rails. I remember that once Mr. HOLLEY looked over my rail piles a half a day for bad flanges he could not find. This was due to the fact that we could get rid of the consequences of blow holes by chipping out the entire defect caused by them. This we did while the hammer was doing its regular work, and by exercising a little discretion it could be done easily without danger.

We used mainly a hammer with falling weight of thirteen tons. A remark here will be interesting. We produced about twelve times as much as they were able to do in Germany with an eighteen ton hammer. In a discussion of the matter in the *Kärnthner Zeilschrift* it was held to be utterly impossible to do what we did, and they did not believe it was done in Pennsylvania. But it was done by the Pennsylvania Steel Company, as was described in my paper on rail making in the first volume of our Transactions. When we found we could sell in 1870 as many rails as we could make we brought the product of the hammer up to the highest point possible. When you add that the hammer gave us good metal for rails out of bad pig iron you will see why the hammer then had the advantage. That day has gone by, but I think the hammer has held its own very well, because, though I am no longer connected with the Pennsylvania Steel Company, that company has continued to hammer and has done it profitably.

At this point, however, I certainly believe the American blooming mill with four-rail ingot, or the English reversing mill, to be the preferable plans. It is evident that the larger you get the ingot the heavier must be your machinery. Now it is a question how heavy and expensive machinery can be made to be profitable, calculated on product. Any design, therefore, that will do equal work with less machinery will, in the end, be best. And I should not be surprised if Mr. JOHN FRITZ would himself ultimately adopt the English reversing system, because his plant is becoming so heavy.

Mr. FRITZ will ultimately have a feeding-table for each train of rolls, and for rails. This table will be very long and cumbrous, so I should not be surprised to see him prefer to use the floor instead of the table. The floor could be put just below the level of the pitch line of the rolls and feeding rollers used as in England.

I think that what Mr. HUNT has said is true as to part of the present great product being due to bottom casting. It strikes me quite forcibly. For if you can keep the pit open and comparatively cool, and the moulds clear, and the ingots stripping easily from the moulds, the work will go on very smoothly and regularly. The result has been very favorable in my opinion and reminds one that methods can be used at one stage of the development of a manufacturing process which have failed at a former stage. The improved flask and the sprue and the hot metal unite in making the ingots sound and solid. And this brings up again the important point, that without hot metal the Bessemer process as a manufacturing process would not have been successful at all.

I notice our worthy Chairman, Mr. PECHIN, is becoming restive, and I think these points are all I can add at present to Mr. HUNT's description. But I may trespass a few minutes to say, that the fact of confidence being acquired in the early rails, may be supplemented by the statement that when the Pennsylvania Steel Company first introduced steel rails, it did so without a test being required on the part of the buyer. The railroads required no test, the idea being that the works would be responsible for its rails indefinitely. If the rails were bad they could be sent back. Some rails were sent back in the early days, but that was human nature (laughter) of the railroads, of course, not of the steel makers. The first test was the drop test on the English plan; this was adopted in 1869. Then, in 1869, the process became a commercial success in this country. All our previous efforts had been expended in reaching a point at which confidence was had in the steel rail. The test next and now used, was adopted to save expense to the steel manufacturers, namely—bending a bar cut from the rail head of a crop end. In connection with this bar test, I made a very interesting series of experiments, which I have now no time to detail, but which proved the test to be against the steel maker and in favor of the buyer.

In rail steel there is, say, three-tenths per cent. of carbon, but by the time we got the heads cut off and hammered out into bars, the steel contained four or even sometimes five-tenths per cent. of carbon. This was due to careful handling—a subject discussed at a previous meeting. When carefully protected from exposure to the blast of the forge, the steel will absorb carbon readily.

When we first introduced the manufacture, the idea was to make rails hard. I have always preferred to make them dense by severe work rather than harden the metal by manipulating its chemical composition. Next, hammering formed a point of superiority, then softness, and now freedom from phosphorus. Luckily the line of composition has steadily run in a direction which has improved the product. But in the early days I made comparatively hard rails of carbon. With good metal, other things being equal, one can make a very good rail in that way, but with poorer metal, the rails will not stand any and every kind of treatment. After steel rails had acquired standing, it was thought they should stand anything whatever. One road we sold to had in use a practical test of great reliability. The track hands would select the roughest point they could find near the spot where the rails were wanted. Standing on the car they would lift the thirty-feet rail and let it fall some seven feet on the rocks, or crosswise on another rail already unloaded. If the rail stood it, it was good and fit to go into the track! Luckily our rails stood it; we believed them capable of standing anything. But that was a practical test largely used in 1871.

ASBESTOS AND ASBESTOS' PATENTS.

THE *American Exchange and Review* gives the following particulars in its "Patents, Arts, and Science" column, which is under the editorial charge of C. E. FOSTER, of Washington, D. C.:

"The daily increasing importance of asbestos in connection with packings, bearings for journals, coverings for boilers, and similar purposes, has directed attention to other applications and uses of this material, and to the patents under which exclusive rights to its employment are claimed. Being a natural substance, long known as a possible substitute for animal and vegetable fibres, and its refractory and lubricating properties recognized for hundreds of years as its peculiar characteristics, it would seem improbable that any exclusive proprietorship, based on the utilizing of these properties, could be claimed or acknowledged at this late date; yet it is by no means uncommon to find advertisements implying the right in some party to the sole use of asbestos for this or that purpose, or to find that capitalists have been induced to invest their money in the experimental manufacture of asbestos products, *to be* protected under the patent laws.

"Asbestos, or amianthus, is a mineral of a white or greenish white color, found in dense heavy blocks capable of being divided into fibres of greater or less fineness and length, and resembling hair silk; it is smooth and unctous to the touch, and, like plumbago, these qualities are available for lubricating or anti-friction purposes. The mineral is extensively distributed, but much of it is coarse, discolored, or in a disintegrated condition, which renders it unserviceable for any purposes to which asbestos has yet been applied. The finest beds are in Corsica and Italy, but a very fair article is found extensively in Canada, Pennsylvania, Maryland, Virginia, and other places. Efforts to utilize this mineral were early made in the historic period, and one of the first applications was in the manufacture of incombustible fabric. For this purpose vegetable filments were combined with the mineral fibre, to give strength and consistency during manipulation, the vegetable fibre being burned away after the formation of the fabric. Notwithstanding this fact the combination of asbestos and animal or vegetable fibre has constituted the basis of many patents, some of which are in existence while others have expired. An English patent, No. 145, for the year 1857, describes a lamp-wick of silk and asbestos woven together. Prior patents describe wicks wholly of asbestos; and a later patent, No. 2,647, for 1865, describes the plaiting of asbestos in a braiding machine, and also felting it or weaving it into ordinary fabric, to be used for lamp-wicks. As a fabric, asbestos was once used in the manufacture of shrouds. One of the earliest applications was in the form of paper, and the efforts to render it available for this purpose have been most persevering and unremitted to the present time. An early description of the mode of making asbestos pulp for paper is contained in an English patent, No. 1,413, for the year 1853, the process consisting of boiling the mineral, dividing the fibres, and mixing alum therewith. Advantage was early taken of the non-conducting qualities of asbestos in the construction of safes—a reference to its use for this purpose being made in an English patent of 1834, No. 6,555—but it was not until 1870 that it was applied as a non-conductor in refrigerators, when F. HYATT obtained a United States patent for a refrigerating car. Being flexible, non-combustible, and a natural lubricant, its employment as a packing for pistons or piston rods, joints, and pump-plunges, naturally resulted. Its adaptation for such purposes is fully set forth in a United States patent for steam engines, obtained by ISRAEL JENNINGS in 1828. Notwithstanding this fact several existing United States patents have claims for the use of asbestos for packings and joints, while others claim imparting to it a rope form for packings—which is clearly described by JENNINGS. Other patents have been granted for the application of asbestos to journals or bearings, notwithstanding the existence of JENNINGS' patent, and also of an English patent, No. 2,048, of 1853, for a lubricating combination of asbestos, quicksilver, fats, and oils. A combination of asbestos, soapstone, and cotton is described in P. S. DEVLAN'S patent of August 22, 1865. C. A. STEVENS' patent of March 29, 1870, claims the insertion of a cord in a rope packing of asbestos to strengthen it; and MORRIS BOTTICHER'S patent of October 4, 1864, refers to the use of the mineral for packing in a loose mass of fibre. A combination of asbestos with plumbago and iron filings is claimed in P. J. KELLY'S patent of November 8, 1870; and a combination of asbestos and clay in LANBEREAU'S English patent, No. 213, for the year 1859, where the mixture is shown moulded into bricks or forms for lining fire-boxes. Combined with felt or pulp, and made into sheets, asbestos has been for some time applied for roofing, under H. W. JOHNS' patents of 1868; in 1866 it was applied to carburetters, as specified in J. A. BASSETT'S patent of September 18; WILLIAM BESCHKE'S patent of August 14, 1866, its use

in lamps, to absorb the oil and prevent its distribution in case of fracture of the lamp; and the English patent, No. 362, for the year 1865, is based on the insulating property of asbestos, and its use as a non-conducting material in electrical apparatus.

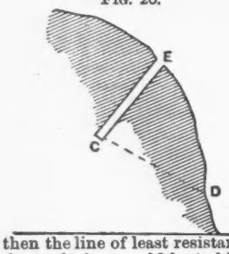
ABSTRACTS OF LECTURES ON MINING.—No. XIX.

By Prof. W. W. Smyth, M.A., F.R.S., Royal School of Mines, London.

(From the London "Mining Journal.")

THE subject of breaking rock by boring and blasting is so extensive, if followed into all its details, that we can only here look at some of the chief points, and especially those connected with the safety of the men. Besides the matters we have already considered in relation to this subject, there are several more points to be noticed. One of these is the question of giving the bore-hole different sizes in different parts, of introducing some instrument by means of which the bottom of the hole may be excavated into a sort of chamber, which may then receive a larger charge of powder than before. One means of solving this problem was adopted, in the South of France, at some limestone quarries. A quantity of acid was introduced down the hole in a glass tube, and allowed to act on the bottom, so as to enlarge the hole in that part. This, and other ingenious contrivances for the same purpose, may be found described in an excellent little work by the late Sir JOHN BURGOYNE. They are subjects deserving of further investigation, although they do not often come into play; but it will be obvious that the more satisfactorily we can get the lower end of the bore-hole to answer the part of a receptacle for a large quantity of a powerful explosive, the greater will be the results obtainable from these operations. A great deal of information has been obtained on the subject of blasting from the operations of military engineers during the last one hundred and fifty years, especially as to the question of calculating the amount of charge required to perform a particular quantity of work. In this matter it is well for the men to err on the right side, and it is the custom for them to put a little extra quantity of powder in if there is any indication of the possibility of the usual quantity being insufficient, in order to make sure. The powder is introduced in several ways, by pouring it in, by inserting a long spoon carrying the powder down the hole and then turning the spoon over, by tubes, etc. With respect to firing the charges, when it becomes a matter of importance to fire a number of holes at once, it may be desirable to introduce the method of firing by the electric machine, galvanic battery, or magneto-electric machine. These have been in use for blasting since the celebrated operation of the blowing up of the Royal George by Sir C. PAISLEY, especially in large quarries; and one or two shafts have been sunk by its means, one of which the lecturer had many opportunities of observing during its progress. For application to the sinking of shafts instead of boring a succession of small holes, and firing them singly, three or more of unusual depth were bored in the central portions of the shaft, pointing more or less toward each other. These were fired simultaneously by the battery, and a large mass of material would thus be removed, and then the outer portions were removed by means of smaller subsidiary bore-holes. For use with the battery you require special firing cartridges, connected by wires with the battery, for the purpose of firing the powder or the larger cartridge. A very simple variety of firing cartridge, which had been employed in the shaft referred to, and which the lecturer had often made and used himself, and found very serviceable, might be constructed as follows: Two pieces of wire, which were to be left free at one end for connecting with the battery wires, must have the other ends separated by a small piece of wood, to which they are firmly bound. The ends of the wires projecting slightly beyond the wood, must be split with a large knife, or chisel edge, and then a small piece of thin platinum wire placed across between. The cut ends must be closed up around the platinum wire, and then dipped into some fusible mixture, so as to get good connection. The whole may now be bound up in a cylindrical piece of wood, and the space around the thin wire filled up with fine powder; the ends may be closed with water-proof paper, etc., and the cartridge is ready. If the rule be made that the last man in the shaft, who has prepared and placed these cartridges in position, shall go up to the proper place and fire them from the battery, it will avoid all mistake as to whose duty it is to fire the charge, and also those accidents which occur from the man having lighted the fuse and not being able to escape to a place of safety before the explosion occurs. Operations of this kind have been carried on on a large scale in works for the improvement of harbors, and a notable case, which was for many years a constant source of interest and instruction to engineers, was that of the works connected with the construction of Holyhead. The blasting occurred in the Holyhead Mountain, which consisted mostly of quartz rock.

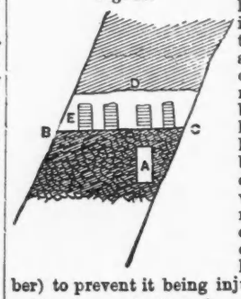
FIG. 20.



It was long ago found that as you increase the distance from the charge to the exterior at which the charge has to be released you must increase the amount of charge, not merely in an arithmetical but a higher ratio. It is found that as the distance increases the amount of charge must be increased in the proportion of the cubes of the distance. If, in Fig. 20, C E represents a bore-hole in the position shown, and C D be the direction the charge is likely to take effect, C D will be called the line of least resistance. If the line C D were longer than C E, and if the resistance of C E were not helped in some way, or made greater than that of C D, then the line of least resistance might come to lie in C E, and the only effect of the explosion would be to blow out the tamping. According to the rule if we had two borings under similar circumstances, except that in one the line of least resistance measured six feet, and in the other 7 feet; if 22 lb. of powder were required for the former, the quantity (35 lb.) required by the latter would be calculated by the simple proportion $6^3 : 22 :: 7^3 : x$. The actual amount here stated would, of course, only answer for one particular class of ground; harder ground would require a larger amount of charge for the same distance. The result of long experience in the case of the Holyhead workings enabled them to calculate to a nicety the amount of charge required for any particular result, and thus to "get" the greatest amount of material for the powder expended. The plan of these works, like many other works of a similar nature, would show a series of steps, representing the facings of blastings. In working it this way advantage was taken of lines of joints which ran from 20 to 30 feet apart, which would, therefore, be the general distance between two succesive steps. In place of the ordinary small bore-holes employed in mining operations, small levels were driven in, and a chamber formed at the end, slightly below the level, for the reception of the powder. The levels were small, of a size (5 feet×3 feet 6 inches), just convenient for the men to work in, the charge of powder (sometimes exceeding one ton) was placed in the chamber, and then the level stopped up as well as possible, mostly by means of surrounding material, leaving wires communicating between the battery and the powder. It is well to remember that a square box of one foot side holds 57·6 lb. of powder; one 3 feet 4 inches side holds one ton. In one of these blastings, where two chambers were fired simultaneously, the chamber nearest the exterior contained 1,800 lb. of powder; the other, in which the line of least resistance was 33 feet, contained 2,400 lb. The quantity blown down by this explosion was no less than 10,000 tons, being at the rate of 2¼ tons of material for every pound of powder employed. When the hill became higher, shafts were sunk from the top, and expanded into chambers, to act in conjunction with the horizontal workings. The results of experience soon show that you have to cube the length of the lines of least resistance, and a certain fraction of the number thus obtained will give the amount of charge required. Thus, in these Holyhead workings experience at first gave 1-10th to 1-15th as the fraction, but in the latter part of the work 1-15th to 1-20th was found to be more suitable.

There is another method of working a way through the rock where this plan of boring holes for firing explosives is not altogether applicable, that is the method called "fire-setting." PLINY briefly mentions the fact of working rocks by means of fire, and this we know was effected in early times, in two different ways. The first of these, which was practiced in the times of the Romans and in Spain, was that of working out a large excavation in a hill on which a castle stood, which castle it was desired to destroy. The roof of the excavation was supported by a series of pillars of wood until the excavations were finished, and then these pillars were set fire to. The second plan, that to which the special name of "fire-setting" has been applied, was practiced largely on the continent of Europe during the middle ages, and there are still several places where it is kept up at the present day, and where it has withstood all attempts to replace it by the use of explosives. And when we remember that cases occur in Cornwall where a guinea an inch has been paid for driving an ordinary level, where in some cases £60 to £80 per fathom has been paid for special difficulties, and where (as in a case known to the lecturer) the men worked hard for a whole day, blunting in the time 5½ dozen of tools, and yet advanced only 1¼ inch, we see there is some reason for endeavoring to find a substitute for the usual method of working. Several mines in Scandinavia are working either entirely or partially by this method, as are also the celebrated mines of the Rammelsberg, at Goslar, at the Hartz, and at Felsobanya, in the east of Hungary. Several considerations may be noted which must be looked at in deciding whether it would be advisable to use this method in any particular case—1. Whether the rock, or veinstone, is suited to the method, to determine what experiments will have to be made.—2. The price of wood as the most suitable fuel, and the quantity which can be obtained; it is essential that the wood used should burn with a bright quick flame. Various kinds of pine are most common, but aspen and beech have been used; pieces of about 1 inch or 2 inches thick, and cut into lengths of 12 inches to 16 inches, and then made into small faggots.—3. The ventilation of the mine should be good, active, and very definite, otherwise a most serious danger is introduced.—4. The nature of the ores, whether they would be injured by fire, as are the ores of mercury.—5. The strength of the rock, whether it is capable of supporting large excavations.—6. A careful comparison of expense, so as to see whether any advantage is to be gained by the use of the method. Several times in this century, in consequence of the increasing price of fuel, it was questioned whether it was desirable to continue the method, but careful experiments showed that the progress to be obtained by boring and blasting was so slow that it was better to keep to the old plan. Some of the deposits, so worked, are irregular masses, as that of the Rammelsberg; others are irregular lodes, and have, therefore, moderate sized galleries, as those of Felsobanya and Kongsberg. The bundles of wood may be introduced into the working by throwing them down the shaft on to an inclined door, which casts them off into the levels, or other and longer methods may be used. It is usual to devote a single day to the purpose of firing the stacks of wood which have been built up; and this is generally done on the Saturday afternoon, so that the firing may be over, and the workings more or less cooled down by the time the men are ready to go down again on Monday or Tuesday. At Felsobanya a simple machine, called a *Pregelkatze*, is employed on which to lay the burning wood. It is a small iron frame, supported on four legs (like cat's paws, hence the name); the top of the frame is inclined downward toward the face to be worked; it is 2 feet 6 inches long, slightly wider from front to back, and somewhat arched at the top; it can be set on the ground, or on a platform of stones, etc., according to the height of part of face to be worked. Having been placed in the level, the wood is carefully stacked on, and a plate of iron laid on the top, the wood is lighted, and the draught being duly managed, the flame will impinge on the face of the rock, the smoke and products of combustion passing back along the top of the level. The men creep along the floor, and supply fresh wood as required, and by means of a long forked implement, and another something like a boat-hook, they arrange the fire so as to play in the best manner. After this has gone on for some time loud cracks are heard, the moisture present in the rock being converted into steam. The men leave it now for a time, and come back to find large pieces of rock scaled off, and much more easily removable by hammer and gad, and when this is cleared away the process is repeated. At the famous silver mines of Kongsberg, in Norway, they also drive their levels by fire-setting, and the depth of this mine is so great (260 fathoms) that a very powerful ventilating current is set up, causing the fire to roar again, and sweeping out rapidly the products of combustion into a shaft. Fig. 21 will illustrate the manner in which the workings at the Rammelsberg mine, has been carried on, this being on a larger scale than the mines of Felsobanya. A is a level situated in a portion of the rock which has been worked; B C represents the floor of the present working; D the rock forming the roof to be worked next; and E one of the piles of wood set ready for lighting on the forenoon of Saturday, in order to work away the rock at D. Care is taken, of course, that a sufficient thickness of stone, etc., lies over the level A (which is supported by timber) to prevent it being injured by fire.

Fig. 21.



About every tenth or eleventh stack one is omitted, and its place filled up by shavings or some such material which can be readily lighted by a man passing hrough the workings with a torch just before leaving them. The piles of

wood are stacked in a way best adapted for them to burn rapidly, and arranged in series, so as to suit the current of ventilation. In this manner they work up toward the level above; the question is how much ground should be left to give you a satisfactorily firm foundation. This system of fire setting has been attended with a very large number of accidents; the ground is so loosened and cracked by the fire that large slabs are liable to break away suddenly from the hanging wall, and the cracks will be propagated in parts where sufficient ground has not been left. In climbing up the ladders you may sometimes see hanging above you masses of rock as large as a cottage; if one of these should fall it smashes through the weaker parts till it comes to a mass of ground firm enough to withstand it. The number of lives lost by these means, and the expense of re-forming the levels, is a great thing to set off against the economy due to fire-setting over the method of blasting.

NOTES.

PETROLEUM AS FUEL IN RUSSIA.—The demand for English coal in St. Petersburg and in the north of Russia is likely to be considerably reduced, partly in consequence of the large quantity now imported from Westphalia, and partly from the impetus likely to be given to the production of mineral oil. An American speculator who has "struck oil" in the valley of the Volga, has taken on lease 350,000 acres of land, which he has already begun to work. He promises to sell petroleum at 30 per cent. under the price of that imported from America, and he has already shown the value of his discovery by supplying some of the steamers on the Volga. It is said that the companies which have tried heating with the new fuel are perfectly satisfied with the result of the experiment.

COAL IN INDIA.—The output of the East India Railway Company's collieries is now nearly 800 tons per diem—the largest "turn out" of any mines in either the Damuda or Barrakar districts, and for that matter, in India. The requirements of the company's lines do not exceed 400 tons a day, or about half the "raisings," so that the shareholders may congratulate themselves on having an additional source of income, besides obtaining their coal at nearly one-eighth the cost of most of the other Indian railways. Some idea of the importance and extent of the workings may be derived from the fact that the total number of hands engaged above and below ground varies from 3,000 to 4,000, and that there are about thirty shafts in operation, averaging over 100 feet in depth, besides "out-crop" inclines. The collieries are worked by an efficient European staff, under the management of Mr. I J. WHITTY, C.E., resident engineer.

SPONTANEOUS IGNITION OF LAMPBLACK.—Within three years, says the *Commercial* (Boston) *Bulletin*, there have been three shops destroyed in Massachusetts from lampblack. A hand damp with perspiration, a drop of water, a bit of greese, or a sprinkle of oil, will create the combustion which will start the lampblack aglow like charcoal, and so ignite the package, and hence the blaze. In lampblack factories, while great precaution is taken to prevent fires, a rainy or sharp frosty day will start a dampness upon the inside of a window pane, and the flying particles of dust lighting upon this creates a spark which communicating with the pile, sends a glow of fire with wonderful rapidity through the galleries of the shop. In cleaning up the smoke galleries, if the men let a drop of perspiration fall into a pile, they instantly scoop up the lampblack in and about where it lodges, and carry it out of the house.

ARIZONA.—*The Silver King Mine*, which is located in Pioneer District, near Florence, has surface works on an open cut 80 feet wide and 75 feet long, with an average depth of about 22 feet. From this quarry nearly 3,000 tons of rich ore have been taken. The ore has been carefully sorted, and all of a value of $1,000 per ton and over bagged and shipped to San Francisco. On the hillside about 35 feet below the level of the open cut, a tunnel has been driven along the course of the ledge 208 feet and is in ore and ore matter the entire length. A winze has been sunk from the open cut to the tunnel in very rich ore. Immediately under the winze a shaft 12 feet square is now in progress, and on the sides and bottom shows ore assaying $2,600 per ton. The main shaft is 115 feet deep and distant about 105 feet from the shaft in the tunnel. At a depth of 40 feet a cross-cut has been carried to the east wall 87 feet. The shaft being on the ledge, and no cross-cut being made in a westerly direction from this level, it is impossible to say what the thickness of the ledge is. A level has also been started at one hundred feet and driven southward along the course of the ledge 30 feet from this drift; a cross-cut is in progress in a due west course and a new discovery made of an ore body, even richer than that on the tunnel shaft. At this writing the cross-cut is four feet into the ore body, and so far shows no sign of weakening. The various strata, and the walls where reached, show a S. S. W. and N. N. E. course; at this level the ledge has a westerly dip of 70 deg. A great many tons of rich ore are now on the way to San Francisco, and more being bagged every day.—From Correspondence in San Francisco *Stock Report*.

Manhattan Silver Mining Company.—Some very rich ore is now being taken out of the chimney recently cut in the Paxton vein, Bowman incline, of the Manhattan mines. This is the narrowest vein (at this point) now being worked by the company, but the high-grade ore which it carries compensates in a great measure for the narrowness of the vein, and as it has been a good-sized vein where worked in other portions, there is every reason to suppose it will increase in size. It is now about eight inches in thickness, of the richest character of ruby silver ore, and assays up into the thousands. The ore vein on this chimney is now being worked through what is known as the Paxton east drift, from the Bowman incline, and as the drift is extended shows increased signs of regularity and permanency. It has not yet been prospected above the drift, but as soon as the drift is extended to a sufficient distance into the chimney a chute will be raised to prospect it above the Great Eastern works, a distance of about fifty feet, which will also give ventilation to this part of the mine. Some specimens have been taken from this chimney which assay $4,000 per ton in silver; but, of course, this is by no means an average, though lots of pieces of this kind can be picked from any portion of the chimney, and it could be easily sorted to make a first-class working of $3,000 per ton. It pays better, however, to send to the mill without sorting, as ore ranging from three hundred to five hundred dollars per ton can be worked to better advantage than that of a very high grade. Comparatively large bodies of this rich ore have been encountered before, near the surface, but were generally marred by breaks or slips; but the workings have now penetrated beyond these influences, and these bodies of exceedingly rich ore are found in regular chimneys, continuing both laterally and downward, without slip, break, or interruption of any kind.—*Austin Reveille.*

MONTANA.—*The Dahler & Armstrong Concentrating Works* are located at Glendale. The furnace has only run about six weeks during the entire season, but in this time disposed of about 700 tons of ore. A scarcity of miners early in the season prevented mine owners from furnishing a running supply. The furnace, when in blast, turns from three to five tons of crude bullion every twenty-four hours, and consumes from 700 to 1,000 bushels of charcoal in the same time. The company is now putting up copper reduction works, to be completed in part this fall, and by July next expect to be turning out ingot copper and handle all ores above 12 per cent. Works will also be added that will enable the company to handle any of the silver or copper ores of this or any other country. The company has about 100 tons of crude copper which the new works will enable them to refine at an expense of only $25 per ton. The same quantity heretofore shipped to New York and refined cost $100 per ton, so the works will soon pay for themselves. Two charcoal kilns, substantially built of stone, enable the company to turn out 4,000 bushels of coal every ten days. Fourteen men are employed on the works.

The Elm Orlu Silver Mine produces a rich ore carrying a good per cent. of lead and from 150 to 230 ounces silver. The tunnel and main level is 500 feet in length. Its greatest depth is 135 feet, at which point the lode changes from a southern to a northern dip and shows a splendid 4-feet vein—all shipping ore. One hundred and sixty tons of ore were shipped to Salt Lake this season. Twelve men are employed, and work will be carried on all winter.

The Franklin Silver Mine is being worked, and will be during the winter. The Company have sold fifty tons of smelting ore this season that ran from $125 to $150 in silver and 45 per cent. lead, and now have 400 tons of milling ore on the dump. The main shaft is down sixty-five feet, and the lead is ten feet wide.

The Atlantic Mine, on Lion Hill, is opened by two inclines 100 feet apart, and 105 feet down, on a dip of 30 degrees—average width two feet. The ore samples 90 to 130 ounces in silver and 35 per cent. lead. A new shaft-house, 20x65 feet, and a boarding house 20x48 feet have just been completed on the hill. Twenty men are employed and work will be continued all winter.

The Oneida and Bannack Chief Mine is a large vein of copper and iron containing rich boulders of ore, 34 sacks of which were shipped and yielded 568 ounces of silver and 1 8-10 of gold, and 50 per cent. copper. But little work has been done on the lode.

The Cleopatra Mine is a six-feet lode with shaft down 90 feet. The ore is carbonate of lead, contains 44 per cent. lead and carries one ounce of silver to each per cent. There are about 500 tons of ore on the dump.—*Butte Miner*, Nov. 7.

The Hope Mining and Smelting Company, of Phillipsburg, recently turned out 24 bars of silver, weighing 1,505 pounds and valued at nearly $24,000, the result of 44 days' crushing. The mill during the past two months was shut down sixteen days for necessary improvements, but is now running steadily and with good results. The lead is looking well, as good as ever it did, and is now dipping at about 65°. The quality of ore is variable and averages between $55 and $60 per ton. It is now being stopped and sunk on. These ores are free milling and the mill is saving from 68 to 72 per cent. of the assay value. There are now employed in the mine 22 men and in the mill 13 men, and work will be continued steadily.—*New North West*, Nov. 10.

NEVADA.—*The Humboldt Reduction Works* have just completed the working of a lot of seventy-five tons of ore from the Grand Prize Mine in Tuscarora District. This ore was worked by the ordinary wet process, without roasting, and produced $25,136, or an average of $334 per ton. The ore worked up to 91 per cent. of its assayed value, and the bullion averaged 996 fine. These results from this new mining camp are certainly very encouraging, and show that there is rich free milling ore in Central Nevada.—Winnemucca *Silver State*, Nov. 15.

NEWFOUNDLAND COPPER DEPOSITS.—Exciting accounts continue to arrive from the mining region. At Tilt Cove a second discovery, believed to be of enormous value, has lately been made. About three-quarters of a mile from the present mine a large mass of copper ore has been found, the deposit being in beds, and can be traced for a considerable distance. Professor HIND, who happened to be present when it was discovered, pronounces it of great value. At Betts' Cove they are working a bed of copper ore 40 feet in thickness. They have nearly completed the export of 20,000 tons of ore this year. It is but two years since the mine was opened, and in that time 26,000 tons of ore have been exported. A sad accident happened lately at Betts' Cove. Three miners were killed by the falling in of a portion of the roof in one of the drifts. It is said that the miners had been forbidden to work at this spot till secured, but the unfortunate men recklessly disregarded the orders. The north side of the Gander Lake and over a considerable area north-east from thence, rocks of the serpentine group, having most of the characteristics of the copper bearing formation in Notre Dame Bay, are extensively developed; while, again, on the Main Gander River they occupy an immense area. 'It is only reasonable to suppose that the ores of copper and nickel will at some future time be found to exist here also.' Until the country is opened up and settled it is not likely such mineral deposits will be found, or could be worked with success, even if discovered. Such, then, is this fine Gander country (recently discovered), in which there is not yet a solitary settler or lumberer, and which is only visited by a few trappers. Gander River is approached from the sea at Sir CHARLES HAMILTON'S Sound by the great inlet of Gander Bay, the head of which in latitude 49 deg. 17 min. N., and longitude 54 deg. 29 min. W. From this point to the lake the river is 30 miles in length. Crossing the lake, the main river was followed for a distance of 60 miles, to within a days' journey of Bay D'Espoir. Beyond this point the river is split up into numerous small brooks, which take their rise in the surrounding hills and marshes. The total length of the Gander River is thus about 100 miles.—From Correspondence in *Toronto Globe* of Nov. 18.

REVIEW OF THE PETROLEUM TRADE.—*Drilling Wells.* During the month of October, the activity displayed in the drilling wells department exceeded the previous month; and at its close, we find 565 wells drilling against 511 in September. Just at this point the thought presents itself: what do these wells cost, and where does the money come from to carry on this gigantic work? Well, let us see, 565 wells when finished and furnished complete for pumping, will cost say $4,000 each; making a total cost of $2 260,000. The parties interested in these drilling wells are all old operators, and have producing wells which are furnishing the necessary money to drill the new ones. These new wells are to take the place of the old ones that are constantly decreasing in the amount of their production, and are altimately to be abandoned alltogether. *Wells Completed.*—The wells completed in October were 273 being an increase of 64 over September. The average production of the new wells is only 10 3-10 bbls. per well, which is a lower average than at any previous month, showing that the territory is becoming rapidly exhausted by the constant drain of the wells which are daily increasing in number; and as no new or fresh territory appears to be opening up, we may look for a decrease in the production before the year ends, especially when the cold, rough season sets in to impede operations. *Production.*—The daily production we find to be 26,102 bbls., substantially the same as in September. We can now say with confidence that the production will decrease from month to month, as it will be impossible to keep it up by drilling new wells in the old territory where the average production of the new wells is constantly running down; and no new or fresh territory appears to be opening up. *Stock.*—The total stock in the region of production in Iron Tanks, Pipe Lines and Refineries is 2,876,855 bbls., there being an increase over september of 270,828 bbls. We have detected errors in the report made by the Gauger on the 1st. September which we adopted at that time, of 175,320 bbls. to which we refer in an article on "Gauger's Report" in another column of this issue; and have made the necessary deductions, in the following table:

COMPARATVIE SYNOPSIS OF PETROLEUM REPORTS FOR SEPTEMBER AND OCTOBER.

	Septemb 30 days.	October. 31 days.	Increase.
Stock on hand at the wells, bbls....	149,210	163,253	14,043
Production for the month, "	780,600	809,162	28,562
Daily production, "	26,020	26,102	82
Producing wells, "	5,285	5,552	267
Drilling wells, "	511	565	54
Stock in iron tanks pipe l. & refs..... 2,781,246 Gaugers' error deducted from Sept. act. 175,320	2,605,926	2,876,855	270,929
Total stock	2,755,136	3,040,108	284,972
Total shipments.....	1,154,549	524,190	dec 630,359

Shipments.—The shipments out of the producing region for the month under review, have been less per day than in any previous month this year, averaging only 16,844 bbls. for 31 days; amounting to 524,190 bbls. for the month. *Market.*—The home market for crude, delivered free on board the cars at Titusville, Oil City, and PARKER'S, ranged from $2.90 to $3.95 during the month. On the first day of the month there was a manifest weakness in the market; a few sales were made at $3.87½@$3.90. Soon after, however, there was little or no disposition to buy, and the market continued languid throughout the month with very few transactions. Some small lots changed hands at various prices, making an average for the month of about $3.50, and closing it at $3.25@$3.30.—*Stowell's Petroleum Reporter.*

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Nov. 18.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co.	66,415	1,769,477	64,075	2,719,131
D. L. and W. RR. Co.	79,030	1,655,879	58,121	2,696,816
Penn. Coal Co	28,300	956,385	25,821	1,217,391
L. V. RR. Co	18,835	831,740	21,757	839,629
P. and N. Y. RR. Co.	718	21,259	726	84,318
C. RR. of N. J.	38,399	1,179,790	41,918	1,280 406
Penn. Canal	16,479	393,909	12,759	289,865
	239,226	6,808,448	225,177	9,127,556
Lehigh Region.				
L. V. RR. Co	98,254	2,475,453	87,031	2,914,968
C. RR. of N. J.	42,370	1,232,947	34,750	687,059
D. H. and W. B. RR.	1,135	38,447	1,635	75,141
	141,759	3,746,847	123,416	2,677,168
Schuylkill Region.				
P. and R. R. RR. Co.	171 799	4,326,223	170,210	4,252,672
Shamokin & Lykens Va.	21,583	852,791	27,482	1,107,455
	193,382	5,179,014	197,692	5,360,127
Sullivan Region.				
S.il. and Erie RR. Co.	355	29,448	683	9,714
Total	574,722	15,763,757	546,968	17,174,565
Increase	27,754	—	—	—
Decrease	—	1,410,808	—	—

* Year beginning January 1st.

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

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 466,784 tons, as compared with the corresponding period in 1875.

Belvidere Delaware RR. report.	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	9,603	271,369	176,562
" " " South Amboy	12,019	389,852	232,998
Shipments at Coal Port (Trenton)	8,626	263,362	171,924
" South Amboy	12,748	442,396	301,373

Perth Amboy business :

	Tons.
Received for the week	28,170
Shipped for the week	20,565
On hand Nov. 18	42,521

Receipts of Coal at Boston, for the week ending Nov. 17, and years from Sept. 1, 1875 and 1876.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	490	10,597	35,411
Philadelphia	23,335	201,285	241,156
Baltimore	2,719	36 622	41,846
Other places	4,740	76,172	100,810
Great Britain	—	1,264	704
Nova Scotia	1,677	11 176	10,742

Coal Shipped at Pictou, N. S., for week ending Nov. 11 1876 ..... 4,057 tons.
Previously exported, since Jan. 1 ..... 159,708 "
Total to date 163 765

The Production of Bituminous Coal for the week ending Nov. 18, was as follows :

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md.	Week, Tons.	Year, Tons.
Tons of 2,240 lb	48,241	1,629,977
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	9,226	307.952
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	4,139	140,065
*East Broad Top	873	58,442
Clearfield Region, Pa.		
*Snow Shoe	963	44,326
*Tyrone and Clearfield	26,382	998,507
Allegheny Region, Pa.		
*Pennsylvania RR	3,800	177,419
Pittsburgh Region, Pa.		
*West Penn. RR	3,008	172,515
*Southwest Penn. RR	1,011	49,438
*Penn. & Westmoreland gas coal, Pa. RR.	22,533	735.772
*Pennsylvania RR	5,182	202,409

* For the week ending Nov. 7.

The Production of Coke for the week ending Nov. 7.

Tons of 2000 lb.	Week.	Year.
West Penn. RR	815	43,562
Southwest Penn. RR	12,025	451.760
Penn. & Westmoreland Region, Penn. RR.	1,492	48,699
Pittsburgh, Penn. RR	3.022	135,813
Total	17,344	679,834

COAL TRADE REVIEW.

NEW YORK, FRIDAY EVENING, Nov. 24, 1876

Anthracite.

THERE has been but little coal sold during the week excepting that offered at auction. Business was very quiet previous to the sales, and even more quiet since then. The prices realized at the sales this week were lower than was generally anticipated. The Pennsylvania Coal Company's average was the lowest it has made since the Combination was dissolved, being $2.99 per ton as against $3.05 August 29, while the Delaware, Lackawanna and Western Railroad Company's average was but 2 cents per ton better than its lowest, being $3.09 per ton, as against $3.07 August 29. It must also be remembered that the offerings this week were but about one-third as great as those of August 29.

The Pennsylvania Coal Company had advertised that it would sell 100,000 tons of coal on Tuesday, but previous to the sale it withdrew 30,000 tons and offered but 70,000 tons, as follows, for which the accompanying average prices were received ; coal, f.o.b., at Newburg :

Tons.		
7,000	Lump	$2 67
3.900	Steamboat	2 65½
17,150	Broken	2 62½
5,125	Egg	2 59
30,000	Stove	3 29
5,000	Chestnut	3 58
68,175	General average	$2 99

To the above prices 20 cents per ton will be added in case an accumulation of ice in the river should necessitate delivery from Weehawken instead of Newburg.

The Delaware, Lackawanna and Western Railroad Company offered the following sizes and quantities of coal and received the accompanying average prices :

Tons.		
7,500	Steamer	$2 77½
25 000	Grate	2 69½
17,500	Egg	2 67½
35,000	Stove	2 58
15,000	Chestnut	3 27
	General average	$3 09

The average of the Pennsylvania Coal Company's sale, based upon equal quantities of six sizes, was but $2.90 per ton, as against $2.95 August 29, while the Delaware, Lackawanna and Western Railroad Company's average upon the basis of equal quantities of five sizes was but $2.78, as against $2.92 August 29. Both of the last sales were lower than the general average of the large sale of August 29, upon whatever basis the calculation is made.

The Delaware, Lackawanna and Western Railroad Company has sold at auction, during the last four months, 410,000 tons of coal, at an average price of $3.23 per ton, delivered, f.o.b , at Hoboken ; and the Pennsylvania Coal Company, 350,000 tons, at an average price of $3.15 per ton, delivered, f.o.b., at Newburgh. These figures cannot possibly be construed into meaning the very smallest dividend, and may mean its opposite, and yet there are no indications of an early improvement in prices. The statistics of production only point to intensifying the difficulties of the situation ; but, as the managers of the several companies must have large figures upon which to base their annual reports, we can scarcely expect much improvement in this direction until after they have closed their accounts for the year. The production last week was 574,722 tons, which, with the amount consumed at mines, make a ratio greater than 30,000,000 tons per annum. Nothing in the present condition of trade calls for this output, and stocks are consequently increasing rapidly. Unless production cease, or be very largely curtailed, the low prices which we have quoted above will no longer mark the bottom in coal, nor will the present quotations of the coal stocks be maintained.

The movement to reduce wages has assumed greater proportions and more definite shape, but the time for making the reduction, and just what this shall be, are not in all cases decided. There is a movement to make a reduction in miners' wages in the Wyoming Region, beginning with December 1, but there is also a feeling that the movement should be general and extend through all the regions, which would necessitate a delay until January 1, by which time there will be, undoubtedly, a general and large reduction.

The Lehigh operators claim that they must have a reduction in freights or close their mines." It is thought that the Lehigh Valley Company will not grant the concession asked.

The Delaware and Hudson Canal Company has issued a circular quoting all sizes except stove and chestnut, at $3 per ton, and those two sizes at $3.75. The Lehigh and Wilkes-Barre Coal and Iron Company quotes "Old Company's Summit" and "Honey-Brook Lehigh" as follows : Lump, $3.75 ; Broken, Egg and Chestnut, $3.25 ; and Stove, $3.75. It quotes Wilkes-Barre Lump, Steamer, Broken and Egg at $3— ; Stove, $3 75 ; and Chestnut, $3.25. A. S. SWORDS quotes Pittston coal at Newburg as follows : Lump, Steamer and Grate, $2.80 per ton ; Egg, $2.85 ; Stove, $3.60 ; Chestnut, $3.70 ; and small Chestnut, $2.75. The above prices show a new feature to this market ; Chestnut coal quoted, in one instance, higher than any other size, and in another as high as stove, while a few years ago it was lower than all other sizes excepting pea and dirt.

Bituminous.

The Cumberland production last week fell behind that of the corresponding week of 1875, but about 2,000 tons. The American and Maryland Companies have stopped shipments by canal, and other companies will probably follow the same course at an early day, which point to a large curtailment of production. The last report to hand shows a large Clearfield production, and it is said that the output for this month will be greater than ever was made in that region. The companies are well supplied with orders, and feel cheerful, although the low prices of anthracite must tend to lessening their business.

The president of the Baltimore and Ohio Railroad Company has made his annual report, but fails to make sufficient explanation of the great loss of coal business by this road during the past year. This company reported a loss of coal tonnage for the year 1874-5, of 258,739, while from Jan. 1, 1876, it has lost in Cumberland trade alone, 198,493 tons. The explanation for this silence will probably be found in identity of some of the officers in the Baltimore and Ohio Railroad and Consolidation Coal Company.

Coal Trade of Philadelphia.

PHILADELPHIA, Nov. 24, 1876.
From our Special Correspondent.

Trade continues very dull, and preparations are making at many collieries for stopping before the first of next month.

There is so little coal loading at Port Richmond that it is difficult to give a correct quotation of freights. A large vessel is reported to have taken at $1.60 to Boston, but small ones are not plenty, and not to be had for less than $1 75, which is too high, compared to the rates from New York, quoted here at $1.25.

There seems to be no coal going South. The last rates were 75c. to Washington, 95c. to Richmond, and 80c. to New York.

Wholesale Prices of Anthracite Coal for Nov., f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Rondout	3 15	3 20	3 30	3 40	4 25	4 00
Pittston at Newburg	3 00	3 05	3 15	3 25	4 10	3 70
Wilkesbarre at Port Johnston	3 25	3 25	3 50	3 50	4 25	3 60
Plymouth, R. A.	....	....	3 50	3 50	4 30	3 60
Susque. Coal Co. at Amboy W.A.	3 25	3 25	3 50	3 50	4 15	3 60
Kingston at Hoboken	3 25	3 25	3 25	3 40	4 10	3 75
Lehigh Coals.						
Old Company at Port Johnston	4 00	....	3 60	3 60	4 00	3 60
Old Company's Room Run "	4 00	....	3 60	3 60	4 00	3 60
Sugar Loaf, Hobok. & Amb. "	4 00	....	3 60	3 60	4 00	3 60
Lehigh Coal Exchange "	4 00	....	3 60	3 60	4 00	3 60
Honey Brook Lehigh	4 00	....	3 60	3 60	4 00	3 60
Beaver Meadow at South Amboy	4 00	....	3 60	3 60	4 00	3 60
Schuylkill Coals at Philadelphia.						
Schuylkill white ash	3 20	3 20	3 20	3 20	3 70	3 45
Schuylkill red ash	...	....	....	3 30	3 80	3 20
Lorberry	....	....	4 20	4 20	4 20	3 25
Lykens Valley	....	....	4 70	4 70	4 70	3 70
North Franklin red ash	....	....	4 20	4 20	4 20	3 25

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	45c.
" " Elizabethport & Port Johnston to N. York.	45c.
" " South Amboy to New York	45c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c.

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

Lackawanna coal delivered to carts in New York or Brooklyn, 50 cents per ton additional.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in NewYork.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
Youghiogheny, Waverly Co., at Balt	4 25	5 65
Despard, West Va	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 85
Fairmount, West Va., " "	4 40	5 70
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va	....	10 00
" Splint, " at Richmond.	5 50	7 00
" Gas Coal at Richmond	4 15	5 65
Peytona Cannel W. Va at Richmond	....	10 00

Manufacturing and Steam Coals.

Cumberland at Georgetown and Alexandria, Va	3 50@3 75	5 20
Cumberland, at Baltimore	3 65@3 80	5 45
Clearfield f.o.b. Canton, Baltimore	3 40@3 65	5 25

Pennsylvania Semi-Bituminous Coals.

At the mines, per 2,000 lb., 90c. f.o.b, at Greenwich, Phila., for Eastern and Foreign shipments, per 2,240 lb. $3 25@340 for Sound ports, 3 50@3 65, through Delaware and Raritan Canal, for points on Hudson River. $3 80 f.o.b., at South Amboy, N.J., per 2,240 lb., $4 50@4 70. Discharged, in New York, per 2,240 lb., $5 00@5 25.

Foreign Gas Coals.

	Sterling.	Am. currency.
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$4 20	$4 50	$3 80
Lackawanna coal, in yard	4 20	4 50	3 80
Wilkes-Barre, delivered	5 00	5 30	4 60
Lehigh & Locust Mountain, del'd	5 50	5 50	5 00
Schuylkill Red Ash, del'd	6 00	6 00	5 50

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb				$18 00
Liverpool House Cannel	"	"	"	22 00
American	"	"	"	13 00
Cannelton Block, or splint,	"	"	"	10 00
American Orrel	"	"	"	11@14
Red Bank Cannel	"	"	"	10 00
Cumberland	"	"	"	7 00

Baltimore, Md. Nov. 20, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," *Pittston and Plymouth,* White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$3 85	$3 55
Broken	3 85	3 55
Egg	3 85	3 55
Stove	4 35	4 05
Nut	3 85	3 55
Shamokin. (red or white ash), and "Boston," free burning white ash,		
Egg	4 10	3 80
Stove	4 35	4 05
Lykens Valley, red ash,		
Egg and stove	5 35	5 05

From wharf or yard, wholesale, 50@75c. additional.
By retail, all kinds and sizes, per 2240 lb. $5 00@7 50

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point	3 75@4 00
West Virginia Gas f. o. b. at Locust Point	4 50
Youghiogheny Gas, f. o. b. at Locust Point	4 50
Swanton	4 00

Boston. Nov. 18, 1876.

COAL is not firm, but Thursday and yesterday there was a little more demand at retail, which had its effect on the wholesale market. The shipments from the mines are becoming less. There will undoubtedly be a movement on the part of operators looking to a reduction in wages, and it is not expected that there will be any great resistance on the part of employés. Bituminous continues very quiet. It is believed by dealers here that the long drouth has considerably increased the use of coal by manufacturing establishments.—*Commercial Bulletin.*

Buffalo, N. Y. Nov. 22, 1876.

Reported by LEE & LOOMIS.

Deliv'red at	Elmira. Afloat.	Ithaca. Afloat.	Syracuse Afloat.	Rochester. Afloat	Rochester. ret. del.	Oswego f.o.b.
Grate	$4 20	$3 45	$3 60	$4 30	$5 55	$4 55
Egg	4 20	3 55	3 70	4 40	5 65	4 65
Stove	4 60	4 05	4 20	4 90	6 15	5 15
Nut	4 35	3 80	3 95	4 65	5 90	4 90

Delivered at	Erie. f.o.b.	Buffalo. Afloat.	Buffalo. f.o.b.	Buffalo. ret.	Buffalo. del.
Grate	$5 05	$4 55	$5 05		$5 80
Egg	5 15	4 65	5 15		5 90
Stove	5 65	5 15	5 65		6 40
Nut	5 40	4 90	5 40		6 15

Chicago, Ill. Nov. 22, 1876.

Lackawanna Stove	$8 00
" Chestnut	8 00
" Grate and Egg	7 50
Erie and Brier Hill	6 00
Wilmington and Illinois	3 50@4 25
Blossburgh	7 00

Cincinnati, O. Nov. 20, 1876.

Reported by A. B. BUCHANAN & Co.

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	@8c.	—
Pomeroy coal	@5c.	—
Kanawha "	7½c.	—
Ohio River Coal	5½c.	—
Cannel coal, according to quality	@16c.	—

The following are the retail prices delivered

Youghiogheny	10@11c.
Pomeroy	9c.
Cannel	@22c.
Kanawha	10c.
Anthracite, per ton	$9 00
Coke, at yard	10c.
Coke, hard and soft, delivered	— @9c.

Cleveland, O. Nov. 20, 1876.

Specially reported by Messrs. LAMBIE & BATES.

Per ton of 2000 lb. f. o. b. vessels.

WHOLESALE.

	1 to 10 tons.	10 tons upw'd.
Lacka'a., Wilkesbarre and Pittston egg and grate,	7 00	6 75
" " " stove	7 50	7 25
" " " chestnut	7 25	7 00

Lehigh to be $1 25 per ton higher.
All sales to be strictly cash with order or C. O. D.

Indianapolis, Ind. Nov. 20, 1876.

Specially reported by Messrs. COBB & BRANHAM.

Wholesale on board cars, and retail delivered to consumers.

Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 50	Peytona cannel, per ton.	5 75
Brazil Block, "	2 50	Indiana Cannel	4 50
Highland, grate, "	2 25	Hocking Valley	4 25
Block coal, nut, per car	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 35	Nut	8 50
Egg	8 35	Stove	8 75

Lehigh Anthracite.

Broken	9 75	Nut	9 50
Egg	9 75	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	13	" Slack, "	7
Brazil Block	14	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use	12	Youghiogheny	20
Highland Nut, "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$9 75 per ton.
Lehigh, retail	$11 50 per ton.

Louisville, Ky. Nov. 20, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Please report our prices as follows;

WHOLESALE.

	per bushel		per bushel
Pittsburg	6½c.	Pine Hill	—
Raymond City	6½c.	Kentucky	7c.

RETAIL.

	per bushel		per bushel
Pittsburgh	10c.	Peytona Cannel	18c.
Raymond City	10c.	Buckeye "	
Pine Hill	13c.	City-made Coke	8c.
Kentucky	9c.	Anth., per ton, $10 00 to 10 50	
Screened Pittsburgh per load		$3 50	
Screened Raymond City		2 50	
Pine Hill (Kentucky)		2 25	
Cannel		4 50	
City-made Coke		4 00	

Milwaukee, Wis. Nov. 20, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

The coal trade is not as good as might be desired. The reduction of prices east compel a decline here. The following are the prices with us for the present:

Retail price per ton of 2000 lb.

Lehigh Lump	$ 8 00	Briar Hill, select	$7 00
Lehigh Prepared	9 00	Blossburgh	7 00
Lackawanna (all sizes)	8 00	Cannel	6 00
Pittston	8 00	Pittsburgh	6 50
Scranton	8 00	Oak Hill	6 00
		Steam coal	4@5 00

Pittston, Pa. Nov. 22, 1876.

Pennsylvania Coal Company's Coal in yard, ton of 2000 lb.

Retail.

Lump, Egg and Stove	$2 25
Chestnut	2 00
Pea	1 00

Delivered, fifty cents per ton additional.

Richmond, Va. Nov. 22, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 40
Coalburgh Splint	5 70	Clover Hill Coal	3 50
Lewiston "	5 70	James River Bitum	3 30
Kanawha Gas coal	4 90	" " Carbonite,	5 00

San Francisco, Cal.

From the *Commercial Herald*, Nov. 16, 1876.

Imports from Jan. 1st to Nov. 14:

	tons.		tons.
Anthracite	10,784	Vancouver Island	83,763
Australian	123,363	Rocky Mountain	163
Coos Bay	34,360	Seattle	80,009
Cumberland	12,421	Bellingham Bay	19.635
English	91,294	Chili	3.150
Mt. Diablo 10 mos	93,964		

The arrivals of foreign continue liberal, while there is a sensible diminution in the Coast receipts. We note the following: *Amethyst*, 500 tons Bellingham Bay; *Gem of the Ocean*, 1,050 tons Seattle; *Santona*, 1,180 tons Liverpool; *Anglo-Norman*, Sydney, 300 tons coal and 820 tons shale; *Florida*, Newcastle, Eng, 1,731 tons; *Castlehead*, 1,154 tons Liverpool; *Ivanhoe*, 171 tons Coos Bay. The spot price of Cumberland ex ship, $14@15 in bulk, $17 in casks; Lehigh, $13.50@15; Pittston, $14@14.50 for egg; Sydney Steam, $7.50, Wallsend, $8@8.25; West Hartley, $8.50@9; Mt. Diablo, fine $5.75, coarse 7.75; Coos Bay, $9; Seattle, $9; Bellingham Bay, $8. Yesterday's arrivals included 800 tons Seattle per *Levi Stevens*, 600 tons Coos Bay per *Empire*; 1,320 tons from Newcastle, N. S. W., per *Remington*, and 2,393 tons from Liverpool per *Northern Light*.

St. Louis. Nov. 20, 1876.

Reported by JAS. J. SYLVESTER, Secretary of the Anthracite Coal Association.

Retail prices, delivered.

ANTHRACITE.

	per ton.
Lackawanna	$9 00@10 00
Wilkes-Barre	9 00@10 00
Schuylkill	9 00@10 00
Lehigh	10 00@10 50

BITUMINOUS.

Blossburg	9 00
Pittsburg	4 50
Indiana Block	4 00
Big Meadow	3 00
Illinois Coals	2 50@3 00
Connellsville Coke	3 50

Toledo, Ohio. Nov. 20, 1876.

Specially reported by GOSLINE & BARBOUR.

We quote as follows for retail delivery:

Lackawanna lump	$6 75	Lehigh lump	$7 75
" egg	6 75	" egg	7 75
" stove	7 00	" stove	8 00
" chestnut	6 75	" chestnut	7 75

Soft Coal.

Hocking lump	4 00	Brier Hill	5 75
" nut	4 00	Blossburg	8 00
Willow Bank lump	4 50	Cumberland	8 00
" " nut	4 00		

Montreal. Nov. 20, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$4 25	Cape Breton Steam	$3 75
Pictou "	4 25	Newcastle Smiths	5 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 25	Chestnut	6 25
Stove	6 75		

Hamilton, Ont. Nov. 20, 1876.

Specially reported by H. BARNARD, Dealer in Coal.

Grate	$5 75
Egg	5 75
Stove	6 00
Nut	5 75
Lehigh Lump	6 50
Smithing	6 00
Bituminous, retail	5 50
" steam	4 00
Coke	6 75

Rates of Transportation on Anthracite Coal to Tide Ports.

We refer to our last issue for these freights.

Freights

Representing the latest actual charters up to Nov 24, 1876.

Per Ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....	....	....
Albany	....	....	....	.... ‡
Alexandria	....	....	....	....
Amesbury, Mass	....	....	....	1 75
Bangor, Me	....	....	....	1 50
Bath, Me	....	2 00	2 10	1 50
Baltimore	....	....	....	....
Boston, Mass	1 75	2 00	2@2 10	1 25
Bridgeport, Ct	1 15†	1 80	1 70	60
Bristol, R. I	1 50	....	....	80
Cambridgeport, Mass	1 80	....	....	1 30
Derby	....	....	....	....
Dighton	....	....	....	....
East Cambridge	1 80	....	....	1 30
Fall River	1 50	1 80	1 70	1 00
Hackensack	1 12†	....	....	....
Hallowell, Me	....	....	....	....
Hartford	....	2 30	....	1 35
Hoboken	†95	....	1 45	40
Hudson	1 10	....	....	....
Jersey City	†95	....	1 75	40
Lynn, Mass	....	....	....	†1 40
Middletown	....	....	....	1 15
Mystic	....	....	....	....
Newark	†96	....	....	....
New Bedford	1 60	1 80	1 80	80
Newburyport	1 75	2 20	2 20	1 40
New Haven	1 10†	1 80	1 70	60
New London	1 45	1 80	1 70	80
Newport	1 45	....	....	75
New York	†95	1 60	1 50	40
Norfolk	80	....	70	75
Norwalk	1 10†	....	....	80
Norwich	1 60	....	....	80
Pawtucket	1 75	....	....	‡ 90
Philadelphia	....	....	....	....
Portland	1 80	2 00	2 20	1 25
Portsmouth, N. H	1 75@1 80	2 20	2 25	1 40
Providence	1 45	1 80	1 70	80
Poughkeepsie, N. Y	1 10†	....	....	....
Rockport	....	....	....	....
Saco	....	....	....	....
Sag Harbor	....	....	....	....
Salem, Mass	2 00	2 00	....	1 25
Salisbury Pt., Mass	....	....	....	....
Stamford	1 10†	....	....	....
Stonington	....	....	....	....
Taunton	....	....	....	....
Troy	1 15†	....	....	....
Warren, R. I	....	....	....	1 00
Wareham	....	....	1 90	....
Washington	75	....	....	....
Weymouth	....	....	....	....
Wilmington, Del	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. ‖ 3c. per bridge extra.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Nov. 24, 1876.

American Pig.—The business of the past week has been excessively quiet and confined entirely to retail lots. The dullness has been intensified, if such could be possible, by the unsettled aspect of political matters, although there were prior causes almost sufficient to bring about the unexampled dullness. Iron is quoted upon the basis of $21@$22 for No. 1 foundry, with some business, in a quiet way, at less than the lower quotation. The market is weaker than it has been, and round lots would have to be offered at concessions to find purchasers. We quote No. 1 foundry at $21@$22: No. 2, $19@$20; and forge, $19@$19.50.

Scotch Pig.—Coltness has advanced to 72/ in Glasgow, and Eglinton 64/, which has given firmness to this market. We note sales aggregating 150 tons of Coltness on private terms. We quote Coltness, $29; Eglinton, $26 50, and Glengarnock, $27.75.

Messrs. JOHN E. SWAN & BROTHERS of Glasgow under date of Nov. 10, report 117 furnaces in blast as against 115 a year previous; quantity of iron in CANNAL & Co's. stores, 97,032 tons (an increase of 907 tons during the week) as compared with 69,213 tons at the corresponding date last year; shipments for the week ending Nov. 4, 9,284 tons as against 10,531 tons for the corresponding week of last year; total decrease in shipments since Dec. 25, 1875 as compared wit the like period of 1874-5, 69,-

567 tons; increase of imports of Middlesbrough pig iron for the same period, 58,612 tons. They quote No. 1 iron as follows: Gartsherrie, 65/; Coltness, 69/; Summerlee, 63/6; Langloan, 66/; Glengarnock, 63/6; and Eglinton, 58/. Quotations of freights as follows: To New York, 2/; Boston, 9/; New Orleans, 5/; Baltimore, 8/; Philadelphia, 7/6; San Francisco, 22/6.

Rails.—There has been no further business reported. Iron rails are quoted at $36@$40 at mills, and steel at $50@$54.

Old Rails.—We note a sale of 200 tons on private terms, and quote at $20.

Scrap.—We learn of no business in this article, and quote at $20.

Philadelphia Iron Trade.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, JR., & CO., Iron Merchants, 333 Walnut Street, Philadelphia. Week ending Nov. 23, 1876

PIG IRON.—We have no particular change in this market this week; it is very dull and de ressed. We hear of less offers being made and accepted daily, and the end is not yet. There seems to be no steady price for pig; every furnace company sells as their requirements demand; those with plenty of orders and money hold firm to price, while those short of orders and money must accept almost any offer in reason. Thus the market is more unsteady just now than it has been this year. We quote No. 1, $21 to $22; No. 2, $19 to $20; Gray Forge, $19, to $19.50; favored brands of Forge, $21, all delivered in Philadelphia.

MANUFACTURED IRON.—The demand for bars remains as for some weeks, exceedingly dull and depressed, with prices unchanged. We quote, for best refined, 2¼c. to 2 3-10c. per lb. Sheet skelp, and tank irons are in better demand than bars, though orders are not so plenty as at our last. We quote skelp 2¼c. to 2 65-100; tank, 2⅝c. to 7c. per lb., as to quality. The demand for muck bars, quoted a few weeks ago, has fallen off to the legitimate trade. We quote $36 to $39.

RAILS.—The demand for steel rails is good, and we hear of several large contracts being made this week. We quote $50 to $54 at mill. Nothing doing in iron rails; we quote $38 to $40 at mill.

OLD RAILS are quite dull at $22 to $22.50.

SCRAP.—Wrought is quoted at $24 to $27; cast, $14 to $19.

Baltimore. Nov. 22, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

The iron market continues dull and depressed, and we look for no possible improvement until the present political uncertainty is settled. We quote:

Baltimore Charcoal	$27@33	Anthracite No. 3	$20@21 00
Virginia Charcoal	28@33	Mottled and White	17@19 00
Anthracite No. 1	23@24	Charcoal C B.Blooms	63@65 00
" No. 2	20@22	Refined Blooms	65@00 70

Boston. Nov. 18, 1876.

PIG shows no improvement. The advices of blowing in of blast furnaces in the anthracite region have a very depressidg effect, which is heightened by the election uncertainty. The sales have been in 10 and 20-ton lots, and very few of those. Some sales to arrive have been made at reduced figures, and it is evident that buyers think we are on the eve of a further decline. We quote all the way from $20 to $25, with the tendency downward. Scotch pig is in small supply, and we quote Gartsherrie $31, and Eglinton $29 currency.

BAR is in moderate demand, and prices are easy at $49 for refined and $40 for common.—*Commercial Bulletin.*

Chattanooga, Tenn. Nov. 20, 1876.

Specially reported by J. F. JAMES pig iron broker, etc., 233 Market Street.

There is no change in the condition of our market since last report. Stocks are light and orders daily refused.

Tenn. Ala. and Ga. Charcoal, No. 1 foundry	$20@ 21		
" " " " No. 2 foundry	19@ 20		
" " " " gray forge	16@ 17		
" and Georgia coke, No. 1 foundry	18@ 19		
" " " No. 2 foundry	17@ 18		
" " " gray forge	15@ 16		
White nd Mottled	14@ 15		
Tennessee and Georgia cold-blast car wheel	21@ 22		
Alabama " "	21@ 22		
Old Rails	cash 20 50		
Cast Scrap	" 13		
Wrought Scrap	" 18@ —		

Cincinnati. Nov. 21, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Our market has been very dull during the past week and the demand is only moderate. We quote:

CHARCOAL.

Hanging Rock, No. 1 Foundry	$24 00@25 00	—4 mos
" No 2, "	@23 00	—4 mos
" Mill	21 00@22 00	—4 mos
Tennessee, No. 1, Foundry	23 00@	—4 mos
Tennessee, No. 2, "	22 00@	—4 mos
" Mill	21 00@	—4 mos
Missouri, No. 1, Foundry	@	—4 mos

STONE COAL.

Ohio, No. 1, Foundry	22 50@	—4 mos
" No. 2, "	21 00@21 50	—4 mos
Ohio Mill	20 00@	—4 mos
Missouri, No. 1 Foundry	25 00@	—4 mos
" No. 2, "	24 00@	—4 mos
" Mill	23 00@	—4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00@45 00	—4 mos
Tennessee "	25 00@32 00	—4 mos
Missouri "	30 00@33 00	—4 mos
Alabama "	25 00@32 00	—4 mos

BLOOMS.

Charcoal	60 00@ 75 00	—cash

SCRAP IRON.

Cast	50c.@ 85	—cash
Wrought	1 00@1 40	—cash

Cleveland, Ohio. Nov. 20, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows:

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	27 00@
No. 2, " "	26 00@
No. 1. Anthracite	24 50@
No. 2, "	22 50@
No. 1, Bituminous	24 50@
No. 2, "	22 50@
American Scotch, No. 1, Cherry Valley	@
" " B—1, " "	@
" " No. 2, " "	@
No. 1, Massillon	25 00@
B—1, "	24 00@
No. 2, "	21 00@

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	27 00@
No. 4 " " "	27 50@
Nos. 5 and 6 "	27 00@

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	26 50@

FORGE IRON.

No. 1, Gray	22 00@
White and Mottled	20 50@

Louisville. Nov. 20, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$24 00@25 00
No. 2 " " "	22 00@23 00
No. 1, Mill, from " "	20 00@21 00
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	22 00@23 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	21 00@22 00
No. 1, Mill, from " " " " "	20 00@21 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	22 00@23 00
No. 2, " " " " "	20 00@21 00
No 1, Mill, " " " "	20 00@21 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores.	21 00@22 00
No. 2, " " " " "	20 00@21 00
No. 1, Mill, " " " "	20 00@21 00
No. 1 Foundry, from Missouri Ores	— @ —
No. 2 " " "	— @ —
No. 1 Mill, from Missouri Ores	23 00@25 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00@43 00
" " Tennessee "	26 00@28 00
" " Alabama and Georgia Ores	28 00@40 00
" " Kentucky Ores	28 00@42 00

Pittsburg, Pa. Nov. 21, 1876.

Specially reported by A. H. CHILDS.

No. 1 Foundry	24 00@25—4 mos
" 2 "	22 50@23 00 "
Gray Forge	20 50@22 00 "
White and Mottled	18 00@20 "
Warm blast Charcoal	23 00@28 "
Cold blast Charcoal Western	40 00@45 "

Richmond, Va. Nov. 20, 1876.

Reported by ASA SNYDER, Esq.

Charcoal pig iron is dull. Hope when the distraction of the recent election is over this interest wi l revive.

Virginia Cold Blast Charcoal Pig Iron	$27 to $33
" Warm " "	24 to 26
" " " Coke " " 1 X	23 to 24
" " " " " 2 X	21 to 22
" " " " " 3	20 to 21
" Anthracite 1 X	— to —
" " 2 X	— to —
" " 3	— to —

San Francisco, Cal.

From the *Commercial Herald*, Nov. 16, 1876.

The ship *City of Delhi*, from Liverpool, brought us 400 tons pig iron, 1,838 boxes tin plate, etc We note a sale of 100 tons Eglinton pig iron at $28.50. The steamer *City of San Francisco*, from Sydney, brought 200 blocks of tin, the last sales of which were at 17½c. The *Australia*, from the Colonies, brought 50 ingots tin.

St. Louis. Nov. 21, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Our market is about the same as last quoted, demand good and prices firm at quotations. We quote same as last.

CHARCOAL.

Missouri No. 1 Found'y.	$23@25
" " 2 "	22@23
" Gray Mill	22@23
H. Rock No. 1 Found'y.	25@26
" " 2 "	23½@24
" " Gray Mill	23@24
Tenn. No. 1 Foundry	23½@24
" " 2 "	22½@23
" Gray Mill	22½@23

COKE.

Alice H. R. Ex No 1 F'y.	26 00
" 1 "	25 00
B, " 1 "	24 50
" 2 "	23 50
Forge	23 50
Chat., Tenn. No. 1 Fd'y.	25 00
" " 2 "	23 50
" " Forge	22 50
" " White Mtl'd	21 00

STONE COAL.

Missouri No. 1 Fd'ry.	25@26
" " 2 "	23@24
" Gray Mill	22@23
" White & Mt'd	21@22

COLD BLACK CHARCOAL.

All Numbers.

Hanging Rock	35@46
Tennessee	30@33
Kentucky	30@33
Missouri	28@30
Georgia	25@30
Alabama	28@30
Assorted Bar Iron $2 25, rates.	
No. 1 Wrought Scrap 95c. cwt.	
Heavy cast " " 70 "	
Light " " 40 "	

PIG Iron is now held in a few hands and being sold at our advanced quotations in fair lots, and altogether

Montreal. Nov. 15, 1876.

Since last week business continues fairly active, price we may say is unchanged. Pig iron is moving in small lots at quotations, and there is a steady demand for tin plates and Canadas. Bars are moving freely and the quantity will compare favorably with previous years. We quote: Pig Iron. Eglinton and Clyde; $19.25@19.75; Summerlee $20.25@20.75; Langloan & Gartsherrie $22.50@23; Calder $22.@22.25; Hematite $26.@27. Bar, per 100 lbs., Scotch and Staffordshire $2.@2.05; best do., $2.25@2.30, Swedes and Norway 4.75@$5; Lowmoor and Bowling, $6.@6.50.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, Nov. 24, 1876.

The market for all articles of metals has been exceedingly quiet, and rather a gloomy view of the position of trade is generally taken. The political aspect is having a detrimental effect upon this branch of trade.

Gold Coin.—During the week under review gold has ranged from 109⅜ to 109⅞, and closed at 109¾.

Bullion.—The market for silver is strong abroad and here. We quote silver here at $1.17½ per oz.; in London, 54⅛d.; and in San Francisco, 11¼ per cent. discount. Gold bars are quoted at par to ¼ per cent. premium.

Copper.—Sales aggregating about 400,000 lb. at 20⅜c. @20¾c. have been made during the week under review. The market closes with 20¾c asked and 20¼c. bid.

Messrs. VON DADELSZEN & NORTH, of London, under date of November 7, say: "Copper has shown an important rise since our last issue; the main cause has been the strength which the market acquired when it became evident that the feeling prevalent at the end of September was correct, as to the effect upon it of the large quantity of Chili now under the control of one holder. The English smelters and large consumers have both purchased freely, and speculators have also operated with confidence. Chili bars went from £73 to £77 10/, when the "war scare" caused a reduction to £74, from this it has again rallied to £77 10 to £78. In Australian, Wallaroo has advanced from £78 10/ to £86 15/, and the transactions during the month have been large at the intermediate prices. Burra has gone from £77 10/ to £84, and other sorts in proportion. The quantity of Australian afloat is now 1,600 tons. English has fully participated in the upward movement, and smelters have fixed their official prices as follows: Tough, £84; select, £86; strong sheets, £90; but the market rates are from 20/ to 30/ below these quotations. In furnace stuff there is also considerable improvement; the last sale of Chilian and Mexican ore was at 15/6 per unit, and regulus at 16/ per unit. Yellow metal has been advanced ¼d. per lb. The following are the stocks:

	Oct. 1, 1876.	Nov. 1 1876.	Nov. 1 1875.	Nov. 1 1874.
	Tons.	Tons.	Tons.	Tons.
Stock, Liverpool and Swansea	14,107	14,649	12,435	12,700
" Havre	6,550	7,950	2,710	3,427
" London	3,732	2,744	8,030	4,849
Chili produce afloat and chartered by mail and cable	24,389 12,700	25,343 12,000	23.175 12,900	20,976 8,000
Total	37,089	37,343	36.075	28,976

Tin.—Straits is quoted in London at £79/10, while here it is quoted at 18c.; L. & F., 17¾c.; Refined, 18c.; Banca, 20c. There is but very little doing in this article.

Messrs. VON DADELSZEN & NORTH, say: "Tin has been favorably affected by the general improvement in metals; the statistical position too is apparently better, which justifies to some extent the rise in price, but the "caprice of operators" has had much more influence on the market than the old-fashioned laws of supply and demand. The deliveries both here and in Holland have been large, while the arrivals have been small. From Holland 678 tons of Banca, 372 tons of Billiton, and 30 tons of Australian have been delivered, of which 110 tons came to London, and from London Warehouse 1,020 tons (including 82 tons overside to America), making a net total of 1,990 tons, but it is well understood that a considerable quantity of this tin (some few hundred tons as the *Western News* informs us), has been taken from both Holland and London direct to Cornwall. It will probably never re-appear from there in its original form, but it may be, perhaps, as well to remember that in Cornwall there is no actual consumption of tin. The next sale of Banca will be probably announced in the course of this week. In 1877, the Trading Company will sell 140,000 slabs in bi-monthly sales as heretofore. The Dutch Market has improved with ours, and we quote Banca $45⅛, Billiton $45. The sale of Billiton in Batavia on October 9th, realized $45 per picul or $42½ per 50 kilos in Holland. Straits stood at £72 at our last issue, and after sundry fluctuations has advanced to £76, our present quotation. Australian was in full supply, and sold readily at about 20/ per ton under Straits, our closing quotation being £74 10/ to £75. English tin is now held for £80 for ingots, £81 bars, £82 refined."

	Oct. 1, 1876.	Nov. 1, 1876.	Nov. 1, 1875.	Nov. 1, 1874.
	Tons.	Tons.	Tons.	Tons.
Banca on warrants	1,330	653	649	460
Arrived for next sales	1,197	1,424	2,330	4,153
Afloat for " "	214	144	509	384
Billiton in Holland	1,008	865	866	774
Afloat	1,100	1,400	1,024	768
Foreign tin in London Warehouse	7,540	7,650	5,492	2,400
Foreign not landed	427	100	100	552
Straits afloat, advised per mail and telegraph for Europe	700	400	1,308	950
Australian afloat, estimated	1,700	1,900	400	1,000
" in Dutch Warehouse	795	765	....	....
Total	16,011	15,301	12,678	11,441
Price of Straits	£71.10	£74.10	£85.10	£93.10

Tin Plates.—These are very quiet, and quoted as follows, gold, per box: charcoal tins, $6.75@$7, and ternes, $6@$6.50; coke tins, $6, and ternes, $5.50@$5.75.

Messrs. ROBT. CROOKS & Co., of Liverpool, under da te of Nov. 9, say of Tin Plates: "Buying continues to be on a most limited scale, and makers are getting more and more desponding. If matters do not mend soon, it will be very hard for some of them to struggle through. The demand, such as it is, is for Coke Tins almost entirely. These are fairly firm at rates of last week, but other descriptions are squeezable to the extent of 3d to 6d a box."

Lead.—Two weeks ago, about 500 tons of Selby lead was sold at about 6c. currency. The market has been very quiet since, and may be quoted at 6c. to 6·10c. currency, according to quantity, for ordinary domestic, and 6·15c. for soft Missouri.

Spelter and Zinc.—There have been several carloads of domestic spelter sold durine the week at prices ranging from 6¼c.@6¾c. currency. Sheet zinc is very quiet, and quoted at 8¼c.@8¾c. currency.

Antimony.—This article is quiet at 13½c.@14c., gold.

Quicksilver.—The San Francisco market is strong a 57½c.@60c., gold, per lb.; this market, 62½c., gold; and London, £8 10/ per flask.

THE SALT LAKE CITY SILVER ORE MARKET.

MR. J. B. MEADER, under date of the 18th inst., reports no change in the silver and copper ore market, as compared with the rates given in our issue of the 4th instant.

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, Nov. 24, 1876.

THE coal shares, like the Presidential question, continue very much muddled. It would appear from the very unproductive rates realized from the coal sales made by two of the companies during the week, that a general decline would occur in the stocks of those interested, but the contrary has been the case, an advance of over 3 per cent. occuring in Delaware, Lackawanna and Western Railroad. It is said that this was brought about by the efforts of a clique to squeeze out the "short interest." That ⅛ per cent. per day can be obtained for the use of stocks, is a very clear indication that the market is largely oversold, and this artificial demand probably explains a condition of the market, which is not in harmony with the true condition of the coal carrying companies. The sales for the week aggregate 151,725, an increase of about 39,000 shares from our last.

Delaware, Lackawanna and Western Railroad.—About 133 000 shares of this stock have been sold during the week at 67⅛@71¼, closing at 70¾. It is rumored that the company will suspend all operations at its shops and mines in Scranton, Pa., on the second Saturday in December, unless its workmen accept a reduction of twenty per centum on their present wages.

The Hudson River Tunnel.—We note the statement that the United States Circuit Court has refused to grant an injunction to restrain this company from building its tunnel under the lands of the Delaware, Lackawanna and Western Company in Jersey City. The Court he'd that, without regard to the merits of the case, it would not be proper for it to grant an injunction at this stage of the proceedings, in view of the action of the State Courts.

New Jersey Central Railroad.—This stock closes at 35⅝, an advance of over one per cent. The sales for the week amount to 14,265 shares, the extreme quotations ranging from 32¼ to 35⅝.

This company has recently sold to a company of capitalists a tract of eight acres of land at Constable Hook, Bayonne, N. J. upon which they are erecting oil tanks and buildings for an extensive oil refinery. The land brought $8,000 per acre. There will be a dock 200 feet front on the Kills, and extending 800 feet into the water. The petroleum will be shipped over the Central Railroad directly to Bergen Point, and thence conveyed to the works through iron pipes. The works will employ a large number of men.

Delaware and Hudson Canal Company.—This stock has been moderately active, 3,780 shares having been sold at from 71 to 67¼, closing at 70.

Mariposa Land and Mining Company.—This stock is weak and almost neglected. A recent letter from the mine says: "The tunnel is now in 2,221 feet, and that the prospects are flattering. Samples assayed from the ore taken out show a value ranging from $4 to $100 per ton. The work of making drifts and crosscuts is reported to be progressing rapidly."

The Pittsburg and Connellsville Railroad Company will hold its annual meeting in Pittsburg, on the 4th of December.

Tennessee Coal and Railroad Company.—We note the statement that this company will pay the semi-annual instalment of interest on its bonds due December 1, 1876.

Pennsylvania Coal Company.—We note an auction sale of 50 shares of the stock of this company, at $221 per share.

Columbus, Ohio and Hocking Valley Railroad.—The earnings of the Columbus, Ohio and Hocking Valley Railroad, from all sources for the month of October, were $96,155.38. The road carried during the month of October, 88,512 tons or 2,389,824 bushels of coal.

Valley Railroad (of Virginia).—A meeting of the stockholders of this company was held in Staunton on the 15th inst. The old Board of Directors, with one exception, was re-elected. A proposition was submitted from the National Security Coal, Iron and Improvement Company, of which, T. S. BLAIR, of Pittsburg, Pa., is President, to lease the road for thirty years, at $1,200 per mile, per year, and to complete it to Salem. The proposition was referred to a committee, who asked for more time, and the meeting was adjourned till the 23d inst.

Baltimore and Ohio Railroad Company (Annual Report). The annual meeting of this company was held in Baltimore on the 20th inst. We extract the following from the report submitted by the President: The coal trade of the main stem shows an aggregate of 1,595,894 tons, which includes 409,605 tons for the company's supply. The prolonged stagnation and depression in the manufacturing and marine interests have again reduced the demand for coal, and resulted in a material decrease of tonnage. The net revenue of the main stem and its branches, including the Central Ohio, Lake Erie and Chicago divisions, the Wheeling, Pittsburg and Baltimore, the Newark, Somerset and Straitsville, and for nine months the Pittsburg and Connellsville railroads, is $5.421,379.54. The aggregate working expenses of the main stem with all branches and divisions are 63·93 per cent. of the whole gross revenues, being 4·66 per cent. less than those of the preceding year. The total revenues of the road branches and connections for the fiscal year ended September 30, 1876, are given at $15,031,235.73. The expenses of working and keeping the roads and machinery in repair amounted to $9,600,-856.19, being 56·18 per cent. upon the earnings, showing a decrease of 2·56 per cent. compared with the previous year. The earnings of the main stem and the branches in comparison with 1875 have decreased $881 817.91, and the working expenses have decreased $765,165.59, making a comparative decrease in the net profits of $116,-652.32. The surplus fund, representing capital derived from the net earnings invested in branch and connecting roads and other improvements, $36,022,365.88. The entire mortgage indebtedness in currency and sterling is $28,163,929.90, showing an excess of surplus fund above the entire mortgage indebtedness of $7,853,435 98. The quantity of petroleum transported has been 46 per cent. greater than in 1875.

Chesapeake and Ohio Railroad.—The Reorganization Committee states that about $17,000,000 out of a total of $27,112,000 bonds have been deposited in accordance with the agreement. It is the intention of the Committee to apply to the courts of Virginia and West Virginia for final decrees of foreclosure and sale at the present term.

James River and Kanawha Canal.—In Richmond, Va., on the 15th inst. in the Virginia Circuit Court, a petition was filed asking the Court to take the property of this company under its control and appoint a receiver therefor. The petitioners submit a series of charges impeaching the present management, as having brought the company to insolvency by burdening the treasury with reckless and large expenditures, failing to pay interest on both mortgage debts, and committing other breaches of trust. At the annual meeting held the same day, all the old officers were re-elected. A large part of the stock is held by the State of Virginia.

Quotations and Sales of Stocks and Bonds.

For the week ending Nov. 24, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	220	—
Consolidation Coal Co	—	—	32	—
Spring Mt. Coal Co	—	—	†60	—
American Coal Co	—	—	*54	—
Maryland Coal Co	—	—	10	—
Del., Lack., and West. RR. Co.	71⅛	67½	70¾	132,830
New Jersey Central RR. Co.	35⅞	32¼	35⅝	14,265
Delaware and Hudson Canal Co.	72	67¼	70	3,780
Quicksilver Mining Co. pref'd	—	—	15	—
" " " Common	11	10½	10½	400
Mariposa Land & Min. Co. pref'd	4⅞	4	4½	450
St. Louis & Iron Mountain RR.	—	—	10	—
Total Shares sold				151,725
Sales for the week previous				112,831
Increase				38,894

* Nominal. † Asked,

BONDS.

	Inter'st	Sales.	Price.
Del., Lack. & West. 2d M	M. & S.	3,000	@108
" " " 7's Con'ble	J. & D.		@100
Cent'l RR. of N.J., 1st M., New	F. & A.	7,000	109 @110
" " " 1st Cons.			@ 83
" " " Convert'le	M. & N.	36,000	81 @ 81½
Lehigh & W.-B'e, Con. Guar'd.		5,000	@ 63
Am. Dock & Imp. Mt. Bonds	J. & J.	4,000	@ 68
Del. & Hud. Can., 1st M., 1891		15,000	107 @107⅜
" " " 1884		7,000	104 @104½
" " " 1877		2,000	@101½
" " " Coup. 7's, 1894		6,000	@ 98
" " " Reg'd 7's, 1894			@
St. L. & Iron Mountain, 1st M	F. & A.	19,000	100½@101
" " " 2d M	M. & N.		@ 70
Chesapeake & Ohio 6's, 1st M		1,000	@ 31
" " Ex. Coupon			@ 20
Mariposa Gold Loan con. 7s			@100⅝
Total sales		$105,000	

Closing quotations, in the absence of sales, represent the latest prices bid.

Philadelphia Stocks.

PHILADELPHIA, Thursday Evening, Nov. 23, 1876.

THE Philadelphia Stock Market continues irregular with the quotations downward. The transactions for the week amount to about 89,000 shares, a decline of some 10,000 shares from the sales reported in our last.

Pennsylvania Railroad.—41.653 shares of this stock have changed hands between 46⅞@45⅝, closing ⅛ above the lower quotation.

Reading Railroad.—This stock closes lower, the extreme prices being 23⅛@22⅛, the lower price prevailing at the close. It is rumored that this company has made full provision for its December and January interest payments.

Lehigh Valley Railroad.—This stock closes a little lower with very limited transactions, the fluctuations for the week have been confined within the limits of ⅛ per cent.

This company has lately finished a new coal depot in Newark, at a cost of $75,000. The depot covers a space of two blocks, with a street running through the centre, dividing it into two separate structures. The front is on Broad Street, and runs from Roimer to Alpine Streets and back to the New Jersey Central Railroad track, where appliances for unloading coal from the cars are placed. There are 34 divisions in the two buildings, which are subdivided into 164 bins, ranging in capacity from 22 to 75 tons. The total capacity of the depot is 8,657 tons.

Lehigh Coal and Navigation Company.—17,491 shares of this stock have sold during the week at 29⅜@26¾, closing at the lower figure.

Lehigh and Susquehanna Railroad.—Several more miles of the double track has been finished, and it now reaches above Treichler's Station.

Geneva, Hornellsville and Pine Creek Railroad.—The Canandaigua (N. Y.) *Messenger* says: "We learn that the Northern Central Company has purchased the track of the Geneva, Hornellsville and Pine Creek Railroad Company from Stanley to Geneva, and is now actively engaged in putting the same in running order. The road is all graded and some of the ties down, and it is believed that trains will be running over it in a very few months. The Northern Central has obtained this route in order that they may successfully compete with the Lehigh Valley road for travel via Geneva."

Auction Sales of Stocks and Bonds for the week have been as follows:

Danville, Hazleton and Wilkes-Barre Railroad Company.—$7,000 coupon bonds due in April, 1875, at 45 per cent.

Shamokin Valley and Pottsville Railroad Company.—86 shares at $24 per share.

Minehill and Schuylkill Haven Railroad Company.—60 shares at $50 per share.

Schuylkill Navigation Company.—$500 1st mortgage 6 per cent. bonds at 88 per cent.

Wilmington and Reading Railroad Company.—$600 2d mortgage 7 per cent. bonds at 2 per cent.

South Mountain Iron Company.—$10,000 3d mortgage 7 per cent. bonds at 5 per cent.

Union Canal Company.—$5,500 mortgage bonds, coupons on from May, 1860, at 1 per cent.

Schuylkill Navigation Company.—$4,000 boat and car 7 per cent. loan of 1864 at 73 per cent.

Quotations and Sales of Stocks and Bonds.

For the week ending Nov. 23, 1876.

STOCKS.

	Highest	Lowest	Closing	Shr s
Lehigh Valley RR. Co	49¾	49½	49¼	471
Pennsylvania RR.	46⅝	45⅜	45⅞	41,653
Reading RR.	23⅛	22⅛	22¾	29,230
Lehigh Coal and Nav. Co.	29⅜	26¾	26¾	17,491
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co.	—	—	*25	—
Fulton Coal Co.	—	—	*3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co.	—	—	*85	—
St. Nicholas Coal Co.	—	—	*1	—
Cambria Iron Co.	—	—	*16	—
Crane Iron Co.	—	—	*25	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	—	—	65	10
Total shares sold				88,861
Sales for the week previous				99,539
Decrease				10,678

* These quotations are nominal.

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 7s	$ —	— @107
" " " 2d "	—	— @102
" " " 3d " cons	—	— @ 38
Lehigh Valley RR. Con. mtg. 6s	12,000	100 @100¼
" " " 7s, 1910	9,000	— @113⅜
" " " 6s Reg.	—	— @109
" " " 6s coup	—	— @108
Pennsylvania RR. 1st mtge. 6s	4,000	106¾@107¾
" " gen. " cou. 1910	—	— @107
" " gen. " 6s, reg.	1,000	— @106½
" " Cons. M. 6s reg.	1,000	— @101
Phil. & Reading RR. Con. M. 7s Reg.	3,000	100 @100¾
" " " G. M. 7s, coup	9,000	— @100
" " " Gen. M. 7s reg.	—	— @103
" " new convertible 7s	15,000	70 @ 71⅛
" " 6s 1880	4,000	— @103⅜
" " Cons M. 7s coup	5,000	— @100⅛
" " debenture 6s	—	— @ 65
Phil. & Reading C. & I. Co. Deb. 7s	—	— @ 69
" " Tamaqua tract.	—	— @ 66
Lehigh Coal & Nav. Co., 6s '84	5,900	— @103
" " " RR. 6s, '97	7,400	101½@102
" " " con. 7s	1,000	— @ 90
" " " 6s gold loan	7,000	101¾@102
" " " Conv. gold loan	1,000	— @101
Penn. Canal, 6s	—	— @ 72
Penn. and N. Y. Canal, 7s	4,000	112 @111⅜
Ches. and Del. Canal, 6s	—	— @ 85
Susquehanna Canal, 6s	—	— @ 68
Delaware Division Canal, 6s	—	— @—
Susquehanna Coal Co. 6s	—	— @ 77
Buck. Mount Coal Co. 6s	—	— @—
Penn. Gas Coal Co. 6s	—	— @—
Honeybrook Coal Co. 7s	—	— @—
Total amount of sales	$79,300	

Closing quotations, in the absence of sales, represent the latest prices bid.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street Boston.

BOSTON, THURSDAY EVENING, Nov. 23, 1876.

WE can say very little encouraging concerning the market. Prices hold their own fair, but there is no disposition to trade. Copper is also a trifle weaker, caused, no doubt, by the more peaceful condition of the East;

MINING STOCKS.

AMERICAN MINING BOARD'S LIST.

Name of Company.	Location.	Feet on Vein.	Capital Stock.	*a* No. of Shares.	Total Assessments Levied.	Date and Amount of Last Assessment per share.	Total Dividends paid.	Date and Amount of Last Dividend per share.	Closing Quotations *g* American Currency. Sat.	Mon.	Tues.	Wed.	Thurs.	Fri.	Shares sold during the Week.
Alpha Cons G. S.	Nevada,	300	$ 3,000,000	30,000	$180,000	Aug. 12, '75, $1.	....	.....	$35 37½	$36 00	$36 00	$38 00	$39 00	$38 00	950
Belcher, G. S.	Nevada,	1,040	10,400,000	104,000	660,400	April 14, '71, $4.	$15,397,200	April 10, '76, $1.	*16 25	16 00	15 00	17 00	17 25	15 75	1,100
Best and Belcher, G. S.	Nevada,	545	10,080 000	100,800	136,192	July 13, '74, 50c.	....	.....	46 25	43 00	50 50	50 50	49 00	50 50	890
Bullion, G. S.	Nevada	943½	10,000,000	100,000	2,052,600	Sept. 22, '76, $2.50.	....	.....	32 00	34 00	34 25	35 00	37 00	35 75	500
Caledonia, G. S.	Nevada,	2,188	10,000,000	100,000	1,210,000	Aug. 28, '76, $1.00.	....	.....	9 50	9 50	8 50	11 50	12 00	11 37½	670
California, G. S.	Nevada,	600	54,000,000	540,000	....	.....	7,560,000	Nov. 15, '76, $2.	47 50	*55 00	50 00	57 75	55 00	55 25	155
Centennial, G.	Califor.	66 acres	1,000,000	100,000*b*	**	.....	....	.....	....	....	....	....	....	....	....
Chollar Potosi, G. S.	Nevada,	1,400	2,800,000	28,000	1,282,000	June 26, '76, $5.	3,080,000	Feb. 10, '72, $1.	73 00	*75 37½	77 00	77 50	84 50	79 00	320
Cleveland, G.	Colo.	3,715	250,000	25,000*b*	....	.....	....	.....	9 12½	9 12½	9 12½	9 25	9 00	9 37½	5,650
Cons. Hercules & Roc, S	Colo.	16,500	1,000,000	100,000	**	.....	120,000	.....	5 50	5 62½	5 75	5 75	5 75	5 87½	3,350
Cons. Imperial, G. S.	Nevada,	468	50,000,000	500,000	125 000	July 25, '76, 25c.	....	.....	3 00	2 50	3 50	3 50	3 62½	3 12½	1,350
Cons. Virginia, G. S.	Nevada,	710	54,000,000	540,000	411,200	June 11, '73, $3.	24,840,000	Nov. 11, '76, $2.	43 00	....	47 50	54 00	55 25	55 00	270
Confidence, G. S.	Nevada,	130	2,496,020	24,962	243,840	March 18, '73, $1.	78,000	May 1, '65, $8.33½	12 00	....	14 75	13 50	....	14 62½	402
Crown Point, G. S.	Nevada,	600	10,000,000	100,000	1,173,370	Oct. 26, '76, $1.	11,588,000	Jan. 12, '75, $2.	9 62½	*10 00	9 37½	10 00	11 50	9 75	1,050
Eureka Cons. G. S. L.	Nevada,	..	5,000,000	50,000	100,000	May 26, '76, $1.	1,000,000	Aug. 5, '75, $1.	12 75	....	....	....	....	....	100
Exchequer, G. S.	Nevada,	400	10,000,000	100,000	280,000	Sept. 25, '76, $1.	....	.....	11 50	14 00	14 50	14 37½	15 00	13 50	850
Gould and Curry, G. S.	Nevada,	621	10,800,000	108,000	2,018,000	Aug. 11, '76, $1.	3,826,800	Oct. 10, '70, $10.	....	11 50	13 00	13 co	14 00	14 25	650
Grant, G. S.	Nevada,	1,000	10,000,000	100,000	....	.....	....	.....	6 37½	6 50	6 62½	6 62½	6 62½	7 00	4,100
Hale & Norcross, G. S.	Nevada,	400	11,200,000	112,000	2,247,000	Oct. 10, '76, $1.	1,598,000	April 10, '71, $5.	....	7 00	*8 75	8 75	8 50	8 75	2,300
Hukill, S.	Colo.	3,288	1,000,000	10,000	**	.....	20,000	Nov. 1, '76, $1	....	....	....	....	....	....	.....
Indian Queen, S.	Nevada,	1,000	3 000,000	60,000	....	.....	60,000	.....	....	....	....	....	....	....	.....
Julia Cons. G. S.	Nevada,	3,000	11,000,000	110,000	110,000	Sept. 11, '76, $1.	....	.....	6 25	6 75	*7 50	6 75	7 00	6 75	800
Justice, G. S.	Nevada,	2,100	10,500,000	105,000	1,502,500	Sept. 14, '76, $5.	....	.....	24 00	25 50	*27 50	24 00	26 50	29 00	800
Kentuck, G. S.	Nevada,	95	3,000,000	30,000	270,000	Dec. 3, '74, $1.	1,252,000	March 8, '70, $5.	11 62½	12 00	11 27	13 25	12 37½	....	850
Kossuth, G. S.	Nevada,	2,700	5,400,000	108,000*c*	405,000	Aug. 15, '76, 50c.	....	.....	....	....	....	....	....	....	.....
Leopard, G. S.	Nevada,	1,500	5,000,000	50,000	50,000	March 31, '76, $1.	137,500	Nov. 15, '76, 50c.	*5 00	*6 37½	7 75	7 50	7 00	7 62½	750
Luzerne Mining Co.	Colo.	4,200	5,000,000	500,000	**	.....	....	.....	1 75	1 87½	1 87½	1 87½	1 75	2 00	2,800
Mer. and Min. Tun. Co.	Colo.	30,000	500,000	50,000	**	..	....	.....	4 75	4 50	4 62½	4 75	4 62½	4 62½	3,850
Merrimac, S.	Mass.	600	10,080,000	100,800	100,80	Sept. 5, '76, 50c.	....	.....	4 12½	....	....	4 12½	4 12½	4 12½	1,300
Mexican, G. S.	Nevada,	1,500	500,000	50,000*b*	**	.....	10,000	Nov. 10, '76, $1.	*25 75	25 62½	25 00	26 00	28 00	26 00	550
Morning Star	Nevada,	1,600	8,000,000	8,000	....	.....	....	.....	....	....	....	....	....	....	.....
Northern Belle, S.	Nevada,	1,600	5,000,000	50,000	....	.....	900,000	Nov. 15, '76, $1.	26 50	....	....	34 00	35 00	....	150
Ophir, G. S.	Nevada,	675	10,080,000	100,800	2,034,400	May 14, '75, $2.	1,394,400	March 9, '64, $4.	*48 50	*49 00	*49 75	48 00	49 75	48 00	250
Original Comstock, G. S.	Nevada,	....	10,000,000	10,000	....	.....	....	.....	....	1 00	75	1 00	....	1 37½	400
Overman, G. S.	Nevada,	1,200	3,840,000	38,400*b*	2,222,280	Oct. 21, '76, $3.	....	.....	81 50	....	....	92 00	93 75	92 50	450
Pleasant View	Colo.	1,200	200,000	20,000*f*	**	.....	....	.....	....	....	....	1 62½	1 50	....	200
Raymond and Ely, G. S.	Nevada,	5,000	3,000,000	30,000	510,000	Nov. 5, '75, $3.	3,075,000	Sept. 10, '73, $3.	*6 50	2 50	....	4 37½	4 00	4 50	800
St. Joseph Lead Co.	Misson.	2500 acs.	1,000,000	100,000	....	.....	210,000	.....	6 87½	7 00	6 50	7 00	7 00	....	500
Santiago, G. S.	Nevada,	2,000	11,200,000	112,000	....	.....	....	.....	....	....	....	....	....	....	.....
Savage, G. S.	Nevada,	800	11,200,000	112,000	2,746,000	May 31, '76, $2.	4,460,000	June 11, '69, $3.	....	12 37½	11 25	10 00	13 37½	12 75	1,850
Seg. Belcher, G. S.	Nevada,	160	640,000	6,400	244,800	April 11, '76, $5.	....	.....	....	....	....	69 00	....	69 50	150
Sierra Nevada, G. S.	Nevada,	3,650	10,000,000	100,000	1,500,000	Oct. 24, '76, $1.	102,500	Jan. 16, '71, $1.	11 62½	....	*12 25	11 50	12 37½	11 75	400
Silver City, G. S.	Nevada,	3,900	6,310,000	63,100	....	.....	....	.....	....	75	*1 50	87½	....	50	500
Silver Hill, G. S.	Nevada,	5,400	10,800,000	108,000	810,000	Sept. 18, '76, $1.	....	.....	9 12½	8 co	*9 25	9 12½	10 87½	10 62½	1,400
South Comstock, G. S.	Nevada,	1,500	10,000,000	100,000	44,000	May 3, '76, 10c.	....	.....	....	....	....	....	....	....	.....
South. California, G. S	Nevada,	1,500	5,000,000	50,000	....	.....	....	.....	....	....	....	....	....	....	.....
Southern Star, G. S.	Nevada,	1,500	6,000,000	600,000	....	.....	....	.....	....	1 25	*1 00	1 25	1 co	....	900
Trenton, G. S.	Nevada,	..	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	.....
Union Cons. G. S.	Nevada,	850	10,000,000	100,000	260,000	March 3, '76, $1.	....	.....	13 37½	13 75	13 75	12 50	12 50	14 25	650
West Belcher, G. S.	Nevada,	1,000	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	.....
Yellow Jacket, G. S.	Nevada,	1,200	12,000,000	120,000	2,718,000	Oct. 28, '76, $1.	2,184,000	Aug. 10, '71, $2.50.	13 00	16 co	*16 50	18 75	17 50	19 co	600
Young America, S.	Nevada,	1,000	3,000,000	30,000	6,000	Oct. 23, '76, 20c.	....	.....	....	....	....	....	....	....	.....

Assessments levied to date, $27,647,784 Div'ds pd. to date, $82,893,400 Total sales..... 44,605

BOSTON STOCK MARKET.

									Fri.	Sat.	Mon.	Tues.	Wed.	Thurs.	
Allouez, C.	Mich.	..	$1,000,000	20 000	$940,000	May 9, '76, $5.	....	.....	$10 00	10 co	10 co	10 co	10 co	10 00	.....
Calumet and Hecla, C.	Mich.	2¼ mile	2,000,000	80,000*i*	1,200,000	.....	$11,050,000	Oct. 21, '76, $5.	170 50	171 00	171 00	172 00	171 50	171 50	.....
Central, C.	Mich.	..	500,000	20,000*c*	100,000	June, '62, 65c.	1,020,000	Feb. 17, '76, $5.	35 00	35 00	35 00	35 00	35 00	35 co	.....
Copper Falls, C.	Mich.	..	1,000,000	20,000*d*	535,000	May 10, '76.	100,000	Nov., '71, $1.	4 12½	4 00	4 00	4 50	4 37½	4 37½	.....
Dana, C.	Mich.	..	500,000	20,000*d*	68,020	Jan., '73, 50c.	....	.....	12?9	12½	12½	12½	12½	12½	.....
Dawson, S.	Canada.	..	1,200,000	60,000*f*	....	.....	.. ..	.....	15	15	15	15	15	15	.....
Duncan, S.	Canada.	..	1,200,000	60,000*f*	75,000	July, '76, 41?5.	....	.....	8 75	8 62½	8 56¼	8 50	8 50	8 62½	.. ..
Franklin, C.	Mich.	..	500,000	20,000*d*	360,000	June, '68, $5.	585,000	Nov., '71, $1.	14 87½	14 75	14 75	15 25	14 50	14 50	.....
†Humboldt, C.	Mich.	..	500,000	20,000*d*	100,000	Sept. 28, '76, 15c.	....	.....	2	2	3	3	3	3	.....
International, S.	Canada.	..	1,200,000	60,000*f*	....	.....	....	.....	93¾	87½	87½	81¼	81¼	81¼	.....
Madison, C.	Mich.	..	50 ,000	20,000*d*	123,000	Sept. 11, '74, 10c.	....	.....	28	27	27	27	27	27	.....
Mesnard, C.	Mich.	..	500,000	20,000*d*	160,000	April 12, '65, 50c.	....	.....	30	30	30	30	30	30	.....
Minnesota, C.	Mich.	..	1,000,000	20,000*e*	436,000	June 10, '69, $1.	1,820,000	Mch. 15, '76, 50c.	1 00	1 00	1 00	1 00	1 00	1 00	.....
National, C.	Mich.	..	500,000	20,000*e*	195,000	Oct., '75, $1.	360,000	Oct., '73, $1.	2 12½	2 00	2 12½	2 00	2 12½	2 12½	.....
Osceola, C.	Mich.	..	1,000,000	40,000*d*	880,000	May 1, '76, $2.	....	.....	17 50	17 75	18 co	18 00	18 00	18 00	.....
Petherick, C.	Mich.	..	500,000	20,000*d*	165,533	March 22, '76, 50c.	....	.....	50	50	50	50	50	50	.....
Pewabic, C.	Mich.	..	500,000	20,000*d*	185,000	June, '68, $3.	460,000	July, '73, $1.	3 25	3 12½	3 00	3 12½	3 25	3 10	.....
Phenix, C.	Mich.	..	1,000,000	20,000*d*	817,500	Sept., '70, $3.	....	.....	....	....	....	....	....	....	.....
Quincy, C.	Mich.	..	*h* 200,000	20,000*b*	....	.....	2,050,000	Oct. 28, '76, $3.	47 50	47 50	47 75	47 75	47 75	47 00	.....
Ridge, C.	Mich.	..	500,000	20,000*d*	....	.....	....	.....	5 75	5 75	5 62½	5 62½	5 50	5 50	.....
Rockland, C.	Mich.	..	500,000	20,000*d*	495,000	Jan., '74, $1.	....	.....	25	27	27	27	27	27	.....
Star, C.	Mich.	..	500,000	20,000*d*	265,000	March 30, '76, 50c.	....	.....	30	30	30	30	30	30	.....
Superior, C.	Mich.	..	500,000	20,000*d*	340,000	March, '74, 25c.	....	.....	12½	12½	12½	12½	12½	12½	.....

Assessments levied to date, $7,440,033 Div'ds paid to date, $17,445,000 Total sales ..... —— shares.

G. Gold. *S.* Silver. *L.* Lead. *C.* Copper. *a* The par value of shares is $100, unless otherwise designated. *b* Par value $10. *c* Par value $50. *d* Par value $25 each. *e* Par value $15. *f* Par value $20. *g* Closing quotations represent the latest prices bid. Prices asked will have a * affixed. *h* Full paid. *i* On the four old companies. ** Not Assessable. †Ass. unp. aid.

this and our political situation seems to put our market in a worse condition than it was any time last Summer. Allouez steady, 10 bid, no sales. Calumet has fluctuated on small sales from 170½ to 172, closing 171½ bid, 172 asked. The Copper Falls has had a very fine letter from their agent, stating that they have come upon a mass of copper; how much of a mass it will prove to be, will probably be known in the course of a few days. The stock on this news rallied from 4 to 4½ bid; in any kind of a market it would have probably advanced at least $2 per share. National is steady at about 2 to 2¼ bid. Quincy is lower, 47 bid. Duncan has been very quiet this week, sales have been small, and fluctuations on a very small scale. International has been very dull, but gently inclining to lower figures. In small coppers nothing.

Gold and Silver Stocks.

AMERICAN MINING BOARD.

NEW YORK, FRIDAY EVENING, Nov. 24, 1876.

THE transactions in mining shares during the week just closed amount to nearly 45,000 shares, a decrease of about 5,000 shares from the business of the week previous. The general market tends lower and is, on the whole, in a very unsatisfactory condition. We note a more even distribution in the transactions than for a long time past, the dealings in the Comstocks being noticably large. It is rumored that a change will soon take place in the administration of the Board, the dissatisfaction created by the disreputable transactions, which we have several times alluded to as carried on under the apparent sanction of the managers, is widespread, and it is proposed by some of the members to co-operate, and if possible put a stop to these transactions. It is said this change will not have reference to the President, who enjoys the confidence of the best members.

At a recent meeting of members of the Board it was determined to change its name to "The American Mining and Stock Exchange," this step being preliminary to the call of any or all of the stocks now dealt in at the New York Stock Exchange. The excuse given for this deviation from the original plan of the organization is that although a large interest is being gradually developed in mining affairs it is of so slow a growth that the young and somewhat impecunious members of the new Board cannot afford to wait, and hence must look to other fields for speculation and profit.

The New York Stock Exchange, at a meeting on the 8th inst., removed all restrictions on its members from joining the American Mining Board. The American Mining Board has accordingly issued a circular to the members of the New York Stock Exchange, inviting them to become members, on the payment of an initiation fee of $50. The fee to others being $150.

October Bullion Products are reported from different mines as follows: Leopard, $70,000; Justice, $175,000; Ophir, $227,000.

Consolidated Virginia.—Daily yield, 450 tons of ore. The ore breasts at all points in the mine are yielding the usual amount of rich ore, and look as promising for the future as ever. The Brunswick mill, which was shut down for repairs, was again started up on the 13th inst.; and along with all the rest is crushing ore to its full capacity. The large blower at the 1,500-feet level, placed there to furnish air for the drifts and crosscuts on the 1,700-feet level, is a complete success, and must greatly aid the development of that portion of the mine. The damage done by the water-burst on the 1,400-feet level is nearly all repaired. The mine has not been in better condition for many months past than it is at present. The connecting drifts with the ore body on the 1,500-feet level to the southward are all being put in good working condition again. The new side track of the railroad is finished to the C. & C. shaft, and the splendid large ore-house below the shaft is completed. As soon as the west drift on the 1,650-feet level of the C. & C. shaft reaches the vein, the extraction and shipment of ore can be commenced.

California.—Daily yield 450 tons of ore. The ore breasts in every portion of the mine were never looking better or yielding richer ores. The ore breasts on the 1,500-feet level are still extending to the eastward, the ore being of the same uniformly rich character. The south drift on the 1,600-feet level has now penetrated a distance of 200 feet south from crosscut No. 5, the entire distance in good ore. In the face of this drift the ore has shown great improvement in the past few days, being at this time of a very rich quality. The main west drift at the 1,650-feet level of the C. & C. shaft is being pushed ahead at the rapid rate of 10 feet per day. It is now in a distance of 270 feet, and will have over 250 feet yet to run to cut the ore vein. The station at the 1 650-feet level is being enlarged and put in condition for big runs of ore when the ledge is reached The new pump tank in the shaft below this level is fast approaching completion. The flow of water at the bottom is unchanged, and keeps the pump running at the rate of six strokes per minute.

Yellow Jacket.—The north drift at the 1,940-feet level will make connection with the drift-south from the Imperial within a week, after which crosscutting the ledge from that level will be commenced. On the 2,040-feet level the south drift is being pushed forward for a connection with the south winze from the 1,940-feet level.

At the new or east shaft temporary buildings are being erected over the engine and shaft, the hoisting frame, engine and reels are in place, and sinking be resumed on the 18th inst. The shaft is sixty feet deep and timbered throughout.

Crown Point.—The extraction of ore has been entirely suspended for the present. The grade of ore was too low to pay the expense of extraction and cost of reduction. As a matter of course the Rhode Island mill will have also to stop. Sinking the main incline shaft, below the 1,800-feet level, is making better progress than it has for some time past. The drills are doing splendid work and greatly expedite the sinking. It is now down 145 feet below the 1,800-feet level.

Silver Hill.—The troubles caused by the loosening of the fly-wheel of the pumping engine last week have been overcome, and the water which had accumulated at the bottom of the main incline on account of the stoppage has been extracted and the sinking resumed. The main east drift on the 650-feet level is being again driven ahead at the rate of six feet per day. The north drift on the 444-feet level is in a distance of 785 feet, the face in good running ground.

Imperial Consolidated.—Sinking the north winze below the 2,100-feet level is going rapidly forward, the bottom showing some fine quartz and ore. The south drift on the 2,100 feet level is being pushed with great vigor, but affords no new features to report. The north drift from the bottom of south winze on the same level is also making good progress. The south drift to connect with the Yellow Jacket is being rapidly driven forward.

Gould & Curry.—The great heat created by the flow of water from the Consolidated Virginia entirely stopped the work at the 1,700-feet level during the first two days of the week. The water, however, ceasing its flow, work is again resumed at all points. The water is entirely drained and the drifts are being put in good working condition as rapidly as possible. The erection of the new pumping machinery is going steadily ahead.

Sierra Nevada.—The north and south prospecting drifts, at the first, second and third station levels, are all steadily advancing at a fair rate of speed. On both the second and the third levels the drifts going north are showing much more encouraging prospects than for some time past. The east drift, on the third level, is steadily advancing without any important change. The north and south drifts, at the fourth station level, are both making good progress.

Julia.—The face of the main south drift on the 1,600-feet level has shown a great change in the past three or four days. The entire face of the drift is in soft clay mixed with quartz, with every indication of paying ore. The face shows some signs of water, but every precaution has been taken to receive it should a body be tapped. The quartz in the south drift on the 1,800-feet level is showing more concentration, and the prospects are better.

Caledonia.—A strong flow of water was encountered in the bottom of the shaft four or five days ago. The flow was so strong that sinking the shaft had to be suspended for the time being. The pumps are kept running at their full capacities, but the water yet continues too strong to admit of a resumption of the sinking. The north drift on the 1,150-feet level running to connect with the Overman mine is making good headway.

Hale and Norcross.—The water has been lowered twenty-seven feet during the past week. The pumps are doing splendid work, and it now begins to look as if it would not take more than thirty days more to reach the bottom and enable the resumption of work on the lowest levels. The pumps are still running at the rate of eight strokes per minute.

Belcher.—Daily yield 250 tons of ore. The ore breasts show no change, and the character of the ore is still low grade, though paying well for milling and extraction. Sinking the main shaft is going ahead rapidly. Sinking main incline shaft at the old works is also making good headway. The south prospecting drifts on the 1,500 and 1,600-feet levels afford no important changes.

Union Consolidated.—The west crosscut from the main north drift on the 1,300-feet level is still showing some quartz and low grade ore. The north drift on the same level shows no particular change. The face is still in clay and porphyry.

Best and Belcher.—The damages by the water have all been repaired, and work resumed in both the east crosscut and the face of the north drift in the Consolidated Virginia ground.

Chollar-Potosi.—Daily yield 120 tons of ore, the assay value of which is $32 per ton. Sinking the main incline, below the 1,600-feet level, is progressing at the rate of 2¼ feet per day. Sinking the combination shaft is also making good progress.

Sutro Tunnel.—Total length of tunnel, 14,970 feet. Material hard, tough-working porphyry, with occasional streaks of quartz, carrying considerable pyrites of iron which give good gold assays. No increase of water.—*Gold Hill News*, Nov. 15.

The Northern Belle is shipping to its mills 90 tons of ore per day of a grade ranging from $40 to $200 per ton. The mills have an aggregate capacity of 40 stamps, and the entire number are kept running night and day. Some samples taken from the 30 feet crosscut of the new strike in the 10th level gave an average assay of $104. The upper levels are not exhausted, but show a full breast of ore of fair quality. It is confidently stated that above the 7th level there is enough ore in sight to supply the mills for six months without further prospecting, and the appearance of the mine bears out the assertion. The ore has changed character with depth; and, as to the late discoveries, is a rich black sulphuret.—*Stock Report.*

The Raymond and Ely and Meadow Valley Mines.—In both these mines work is being carried on above the water-level, with a fair amount of ore being extracted. The pinions and center-wheel have arrived for the Raymond & Ely, but nothing will be done with them until work on the pump of the Meadow Valley mine is started, as it has been demonstrated that the pump of the Raymond & Ely mine is insufficient to drain the water of both mines without the assistance of the pump to be erected on the Meadow Valley shaft.—*Pioche Record*, Nov. 12.

Gas Stocks.

NEW YORK, FRIDAY EVENING, Nov. 24, 1876.

Gas stocks remain generally steady with a heavy decline in Mutual. In only a single instance do we learn of sales.

Mutual, New York, Gas Company.—The decline in the stock of this company is the feature of the week. Sales have been made as low as $97½ per share, which is a decline of $9 per share from our last. A slight improvement on the lower figure is noticeable at the close. The sales of this stock for the week will amount to nearly 1,000 shares.

The Chicago Gas Difficulty appears to be as far off from settlement as ever, the latest information on the subject showing that it is the intention of the corporation council on behalf of the city and the People's Gas Company to argue their respective claims before the courts.

Logansport, Ind., Gas Works.—We note the statement that these works have passed into private hands. The purchasers announce that they will take charge of the same on the 25th inst.

Tarrytown, N.Y., Gas Works.—These works exploded on the 19th inst., leaving the town in darkness. The loss is $15,000. Two men were badly injured.

Lighting Philadelphia.—The sum appropriated by the Common Council for lighting Philadelphia in 1877 amounts to $531 100.

San Francisco Gas Company.—This stock has materially advanced. We note recent sales aggregating 700 shares at from 108¼@110 ex-monthly dividend of ¾ per cent., which is equivalent to 9 per cent. per annum, and makes the market value of the stock equal to $11,000,000.

Foreign Gas Companies.—The gas companies the world over seem to be akin. We note the Thames (New Zealand) Gas Company have reduced the price of gas to 15/ per 1,000 cubic feet, in compliance with a memorial from 120 consumers, threatening to discontinue using gas unless a reduction was made.

The Paris, France, Gas and Fuel Company.—The revenue of this company for lighting and heating by gas amounted in the first eight months of 1876 to about $5,000,000, being an increase of 6½ per cent., as compared with the corresponding period of 1875.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Dividend	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.....	$5,000,000	$ 100	2½	Oct. '76	98	101
" " Bonds	90,000	1,000	3½	Aug. '76		109
NewYork, "	4,000,000		5	Nov. '76	135	136
Metropol. "	2,500,000	100	5	Sep. '76	140	145
" " Certf.	1,000,000	....	3½	" "	102½	104½
" " Bonds	500,000	1,000	3½	July "		102½
Harlem "	1,850,000	50	4	Aug. '76	103	106
Manhattan"	4,000,000	50	10	July "	238	—
Brooklyn, B'klyn.	2,000,000	25	5	Nov. '76	179	181½
Nassau "	1,000,000	25	4	Jan. '76	75	—
" " Certf.	700,000	1,000	3½	Nov. '76	95	—
People's "	1,000,000	10	3½	Jan. '76	50	55
" " Certf.	300,000	1,000	3½	July '76	88	90
" " Bds.	325,000	....	3½	Aug. "		95
Metropol. "	1,000,000	10	3½	Nov. '76	76	80
Wmsburgh "	1,000,000	50	3	Oct. '76	130	—
" " Certf.	1,000,000	....	3½	July "	101	102½
Citizen's " ...	1,200,000	20	2½	Jan. '76	97	100
" " Certf.	320,000	1,000	3½	Oct. "	98	100
† C. N.J.....	750,000	20	5	July,'75	110	—
Centl. Westch. N.Y.	465,000	50	4	July. "	90	—
Subur'n " "	390,000	50				90

† Gold.

COMPANIES OUT OF TOWN.

We are reported no change in the quotations of the out of town companies, which, in the absence of transactions, are nominal. Our issue of the 4th inst. contains the prices of these, as were generally prevailing on that date.