

ENGINEERING and MINING JOURNAL.

VOL. XXXII. No. 20.

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THE SCIENTIFIC PUBLISHING CO., Publishers,
P.O. Box 1833. 27 Park Place, New York.

CONTENTS.

EDITORIALS :	PAGE.		PAGE.
Mining Jobs in Arizona	317	A New Method of Manufacturing Superphosphate.....	324
The Southern Pacific Railroad.....	317	The Force of the Future.....	324
A Reform in Mining Enterprises in Spain.....	317	NOTES :	
The Mississippi River Improvement Convention.....	317	Manganese Ores in Russia	324
The Georgia Pacific Railroad.....	317	GENERAL MINING NEWS :	
The Smoke Nuisance in Cincinnati.....	317	ARIZONA.....	325
Prevention of Fire-Damp Explosions.....	317	CALIFORNIA.....	325
The Paris Exposition Reports.....	318	CANADA.....	325
The Harrisburg Meeting of the American Institute of Mining Engineers.....	319	COLORADO.....	325
The Embrey Ore-Concentrator.....	320	DAKOTA.....	326
The Classification and the Uses of Steel.—II.....	321	GEORGIA.....	326
Rare Minerals of Socorro Mountain, New Mexico.....	322	IDAHO.....	326
Progress in Steam Engineering.....	322	MICHIGAN.....	326
The Zinc Industry of the United States.....	323	MONTANA.....	326
Cement as a Lining for Headings in Mines.....	323	NEVADA.....	326
Petroleum Statistics.....	324	FINANCIAL :	
The Manufacture of Bessemer Steel and Steel Rails in the United States.....	324	Gold and Silver Stocks.....	327
PROGRESS IN SCIENCE AND THE ARTS :		Copper and Silver Stocks.....	328
An Analysis of Wulfenite.....	324	GAS STOCKS.....	328
Aluminium Plate for Volatilizing Substances in Blow-pipe Analysis.....	324	COAL STOCKS.....	328
Illuminating-Gas at Various Altitudes.....	324	BULLION MARKET.....	329
		Philadelphia Mining Stocks.....	329
		METALS.....	329
		IRON MARKET REVIEW.....	330
		COAL TRADE REVIEW.....	331
		FREIGHTS.....	
		STATISTICS OF COAL PRODUCTION.....	331
		Advertisers' Index.....	x

OUR correspondent, "BENDIGO," whose letter we print in our "MINING NEWS," throws some strong light on the Bradshaw, and on a job which goes under the name of "Rescued Total Wreck."

ACCORDING to a circular issued by Mr. C. P. HUNTINGTON, the Southern Pacific intends, in the absence of any good harbor along the coast of Texas, to make New Orleans the Gulf terminus of the road. From that city to San Antonio, the line is already completed, and the extension between San Antonio and El Paso, a distance of 578 miles, is now in process of construction, and it is expected will be completed in the summer of 1882.

THE NEW Spanish Minister of the Interior, CAMACHO, is reported to be contemplating a reform which will largely affect mining enterprises in the Peninsula, and may lead to increased shipments of ore to this country. He proposes to abolish the seven per cent export tax on ores, and intends to reduce the taxation of mine-owners, which has hitherto been double that of other property-owners. It seems to be dawning on the Spanish mind throughout the world generally, that it is good policy to encourage home industries, even though they may be under the control of foreign capital and under foreign management.

As it does annually, the Mississippi River Improvement Convention has again urged upon Congress and the people the necessity of appropriating funds for the improvement of the Father of Rivers. General GILLMORE,

who has charge of the operations now actually going on, favors the plan of reducing the width of the Mississippi between Cairo and New Orleans by protecting caving banks, and he states that out of the \$1,000,000 appropriated during the last session, an effective equipment had been ordered, and that active operations would be soon started upon the Plum Point reach, above Memphis, and the Lake Providence reach above Vicksburg, an aggregate length of seventy miles. These works will, it is expected, secure at least a low-water depth of 10 feet.

AMONG the many Southern enterprises which are directed toward the development of the mineral resources of that section of our country is that of building what is called the Georgia Pacific Railroad, under the control of the parties connected with the Richmond & Danville Railroad. The aim is ultimately to establish through transportation from the Pacific coast to the Southern Atlantic seaboard. At present, however, actual work is taken in hand nearer home, a contract having been let for a line from Atlanta west to Birmingham, Ala. The projected road will open out the rich mineral territory of Alabama, the iron deposits of which are described as being of exceptional magnitude. The road will pass through the heart of the Black Warrior and Little Warrior coal-fields and the Coosa River coal territory.

THE Cincinnati manufacturers are opposing all efforts to force a compulsory introduction of smoke-consuming apparatus with a steady obstinacy which can not ultimately be successful. The nuisance is one which has been growing more and more intolerable in our Western manufacturing cities, and public opinion is naturally strongly in favor of a prompt abatement. The Cincinnati manufacturers claim that the various devices tried have proved impracticable and unsuccessful, but we need not inquire whether or not they are right as far as the appliances they tried were concerned. Abroad, gas firing for steam boilers with a properly constructed furnace has not alone done away with smoke entirely, but has led to a considerable saving in fuel and maintenance of the boilers. In modern metallurgical plant, gas firing is largely adopted; and the sooner our manufacturers generally carefully inquire into this subject, the better it will be for them. Aside from questions of economy in fuel, they ought to know that it does not pay in the long run to oppose the just demands of the public. The authorities of the city do not show any disposition to rely upon the good sense of the manufacturers, but are taking active measures of coercion, and by a recent ordinance an inspector has been appointed whose duty it will be to see that the requirements for the abatement of smoke are carried out.

THE PREVENTION OF FIRE-DAMP EXPLOSIONS.

The prevention of accidents in mines, and notably those caused by fire-damp explosions, has been the subject of very exhaustive government inquiries, for which the general public has loudly and emphatically called after almost every disaster. The great loss of life, the many heart-rending incidents, and the air of mystery which seems to surround mining operations generally in the minds of most people, have led to very wrong notions as to the extent of such calamities. It has become the habit of many writers to rush into print after every such occurrence, denouncing managers and men generally, and appealing to the authorities to put a stop to such wholesale murder. Rarely, if ever, are suggestions offered; and when they are submitted, they clearly show the utter ignorance of these reformers and their entire indifference to interests of the greatest magnitude. It is not fully known how frequently this matter has been the subject of legislative enactments, and what a vast number of observations, scientific investigations, discussions, and experiments it has called forth within the last fifty years. There are now at work, or about to be organized, three commissions specially appointed to go over the whole ground: one in France, having almost completed its labors; while a second, in England, is approaching it; and a third, in Germany, is just about to begin its work.

The French commission, after a somewhat protracted series of consultations and studies, has finally drawn up what it has termed "principles to be consulted." These, we presume, are to serve ultimately as a basis for any recommendations it proposes to offer in framing a code of rules to be submitted for approval by the legislative and executive bodies of the country. This, the commission, it is true, disclaims for the present; but it is difficult to see how its members propose to lead any force to their recommendations unless they urge the adoption of some set of general rules, leaving possibly to the judgment of local inspectors an elaboration of details to suit every special case. It seems that it has submitted a preliminary draft of its "principles" to French mine-owners and operators for criticism; and as they are now framed they are probably a compromise between the views of the commission and those of colliery managers and proprietors. As such, they deserve attention even beyond the territory for which they possess special significance.

The commission urges that every mine must have at least two inde-

pendent outlets, so located that they can not be affected simultaneously by one accident; and for those collieries in which there is danger of sudden outbursts of gas, the necessary precaution must be taken above ground to guard against the danger that fire-damp issuing from any one of the outlets may ignite by coming into contact with any fire or lamp. All underground workings accessible to the miners must be swept by a regular and continuous current of air, its velocity and volume being great enough to dilute the gas and render it innocuous. When the ventilation is effected by means of a ventilator only, that apparatus must only be stopped when work in the colliery is suspended; and previous to such stoppage, means must be taken to obtain the certainty that no one is still in the mine, except, of course, those whom special duties retain in it. Any accidental stoppage must be immediately reported, and the ventilating apparatus must be run for a certain number of hours before resumption of work. Ventilating furnaces must be supplied by a current of air coming directly from the surface, and the communications between the furnace and the mine must be so planned that they are never disturbed by an explosion. The gases from the fire and the vitiated air from the mine ought not to come into contact except at such a distance from the furnace that any ignition is impossible. Workings definitively abandoned or temporarily suspended must not imperil those actively worked, and the different portions of the mine should be independent as far as ventilation is concerned, if practicable, and currents of air, after passing localities emitting fire-damp, should not be taken downward. Whenever circumstances imperatively demand such a course, special pains ought to be taken to watch the turning-point. The number of rooms in operation served by the same current of air must be so limited that when it leaves the last one it is still sufficiently pure; and when vitiated, the current ought to be conducted to the return current by the most direct course, and in such a way that it passes as little as possible through workings or headings in actual operation. Goaf or gob must be packed as closely and made as impenetrable as circumstances will allow, and the number of doors necessary for changing and dividing the air-current ought to be as few as possible, and all precautions be taken to insure their doing their work effectively. The French commission urges that every colliery possess apparatus to watch and control the ventilation, a special plan showing its distribution and course, and a special record of the regular observations. Only under particular circumstances is travel or work permitted in portions of the mine where the safety-lamp indicates the presence of fire-damp, and every colliery ought to have men part of whose duty it is to watch for dangerous gases; the work of these firemen being fully specified. Access to those parts of the mine where fire-damp is accumulating at a dangerous rate must be effectively cut off; and when such a part has been abandoned, special measures must be taken, either by filling up or by building a tight bulkhead.

The use of explosives must be restricted as far as practicable, and they should be permitted to be taken into the mine only in the form of cartridges, furnished by the managers, in well-closed boxes, to those only who are specially authorized to fire shots, the quantity not to exceed twenty-four hours' consumption; and when blasting is forbidden in any one part of the mine, the necessary tools should be removed. A careful examination of the adjoining workings ought to precede the firing of any shots, and, if possible, it should be under the direction of special workmen, who ought to be instructed to be particularly cautious about firing holes located in the upper parts of a working.

The precautions to be observed in the use of lights need be restricted only to those parts of a mine otherwise safe in which the presence of fire-damp has been observed. It is only in certain cases, to be noted farther on, that lamps like the Davy, in which fire-damp ignited in the interior is only protected against the action of currents of air by one or more metallic screens, should be used. Such lamps may be used in headings in which it is known that only such small quantities of gas can gather that the mixture can not at any time become explosive. They may, however, be given into the hands of firemen or bosses when their work requires it. The safety-lamp is furnished to the miner by the colliery operator, and is turned over to the miner in good condition, locked and lighted. When accepted by him, he is responsible for its good condition, and he must be fully instructed how to use it and how to preserve it from injury. He must return his lamp when he comes out of the pit, and it must be examined to note whether it has been opened. Lamps injured or extinguished during the work must be taken at once to a lighting station in the mine.

As far as the danger from propagation of explosions by dust is concerned, the French Commission recommends that the principal haulage-roads be kept constantly moistened, and that no shot be fired before the floor within the range of disturbance of the blast be wetted. Some general recommendations, such as the prohibition of making and carrying matches, the maintenance of life-saving apparatus, etc., are added.

Almost simultaneously the Royal Commission of Mining Accidents of Great Britain has issued a preliminary report, which, however, covers a larger range, including, as it does, a discussion of the best means of preventing accidents of all kinds in mines. Naturally the commission

has devoted much of its labors to the special field which we are discussing. It says that it is upon the issue of gas from coal-seams and associated strata that accurate information is most wanting, and that we possess little or no definite knowledge as to the condition in which the dangerous gas exists in the coal. While the quantity of gas regularly emitted from freshly-bared surfaces of coal is readily dealt with by existing measures, it is the occurrence of blowers or sudden outbursts that constitutes the greatest source of danger, while other causes, such as the irregular falling of the roof and the accumulations of gas due to insufficiency and temporary interruption of ventilation by the partial openness of goafs, call for constant care and watchfulness. While the majority of those submitting evidence state that, in their opinion, variations of atmospheric pressure exercise an effect upon the discharge of gas into the mines, opinions differ considerably as to when and how this takes place. Professor ABEL has extended Mr. GALLOWAY'S observations on the influence of coal-dust upon explosions of gas; but the only method to meet the danger incident to it, that of watering the roadways, has not proved unobjectionable in all cases, as the wetting of the floor in some instances has increased its tendency to upheaval.

In regard to the employment of safety-lamps, some engineers appear to have so much faith in the efficiency of ventilation that they urge the employment of open lights, arguing that the use of the latter makes the miners more cautious and the managers more careful in attending to ventilation. On the other hand, the inability of the latter to cope with sudden outbursts is justly pointed out. The Davy lamp still seems to have a strong hold upon many, and it is very largely recommended for use by the firemen. Both the Davy and the Clanny, which has many ardent supporters, are quite generally conceded to be dangerous in an explosive mixture when the velocity of the current exceeds six feet per second. As for the use of explosives in collieries, the great weight of evidence is to the effect that they can not be dispensed with, although the proposition to restrict blasting as much as possible, and to have it carried out only by special officials at special times and only in certain portions of the workings, meets with much favor.

On the whole, it will be seen that on the part of those who are supposed to supply the various governments with information and tender them advice there is now a greater disposition to take into consideration the interests of those engaged in getting coal. They are not as dogmatic as the members of similar commissions have been in former years, and there is every evidence that they are met by colliery proprietors, engineers, and miners without a spirit of opposition, and have often secured their good will and co-operation. The British commissioners, pointing to the proofs of improvement in the safety of mines, take occasion to say that this beneficial result is to be ascribed to the simultaneous action of legislation and of the spirit of inquiry and emulation of mine managers fostered by local scientific institutes. Such an acknowledgment is suggestive, and it is a source of regret to all those who have the best interests of mining and miners at heart that we do not in this country possess such institutions.

THE PARIS EXPOSITION REPORTS.*

The Reports of the U. S. Commissioners to Paris, though they bear the imprint 1880, have but recently been issued and distributed, in five octavo volumes. Hope is held out of a sixth volume, to contain the report of President BARNARD, Assistant Commissioner-General, "on the Exhibition at large, and the general results thereof;" but that gentleman has unfortunately been hindered thus far, if not entirely prevented from carrying out the proposed work, by ill-health. Those who remember the quality of his contributions to such literature hitherto will know how great a loss is involved in this failure.

The volumes before us command our attention in several ways. They are instructive as a history of the Exposition and of the representation of the United States therein; the reports of the different commissioners present, in different degrees of ability and thoroughness, surveys of many branches of industry and suggestions of value to those concerned; some of these reports, concerning particularly the professions represented by this journal, deserve our special consideration; and finally, the series is worthy of notice as a specimen of book-making. In all these respects, we propose to make such observations and reflections as the case seems to require, and our time and space will permit.

The administration of the American department reflects credit upon Commissioner-General MCCORMICK, but not upon the country. The shameful behavior of Congress in such matters is by this time well known. A churlish and stupid refusal to take part in international enterprises of this kind would be at least intelligible and consistent. But Congress never does that. It simply haggles and spouts and postpones, giving demagogues a chance to make cheap reputations as guardians of the treasury; and then, at the eleventh hour, it makes an inadequate ap-

* REPORTS OF THE UNITED STATES COMMISSIONERS TO THE PARIS UNIVERSAL EXPOSITION, 1878. Published under direction of the Secretary of State by Authority of Congress. Washington, 1880.

propriation, and loads it with conditions in the way of patronage for politicians. It gives too little too late; and it prevents, so far as may be, the efficient and economical use of that late little. Governor McCORMICK was not only hampered by lack of time and lack of money, but also overwhelmed by a crowd of ornamental appointees. There were, in addition to the Commissioner-General, and his necessary working staff, twenty Additional Commissioners appointed by the President, and paid to write reports; twenty-four Additional Honorary Commissioners, appointed by the President, without pay; seventy-six Honorary Commissioners, nominated by the governors of the States, and appointed by the President; and State Commissioners, appointed by the State authorities *ad libitum*, of whom fifty registered their names in Paris. Congress provided that all these commissioners should have the same status, though only one class was paid by the United States. Consequently, this country surpassed all others in the number of its official representatives. Governor McCORMICK says of the honorary "supers":

"Simply to receive them and their companions consumed much of my time and that of my clerks, which should have been given to the exhibitors and jurors. In scarcely an instance could they render any service; and realizing what an empty honor their appointment conferred, and how reluctant the authorities were to recognize them, their position was any thing but a pleasant one. Moreover, their coming was not without expense to the government; for while, under the resolution of Congress, they were not allowed pay or compensation, their presence necessitated certain increased expenditures in the way of office accommodations, stationery, etc.; and to obtain admission for them to the official entertainments was at times a difficult matter."

This picture of a throng of "distinguished citizens," sponging on the scanty funds of the Commission for envelopes and postage-stamps, and crowding for free tickets to shows, is not pleasant for patriots to contemplate. Still worse is the spectacle presented by the jurors. No money was provided to pay jurors (although this had been done, and with good results, at our Centennial Exposition). Consequently, the American members of juries were found with difficulty; and the Commissioner delicately puts one of the results as follows:

"Another serious objection to the non-payment of jurors is, that they are often led to seek recognition in a way which must, to a greater or less degree, influence their judgment, however conscientious they may be. For instance, giving as an excuse that they performed valuable and even delicate and tedious labor, at much personal inconvenience and at their own expense, more than half of the American jurors became active applicants, and, in several instances, earnest supplicants, for the decoration of the Legion of Honor."

The Commissioner in another place speaks of his "contempt for those Americans whose importunities for the red ribbon well-nigh distracted the Minister of Agriculture and Commerce and the Director of Foreign Sections, for several weeks." It is a comfort to be assured that in the score of American citizens who received the decoration, none of those who had been guilty of soliciting it was included. We would not now reopen this disgusting chapter but for the lesson to be drawn from it. For this display of dead-heads and toadies Congress is responsible. It is, however, not an argument against governmental participation in international exhibitions, but only against that kind of participation which politicians plan.

Under all these difficulties, the American Commissioner-General certainly accomplished marvels. Considering his time and means, he deserves much credit for the result; and the proportion of prizes awarded to American exhibitors speaks loudly for the enterprise and ingenuity of our citizens. Such merits deserved better of our government. We have no reason to be ashamed of any thing except the results of folly and vulgar demagogism at Washington. What Mr. STORY, in his report, says of the United States *façade* in the *Rue des Nations*, sums up the whole matter:

"The responsibility of this is not, however, to be thrown solely on the shoulders of the architect, nor indeed upon any of the Commissioners. * * * * The Commissioner-General and his subordinates were forced to have but one aim—to build cheaply and rapidly; to save time and money at any risk. We did save money; we did save time; but we lost credit. We went to a great international reception in our shirt-sleeves."

So much for the errors and shortcomings of the government in this affair. We might extend the list, quoting details from Vol. I. of the series before us; but this will suffice. We trust that an enlightened public sentiment will coerce the politicians, next time, into a wiser and purer procedure. But we can not be very sanguine, remembering how the plan of a World's Fair in New York, which started last year under good auspices, was utterly killed by the action of Congress, saddling upon the scheme a lot of managers named at Washington, and repelling from it the men of wealth and energy who would have made it successful.

We shall return to these Paris reports; and shall have pleasanter things to say about some of them, at least, than about the legislation which led to them.

THE HARRISBURG MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

As a contribution to the discussion of the methods for analyzing steel, Mr. F. A. Emmerton described those in use in the laboratory of the Joliet Steel Company. For carbon, the Eggertz test is used (dissolving one gram of steel), the color of the solution being compared with standard colors corresponding to every hundredth of a per cent, ranging from 0.16 to 0.44 per cent, the standards being made from a mixture of the solutions of burnt coffee and caramel in alcohol, diluted with its own

volume of water. Mr. Emmerton states that he finds that they do not vary more than 0.02 per cent in a month, and that they are renewed generally every three or four weeks, oftener in summer, and less frequently in winter. For silicon, Mr. Emmerton uses what is essentially Dr. Drown's method. The solution, however, is made at once in a mixture of one part of concentrated sulphuric acid and four parts of nitric acid of 1.2 specific gravity. Of this mixture, 20 c.c. suffice for dissolving one gram of steel. Determinations made in this way can be completed in forty-five minutes. For sulphur, he uses Elliot's method of conducting the sulphureted hydrogen formed by dissolving five grams of steel in hydrochloric acid through a solution of caustic soda, acidifying with hydrochloric acid, adding starch solution, and titrating with a standard solution of iodine, each cubic centimeter of which is equal to about 0.0005 sulphur. The iodine solution is made by dissolving 5 grams of iodine with the aid of 7 grams of iodide of potassium, and diluting to a liter. Its strength is found by titrating against a hyposulphite of soda solution, which is standardized with bichromate of potash solution. The hyposulphite solution does not show essential changes for months at least, and the iodine solution does not need to be tested oftener than once in three or four weeks. Mr. Emmerton states that he has compared this method with one described by Fresenius, which Fresenius says agrees perfectly with the acetate of lead method. It consists in passing the sulphureted hydrogen evolved by solution of the steel in hydrochloric acid through bromine solution, boiling off the bromine, evaporating the greater part of the hydrochloric acid, diluting and precipitating the sulphuric acid by chloride of barium. Mr. Emmerton insists, as did Dr. Dudley and others, during the discussion, that here, as in other methods, there is danger that some of the sulphur which remains behind in the residue during dissolving is lost. Mr. Emmerton estimates the time required for making a determination of sulphur by the Elliot method at from thirty to forty-five minutes. For phosphorus, Mr. Emmerton dissolves ten grams of steel in nitric acid, boils to dryness, redissolves in hydrochloric acid, dilutes with two or three volumes of water, and completely neutralizes with ammonia. The precipitated oxide of iron is dissolved in a slight excess of nitric acid, and about 80 c.c. of molybdate solution are added. After resting for four hours, the yellow precipitate is caught on a filter, washed, redissolved in ammonia, and precipitated with magnesia mixture. Mr. Emmerton redissolves and precipitates, weighing as clear white pyrophosphate, the whole method requiring from 24 to 30 hours. For manganese, Mr. Emmerton uses essentially Volhard's method: 1.2 grams of steel are dissolved in 25 c.c. of a mixture of one part sulphuric and four parts nitric acid, boiling down and heating two minutes while white fumes of sulphuric acid are given off, in order to destroy organic matter. Dissolve in water and add zinc oxide, specially prepared, suspended in water, shaking between every addition, until all the acid has been neutralized and all the iron precipitated. Cool, dilute, agitate thoroughly, and filter through a ribbed filter, and titrate with permanganate of potash solution standardized with iron. One drop of strong nitric acid must be added before titrating. The method requires about 45 minutes.

Mr. Benjamin B. Wright, of the Black Diamond Steel-Works, Pittsburg, estimates phosphorus by precipitating it as ammonium phosphomolybdate, in which the molybdic acid is volumetrically determined by permanganate of potash. From this the phosphorus is calculated by means of a ratio based on numerous analyses of the ammonium phosphomolybdate precipitate. Three grams or less of steel are dissolved in 30 c.c. nitric acid, boiled to dryness, and heated till no more fumes are given off, thus destroying organic matter. The dried mass is dissolved in hydrochloric acid, evaporated to small bulk by boiling, cooled, and then a strong solution of nitrate of ammonia added. Filter into a beaker, add water, and precipitate the solution heated to between 75 and 80 degrees C. by adding a nitric acid solution of molybdate of ammonia, keeping the solution at above temperature for an hour. Filter, wash with a six per cent solution of nitrate of ammonia, dissolve precipitate in dilute ammonia, add 50 c.c. of dilute sulphuric acid and from 5 to 10 grams of granulated zinc, boil hard for thirty minutes, to reduce molybdic acid completely, and titrate with permanganate of potash. Mr. Wright states that the precipitate of ammonium phosphomolybdate contains uniformly in phosphorus 1.54 per cent of the amount of molybdic acid. He gives details of the time required, which he puts at three hours twenty minutes, and he adds the following series of figures to show its accuracy:

Iron and steel.	Gravimetric.	Volumetric.
No. 1. B. B. W.	Per cent P.	Per cent P.
" 2. "	0.070	0.070
" 3. "	0.085	0.084
" 4. "	0.087	0.084
" 5. "	0.071	0.070
" 6. "	0.036	0.033
" 7. "	0.024	0.023
" 8. Assistant	0.125	0.125
" 9. "	0.087	0.083
" 10. "	0.032	0.031
" 11. "	0.163	0.152

Mr. J. B. Mackintosh, of Hoboken, N. J., determines carbon by combustion, dissolving two grams in concentrated chloride of copper, with an addition of enough ammonia to produce a permanent precipitate, and finally adding hydrochloric acid, and, if necessary, more copper solution, to dissolve precipitated copper. After filtering through asbestos and drying, the combustion is performed in a stream of oxygen, and the resulting carbonic acid is absorbed by soda-lime. For phosphorus, Mr. Mackintosh dissolves in a mixture of hydrochloric and nitric acids, boils, and expels nitric acid completely, evaporating to dryness. After redissolving in hydrochloric acid, iron is reduced to ferrous condition by passing sulphureted hydrogen through the solution, thereby separating also any arsenic present. After boiling to expel an excess of sulphureted hydrogen, and without filtering, a few cubic centimeters of permanganate solution are added, and then ammonia in quantity sufficient to precipitate all the ferric oxide, and with it all the phosphoric acid. After filtering as rapidly as possible, and without washing, the precipitate is dissolved in hydrochloric acid; and after filtering out the sulphur, nitric acid is added to peroxidize the iron. Precipitate with ammonia, filter, wash once, and dissolve in nitric acid, concentrate to 50 c.c. and blow into it forcibly from a pipette the solution of molybdate of ammonia, which has a strength sufficient to precipitate about 0.02 gram of phosphorus per 10 c.c. Heat, an

add ammonia gradually until yellow precipitate forms. If iron is present, redissolve. After thoroughly washing the precipitate with a solution of nitrate of ammonia, dissolve in ammonia and add magnesia mixture.

Mr. J. W. Cabot considers the Eggertz color test for carbon satisfactory if certain precautions are taken. Two sources of error are, a loss of color when the solution of the steel is allowed to become too hot, and the formation of an oxide soluble with difficulty. To avoid these sources of error, he pours the steel borings into the acid instead of the acid into the steel, so that there is always a large amount of acid for a small quantity of steel, the dissolving vessel being kept cool in water. He says that it does not seem to be of importance whether the final dissolving is done at 90 or 100 degrees, provided the time is varied comparatively; the higher the heat used, the less time being allowed. Mr. Cabot gives his method for the estimation of manganese in some detail, it being the acetate of soda and bromine process.

Mr. F. P. Dewey uses the Eggertz method for the estimation of carbon; but he states that he is not favorably impressed with its accuracy, owing to occasional anomalous results and the lack of agreement in the figures obtained by different chemists working on the same sample. He expresses his conviction that the accuracy claimed for it has been over-estimated, and that its proper function is to control at the works. When close results are required, he dissolves in chloride of copper and ammonium, determining the carbon by the combustion method. For phosphorus, he uses for the control of works the following method: Dissolve in nitric acid with slight addition of hydrochloric acid, evaporate to dryness, dry and heat residue $1\frac{1}{2}$ hours to 120 to 130 degrees. Dissolve residue in nitric acid, by warming gently for 15 or 20 minutes, evaporate to consistency of thick sirup, dilute and filter. To the filtrate add a sufficient amount of nitric acid solution of molybdic acid, agitate from time to time during two or three hours, filter and weigh, using the Gooch filtering crucible, the employment of which, we may add, was strongly indorsed during the discussion by Dr. Dudley and others. A second method allows the molybdic precipitate longer to separate, and the fluid is kept warmer. After filtering, the precipitate is dissolved in ammonia and the phosphorus is precipitated by magnesia mixture ammonia. Mr. Dewey proposes to adopt Dr. Drown's method for the estimation of silicon. His method for manganese has already been printed in the Transactions. For sulphur, he has two methods, a rapid and a slow one. In the former, 5 grams of steel are dissolved in hydrochloric acid, and the gas passed through an ammoniacal solution of sulphate of cadmia. The sulphide of cadmium precipitated is filtered off in counterpoised filters, washed first with ammonia water and then with water, dried at 100 degrees, and weighed. It is not a rigidly exact method, but yields fair results in from two to three hours. For accurate work, Mr. Dewey uses Dr. Drown's method.

Mr. Jed Hotchkiss, of Staunton, Va., then communicated the substance of a paper on the Great Flat Top Coal-Field of West Virginia, which he claimed showed in openings extending over a considerable area at least from 30 to 40 feet of coal. Mr. Hotchkiss went at some length into the topography of the region and the pending establishment of branch railroads into it. He gave some analyses of the coal, the purity of which appeared to startle the majority of those present. Dr. H. M. Chance, of the Geological Survey of Pennsylvania, based upon his experience with coals of that geological horizon to which those of the new district belong, expressed some doubts as to the veins proving continuous and persistent, and some discussion followed as to the nomenclature of the coal measures in different parts of the country.

FOURTH SESSION.

The fourth session, on Friday morning, October 28th, was opened by the reading of a paper on Test Supports, by Mr. W. P. Blake, of the Pennsylvania Lead-Works, at Mansfield Valley, near Pittsburg. As we propose at a future time to present this paper in full, with illustrations, we need only state now that though simple, the improvement has considerable merit, which will commend it to cupellers of silver-lead.

Mr. Julian Kennedy, who is well known as manager of the blast-furnaces of the Edgar Thomson Steel Company, then read a paper on an Improvement in Fire-Brick Stoves, an important modification in details of the Siemens-Cowper-Cochrane stoves, introduced at the new plant of the Edgar Thomson Steel-Works. It was found that some hitches would occasionally occur in the working of the stoves of the old pattern, which did not fully do the work which it was sometimes necessary that they should perform. It is necessary in this connection to note, as Mr. Hartman, of Philadelphia, stated during the discussion, that the old Siemens fire-brick stoves at the Edgar Thomson Works were designed to heat a maximum of 20,000 cubic feet of blast per minute, while they are actually taxed at the rate of 30,000 feet. Their occasional failure to meet all demands is not therefore chargeable to the stoves. In looking for means to increase the efficiency of such a plant, Mr. Kennedy soon recognized that no improvement could be expected in the direction of reducing the temperature of the gases escaping into the stack, it being only 320 to 400 as a maximum. In the old style, however, much trouble was found in cleaning the stove properly, a trouble due to the shape of the openings in the stove, the main channels through which the gases flow, they now being four inches square. In the corners of these flues the dust accumulates, and the cleaning chains do not touch it. Other drawbacks of the old style are, the expense and the loss in time of building in the checkerwork dry, and the failure of the corners to come true over each other; while the openings, to permit the most effective work in heating the blast, ought to be true and straight. Aside from the loss of heating surface, the presence of accumulated dust causes a partial stoppage of the flow of gases through the stove, and thus impairs its efficiency. Mr. Kennedy has replaced the checkerwork by hexagonal bricks, 10 inches in thickness, through the center of which passes a 6-inch hole. Though the bricks cost \$2 per 1000 more than ordinary 9-inch brick, they are cheaper, because there is less labor in putting them in; and though the heating surface is theoretically somewhat smaller, the smoothness and accuracy of the work will permit the passage of more air through the stove. As they are now building, cast-iron in their construction has been abandoned, and there is only one pass up and one pass down, the average velocity of the gases being estimated at 300 feet per minute. Mr. Kennedy made some very interesting remarks on experimenting with the

draught of the stoves; and, as one occasional trouble experienced in the old plant, spoke of the so-called "gray gas," which will neither burn in the stoves nor under the boilers, and ignites only in the upper part of the combustion-chamber, especially during fast driving, thus leading to losses. In the new plant, this tendency has been counteracted. The boiler-flue is run into the same chimney as the stove-flue, a baffling of the currents being avoided by running a wall up between them for a certain distance. In this way, a higher temperature in the chimney (235 feet high) will be reached, and it is expected that the draught will amount to $1\frac{1}{2}$ -inch water column. Mr. Kennedy concluded his paper with some very interesting remarks on errors in reasoning from observations of draught in various portions of fire-brick stoves upon the friction in them.

The session was concluded by an *exposé* by Gen. J. F. Hall on the Timly system of coast defense.

Soon after closing of the session, the members took a train and were taken to the Colebrook furnaces, a new plant erected by R. H. Coleman. There is not in this country, nor is it likely that there is anywhere else, a blast-furnace plant upon which money has been so lavishly expended, the design of the builders having evidently been to secure the best and the most substantial at almost any cost. The stock and casting-house is of cut stone, and the engine-house is faced inside and outside with pressed brick. The trestle-work is of wrought-iron. At present there are six roasting-furnaces of the ordinary English type, one stack with three fire-brick hot-blast stoves and pneumatic hoist, and one vertical blowing-engine. The foundations for stoves, stack, casting-house, chimney, etc., of the second one are completed, and building has commenced. The furnace was ready to be blown in when it was visited, and it remains to be seen whether its performances will come up to the expectations of its builders. Until it has proved by its work that it is what it pretends to be—a model plant—it can only lay claim to the cognomen given to it by an experienced furnace-man present, "a dandy furnace."

After a long sojourn at the Colebrook furnaces, the party was taken to Lebanon, where an excellent lunch was provided by the courtesy of the Cornwall Ore-Bank Company. The Cornwall ore-banks, the most famous of Pennsylvania's ore-deposits, were then visited. Prof. T. Sterry Hunt has given so full a description of these in Vol. IV., page 319, of the Transactions of the Institute, that we need not refer to them in detail here. Suffice it to say that on the Big Hill the more thoroughly weathered portions of the ore, which ran comparatively low in sulphur, have now been almost entirely removed, and the bulk of the ore now mined is very high in sulphur. The question of a more thorough and rational mode of roasting than that practiced at present in simple circular kilns will soon become a very urgent one, and is that which deserves the fullest attention. We may add that Mr. Andrew S. McCreath, chemist of the Survey, contemplates, we understand, making analyses of a full series of samples of Cornwall ore. Earlier analyses by Mr. Genth yielded as low as 0.045 and as high as 4.55 per cent of sulphur. The production of the banks during the last year was over 280,000 tons.

After a brief visit to the Bird-Coleman furnace, near the ore-banks, and to the Memorial Church at Lebanon, the members and their friends returned to Harrisburg.

In the evening, an extra session was held for the reading of a very valuable paper by Mr. F. Witherbee, of Port Henry, N. Y., on the Use of High Explosives in the Blast-Furnace, a communication to which we shall refer at greater length at a future time. Later, over two hundred ladies and gentlemen sat down to an elegant banquet tendered to the Institute by the Pennsylvania Steel Company, thus worthily closing the memorable Harrisburg meeting.

THE EMBREY ORE CONCENTRATOR.

The growing demand for concentrating machinery has led to efforts to improve upon existing devices. Among those of recent date is the Embrey concentrator, which deserves attention on account of some novel features, which, as far as it is possible to judge from an examination of mechanical details only, promise to be of value. So far as we have been able to learn, the machine which we illustrate has been used on an experimental scale at the Rappahannock mine, in Virginia, and a second one is now in operation at the Semi-Centennial Exhibition of the American Institute in this city. The apparatus consists of a four-foot belt with a half-inch rim, which is passed over four rollers, of which the two upper end rollers are 6 inches in diameter, while the lower two are 12 inches in diameter. Between the two lower ones is a third, of the same dimensions, which acts as a tightener of the belt, being vertically adjustable. The forward lower roller is rotated by a mechanism to be explained hereafter, the belt being thus driven at a rate of speed varying according to circumstances from 4 to 10 feet per minute, the direction of the movement being such that the belt on the upper table travels toward the front of the machine. The upper table upon which the dressing is done is 11 feet long, while the total length of the belt is 27 feet. The upper end rollers are attached to a frame, which is suspended by iron rods hanging in the four corners of the wooden frame-work. This table frame is given an oscillating movement by two eccentrics on the eccentric shaft mounted in front of the machine and driven by a belt from the line shafting of the mill. It will be seen, therefore, that the upper table has a longitudinal forward and backward motion, these endwise oscillations, of which from 180 to 200 are made per minute, being a characteristic of the machine. The belt on the table is supported by small rollers placed one foot apart.

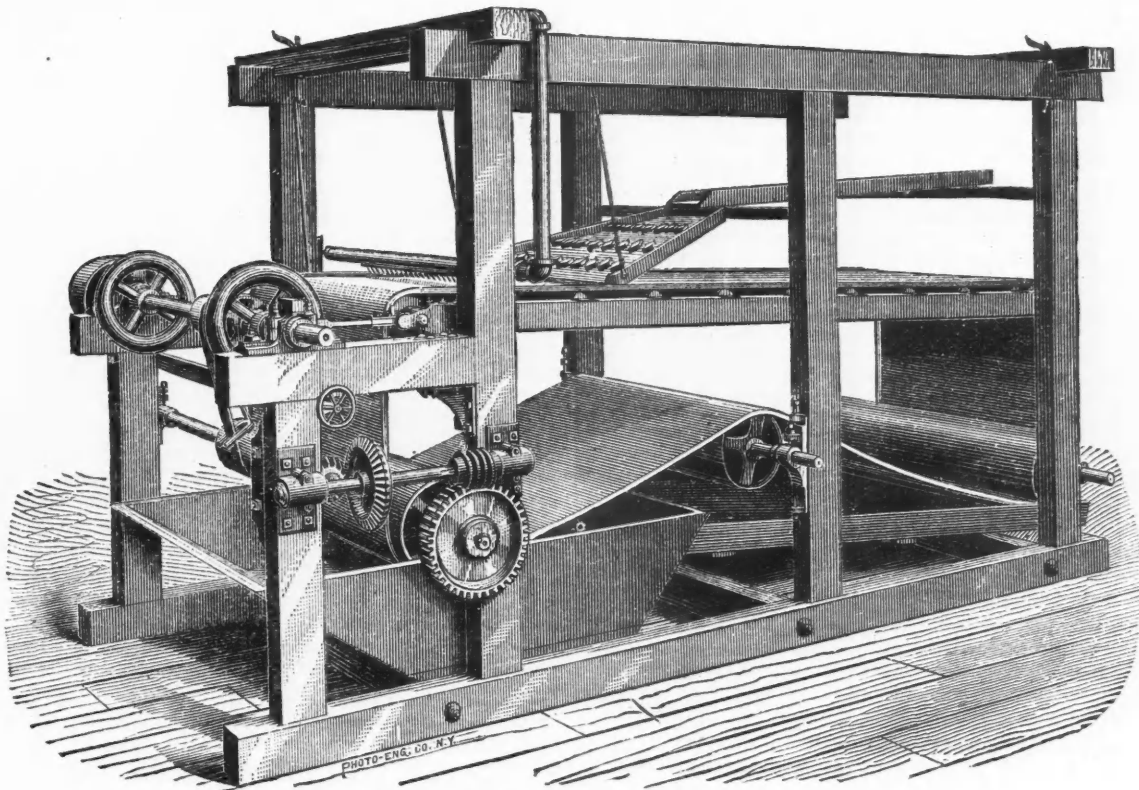
The material to be dressed coming through the flume, shown in the drawing, passes over the stationary distributor and flows upon the table; there the longitudinal oscillations give the various minerals a chance to separate, the lighter being carried down the table, while the heavier particles are slowly carried forward to the front of the machine. A foot from the lower end of the stationary distributor they must pass under an oscillating spray-washer, which is a characteristic feature of the Embrey concentrator, and the function of which is to perfect the cleansing of a product already much enriched. It consists simply of a pipe furnished with a number of nozzles placed $1\frac{3}{4}$ inches apart, the travel of the oscillation being $\frac{1}{2}$ inch. After passing this second washer, the cleaned concentrates are carried over the front by the belt, and are taken down

into a box filled with water, where they are washed off by dipping into it. Should this not prove sufficient, sprays are provided on the under side of the belt, between the driven roller and the tightener.

Mr. J. J. Embrey's principal aim in working out the details of his apparatus appears to have been to adapt it to a variety of ores by making the various parts adjustable within certain limits, so that by varying their work, their part may be properly performed. The speed of the belt is varied by shifting the belt on the cone-pulleys mounted on the eccentric shaft below it, through which motion is transmitted by the gearing and worm-wheel shown in the engraving. The inclination of the table toward the back, which is ordinarily about $\frac{1}{4}$ inch to the foot, can be increased or decreased as circumstances may demand, by raising or lowering the hangers of the table frame at the back end. The quantity of water poured on the table through the oscillating washer, too, may be varied. Of course, it is possible to speak only in a general way of the proper adjustment of the work of the various devices contributing to the concentration; but we may state that, for instance, with low-grade ores a slow speed of the belt and a little water from the oscillating washer would probably do the best work.

steel in which carbon is the hardener is more compact than the product of the open hearth of the same grade. In producing phosphoric steel, such as that on which Terre-Noire has made such famous experiments, the operation is carried on until about 0.2 of carbon is reached, and rich ferro-manganese is then added, in order to keep the carbon in the final product as low as possible. M. Deshayes prints a table summarizing the experiments above referred to, and which, having never been published in this country, to our knowledge, we shall reproduce at an early date.

Practice in the various countries in relation to rolling and hammering the metal belonging to the third class varies considerably in Europe. For rails, the ratio of section of ingot to section of finished article is 1 to 19 at Reschitz, while it is less at Anina. For springs, the reduction at the former place is from 11 to 1, while in the French works of the Loire basin it ranges from 6 to 1 to 5 to 1. For tires, for which steel of this class is used, the process of manufacture is a subject of some controversy among producers as well as consumers. Some prefer the use of annular ingots, while others hold that it is better to use ingots of large diameter, which are afterward cut and pierced. The former method is used in England and Sweden, and we may



THE EMBREY ORE-CONCENTRATOR.

THE CLASSIFICATION AND THE USES OF STEEL.—II.*

III. *Ordinary Mild Steel* (tensile strength greater than 70,000 and less than 85,000 pounds).—The greatest variety of metal is embraced in this class, in which many kinds of soft crucible and puddled steel may be included. M. Deshayes deals, however, chiefly with the metal produced by modern processes, the chemical composition of which may vary within wide limits. Metal having a tenacity of from 70,000 to 85,000 pounds per square inch may be obtained by keeping manganese, silicon, sulphur, and phosphorus as low as possible and bringing carbon to about 0.5 or 0.7. By introducing 0.5 per cent of manganese, a tenacity of 70,000 pounds may be reached, with 0.3 carbon; 85,000 pounds, with from 0.5 to 0.6 carbon; and an average of 77,000 pounds, with 0.5 of manganese and from 0.45 to 0.48 of carbon. By running the manganese up to 0.8 or 1.0, and keeping the carbon near or a little lower than 0.3, steel is obtained which is remarkable for its elasticity, having an elongation of 20 to 25 per cent, and much resistance to shocks. On the other hand, by holding manganese at 0.6 to 0.8 and carbon near 0.3, and bringing in 0.25, 0.3 to 0.4 of phosphorus, a metal is reached ranging in tenacity from 77,000 to 85,000 pounds and in elongation from 20 to 25 per cent. Steel of this class is easily and regularly made by the Bessemer and the open-hearth processes, which are most widely employed for the purpose. The metal is perhaps modified in its quality most readily by annealing or hardening. M. Deshayes does not speak with much approbation of the method of producing this steel by direct blowing of manganese pig in the Bessemer process, holding that the product is apt to be irregular. He recommends blowing until 0.2 or 0.15 of carbon is reached, and adding low spiegel, if carbon steel is to be made, or 30, 40, or 60 per cent ferro-manganese if manganese steel is to be produced, the quantities of either when chosen being, of course, dependent, both in the Bessemer converter and the open-hearth furnace, upon the circumstances of each special case. It has been noticed that when very pure raw materials are employed and the carbon is equal, the metal made in the converter has a greater tenacity than that obtained by melting in the open hearth. This, in M. Deshayes's estimation, is due to the greater fluidity of the former metal, and tends to prove that the Bessemer

add in this country, while for the latter Reschitz furnishes an example. There a start is made with 15.6-inch square ingots, which are worked into 9.36-inch round by a 17-ton hammer. Each ingot is then cut into three pieces 15.6 inches long, which are hammered flat into disks 5.88 inches thick, which are pierced in the center. An annular body similar to that obtained elsewhere by direct casting is thus reached, which is further worked by a 6-ton hammer until ready for the final rolling in a horizontal mill. The relation of initial to final section is 8.5 to 1.

Steel of this third class is employed for guns, rifles, bayonets, swords, etc., and for railroad materials of different kinds. Thus it is used for springs by Sersing, Angleur, Bochum, and Reschitz, while Terre-Noire recommends particularly steel containing manganese, alluded to above. M. Deshayes adds a table of the requirements of the various railroads, and we may say that similar compilations for tires and rails are also given. Some of the Austrian works, and occasionally Angleur and Seraing, use steel which might be classified here for rails. The Terre-Noire phosphorus steel finds some application in this field, and Bochum turns out steel sleepers having the following composition: Manganese, 0.640; carbon, 0.224; silicon, traces; and phosphorus, 0.295. The metal which properly belongs to this class is also quite largely used in Europe for various parts of machinery, engines, and a large variety of other purposes. We may give in conclusion the chemical analyses and corresponding mechanical tests of a few samples of steel:

	Mang.	Carb.	Sil.	Sul.	Phos.	Tens. str.	Elast. limit.	Elongat.
Terre Noire, Open H.	0.521	0.450	tr.	tr.	0.067	73,586	39,329	22.06
" " " "	0.746	0.310	tr.	tr.	0.247	80,592	48,388	22.66
" " " "	0.800	0.274	tr.	tr.	0.273	80,109	50,125	21.55
T. N. "solid steel"	0.670	0.459	0.221	tr.	0.078	79,299	41,819	14.50
Reschitz, O. H.	0.562	.....	.....	.....	.....	75,572	25,205	25.80
Bess.	0.235	.....	.....	.....	.....	75,316	29,870	21.25

IV. *Hard Steel* (tensile strength higher than 85,000, but less than 100,000 pounds).—With the exception of crucible steel, metal belonging to this class is rarely obtained without manganese. The mechanical properties above alluded to correspond to 0.65 to 0.80 carbon where little manganese is present; but as soon as the proportion of manganese approaches 0.5 per cent, the carbon must be reduced to 0.5 or 0.6. The manufacture of these grades may be considered the base of the present metallurgical industry; and while the great mass is made by the Bessemer process, the open-hearth furnaces tend to take a growing portion. It

* *Classement et Emploi des Aciers*. By VICTOR DESHAYES, Engineer at the Terre-Noire Steel-Works. Published by Dunod, Paris, France, 1880.

may be said as a general thing that it is produced in three ways. In the Bessemer converter, generally, pure pig is completely decarbonized, and low spiegel-eisen, running from 10, 15, or even 18 per cent of manganese, is added. Instead of decarbonizing by blowing, many European mills add scrap, crop ends, etc., and finish with spiegel-eisen, if the raw materials are pure, or with ferro-manganese, increasing in manganese as the impurities in pig or scrap are larger. A third method is the pig and ore process in the open-hearth furnace, the product of which has not generally, however, been able to come up to the requirements of Lloyd's in England. In these steels, the series high in phosphorus shows some remarkable figures, having a tensile strength of 85,000 pounds, with an elongation of 26 per cent. They are, however, weak as regards their resistance to shocks, and they harden to some extent and retain considerable ductility. It would, however, be erroneous to infer that phosphorus prevents hardening. Those grades of steel which are higher in manganese are more valuable practically, as they possess greater tenacity than met-1 in which carbon predominates. All of the various kinds will harden well in oil, their tensile strength being, in some cases, carried up to 142,000 pounds.

The chief use for steel of this class is for rails of medium hardness, as generally demanded by French and other roads. It is employed also for tires, springs, and many tools requiring softer metal.

V. *Very Hard Steel* (tensile strength greater than 100,000, but less than 115,000 pounds).—Steel in which carbon is the only hardener is very rarely manufactured except by the crucible process. The percentage of carbon corresponding to the tensile strength above given ranges from 0.8 to 1.0, traces only of manganese being present. Generally, however, the proportion is as low as 0.7 or 0.8 for metal containing up to 0.5 per cent of manganese, and goes as low as 0.6 for steel hardened by manganese chiefly, the percentage of that constituent running as high as 1 per cent, and there are cases where the carbon is 0.5 and the manganese 1.5. The various grades of metal belonging to this class are manufactured either in the Bessemer converter, the open-hearth furnace, or the crucible, and M. Deshayes adds that there is a tendency in Europe to supersede the former by the two latter. In the converter, this hard steel is obtained with pure raw material by complete decarbonization and the addition of 10 to 12 per cent of spiegel holding 8 to 10 per cent of manganese and 3 to 5 per cent of carbon, in order to obtain hardness by the presence of the latter without adding an excess of manganese. For hard rail steels, a richer spiegel, containing 15 to 20 per cent of manganese, is recommended. In Austria, the process is controlled by observations of the color of the cinder, the characteristics of which have been closely described by Mr. A. L. Holley in his paper on the manufacture of solid steel castings at Terre-Noire. Spiegel largely enters into this grade of steel also. It has been shown that solid steel can be produced on a large scale in the open-hearth furnace, and M. Deshayes thinks that, as regards purity and compactness, there is much promise that it will replace crucible steel. The ingots into which metal belonging to the fifth class is cast are generally small in view of the uses to which they are to be put. It is only when they are to be employed for extra hard steel rails, such as those demanded by the Brazilian government, that larger ingots are cast. The hammering of these grades of steel must be proceeded with under great precautions as regards temperature, especially if the metal is low in manganese, silicon, and phosphorus. It is necessary to heat up carefully and thoroughly, and to hammer rapidly at a low cherry heat rather than to do it slowly at a more elevated temperature. This generally necessitates a final annealing, to restore the steel. Conflicting statements are made as to the welding properties of these steels: this much, however, is certain, that welding is very difficult, and can only be done by skillful hands. Steel belonging to this class is occasionally used for rails, and is often employed for railroad crossings, frogs, etc. The Bochum works make cast-steel wheels, holding 0.56 manganese, 0.93 carbon, and 0.435 silicon, and the Terre-Noire works use a similar metal for small wheels for the cars used for transportation in various industrial establishments. Bessemer, open-hearth, and crucible steel having a tensile strength ranging within the limits above given is widely used for car and locomotive springs, and the best grades of the famous Terre-Noire solid steel are used for projectiles and parts of machinery. M. Deshayes gives a series of analyses of steel for the manufacture of wire, and then closes the chapter with quite an elaborate discussion of the different grades for various tools.

VI. *Extra Hard Steel* (tensile strength higher than 115,000 pounds).—In steel of this class, carbon is generally the hardener, ranging from 1 to 1.5 per cent, though 1.25 per cent appears to represent the point at which the greatest hardening by tempering is attained. Manganese, tungsten, and chromium may, however, act in the same manner as carbon. Though possessing so high a tensile strength, these grades of steel generally show considerable elongation and contraction of area—a fact due, without doubt, to their great homogeneity. When they contain carbon alone, that constituent should not fall below 1 per cent; even when holding from 0.5 to 2 per cent of manganese, carbon must not be lower than 0.5; and when carrying 1 per cent of tungsten or chromium, they are difficult to produce unless they contain a quantity of carbon or manganese approaching 0.5 per cent. M. Deshayes states that at Terre-Noire they obtained a large quantity of chrome steel with 0.7 manganese, 0.45 carbon, and 0.7 chrome, which had a high tensile strength and an elongation of 10 per cent. Steel belonging to this class is rarely made by the Bessemer process, more frequently in the open-hearth furnace, but in most cases in the crucible. The dimensions of the ingots cast are generally small. M. Deshayes takes occasion in this connection to state that bars of great length manufactured by the crucible steel process are often very irregular in quality, in some cases to such an extent that repeated tempering will not remove the difficulty, and he adds that the progress of recent years in obtaining large masses in the open hearth will at an early date permit the product of the latter to supersede that of the crucible, because greater regularity can be obtained. While there is much that is forcible in his position, we can not help believing that his partiality has led him to underrate the recent progress in the manufacture of crucible steel, which, notably in this country, has obtained and deserves great popularity. M. Deshayes gives a series of recipes for tempering various grades for a number of purposes.

We believe that we have given a sufficiently detailed account to afford some conception of the value of M. Deshayes's work. In his

general conclusion, in which he gives a summary, he prints the following formula, in which R is the tensile strength in kilograms per square millimeter:

$$R = (30 + 18C + 36C_2) + 1.80Mn + 1.50P + 1.00Si.$$

Throughout his work M. Deshayes naturally refers frequently to what has been accomplished at Terre-Noire; and an occasional claim for the excellence of the products of those famous works will be readily pardoned, as it is always based upon elaborate chemical and mechanical investigations.

RARE MINERALS OF SOCORRO MOUNTAIN, NEW MEXICO.

Special Correspondence of the Engineering and Mining Journal.

The ores from the mines of the Socorro Mountain are of special interest to the collector of the rare minerals of lead. William M. Courtis, M.E., General Manager of the Torrence mine, has detected the following minerals, composed mostly of vanadate of lead with zinc, copper, and manganese: Descloizite, vanadinite, dechenite. Wulfenite is also found in some of the veins. The new tunnel on the Merritt mine produces the finest specimens of the first three. The crystals, though small, are abundant.

As a general rule, the silver does not follow the lead ores, which rarely assay over 20 ounces, but occurs as argentite or embolite in small particles through the barite gangue, associated with chalcocite or the carbonates. The richest ore, assaying from 500 to 1000 ounces, is a black undetermined mixture of silver, zinc, and copper, with a very little lead. While that part of the ore rich in silver carries hardly a trace of gold, when the barite gangue is replaced by iron oxides, assaying from 5 to 20 ounces silver, gold becomes quite prominent, from a trace to \$20. The economic value of these deposits will soon be established by the completion of the Torrence mill. EZUEST.

PROGRESS IN STEAM ENGINEERING.

From Prof. Robert H. Thurston's annual address as President of the American Society of Mechanical Engineers, an address which is full of valuable information and suggestions, we take the following remarks on progress in steam engineering:

The efficiency of the late styles of stationary engines is illustrated by figures like these: Corliss obtains a duty, as reckoned from figures recorded by his assistant at a recent 12-hour trial of his last Providence pumping-engine, of 113,878,580, without reduction or allowances, and the average of several days' trial is 112,900,000. Leavitt gives me data showing a duty for months together of about 105,000,000, and obtains a horsepower with an expenditure of 16½ pounds of feed-water per hour at Lynn and 16.23 at Lawrence. His Calumet engine, with wet steam and but 200 feet piston speed, demands but 18 pounds, and the Hecla hoisting-engine is credited with the wonderfully low figure of 16 pounds. This, by the way, is the more remarkable from the fact that the jackets were disconnected. We thus sometimes meet with hints, apparently, that we may do better work with an underheated than with an overheated cylinder jacket. The performance of the Westside pumping-engines at Chicago, giving a duty of nearly 100,000,000 with lower heads only jacketed, is similarly significant.

This figure—16 pounds of steam per hour and per horse-power—may be put on record as the very best economy attained by our best engineers at the end of the decade 1870-1880. It is just double the weight which would be required in a perfect engine working steam of the same pressure at maximum efficiency. This leaves us still a fair margin for further advance in the construction of the engine. The steam boiler is at a stand-still; there is but little margin for gain in economy; but a large gain in weight of steam supplied per pound of boiler may be expected when the tardily recognized advantage of forced circulation is secured.

Air and gas-engines are here competing with stationary steam-engines, and, so far as I can see, in no other field. The compressed air-engine, the petroleum-engine, and the gas-engine are all just now coming forward. I have no figures that I can rely upon except for the gas-engine, which sometimes consumes as little as 18 cubic feet of gas per hour per horse-power.

The solar motor proposed by Ericsson, the inevitably coming motor of some far-distant epoch, has, as yet, made no progress beyond the plans and experiments of the inventor.

The purely commercial aspects of steam-engine economy, familiar as they have long been to builders of expensive engines, and to the more intelligent buyers, have barely attracted the attention of engineers generally, and have, as yet, apparently been entirely overlooked by all having a scientific standing, with, I think, the solitary exception of that greatest of modern scientific engineers, Rankine. A year ago, in debate, I called attention to the fact that economy in fuel was but one among the many items of expense incurred in the operation of steam machinery, and that it formed by no means the greatest part of such expense in certain cases. The inference at once followed that commercial economy, affected as it is by all these items, must be studied with reference, not to cost of fuel simply, but with a view to making total expense a minimum. Rankine called attention to this obvious conclusion many years ago, and a paper presented by two of our colleagues at the May meeting in Hartford, extending Rankine's work, and applying his approximately exact method to modern engines, showed that commercial efficiency is often made a maximum with very much smaller engines and lower rates of expansion than are found to give maximum economy of fuel. Such methods of determining size of engine will probably be generally adopted by engineers seeking the best interests of their clients. We are not, it is evident, to conclude, from the results of the application of the Rankine method of determining size of engine and maximum commercial efficiency, that we are always to lose so large a proportion of the gain obtainable by further expansion of steam. We conclude, rather, that the engineer must direct his attention to improvements designed to reduce these counteracting wastes. He must find methods of rendering the machine, including boiler, automatic, and thus of reducing cost of attendance; he must find ways of reducing first cost, as by increasing speed and making smaller

engines do the work; as by finding ways of building cheaply, yet doing good work, and of making lubrication less costly, or of doing away with it altogether. Automatic firing or "stoking" automatic feeds, and automatic cleaning apparatus, are already in use, as well as automatic regulation of the engine, of steam pressure, of point of cut-off, and of chimney draughts. The "compound" engine has become the standard type of steam-engine in use on shipboard as well as for stationary pumping-engines. The direction and extent of recent advances in marine architecture are readily noted. The proportions of length of ship to breadth remain, as during several years past, about 10 to 1 or 11 to 1, about 50 per cent greater than has been considered by some of the best engineers as that giving highest efficiency. The Great Eastern, 680 feet long, of 83 feet beam, and measuring 25,000 tons displacement, still remains the largest ship built; but steamers are under construction for transatlantic lines 600 feet long, of over 50 feet beam, and fitted with engines of 10,000 indicated horse-power. A speed of twenty miles an hour in good weather throughout the voyage, making the distance from land to land in less than a week, may be expected soon to become usual. Double hulls and transverse bulkheads will make these great vessels safe even against the shock of collision with an iceberg.

Steam pressure has gradually and steadily risen since the time of Watt, when 7 pounds was usual. To-day 75 pounds per square inch is usual, and 90 pounds is often adopted. Such pressures have compelled the general introduction of the simplest form of steam boiler; the cylindrical tubular boiler with large flues beneath the tubes, in which the furnaces are formed. During the past ten years, steam pressure has risen from 50 to 75 pounds by gauge, and the consumption of fuel per hour and per horse-power has decreased from 2 to 1.8 pounds. Incidentally, the area of heating surface has decreased from $4\frac{1}{2}$ to 4 square feet per indicated horse-power; that is to say, remaining, as formerly, nearly 2 square feet per pound of coal burned per horse-power per hour; where, as in some cases, pressures of 100 and 125 pounds are adopted, somewhat further gain may be expected.

Increased pressure has been accompanied by increased speed of piston—from 300 to 500 feet per minute—and both causes have combined to reduce greatly the size and weight of engines. Formerly 500 pounds per indicated horse-power was a common figure. To-day, one half that weight is often noted, and in special cases in which, as in torpedo-boats, economy is not important, one fifth and even one eighth those weights are said to have been reached. Surface condensation is almost exclusively adopted, but the area of cooling surface is becoming less and less, and at the pressure soon likely to become general the production of a vacuum may possibly cease to be desirable, as it is already known to be with un-jacketed cylinders; and the non-condensing engine may yet displace the condensing engine at sea as it has on land, and on our Western rivers, where this comparison was earlier made, and where the evil effects of cylinder condensation were earlier perceived. A still for converting exhaust and waste steam into feed-water has already been used, and it must remain in use in all salt-water navigation.

Among the most interesting events of the years 1880-1881 have been the trials of the steam yachts Anthracite and Leila. The first is a small vessel 86 feet long, 16 feet beam, and 9 feet draught, fitted with a three-cylinder compound engine, and carrying 300 pounds steam and upward. Trials in London show these engines to have required but 1.7 pounds of coal and 17.8 pounds of steam per hour and per horse-power. Cylinder condensation amounted to 30 per cent in the first cylinder, and of this nearly three fourths was re-evaporated before discharge from the third cylinder. The same engines tested in this country require 21.6 pounds (10 kilogs. nearly) of steam per hour and per horse-power, the cylinder condensation becoming over 50 per cent, of which four fifths was re-evaporated before reaching the condenser, the difference being probably due to a variation in the efficiency of the steam-jackets and in speed of engines. This little yacht—the smallest that ever crossed the Atlantic—should be remembered in history quite as much on account of the lessons in engineering learned on board the little craft as on account of her far famous voyage.

The trial of the Leila, under the orders of the U. S. Navy Department, was even more instructive than that of the Anthracite. The Leila is a Herreshoff yacht 100 feet long, 12 feet beam ($30 \times 3\frac{1}{2}$ inch, nearly), and measuring 37 tons. With a "coil" boiler, steam at 120 pounds at the steam-chest (9 atmospheres) and driving the boat 15 knots an hour (17 miles), the engines developed 150 horse-power, using but 16.4 pounds of steam (7.5 kgs.) per hour per horse-power. The cylinder condensation amounted to but 10 per cent.

An important deduction from the results of the trial of the Anthracite and the Leila is, that efficiency has little relation to size of engine when protection against cylinder condensation is secured, and this conclusion is further justified by the fact that some of the very best work has been done, where non-condensing engines have been compared, by small portable engines. Steam-engines of 5000 horse-power are equalled in economy by engines of one fiftieth that power. A large difference in magnitude seems more than compensated by a moderate difference in steam pressure. Naval engineering is one of the most interesting and important branches of our profession, and the progress which has been made in its field during our generation illustrates the advances observed in nearly every other department. The old-fashioned mariner is rapidly disappearing, and the engineer is likely to become the responsible officer on the voyage as during construction.

CEMENT AS A LINING FOR HEADINGS IN MINES.

A novelty in the way of protecting headings and as a partial substitute for timbering, has been introduced on a large scale in some parts of Austria. Herr W. Stieber has given an account of it before a local society. Even in good rock, gangways and headings will require timbering after a while, the variations of temperature and the water acting in addition to other deteriorating causes; and prices of timber and cement being favorable, 13,000 lineal feet of heading have thus been coated in the Wlczek mines, over 3300 feet having been put in four years ago. The best way is, of course, to use the cement in the shape of masonry. Herr Stieber has, however, simply coated his gangways with a layer of cement ranging in thickness from 0.3 to 0.4 inch. The strata of the rock

must not be so weak as to break down within a week, as the drying of the cement often requires from three to four days. The thickness varies according to the nature of local circumstances. The surface of the heading is made as even as possible, wet with water, and then the cement is put on with a trowel, all fissures and cracks being filled up carefully. When partially dried, new layers are put on until the right thickness has been obtained. The surface is smoothed and is sprinkled with water from time to time during the next few days, in order to prevent cracking by too rapid drying. Both at the Wlczek mines and at the Johann-Marie, at Polnisch-Ostran, this cement lining proved cheaper than timbering. The editor of the *Oesterreichische Zeitschrift* states that in a limited way this method had been employed in Prussia as early as 1871, and we may add that it is carried out on a large scale by Gen. William Sooy Smith and son in lining the Hudson River tunnel.

THE ZINC INDUSTRY OF THE UNITED STATES.

From M. Léon Thonard's work, which we had occasion to review in our last issue, we take the following summary of the status of the zinc industry of the United States, because it well illustrates how an impartial and clever observer views that branch of our home manufactures.

The zinc industry is not as favorably situated as that of lead. Though created at a much later date than the latter, it has also developed rapidly, and is now able to meet the demands of the country. But since its origin the conditions have changed but little and have not always improved. In the Eastern States, the zinc mines have become poorer, or have been, in a certain degree, practically exhausted. In consequence, some smelting-works have closed down, while the more important ones have restricted their production or have been forced to draw their supplies of ores from the Southern States, where deposits are developing whose true value must still be demonstrated. In Virginia, a new works has been established recently, but its capacity is small.

In the Western States, the deposits are abundant, productive, and easily mined. But one of the mining districts, that of Wisconsin, decreases its output from year to year, while, on the other hand, the principal center for the manufacture of metal to which the ores are shipped, La Salle, Ill., has grown in importance and is adding new plant. The result is, that the owners of the works are forced to look for increasing quantities of ore at a steadily increasing distance. Other works are advantageously located at St. Louis and in Kansas particularly, but as yet they have not developed to the extent of those referred to above. It will be seen, therefore, that, as far as the supply of ore is concerned, the zinc industry in the United States is not better situated than that of Europe; and when the various circumstances affecting the production are taken into consideration, that industry more than others requires for its maintenance or prosperity a continuance of the duty on metallic and sheet-zinc.

If a number of establishments have an assured future, there are, on the other hand, others whose existence is precarious and subject to numerous vicissitudes. It is natural to conclude that in the struggle which this competition calls forth the stronger will gradually secure the monopoly of the make of the crude metal, as they have already succeeded so far as sheet-zinc is concerned, and that they will force down the price of ore, on which the largest share of the profit has been made, because the market has not been such as to lead to payments regularly on their percentage of metal.

The production of high grades of zinc has decreased, while that of ordinary spelter has increased, and is steadily growing, especially that of metal extracted from the blende, which is the principal ore in the West. The pure zinc is the principal product which has been exported, because its exceptional quality makes its price on both sides of the Atlantic nearly equal. As for ordinary spelter, exporting can only be a question in exceptional cases. M. Thonard here gives a series of tables of exports and imports. Up to 1876 we take his figures, for which we find no statement as to whether they refer to fiscal or calendar years; for those following 1876, inclusive, we have ourselves extracted them from official sources for calendar years, in tons of 2000 pounds.

Year.	Imports.			Exports.
	Zinc.	Sheet-zinc.	Total.	
1869.....	6,150	4,250	10,400	.....
1870.....	3,800	5,200	9,000	55
1871.....	5,100	3,200	8,300	38
1872.....	5,700	6,500	12,200	31
1873.....	2,900	4,250	7,150	37
1874.....	1,000	2,000	3,000	22
1875.....	940	3,300	4,240	10
1876.....	232	950	1,203	361
1877.....	570	676	1,246	1,000
1878.....	551	428	979	1,549
1879.....	2,136	1,311	3,447	618
1880.....	3,080	2,145	5,225	868
1881, 8 months.....	649	729	1,378	398

M. Thonard says that however unimportant the imports have become, they may at any time assume larger proportions. He says that if the duty were taken off, the existence of many of the American works would be seriously threatened. Some, perhaps, those best managed, might continue operations; but in any case the European works would be better placed, because they could supply the States of the Atlantic coast without being forced to carry the burden of nearly as high rates of transportation. The American works, which have a capacity of 30,000 tons per annum, turned out 20,000 tons in 1879, of which one third was rolled into sheet-zinc.

Zinc white is only made in the United States by the American process, which yields a product less fine and lighter than that obtained by oxidizing the metal. A great quantity of it is manufactured, more, even than consumption calls for, the amount varying more or less frequently. The manufacturer is favored by the existence in great abundance of a special ore and of a coal which is admirably adapted for the process. In consequence of the great competition between the works and of the limited market which they have in the country, the manufacture is subject to wide variations as far as profits are concerned. A quantity, which has gone as high as 900 tons in 1878, is annually exported. Still a considerable amount of European zinc white, obtained by oxidizing metallic zinc, is imported.

As far as zinc ores are concerned, there can be no question of exporting them, with the exception of the New Jersey ores, which can only be ad-

vantageously utilized for the manufacture of zinc white by the American process; for that purpose it is actually exported. As for other ores, blende or calamine, they are found at such a distance from the coast that it is impossible to carry them to the seaboard without paying excessive freights. Those deposits which are nearer the coast have been too little explored and have too little present value to permit of anything but speculation as to their importance. It is possible that the subject may be worthy of careful study at a future date, but for the present it has not reached a sufficient degree of interest.

PETROLEUM STATISTICS.

COMPARATIVE SYNOPSIS OF REPORTS FOR AUGUST AND SEPTEMBER, 1881.

42 GALLONS = 1 BARREL.	1881.			
	August, 31 days.	September, 30 days.	Increase in Sept.	Decrease in Sept.
Production for the month..... bbls.	2,341,727	2,193,420	.....	138,307
Daily average..... " "	75,217	73,114	.....	2,103
Stock at the wells..... " "	768,645	585,685	.....	183,060
Iron tank stock..... " "	24,336,542	24,481,072	244,530	.....
Total stock..... " "	25,005,187	25,066,657	61,470	.....
Number of producing wells.....	17,250	17,502	312	.....
" drilling wells.....	352	388	36	.....
" completed.....	35	312	.....	20
" dry holes.....	34	14	.....	20
Aggregate daily production of new wells..... bbls.	5,368	4,763	.....	605
Average daily production of new wells..... bbls.	16 1/2	15 7/10	.....	1/2
Number of rigs building.....	373	435	60	.....
Total shipments out of the region, bbls..	2,214,877	2,137,950	.....	76,927

—Stowell's Petroleum Reporter, Oct. 24.

THE MANUFACTURE OF BESSEMER STEEL AND STEEL RAILS IN THE UNITED STATES.*

By William E. Jones, of the Edgar Thomson Steel-Works.

In continuation of the information presented to the Institute in May last, I have now the honor of submitting some particulars of the operations carried on at the Edgar Thomson Steel-Works during the first six months of 1881.

In that period, the two converters at work produced 76,758 tons of ingots, as against 55,428 tons for the corresponding half of 1880, being an increase of a fraction over 38 per cent. In the converting department, with two converters, each of 7 tons capacity, the best twenty-four hours' work has been 623 tons. The largest production in a single week has been 3433 tons; and the best month's work has been 14,033 tons. The rail-mill, in the same time, has produced 65,087 tons of rails, as against 43,272 tons in the corresponding half of 1880, being an increase of a fraction over 50 per cent.† The average weekly yield of rails during 1881 was therefore 2503 tons, as compared with an average of 1664 tons per week in 1880. In some weeks, however, these averages have been greatly exceeded. During the week ended July 30th, we rolled 11,278 rails of 56 lbs. per yard, aggregating 2808 tons. In the following week, we rolled 11,285 rails of 60 lbs. per yard, aggregating 3004 tons; and for the week ended August 13th, we turned out 12,219 rails of 57 1/2 lbs. per yard, making a total of 3101 tons. I have reason to believe that the production of rails at these works during the fortnight ended August 13th is the greatest that has been obtained in one mill. I am fully aware of the claim made on behalf of the Cleveland Steel-Works of Bolckow, Vaughan & Co., that during the week ended Saturday, May 21st last, 3623 tons of rails were rolled in one mill; but I am informed by one who was present during the time that this large production was obtained by Mr. Windsor Richards, that the rails were double-headers, of 80 lbs. per yard. Assuming this to be the fact, you will find, on a comparison of the number of rails rolled, that our output at the Edgar Thomson Works greatly exceeds that of the Cleveland Steel-Works. If we take the 12,219 rails rolled here during the week ended August 13th at 80 lbs. per yard—the weight of the rails rolled at Eston—making the usual allowance for short lengths, we should have a weight of at least 4320 tons.

I am not, therefore, prepared to admit the claim made by Mr. Richards, at the May meeting of the Institute, that "we beat the Americans in rolling-mills." At the Edgar Thomson Works, the output of the rail-mill is limited by the quantity of steel furnished by the converting department, and for that reason we anticipate still better results when the three new converters now erecting have been got to work, as thereby the rail-mill will be fully supplied. What the American three-high mill is capable of doing in the way of rolling rails is still an unsolved problem. Until quite lately, I was disposed seriously to doubt whether it could equal the output of a reversing train such as those used at the Dronfield and Cleveland Steel-Works in England. If Mr. Windsor Richards will kindly furnish the Institute with the largest number of rails rolled in a given time at the Cleveland Steel-Works, a better comparison could then be made of the real merits of each of the two systems of rolling. With reference to rolling off directly from the ingot, I would put it to English steel-makers whether they are not compelled to carry an excess of manganese in their steel to prevent heavy loss by reason of second-class rails? The percentage of second-class rails obtained is an important factor in judging of the true merits of any system of rolling, and some information on this point would be of interest to the trade. Apart from the necessity of using a greater amount of manganese and the turn-out of a higher percentage of second-class rails, I do not for a moment question that in the reversing rolling-mill, rolling two or more lengths as at Dronfield and the Cleveland Works, there is a great economy of labor and of waste.

It was suggested in the discussion that followed the paper which I had the honor of submitting to the Institute in May last, that the great

* A paper read at the meeting of the Iron and Steel Institute.
 † In all cases I quote the gross ton of 2240 pounds.
 ‡ The rail-mill is three-high, with rolls 23-inch pitch, the train being driven by a 46-inch by 48-inch engine having balance slide-valves.

yield of American steel-works must represent a larger cost per ton than the average of English practice. To this I reply that as most of the workmen are paid on a tonnage basis, the cost can not be increased according to output; but, on the other hand, the charges debited to interest and general expenses, as well as the day-labor account, are always lower in proportion as the output is increased.

PROGRESS IN SCIENCE AND THE ARTS.

An Analysis of Wulfenite.—Mr. C. L. Allen, of Charleston, S. C., has made, in the laboratory of the University of Virginia, the following analysis of wulfenite from Ruby Hill; Eureka County, Nev., which it was supposed might contain molybdate of lime:

Molybdic acid.....	39.33
Oxide of lead.....	61.11
Lime.....	1.04
Sesquioxide of iron.....	0.38
	101.86

Though not accurate, this analysis is of interest as showing that no great quantity of lime is present.

Aluminium Plate for Volatilizing Substances in Blow-pipe Analysis.—Instead of using charcoal in treating volatile metals and sulphur compounds before the blow-pipe, Lieutenant-Colonel W. A. Ross, in a paper read before the British Association at York, proposes to use aluminium plate, and thus overcome many of the drawbacks of charcoal. He found that some volatile substances like antimony would not yield a sublimate when treated before the blow-pipe upon the bare aluminium plate, but readily did so when a small slip of charcoal was placed between the assay and the aluminium. This offers a rapid and effectual means of separating the sublimates obtainable from a compound, for instance, of antimony and arsenic, the latter subliming readily upon the bare aluminium plate, the former only after treatment upon a charcoal slip. Black and white sublimates can be readily detected, and globules melted with alkaline carbonates can be easily taken off the plate with forceps.

Illuminating-Gas at Various Altitudes.—Before a French society of gas engineers, M. Brémond has resumed the discussion of a subject treated by him three years ago—the effect of altitude upon the illuminating power of gas. He formulates the general law that, by reason of rarefaction of air, "gas loses at least one liter of illuminating power per 50 meters of altitude." He gives the details of an interesting experiment made on the Northern Railroad of Spain, observations being taken at various altitudes on the way from Madrid, 595 meters above sea-level, to La Cañada, a station 1373 meters above sea-level. We can not enter into the details of these trials; but we may give a general idea of the effect of altitudes upon illuminating power by citing the following table, in which Paris is taken as a unit of comparison:

City.....	Altitude, meters.	Barometric pressure,		Illuminating power.
		millimeters.	millimeters.	
Paris.....	0	0.754	105	105
Vienna.....	68	0.747	103	103
Moscow.....	235	0.732	99	99
Madrid.....	573	0.705	87	87
Mexico.....	2,212	0.572	30	30

A New Method of Manufacturing Superphosphate.—Dr. Brunner, in the *Chemiker Zeitung*, gives a description of a new method of manufacturing superphosphate, which is being carried out at Wetzlar, Germany. Instead of adding sulphuric acid to the phosphate rock and selling the product with the alumina and iron compounds it contains, the manufacturers at Wetzlar turn out a material holding 35 to 40 per cent of phosphoric acid soluble in water, and 6 to 7 per cent of precipitated basic phosphate. The phosphate rock is treated with sulphuric acid (containing 12 per cent of acid), and the solution separated from sand, iron, and alumina compounds, and gypsum is boiled down until it contains 40 to 42 per cent of anhydrous phosphoric acid. With this solution, phosphates, which are easily decomposed, are treated like bone ash or guano phosphates. In this way, a product holding 35 to 40 per cent of soluble phosphoric acid is obtained. If the phosphate rock used contains much carbonate of lime, a portion of the phosphoric acid is rendered insoluble in water. It is, however, readily soluble as citrate, which is very popular in France and Belgium, and is exported to those countries. The value of the method lies in the production of an article high in soluble phosphoric acid, the importance of which will be readily appreciated, and in the reduction of the percentage of iron and alumina in the product.

The Force of the Future.—Dr. C. W. Siemens, in a recent lecture, says: One of the great practical illustrations furnished by the Paris Exposition has reference to the transmission of power from one place to another by means of the electric conductor. The electric railroad leading from the Place de la Concorde into the exhibition and only half a kilometer in length, does its work regularly and well, running a trip every five minutes, and conveying generally as many passengers as can be packed both inside and outside of a tram-car of ordinary dimensions. This system of propulsion will soon be in operation on a new line of railroad, six miles long, with which I am connected, in the north of Ireland, to be extended, if successful, to a farther equal distance. This will give us twelve miles of electric railroad worked without expenditure of fuel; for the motive-power will be obtained from a neighboring water-fall which at present runs to waste. Mr. W. A. Trail, the resident engineer of the line, has already commenced operations, and I hope that by next spring visitors to the sister island may reach one of its most interesting sights, the Giant's Causeway, propelled by invisible but yet potential agency. The experience gained by my brother in the working of the first electric railroad, two miles in length, established by him at Lichtenfelde, near Berlin, leaves no reasonable doubt regarding the economy and certainty of this mode of propulsion, although it is not anticipated that it will supersede locomotive power upon our main trunk railroads. It will have plenty of scope in relieving the toiling horses on our tramways, in use on elevated railroads in populous districts, and in such cases as the Metropolitan Railroad, where the emission of the products of combustion causes not only the propulsion but the suffocation of passengers.

MANGANESE ORES IN RUSSIA.—Manganese ores were for the first time

exported from Russia in 1880, the quantity being 1343 tons. They are mined in the government district of Kootais, where very large deposits are said to exist. In stating that they contain from 92 to 96 per cent of manganese, the *Bulletin Consulaire Français* has, however, been led into an obvious exaggeration.

GENERAL MINING NEWS.

ARIZONA.

Our correspondent "Bendigo" writes us the following letter from Tombstone under date of November 1st:

We have a fiasco on the outskirts of this district, in what is known as the Bradshaw mine. This property, unfortunately, is principally owned in New York, but has been engineered by California adepts, and floated on the public. Attachments have been issued for supplies, and the miners and workmen have been here with a view to put liens on the property, to secure their just dues for labor performed. It is reported that Superintendent Tierney, who was one of the owners and who was the recipient of a considerable sum by the sale at three dollars per share, has resigned and gone to other fields and pastures new. This is the second advent of the same parties in this territory. The first was Stonewall, in the McLellan District. The unfortunate stockholders in that delectable bubble will have reason to remember it. There is another pretty job now on the tapis, called the Rescued Total Wreck. This is taken up by a combination of lawyers and one nondescript editor, against one of the best properties in the territory—the Total Wreck Company in the Empire District. The claim which these parties set up to this property has no merit whatever. They have organized a company under the name of the Rescued Total Wreck and are now and have been trying to induce fools to buy it at from six to twenty-five cents per share. Tom Fitch, the silver-tongued, is at the head.

Every thing in connection with the Contention, Grand Central, Tombstone Mill and Mining Company is flourishing. The output from these mines is as regular as an eight-day clock. The Vizina Consolidated has, I understand, declared its first dividend. The Girard is now erecting a twenty-stamp mill at the mine. This is a new departure, and will be the pioneer mill in this camp. The water question is settled. Water-pipes are laid through the city, and water sufficient for all purposes can be had at cheap rates.

EMPIRE DISTRICT.

The *Tribune* prints the following dispatches from Tucson, under date of November 5th: A rich body of ore was struck in the New York mine belonging to the New York Mining Company, of Oil City, Pennsylvania. The shaft is down 40 feet. This mine is one mile east of the Total Wreck mine. A body of ore, three feet wide, was struck in the bottom of a 30-foot shaft on the Fairplay mine, Empire District, belonging to the Justice and Mammoth Company, of New York.

TOMBSTONE DISTRICT.

CONTENTION.—The *Epitaph* says: The bullic output will be short, owing to the break in the engine in the early part of the month, which caused a stoppage of one whole week. However, with the surplus in the treasury, it is not anticipated that there will be any suspension of dividends for the month.

TOMBSTONE.—The *Epitaph* has the following: In No. 2 shaft, west side, the vein has increased to 4½ feet, all ore of fine quality. The drift is in north on the ledge 30 feet. They are working only 9 men, including surface men, and taking out 36 tons of ore per week, which goes forward to the mill. This ore is all extracted in the legitimate way of development by running the drift upon the vein. Counting the ore at \$50 per ton (a very low estimate for this ledge), the product is \$1800 per week, less mining expenses, \$252, which leaves a balance of net ore value at the mine of \$1528. The body of ore in Tough Nut, on 200 level, is getting superficially larger and thicker as the developments proceed. It is of the regular uniform Tough Nut ore, running about \$60 to the ton. Work in the old mine, east of the northwest shaft, shows the ore-body going down to the level of the northwest workings. The combination continues to yield its accustomed amount of ore. The developments for the last month have been more favorable than for any preceding period in the history of the mines, and there are more good ore-bodies exposed than at any former period.

VIZINA.—For the month of October, the superintendent officially reports as follows: Ore extracted and forwarded to mill during October, 300 tons, 80 tons of which average \$454 per ton; the rest, \$107 per ton. Bullion value for the month, \$60,000; net value, \$43,000. Shall remit \$35,000 to home office. This makes total of ore extracted to date 4592 tons, yielding \$425,500, bullion value. We commenced drifting from the main shaft on November 1st. Every thing at the mine going smoothly.

CALIFORNIA.

THE BODIE DISTRICT.

The *Free Press* prints the following summary, under date of the 1st inst.: Probably all the mines now running will be kept in operation during the coming winter, and not impossibly others may, after the deep shafts have drained down somewhat deeper, take up their work where it was left off months ago in consequence of too much water. The Standard shaft is now down 1090 feet; the Lent, 775; and the Red Cloud, 640. The Lent reports most of its water from the 700 and 740-foot levels, and not from the bottom. The Red Cloud has far less to contend with in this regard than formerly, and there seems a reasonable probability that, as still greater depth is attained, the obstacles which this element has presented may disappear altogether. The completion of the Mono Lake Railroad will render it possible to obtain supplies of wood and lumber in the winter-time without greatly increased cost or inconvenience. The Standard-Bulwer mill has been undergoing a thorough overhauling the past week, the first for a year and a half, a work which was going on on the 9th, according to dispatches of that date. The Noonday mill of forty stamps has completed its contract with the Bechtel, and has resumed crushing ore from the Noonday and North Noonday mines. The contract of the Oro Company with the Silver Hill has also expired. The Oro Company advertises for bids for a contract to sink its shaft 150 feet farther. This will give it a level equivalent to the 600-foot level of the Red Cloud. The Tioga, Black Hawk, Champion, Goodshaw, Addenda, and others of our mines are prosecuting their explorations steadily. The Bodie Tunnel mill, it is anticipated, will be completed by the 1st of December.

The *Tribune* has the following dispatches: The convenient absence of the superintendent of the Boston Consolidated mine until after the sale of the delinquent stock excludes all opportunity for further information concerning the development on the 400 level reported last week. The Union Consolidated Company is starting a new tunnel to cross-cut and develop its series of veins.

BODIE CONSOLIDATED.—There were 122,465 tons of ore hauled to the mill during the week ending October 29th, and 117,472 tons were crushed, yielding \$6977.95, or an average yield of \$59.40 per ton. The average assay value of the pulp was \$81.43 per ton; that of the tailings, \$11.52; so that the average value of the ore worked was \$70.92 per ton. The amount of ore extracted during the week was 100,402 tons, as follows: 43,812 tons from the fifth-level stopes, and 56,590 tons from the sixth-level stopes and winzes.

STANDARD CONSOLIDATED.—During the week ending October 29th, there were shipped to the mills 495 tons of ore from the 300, 385, 500, and 550-foot levels. Average pulp-assay for the week was \$60.60 rude bullion received, 4000 ounces, and the amount shipped to the company \$41,397.79.

THE MINING DEBRIS QUESTION.—The following dispatch from San Francisco is of much interest: The committee appointed by the Board of Trade to investigate the debris question, and arrange some basis of compromise between the farmers and miners, has completed its report. After reviewing the recent tour through Yuba, Sutter, and Nevada counties, and considering the great damage inflicted on the water-courses and the farming population by the deposit of debris from the mines, and on the other hand, the magnitude of the mining interests, involving, as they do, nearly one eighth of the present gold product of the world; and considering also the fact that the safety of the valley depends not only upon the stoppage of a further flow of debris from the mines, but also the retention of the vast masses of debris already washed out and liable to be carried down by the winter floods, the report concludes by recommending that dams be immediately constructed on the Yuba River, below the junction with Deer Creek, and at Degare Point; that the brush dam on Yuba River be at once repaired; that the entire cost of construction, maintenance, and repair of the dams should be borne by the mining interests; that the federal government should be urged to appropriate sufficient means to dredge and otherwise improve the navigation of the Sacramento and Feather rivers in the interest of commerce; that all litigation be suspended between the parties interested; that security against further damage is imperative, but whether that shall involve the stoppage of the mines during the construction of the dams is not the province of the committee but that of the convention to decide; that to bring about a co-operation of the conflicting interests, secure an equitable adjustment of the matter, adopt and carry out a speedy plan and remedy, a convention should be called in San Francisco, to meet on Thursday, November 17th, 1881; that the Anti-Debris Association of the Sacramento Valley and the Miners' Association each appoint 15 delegates to form said convention, duly authorized to act upon this and all other subjects connected with their interests on the debris question; and, if they deem it advisable, select ten disinterested citizens of San Francisco, Oakland, or vicinity, as members thereof. Gen. Rosecrans, who accompanied the committee, concurs in the report.

From Nevada City the following was announced by telegraph on the 10th inst.: Suits were begun in the Superior Court yesterday against C. O. Tompkins, Sheriff, by the following mining companies: The Eureka Lake Company, the Yuba Tunnel and Mining Company, the Milton Company, the North Bloomfield Grand Mining Company, and the Wahguen Company. The plaintiffs prayed the court to grant temporary injunctions restraining Tompkins or his agents from turning off the water in the mines belonging to the plaintiffs. The judge issued the injunctions, and they were served yesterday afternoon. These mines were visited by the sheriff on Monday and Tuesday. In some of them the water had already been turned off, but those found running were closed down by the sheriff. The injunctions issued yesterday will doubtless cause the mines to start up again immediately.

MARYSVILLE, CAL., Nov. 10.—The Sutter County supervisors yesterday passed a resolution instructing the district-attorney to begin suit for an injunction against all hydraulic miners discharging debris into Bear River or its tributaries. This action was taken in response to a petition signed by nearly all the taxpayers in the county. The actions will be brought in the name of the county. Prominent lawyers will be employed by the supervisors.

CANADA.

NEW BRUNSWICK.

DORCHESTER.—The *St. John's Daily Telegraph* prints the following: Mr. Couch sold his copper properties at Dorchester on Thursday last to Mr. Elmer F. Howe, of Boston, for a large sum of money, receiving \$85,000 in cash down. We are not at liberty to state the total sum, but can say that it is a very large amount. He has paid considerable sums to the farmers for their mineral rights, and the sums thus distributed are very acceptable. Mr. Joseph Revere, of Boston, who is a son of Mr. Revere, of the Revere Copper-Works, of Boston, is to be the superintendent of the works, and has already commenced operation on a large scale. If the vein proves as productive as present indications seem to warrant, there will probably be a force of 1000 men at work by spring, and the quiet Woodville Valley will be transformed into a thriving colony. The situation will enable the mine to be worked cheaply, and the shipping facilities are good. A tramway through a branch of the main valley, across William Turner's farm, can be made to tap the railroad at a distance of about a mile from the works, and less than two miles from the Dorchester Island wharf, to which there is already a branch track. The Dorchester harbor is the best port at the head of the bay, giving abundant water, safe anchorage, and being sufficiently land-locked to afford security from storms.

COLORADO.

CLEAR CREEK COUNTY.

The *Denver Tribune* prints the following interviews of a correspondent with the principal ore purchasers at Georgetown: Mr. W. S. Duncan, agent for the Argo works, says that very rich ores are coming in now, and although business has not been brisk for the last month or six weeks, thinks the product of the camp will be a little larger this year than last. His purchases of ore during October will reach \$25,000, while for the nine months preceding October they averaged about \$33,000. He is getting nice grades of ore from the Terrible, Pay Rock, Shively, and Wheeling mines. He says that a large amount of ore has come down from Silver Plume during the summer, and that Lawson has also furnished a large amount. He has had a number of fine mill-runs lately, the mines sending in rich grades of ores. The Cashier, noted for its low-grade ores, sent down a 2½-ton lot last week running 601 ounces, and a 7-ton lot running 200 ounces. He recently shipped to Argo one car-load of ore, for which he paid \$5500 after deducting charges. The ores bought averaged over 100 ounces. Mr. R. M. Vail, agent of the Valley smelting-works and Golden Smelting Company, who makes a specialty of buying lead ores, has bought nearly 600 tons since starting, the average value of which was about 180 ounces. Ores are secured from Lawson and mines from above Silver Plume, from Argentine, Chihuahua, and from the Daily and Atlantic districts. The Atlantic District sends no ores that run less than 100 ounces, and from that up to 600 ounces. The Mountain Ram mine has sent some very fine ores running from 160 to 600 ounces. Mr. E. C. Billings, agent of the Miners Smelting and Reduction Works at Golden, has been here only since June 1st, but from the best information thinks the output of the camp will not be as large this year as for several years past. He is buying light ores principally, and some lead ores. The Dunderberg mine has been turning out large amounts of ore all the past six months, and its product for October will be fifty per cent more than before. Mr. Billings has been getting all the product of the Dunderberg, and has also been buying from the Terrible, Pay Rock, Dunkirk, Pelican-Dives, Little Emma, and Fred Rodgers. His purchases run from 200 to 225 tons per month, the average value being 150 ounces. He estimates the amount of ore sold in Georgetown as about 800 tons per month.

CUSTER COUNTY.

BULL-DOMINGO.—The *Silver Cliff Mining Gazette* has the following: Concerning the Bull-Domingo, we are unable to obtain any information whatever. The machinery is idle, the buildings are closed up, and there is no one on the premises but two or three employes. Among the knowing ones on the street, it is an open secret that the lower workings are in good ore, and exactly why the present policy of the management has been adopted will probably become apparent pretty soon after the annual election.

GUNNISON DISTRICT.

From a letter to the *Leadville Democrat* we take the following: There are, at present, from six to ten paying mines in the Ruby District, and of that number

only two employ machinery in hoisting their ore. These two are the Ruby Chief and the Lead Chief. The first mentioned is in Ruby Basin, one mile from town, where they work four six-hour shifts and hoist about 2500 gallons of water per hour. They are sinking a shaft at a cost of one dollar per foot, and are down 87 feet. No stopping or drifting has been done. The shaft shows a strong vein, with a good pay-streak of as fine ore as Colorado contains, of ruby, brittle, and native silver. The owners are Messrs. Deffbaugh, Brennand, Smith, and Ritchey, and they have unquestionably a very valuable piece of property. The same parties own the Howard Extension, Old Shirk, Chloride Deposit, Jeur, and three valuable claims in Redwell Basin, four miles from Ruby. The Lead Chief has a 25 horse-power engine, good hoister, and a six-inch oil-pump. They are down 102 feet with their shaft, and have good mineral. The Durango, Bullion King, Lee Taylor, all in the immediate vicinity of the Ruby Chief, are producing good ore. The Old Mexico, Milwaukee, Robert Emmet, and other promising properties, are being developed in the same basin. The towns of Irwin and Ruby, which join end-lines, are right up among the mountains, 10,250 feet above sea-level; and the mines, or a majority of them, are still higher, being up in the basins at the foot of the high peaks of the Elk Mountains. The Forest Queen, one of the first discoveries here, lies just at the edge of town; the work, however, seems to have been injudiciously conducted, and no ore of any consequence is produced at present. The Ruby King, on the same vein as the Forest Queen, should be the greatest producer in the camp, but it is suffering from the same misfortunes as some others. The workings are too near the surface, and but little good ore is produced. The denizens of Irwin and Ruby are loud and severe in their denunciations of M. M. Pomeroy and one of his colossal mining schemes, the Standard Mining Company, organized on some worthless prospects here, with no mineral showing whatever. "Brick's" company has a capital stock of \$3,000,000, from which was sold \$10 shares, first at \$1 and later at \$2 per share, to the unsophisticated natives of the "solid South," the distant lands of Oregon, Canada, and Nova Scotia. Out of the proceeds of this sale of stock, the Standard Company was to buy the Hopewell lode (the southern extension of the Ruby Chief) and several thousand acres of coal lands. The Hopewell was bought and \$5000 paid on the purchase, and an extensive shaft-house built. The whole business has been attached, and is now in the hands of the sheriff for the satisfaction of \$8000 worth of creditors. A saw-mill was bought with Standard stock, and the Great West advertised that a contract had been made with the Denver & Rio Grande for 2,000,000 feet of lumber, the profits from which would apply to pay a dividend to the Standard Company shareholders, but the dividend was never paid. The best citizens here denounce the Standard Company as a grand steal.

LAKE COUNTY.

It is stated that the jury in the suit of the Iron-Silver mine against the Smugler, which has been in progress in Denver, has disagreed and has been discharged. CATALPA.—A new shaft is now sinking on the break, and will follow it down until the lower contact is reached. The new ore-bins and timber-house have been completed.

EVENING STAR CONSOLIDATION.—According to the estimates made of the output of the mines for the month of October, the amount of ore shipped was 2600 tons. In the middle shaft of the Evening Star, above the large ore-body, another body of mineral has been discovered.

DENVER CITY.—The Leadville *Circular* says that shipments have at last begun from this mine, and that the pumps work well, one fourth their capacity sufficing to keep the mine free from water. When the Robert E. Lee pumps are started up, even less power will suffice to accomplish the purpose. The Denver City should now begin to fulfill its promise. It is said to have a heavy body of ore, thickly streaked with chlorides.

GLASS-FENDERY.—An important strike of rich chlorides has been made in this mine.

HIGHLAND CHIEF.—The *Democrat* says: A new pocket of mineral has just been struck that assays 310 ounces of silver to the ton; but there has not been sufficient development to learn the extent of it. A contract has just been let on the Bobby Burns claim, which belongs to the Highland Chief property, to sink a shaft, and it is the intention, when a depth of 200 feet is reached, to connect by a drift with the old workings of the mine.

LITTLE PITTSBURG.—The *Democrat* states that the manager has during October taken out 618 tons of ore, netting the company over the expenses of prospecting, to which it has been devoting its attention for some time, about \$5000.

ROBERT E. LEE.—The new machinery is all in, and the pump is now placing on shaft No. 6, which has about fifty feet of water in it. This shaft is 246 feet deep. The old shaft is 190 feet deep, and about ten tons a day are taken from this part of the mine that will run from 300 to 400 ounces of silver to the ton. It is thought that the new pump which is placing on the No. 6 shaft will probably be running by the middle of the month. The mine has now about 75 men at work. It is reported that a rich strike was made in the north drift of the workings recently, consisting of a three-foot body of chlorides that run all the way from 460 to 1700 ounces in silver. Since then, another ore-body, running from 2 to 3 feet wide at the north to 6 to 7 feet wide at the south, has been found 30 feet above the old workings.

SILVER CORD.—The surface improvements at this mine are approaching completion.

DAKOTA.

There has been considerable agitation in the Black Hills to bring about the building of a smelter to work suitable silver ores, which, it is stated, have been found in sufficient quantity to warrant such an enterprise. The Deadwood *Pioneer*, which has been strongly supporting the movement, now announces that steps have been taken to examine the question carefully, with a view to erecting such works. In the Galena District, the McDonald smelter is running on a mixture of dry ore from the Red Cloud mine and galena from the El Refugio.

FATHER DE SMET.—The superintendent reports for the week ending November 1st that 1500 tons of ore were extracted from second level. During the week, 3430 tons of ore were milled. The north end tunnel is in 257 feet, and the south header, second level, is in 51 feet. On the contract to break down ore for 100 sets of timbers on the second, third, and fourth floors of McGinty chamber, ore for 20 sets was broken during the month.

SILVER KING.—The vein of this mine, in the Galena District, is seven feet thick, and it is reported that at the bottom of the shaft the ore is rich.

GEORGIA.

A correspondent forwards to us the following letter: In this county, considerable interest is manifested in gold mining, and new mines are opened and old ones reopened. Among the most important of the latter is the Franklin, from which Mrs. Mary G. Franklin, under her personal supervision, took half a million dollars between the years 1837 and 1856, by the most crude process; and the Pascoe, from which John Pascoe, on a little 5-stamp wooden mill, made a handsome fortune between the years 1834 and 1839; and the Butler, worked by Howell Cobb's father very successfully about the same time. These mines have been bought up by some gentlemen of Pennsylvania, and consolidated. They have water-power of over 2000 horse-power, and propose putting up 300 stamps for the reduction of their ores. The mines embrace 1400 acres of land, and are over three miles in length on the six veins, five of which are quartz veins from 3 1/2 to 21 feet in width, assaying from \$10 to \$80 per ton. The other vein, if it can be called a vein, is about 300 feet wide, and is a horn-blende slate, which makes the shoal upon which the dam is built. The company has already opened one of the veins to a depth of 100 feet, and has run a tunnel on it for 200 feet, to satisfy itself

of its extent and value before beginning work on the mill. Mr. J. McC. Creighton, General Freight-Agent of the Pennsylvania Railroad, Philadelphia, is one of the owners. The placer mining is also very valuable, with plenty of water for hydraulics. The property is in Cherokee County, 50 miles from Atlanta and eight miles from the railroad. A. H. M.

IDAHO.

WOOD RIVER DISTRICT.

The prospecting season is drawing to a close, and in the various portions of the district the fall of snow has stopped any outside work, and freighting has almost entirely ceased. It is expected, however, that work will be continued on many of the prominent mines. From Belleville, a correspondent reports to the *Salt Lake Tribune* that a mill will be in running order at Sawtooth City on the first of January.

MICHIGAN.

The *Houghton Mining Gazette* publishes the following returns of production of copper for the month of September:

	Tons.	Lbs.
Calumet & Hecla	1,640	560
Quincy	404	1,880
Franklin	135	52
Pewabic	104	880
Allouez	65	1,110
Hancock	35	335

The *Northwestern Mining Journal* has the following for October:

	Tons.	Lbs.
Quincy	405	1,880
Franklin	135	184
Pewabic	104	1,790
Allouez (one head idle two weeks)	65	1,110
Hancock	35	335

The product of the above-mentioned mines from January 1st to October 3d, 1881, is as follows:

	Tons.	Lbs.
Allouez	807	965
*Atlantic	1,488	1,933
Franklin	1,322	1,392
Pewabic	836	441
Quincy	2,006	1,470
Hancock	361	1,615

* Estimating October product at 160 tons.

The *Marquette Mining Journal* says: The following table exhibits, in gross tons, the total lake shipments of iron ore the present season, up to and including November 2d, together with the amount shipped during the corresponding period last year:

Where from.	1880.	1881.
Escanaba	1,084,992	1,335,743
Marquette	600,533	661,650
L'Anse	51,779	52,602
Total	1,746,309	2,049,995

An increase of 303,686 gross tons.

MONTANA.

GAGNON.—The *Butte Daily Miner* says: Stopping is going on, as before reported, between the 225 and 300-foot levels, the ore if any thing looking better than it did a week ago. The Belk litigation in the Supreme Court of the United States is not yet concluded, the case not having been reached for trial when last heard from, a day or two ago. When this matter is put at rest, it is quite likely that the owners of the Gagnon will erect a smelter and concentrator of their own. As the ore is now taken to the smelter, the dress and zinc reduce the assay so much lower than the real outcome would be, if smelted by the owners without separation, that it will be profitable to them to build their own concentrator and smelter.

NETTIE.—The hoisting-works of the mine were burnt down recently.

NEVADA.

BATTLE MOUNTAIN DISTRICT.

The following is a series of dispatches to the mining associated press: During the past week, the forces on the Eagle and Lookout mines have been increased. The Highland Chief has started up and sinking has been begun. In the Starr-Grove mine, every thing is going on splendidly, and all portions of the mine are looking well. The incline shaft is down on a fine body of sulphurets, and the different drifts show increased quantity of high-grade ore. Good progress has been made in the different workings of the Chloride mine. The ledge in the upper tunnel never looked half so well as at present. A large quantity of high-grade ore is now ready for the stamps. The Governor Kinkead is looming up, and its ore-channel has improved. The tunnel is advancing at the rate of three feet per day. The Betty O'Neal Company has leased the Eagle mill to enable it to turn its large pile of fine ore into bullion. The Eagle mine is showing good ore. The contractors have struck the main ledge, and are now ready for stopping. They have completed their contract for running 300 feet of the tunnel, and now the company will take hold of the work in this tunnel. The new shaft is advancing finely, and some rich ore has been encountered. The new 40-stamp mill is expected to start up on the 30th of November.

THE COMSTOCK LODGE.

The following is the weekly summary of the *Gold Hill News*, dated November 2d: The north end has presented no new features since last report. The work carried on there is the same as heretofore. The cross-cut from the Gould & Curry and Best & Belcher shaft is reported on the street to be in very interesting ground. The fight for control of Gould & Curry will doubtless cause it to be the center of attraction until after its annual election, which occurs the latter part of December. It appears that an attempt is making to "bull" Savage stock. There is good groundwork for such an operation—the daily extraction of 50 tons of ore and the stopes improving in appearance. Bullion has started work, which will add to the working force on the Comstock. The repairs to the Consolidated Imperial machinery are completed, and work will be resumed in that mine and the Alpha to-night. There are rumors current of an improvement in Overman, but Superintendent Forman stated to a *News* reporter yesterday that the street appeared to be wiser than himself.

EUREKA DISTRICT.

The *Eureka Sentinel*, under date of November 3d, prints the following account of an important sale of mining property on Mineral Hill, in that district: The property sold consists of the Austin mine, Spencer and North Pole Consolidated, Great Republic and Troy Consolidated, a 15-stamp mill, water-rights, wood ranches, assay-office, and buildings of various kinds. The owners were John Spencer, John Crumbie, John McCabe, William Fleming, and Amos and B. L. Plummer. The purchaser was H. G. Catlin, of Elko, at present, but whose main headquarters are in New York. The price paid was \$140,000. Mr. Catlin bonded the property in May last, the bond expiring November 1st. On the day last named, the parties met in Eureka, and, as above stated, the sale was concluded.

METALLIC EQUATOR.—The *Candelaria True Fissure* reports that work on this mine, which has been idle for a year, will be resumed.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Nov. 11.

The business of the past week, although only aggregating 700,181 shares, represents even a larger amount of money than in many weeks of the past when there was a much higher aggregate of shares. It stands for a large business in the higher-priced stocks, and indicates the appreciation of the public in the properties with a represented value. The only discouraging feature is, that prices have all had a downward tendency, and the public, which is generally a buyer, is a large loser. The worst feature of the market is a further decline in the State Line stocks, which has a very demoralizing effect.

The Tuscarora stocks continue to show but little value and to receive but little attention.

The Comstock shares are neglected, as compared with a few weeks past. California, with a business of but 8850 shares, declined from 75@65c. Consolidated Virginia has ranged between \$2.30@2.20, with sales of 8360 shares. There have been quite a number of other mines of this lode represented in the dealings, but the transactions have been unimportant, and prices generally weak.

The Bodies have been quiet. The dealings in Bodie Consolidated amount to 1340 shares, declining from \$6 1/2@5 1/2. We suppose this is the "deal" that has been so long promised in this stock.

Chrysolite has had a moderate business at \$5 1/2@ \$6 1/2. Excelsior has developed some activity and strength. The sales amount to 2250 shares at 13c. @ \$1.50. To-day, 30 shares of Gold Stripe sold at 50c. Green Mountain has been very active but weak; the sales aggregate 15,850 shares at \$3.60@2 1/2@3.05. Hibernia, under a moderate business, has been weak at 31@27c. Horn-Silver has ranged between \$16@17, with sales of 1020 shares. Iron Silver has been moderately active but weak, the sales amounting to 14,350 shares at \$2.15@1.90.

Moose, although fairly active, has been weak at \$1@80c. Northern Belle has ranged between \$12 1/2@14 1/2, with sales of 1435 shares. Robinson Consolidated records a business amounting to nearly \$1,000,000 at a decline and final slight recovery. The sales aggregate 98,061 shares at \$12 1/2 @9@10 1/2. This is the largest business ever done in one mining stock in one week in this market. Stormont has ranged between \$2.15@2 1/2, with a small business.

Boulder Consolidated has declined to 6c. Bradshaw declined from 89@76c., with sales of 2700 shares. Oriental & Miller was quite active and weak; the sales amount to 61,500 shares at 77@59c. Silver Cliff has joined in the general weakness, and declined from \$3.05@2.80 on sales of 2550 shares. South Pacific concluded to be marked up to \$11.50 to-day, as against \$6 1/2 on Saturday, with sales for the week of 21,385 shares.

The value of the State Line properties has been dependent on the will of a "pool." The "pool" apparently has seen fit to let values take care of themselves. Sales of Nos. 1 and 4 aggregate 24,400 shares, declining from 65@50c. Nos. 2 and 3 record sales of 136,000 shares, declining from \$3.55 @2.10.

In our summary of the annual report of the Chrysolite Silver Mining Company, the following sentence was made, by an accidental misplacement of quotation-marks, to appear as a literal extract from the report:

"With the mine still producing and good prospects ahead, and an estimated cash surplus of \$426,000 on October 31st, dividends may be kept up for several months, and in the mean time it is not improbable that new and important discoveries may be made that will enable the management to declare dividends which its conservatism will not permit it to predict."

This was our deduction from the facts officially given; but it should not have been printed as a quotation. We make the correction at the request of President Raymond, who is responsible for the report, but not for our comments upon it.

UNLISTED QUOTATIONS.

Mr. L. V. Deforest, No. 70 Broadway, under date of November 11th, 3 P.M., reports the current quotations of unlisted stocks as follows:

Table with 2 columns: Bid. Off'd. and Bid. Off'd. containing stock names and prices like Colum. & Beaver, Highland Chief, etc.

DIVIDEND-PAYING MINES.

Large table with columns: NAME AND LOCATION OF COMPANY, SHARES, ASSESSMENTS, DIVIDENDS, HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE. Rows include Alice, Mon., Argenta, Bar & Walker, etc.

* Non-assessable. † The Deadwood mine paid in dividends, previous to the consolidation, \$275,000, and the Golden Terra paid \$75,000.

SALES.—Alice, 500; Amie Consolidated, 4300; Argenta, 200; Barbee & Walker, 200; BeBe Isle, 200; Bodie Consolidated, 1340; Breece, 1000; California, 3850; Chrysolite, 5400; Climax, 100; Consolidated Virginia, 836; Copper Knob, 31,800; Dunkin, 100; Eureka Consolidated, 232; Excelsior, 2250; Father de Smet, 200; Findley, 1000; Gold Stripe, 30; Grand Prize, 500; Green Mountain, 15,850; Hibernia, 24,100; Homestake, 100; Horn-Silver, 1020; Hukill, 1000; Independence, 450; Iron Silver, 14,350; Leadville Consolidated, 40; Little Chief, 520; Moose, 14,700; Navajo, 400; Northern Belle, 1435; Ontario 250; Ophir, 430; Quicksilver, Preferred, 3800; Common, 5950; Rising Sun, 4900; Robinson Consolidated, 98,061; Sierra Nevada, 1175; Silver King, 100; Spring Valley, 600; Standard, 335; Stormont, 1330; Tip Top, 400; Yellow Jacket, 10. Dividend shares sold, 364,516.

DIVIDENDS.

The Ontario Silver Mining Company has declared its 73d regular monthly dividend of 50c. per share, payable on the 15th inst. Transfer-books close on the 10th.

The Evening Star Mining Company has declared a dividend of 50c. per share, payable on the 12th inst. Transfer-books close on the 9th.

The Deadwood-Terra Mining Company has declared a dividend of 15c. per share, payable on the 21st inst. Transfer-books close on the 15th.

The Silver King Mining Company, Arizona, has declared a dividend of 25c. per share.

The Christy Mine and Milling Company, of Utah, has declared a dividend of 10c. per share for October.

The Northern Belle Mining Company has declared its usual dividend of 75c. per share.

The Idaho Mining Company, Grass Valley, Cal., has declared its usual dividend.

REVIEW OF THE SAN FRANCISCO MARKET.

But little change is observed in the quotations of mining shares on the San Francisco market. The leading stocks have been fairly maintained during the business of the week, and in many instances a slight advance is noticed. Judging, however, of the actual condition of the mines from the published

statements as contained in the local press, and comparing such statements with those published a year or more ago, we can not but feel that the same uncertainty regarding the value of the principal mines of the Comstock hangs over them now as then, notwithstanding the enormous sums paid in by stockholders during this time for development and prospecting purposes, nearly \$1,000,000 being called for in November alone. The following dispatches received during the week are appended as being of interest:

SAN FRANCISCO, Nov. 9.—At the annual election of the Western Company on Monday, its consolidation with the Sulphuret and Flora Morrison companies, under the name of Contention, was effected. The new corporation has 250,000 shares; the Western stockholders receiving 200,000, the Flora Morrison stockholders 32,000, and the Sulphuret stockholders 18,000 shares. The Western Company will wind up its affairs and go out of existence. To that end it has already declared a dividend of \$1 per share. Another and final one will follow as soon as the bullion on hand and coming forward is sold.

The Savage mine is reported to be improving, both in the Sutro Tunnel level and the 1100 level. The drill going east on the 2900 level of Ophir and Mexican has reached clay which it could not penetrate. Something valuable is expected when the drift passes this point.

The east drift of Yellow Jacket on the 3000 level is passing into softer ground.

Nov. 10.—The dumps at the Savage mine are full of low-grade ore, awaiting the completion of repairs to the Santiago Mill on the Carson River. The water in the Bullion shaft is being reduced 40 feet

NON-DIVIDEND PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, NUMBER OF SHARES, Par., ASSESSMENTS, HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (Nov. 5, 7, 8, 9, 10, 11), and CLOSING QUOTATIONS (Nov. 4, 5, 7, 8, 9, 10, 11).

SAN FRANCISCO MINING STOCK QUOTATIONS. Daily Range of Prices for the Week.

Table with columns: NAME OF COMPANY, CLOSING QUOTATIONS (Nov. 4, 5, 7, 8, 9, 10, 11), and Open ing. Nov. 10, 11.

tion of the market for Lake Superior copper stocks. There is very little doing in them, but prices for the best mines are very well sustained, and until another advance in iron-got copper takes place, we do not look for any degree of activity or material advance in quotations. The silver stocks dealt in at the Stock Exchange have ruled dull, and sales confined to a few specialties. At the Mining Board, there is more doing, business being confined entirely to mining shares, and a few favorite stocks are very active under manipulation of the parties in interest, and higher prices are recorded. Calumet & Hecla declined from \$224 on small sales, to \$221, but rallied to \$224, and closed \$224 bid. Quincy rallied at one time to \$42, but on reports of an explosion at the mine, declined to \$41, at which it was offered at the close. Osceola advanced \$4, with sales at \$20 3/4. Franklin, but one sale reported for the week, of 100 shares at \$12 1/2 regular, and \$12 1/2 buyer 60. Pawabic holds steady at \$13, with sales of 200 shares only. The remainder of the list is without feature, with the exception of Ridge, which advanced from \$3 to \$4, closing \$4 bid. Alouez sold at \$3.

In the silver stocks, Silver Islet declined from \$35 3/4 to \$30; Harshaw, from \$53 1/2 to \$5; Sullivan, steady at \$3. An assessment of 25 cents per share has been levied on this stock, and sales to-day, assessments paid, were at \$3 3/8. Bonanza, dull at \$5 1/2 to \$5. Catalpa declined to \$7, and Crescent to same price. At the Mining Exchange, Milton has been the leading favorite, and continues to steadily advance, showing a wide margin between cash and buyers' option, sixty days. Sales aggregate about 50,000 shares at a range \$1.06 to \$1.21 regular and \$1.22 to \$1.33 buyer 60. There is said to be a large short interest in the stock, and higher prices are looked for. Twin Lead has been quiet this week and further declined to 47c, closing 48c bid. Deer Isle dull and a little heavy, although every thing from the mine is favorable; price has ranged from 85 to 90c. Massachusetts & New Mexico declined from 23 to 20c, which is bid. Cedar Spring continues to gain steadily in favor and price, advancing from 82 to 86c.

3 P. M.—At the afternoon Board, Silver Islet took one of its famous jumps from \$30 to \$40. Only about 300 shares were sold, and the stock closed strong at \$39 bid, \$41 asked, the rest of the list unchanged. At the morning Board, Milton, Cedar Spring, Deer Isle, and others were more or less active, and prices generally well sustained.

Gas Stocks.

The following list of companies in New York and vicinity is corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 17 Wall street, New York. Quotations are based on the equivalent of \$100.

Table with columns: COMPANIES IN NEW YORK AND VICINITY, Capital Stock, Par., DIVIDENDS (Rate per an., Am. of last, Date of last), and QUOTATIONS (Bid, As'd).

SALES.—Albion, 80; Alta-Montana, 200; Barcelona, 1000; Bear Creek, 600; Bechtel Consolidated, 400; Best & Belcher, 500; Big Pittsburg, 100; Black Jack, 500; Boston Consolidated, 800; Boulder Consolidated, 800; Bradshaw, 2700; Buckeye, 100; Bull-Domingo, 500; Bulwer, 110; Brea and Bye, 700; Calaveras, 2000; Calaveras W. & M. Co, 700; Carbonate Hill, 380; Central Arizona, 50; Cherokee, 1100; Consolidated Imperial, 200; Consolidated Pacific, 100; Crowell, 2100; Dahlonega, 1800; Dunderberg, 200; Durango, 100; Enterprise, 100; Goodshaw, 1200; Graniteville, 1500; Index, 4400; Lacrosse, 790; Legal Tender, 300; Leviathan, 2500; Maiposa, Common, 100; Mayflower, 500; Mexican, 450; Mineral Creek, 11,700; Miner Boy, 17,800; Noontday, 100; Oriental, 100; Pacific Consolidated, 200; Rappahannock, 1800; Red Elephant, 2700; Silver Cliff, 250; Silver Nugget (old), 500; Silver Nugget (new), 600; Sonora Consolidated, 200; South Hite, 300; South Hite, 500; State Line No. 1, 400; State Line Nos. 1 and 2, 400; State Line No. 2, 130,000; Sutrö Tunnel, 450; Taylor-Plumas, 2300; Tloga, 100; Tuscaraora, 600; Unadilla, 5500; Union Consolidated, 450; Vandewater, 15,800; Washington, 300; Utah, 50; North State, 28,850; Alta, 300; North Horn-Silver, Preferred, 1500. Non-dividend shares sold, 455,953. Total shares sold at all the exchanges, 700,181.

per day. It is expected that the bottom will be reached in five days.

The diamond drill run east from the Union Consolidated shaft on the 2700 level has demonstrated the fact that the water will not interfere with the work.

The east drift on the 2300 level of Ophir and Mexican is rapidly advancing toward the soft vein and clay region which recently baffled the drills.

The strike reported in Northern Belle is not reflected in the quotations, the stock closing yesterday somewhat lower.

Coal Stocks.

New York, Friday Evening, Nov. 11.

There has been a comparatively small business trans-

acted in these stocks during the week past. Prices have been uniformly steady. The sales include 83,270 shares Delaware, Lackawanna & Western at \$127 1/2 to \$128 1/4, 6070 shares Delaware & Hudson at \$109 1/2 to \$111, 32,055 shares New Jersey Central at \$95 1/2 to \$97 1/2, and 17,000 shares Reading at \$67 1/2 to \$68 1/2.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

Boston, Nov. 10.

There is no change for the better to report in the condi-

BULLION MARKET.

Friday Evening, Nov. 4.

Table with columns for DATE, London, N. Y., and Pence/Cents. Shows bullion prices for Nov. 5, 7, 8 and Nov. 9, 10, 11.

BULLION PRODUCTION FOR 1881.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported.

COAL STOCKS.

Table of Coal Stocks with columns for NAME OF COMPANY, Capital Stock, SHARES, and Quotations of New York stocks. Includes companies like Am. Coal Co., Col. C. & I., Ches. & O. RR., etc.

Total Sales... 188,239. *Of the sales of this stock, 12,127 shares were in Philadelphia and 17,000 in New York.

PHILADELPHIA MINING STOCKS.

Table of Philadelphia Mining Stocks with columns for Nov. 3, 4, 5, 7, 8, 9 and Sales. Includes companies like Aetna, Alonzo, Algonquin, Am. Con, Argent, Atlanta, Aztec, Battle Mt., B. Sulphuret, Buena, Bunker Hill, Cincinnati, Compromise, Con. Virginia, Crown, Crown Virginia, Del Monte, Dauntless, Den. City Con., Eureka Con., Fairview Con., Flora Morrison, Girard, Golconda, Golden Age Group, Gov. Group, Grand Trunk, Grand Union, Gun. Imp. Co., Hancock, Hibernia Con., Homestake, Iowa Gulch, King Bullion, Lit. Diamond, Little Maud, Long & Derry, Mollough, Monitor, Mt. Lincoln, Mt. Sheridan, National, Orion, Palmetto Ex., Pembina, Penn Breck, Permanent, Pizarro, Pizarro Exten, Rara Avis, Rara Avis Ex, Rico Pioneer, San Pedro, Silver Cord, Silver Plume, Silver Rock, Standard, Sovereign, Sultana, Sutro Tunnel, Tombstone, Victor, W. Ontario, Western Union.

Table of Mines with columns for States, For the week, Month, and Year from Jan. 1st, 1881. Lists various mines and their production values.

Total amount of shipments to date... \$30,705,520

* Official. † Net. G. Gold. S. Silver. L. Lead.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended November 4th, as compiled from various sources, amounted to \$359,787.47, as against \$322,319.41 reported for the previous week.

Exports of Gold and Silver from New York.

Table showing exports of gold and silver from New York for the week ending November 5th, corresponding week last year, since January 1st, and corresponding period last year.

Foreign Bank Shipment.—The weekly statement of the Bank of France shows an increase of 10,675,000 francs gold, and a decrease of 2,525,000 francs in silver.

perial Bank of Germany shows an increase in specie of 2,740,000 marks. Imports and Exports of Specie.—The imports of specie for the week ended November 5th amounted to \$1,493,084, against \$754,572 for the same period in 1880, and the total imports of specie since January 1st have been \$53,804,929, or \$3,309,429 in excess of the imports for the same period in 1880.

METALS.

New York, Friday Evening, Nov. 11.

On the whole, the week under review has been a quiet one. There is a growing scarcity in some metals, which is partly due to natural and partly to artificial causes. It is becoming evident more and more, however, that the supplies held by consumers have been depleted by active trade, and the future course of the markets is the subject of much comment.

Copper.—Business during the week has been only limited, and though quiet, the market is firm, 18c. being offered and 18 1/2c. asked, which we quote. As the close of the year is approaching, when existing contracts of the Lake companies with the principal consumers terminate, the situation is very carefully watched by both parties. The companies who now practically control the market claim that they have now hardly enough stock to last during the winter season, and that they will probably be forced to bring on supplies toward its close by rail. It is stated that they have practically refused to entertain any export orders. But it is argued against any rise in the near

BOSTON MINING STOCKS.

	Nov. 3.		Nov. 4.		Nov. 5.		Nov. 7.		Nov. 8.		Nov. 9.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Adrie Con	1.03				1.05		1.04				1.05		1,500
Allouez							3.00						43
Ariz. Queen							.55						200
Atlantic													
Beacon Hill	1.06	1.04			1.06		1.06				1.10	1.06	2,600
Blue Hill													
Bonanza Devel.	5.00				5 1/4	5 1-16					5.00		1,400
Brunswick Ant'y	7.00	6.00	7.00										210
Cal. & Hecla	224.00		221.00	220.50	223.00		223.00				224.00		56
Catalpa			1.00								.93 1/2	.87 1/2	300
Cedar Springs	.90	.82			.92	.83	.92	.83			.93	.84	14,000
Central Arizona											1.45		600
Commonwealth Mica	1.45	1.40											5,500
Columbus Gold	1.12	1.09					2.10	1.10					
Copper Falls													
Copperopolis	2.13	2.10			2.11		2.14	2.11			2.27	2.15	3,900
Crescent					.93 1/4								100
Crystal Mica													
"Cusi"													
Dana													
Deer Isle	1.10	.87			.90		.85	.84			.90	.84	6,000
Douclass							1.12 1/2	.75			1 3-16		600
Duncan													
Dunkin	.40				.40								1,300
Edgemoggin	.50				.50						.50	.40	6,000
Empire	.30				.30								800
Eureka Tunnel							12.25	12.00	12.50	12.25			400
Franklin							.56				.55	.54	300
Galena Hill, pref.							.54		.55	.50	.55		3,108
Gem													
Golden Development													
Gouldsboro'											.25		500
Granger	.04												600
Harshaw											5.00		200
Hopewell Mang.	.75	.66			.73	.67	.78	.68			.79	.71	10,900
Huron													
Indian Queen													
Mammoth Copper	.46	.45			.50	.49	.51				.52		800
Mascot													
Mass. & N. Mex.	.22	.21			.21		.22	.21			.21	.20	11,800
Mendocino													
Mesnard													
Milton	1.25	1.06			1.26	1.03	1.30	1.15			1.33	1.19	41,600
Napa													
National													
No. Castine													
Osceola											.26 1/2		15
Peabody	.63	.62			.63	.62	.63	.62			.63	.62	4,000
Pewabic	13.25	13.00	13.00				13.00						600
Pine Tree													
Plymouth Gold							.30						400
Port & Sullivan					.54								200
Quincy	41.00		41.00		41.75	41.25	42.00	41.50			41.00		559
Ridge							4.00						25
San Pedro			1 3/4	1 1/4							1 1/2	1 1/4	2,150
Silver Hill													
Silver Islet					35.00	34.00					32.00		160
Silver Lake													
Simpson Gold	.06					.08	.08				.09		3,000
Sullivan							3.00	2.50			3 1/4	2 3/4	436
Sycamore					1.00								400
Titus Cons											.25		500
Tremont Silver													
Twin Lead	.51	.47			.50	.47	.51	.48			.71	.48	48,400
Young Hecla													

Newark lead at 5 1/2 @ 5 1/4 c., which is the price for refined lead.

The receipts of lead at St. Louis via the St. Louis & San Francisco Railroad for the week ended October 31st were 306 tons.

Spelter and Zinc.—Transactions are limited, the scarcity of the article continuing. We quote 5 1/2 c. for domestic Spelter and 7 1/2 @ 7 1/4 c. for Sheet-Zinc.

Antimony.—The market remains quiet at 14 @ 14 1/4 c. for Cookson, and 13 1/4 c. for Hallett's.

Quicksilver.—The San Francisco Commercial Herald of November 3d says:

The export demand is light, and the local requirement small; price, 41c., with limited transactions.

The exports of quicksilver by sea from January 1st to November 1st were as follows:

To	Flasks.	Value.
China	13,181	\$375,937
Mexico	12,910	380,332
Australia	9 0	28,115
New York	300	9,000
South America	720	21,124
Japan	315	9,504
Panama	175	5,236
New Zealand	89	2,654
Central America	138	4,088
British Columbia	14	395
Bombay	10	287

Total..... 28,812 \$834,670
Same time in 1880..... 27,413 820,336

Increase this year..... 1,399 \$16,334

The shipments by rail for the first nine months aggregate 9090 flasks. The receipts from January 1st to November 1st amount to 44,331 flasks, and for the same time in 1880, 44,290 flasks.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 11.

There is a very fair amount of business doing in iron, although makers show no anxiety to sell. The closing of navigation will probably tend to make business quieter for a time, but the favorable rates which have ruled for several years for railroad freights during the winter months tend to make consumers reserve a certain blank to be filled during that season. Should this lull occur, it will probably be followed by a period of activity, which will advance prices to a higher point than they have been for months.

An important question in the future of the iron trade is labor. Already advances of wages are made, and there is no knowing what further ones will have to come.

American Pig.—The only business we learn of is sales of 8000 tons of No. 2 Foundry and Forge iron, of a leading make, at prices equal to \$22.50 and \$23.50 respectively, at tide-water. The leading furnace companies are well sold ahead, and there is no disposition to force business. On the other hand, many consumers buy as sparingly as possible, with the hope of purchasing at lower prices. We quote No. 1 Foundry at \$25@26; No. 2 Foundry, \$22 1/2 @ 23; and Forge, \$20@21.

Scotch Pig.—The arrivals are small and fully absorbed as they come. The stocks are very light. The sales for the week amount to 500 to 600 tons. Glasgow prices are practically unchanged, while freights for December by steamers have all been absorbed at 15s. We quote Eglinton at 23 1/2; Coltness, 26; Glengarnock, 24 1/2 @ 25; Gartsherrie, 25; and Summerlee, 25 1/2. English iron has become very scarce.

Messrs. John E. Swan & Brothers, of Glasgow, under date of October 28th, report 106 furnaces in blast, as against 118 at the same time last year. The quantity of iron in Connal & Co.'s stores was 607,428 tons, an increase of 5086 tons for the week. The shipments show a decrease since Christmas of 97,510 tons, as compared with the shipments to the same date in 1880. The imports of Middlesbrough pig-iron for the same period show an increase of 36,201 tons. The following were the quotations of the leading brands of No. 1 pig-iron: Gartsherrie, 59s. 6d.; Coltness, 60s. 6d.; Langloan, 61s. 6d.; Summerlee, 60s.; Carnbroe, 54s.; Glengarnock, 52s. 6d.; Eglinton, 52s. Middlesbrough pig-iron was quoted as follows, f. o. b.: No. 1 Foundry, 46s.; No. 2, 44s.; No. 3, 42s.; No. 4, 41s. 6d.; No. 4 Forge, 41s.

Rails.—The sales of American steel rails for the week have amounted to about 20,000 tons for delivery between January and July. American for immediate delivery are quoted at \$62@62 1/2; for next year at \$60@62 at mills. Foreign are worth from \$61@62, but, owing to the scarcity of freights, prompt delivery can not be depended upon. There is a large inquiry for iron rails, which will probably result in

future, that the strong Lake companies must oppose it to secure future co-operation of the smaller mines. On the other hand, manufacturers are making efforts to impress those in control, and 100,000 pounds were offered at 18c., a quantity which was taken by a strong producer.

Our London advices by mail include October 28th, from which we take the following:

Oct. 24th. A moderate business done to-day and on the 22d. Prices quite nominal.

Oct. 25th. The lower prices bring about a more active business. Sales at £62 cash and short prompt, £61 1/2 seller's option to deliver between November 8th and January 1st, and £63 for three months fixed.

Oct. 26th. Market firmer. Sales at £62@£62 1/4 cash for g. o. bs.; for forward metal £62 1/4 @ £63 1/4 according to terms and prompt.

Oct. 27th. Good business in g. o. bs., at £62 1/4 @ £62 1/2 cash, £63 @ £63 1/4 three months.

Oct. 28th. Large business and firm prices. Sales at £62 1/2 cash, and £63 1/2 to arrive or in three months. Wallaroo quoted at £69@£70; Burra, £68@£69; English Tough Cake, £66 1/2 @ £68; Select, £68 1/2 @ £70.

Tin.—The speculative element on both sides of the Atlantic seems to be still at work; and during the week, from 400 to 450 tons of Straits and Australian were taken for foreign account at prices ranging from 20 1/2 c. down to 20 1/4 c., and recovering to 21c., which is now asked. The London market has advanced during the week from £97 5s. to £99 cash, and from £98 to £100 for futures.

Our London mail advices include October 28th, from which we take the following:

Oct. 24th. A fair amount of business done to-day and on the 22d. Sales of about 250 tons at 97 1/2 @ 97 3/4 s. sharp cash; 97 1/2 @ 97 3/4 s. fourteen days; 97 1/2 @ 98 1/2 s. one month; and 98 1/2 @ 98 3/4 s. three months. Some three months' transactions took place with the

option of purchasers to double the quantity on call day.

Oct. 25th. Sales about 200 tons, chiefly cash, at 97 1/2 @ 97 3/4 s. sharp payment; 97 1/2 @ 97 3/4 s. fourteen days; 98s. one month; and 98 1/2 s. three months

Oct. 26th. Sales about 150 tons, mostly with buyers option to call for double the quantity at 100s., and the balance at 97 1/2 @ 97 3/4 s. sharp payment; 97 1/2 s. fourteen days; and 98 1/2 @ 98 3/4 s. three months.

Oct. 27th. Quiet and lower. Sales at 97 1/2 @ 97s. immediate payment, 97 1/2 @ 97 1/4 s. usual fourteen days.

Oct. 28th. Quiet. Sales at 97s. sharp cash, 97 1/2 s. fourteen days; 97 1/2 s. one month; 97 1/2 s. eight weeks; and 98 1/2 @ 98 3/4 s. three months.

Tin Plates.—Though quiet in a large way, they are quite strong. We quote per box as follows: Charcoal tin, Melyn grade, 1/4 cross, \$6 1/4; Allaway grade, \$5 1/2 @ \$6. Charcoal Roofing, Dean grade, \$5 1/2 for 14 x 20, and \$11 1/2 for 20 x 28; Allaway grade, \$5 1/4 for 14 x 20, and \$11 @ \$11 1/4 for 20 x 28. Coke Roofing, B. V. grade, \$5.15 @ \$5 1/4 for 14 x 20, and \$10 1/2 for 20 x 28. Coke tins, B. V. grade, IC, \$5.20; and ICW, \$4 1/4 @ \$5.

Messrs. Robert Crooks & Co., of Liverpool, under date of October 7th, says of tin and terne plates: Continued reports from New York of under-selling there have had a most depressing effect, and buyers for the greater part have held off. This has made needy holders more pressing, and even the firmness of material has not prevented a further decline, though it has stopped the decline from being other than quite trifling, and any movement in the United States will cause a sharp reaction.

Lead.—Nothing but a jobbing business is doing; 1100 tons of Richmond lead, now unloading here, are being pretty well distributed among all the larger consumers. The quotations are nominally 5c. for common, and we hear of occasional sales of

business, but we do not learn of any thing worth mentioning having been done since our last. We quote American rails at mills at \$49@50, and foreign at \$47½@49 here.

Old Rails.—There has been a business of several thousand tons of Ts. at \$28½@29, closing at \$29 asked. D. Hs. have been quiet and are quoted at \$32.

Wrought Scrap.—This article is in short supply. The inquiry is good, although we do not learn of important sales. Yard scrap is quoted at \$31@33, while from ship about \$29 is asked.

Philadelphia. Nov. 11.

The iron market is strong throughout. Current production is absorbed in deliveries contracted for, and there is no accumulation of stocks of any moment for future contingencies. During the week, inquiries for Pig were answered at \$21 for Gray Forge at furnace, \$23 for XX, and \$26 for No. 1 Foundry. The market is not liable to fluctuations from domestic causes, as three months' consumption is provided for, and during that time new factors may arise. Some parties hold good Forge Irons at \$21.50@22. Wages have been advanced at a few more furnaces. Bessemer Pig is dull at \$25.50, spring delivery. Three round lots of Steel Blooms are under negotiations, but fluctuating freight rates and exacting terms of holders check business. There is just now a great deal of inquiry for foreign material, and but little present probability of shipments. Steel Blooms, Bessemer Pig, Old Rails, Steel Rails, and Iron Rails are wanted in large amounts; but buyers do not seem to be in such urgent need as to agree to pay holders high figures. The steel-rail mills have done very little business for thirty days. Meanwhile, new enterprises are blossoming, and inquiries are being returned with quotations and dates of delivery, which oblige buyers to turn to foreign mills. Galveston and New Orleans deliveries were quoted to-day at \$65, but less has been taken. No orders for shipment to Atlantic ports have gone out recently. The iron mills are all busy, but the orders are small and prices high. Three or four mills are filling contracts on Northern Pacific work. The advance of old rails has stopped all business, and they will be scarce until ocean freights decline or until the home roads can get time to haul in rails which have been taken up the last three months. The Merchant mills are selling at 2½c., and are as afraid of the consequences of higher rates as they were six months ago of lower rates. The storekeepers report orders still leading supply, notwithstanding the increased output. The sheet mills are wrestling with demand, and report capacity sold up toward spring. Structural iron quotations are 3¼c. for Angles, 4c. for Beams, 4½c. for Channels and Ts. Orders are booked at these figures, and the prospects for a busy winter are assured. Plate-iron mills are very busy, and the orders for the past week are up to the average. Quotations, 3½c. for Tank, 4c. for Refined, 4½c. for Shell, 5@5½c. for flange. Consumers are ordering for winter requirements with confidence. Nails are in fair demand at \$3.30.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 11.

Anthracite.

There is still a very good demand for this class of coal, but the necessities of the dealers and consumers are not so great as they were for two or three weeks past. Stove and chestnut sizes are still in short supply. Other sizes are in sufficient supply to meet requirements, but not excessive. Prices are very well maintained. There is nothing yet to indicate an early falling off in the demand, although it is very probable that it must be curtailed by the first of the month. The production last week was not nearly so large as it has been for some weeks past. The difficulty which was experienced in obtaining the necessary supply of water has now been overcome by the recent rains, and the production is not likely to be affected on this account. Vessels are by no means abundant, and freights are a shade firmer. The demand from the West continues to be very large, while the supply of cars shows but little if any improvement.

The production of anthracite coal last week was 568,691 tons, as compared with 662,070 tons the previous week, and 504,833 tons the corresponding week

of 1880. The total product from January 1st to November 5th was 23,541,225 tons, as against 19,576,972 tons for the like period of last year, showing an increase this year of 3,964,253 tons.

The Philadelphia Ledger of November 7th, says:

We continue our caution to coal consumers not to postpone laying in a good winter's stock of coal; the trade is liable to many contingencies, and all these this year are against the consumers, with none indicating lower prices for coal, which is the only contingency that can favor the consumer. If the winter shall open early and with seeming severity, with comparatively little stock of coal on hand, there will no doubt be a bounce in prices, which may increase until far into the new year. It is remembered that the stock of coal has steadily lessened for five or six weeks, and the orders for coal have more than doubled. This order of things widens the relative sides of the situation very much, and points very conclusively to a scarcity of coal and very surely to higher prices. The coal outlook is very encouraging to those in the trade, an equally threatening to those who may require coal all through the winter and in the early spring. Independent of the very low stock of coal, it is to be remembered that the furnace demand for coal is likely to be more than usually large. All branches of the iron industry are said to be actively employed in carrying forward the large contracts in hand, and in many instances foundries, rolling-mills, and furnaces are taxed to their utmost capacity in supplying the large demands that coal operators have had made upon them; but, as far as the transactions of fresh business is concerned, trade generally presents a quiet appearance. This is the natural result of circumstances, and not by reason of any falling off in the demand for material, new or old, manufactured or raw.

Our Philadelphia correspondent, writing under date of November 10th, says:

The condition of the trade here is almost a famine for certain kinds of coal, particularly stove. Broken and pea are dull, but the demand for the other sizes continues quite active. Vessels have been very scarce, and continue so for points beyond the Cape. But for the scarcity of coal, freights would rise rapidly. Even as it is, there is an upward tendency; \$1.80 below bridges is paid for large vessels to Boston, and as to small, light-draught vessels, a fleet of them could secure \$2 and more. Most of the captains want to go South, and freights in that direction are a little off from what they have been for more than a month past.

Bituminous.

There is a much better demand for bituminous coal than there was a few weeks past. The supply is greatly curtailed, owing to a lack of transportation facilities. Upon the Baltimore & Ohio Railroad there is still a scarcity of cars. The Chesapeake & Ohio Canal has a better supply of water, but, owing to a scarcity of boatmen, the shipments have been largely increased. The Clearfield region and those Cumberland companies which ship by the George's Creek & Cumberland Railroad are experiencing a great scarcity of cars. The Pennsylvania Railroad has such an immense freight business that its motive power is quite inadequate to the requirements, and it will probably take some time to greatly increase the facilities offered to the coal companies. It is stated that the road will have thirty additional locomotives by the first of the year and sixty more by spring. This will give some relief, but not all that is required. It is difficult to name prices. We think, however, that a fair quotation is about \$5 alongside.

San Francisco. Nov. 3.

COAL.—The so-called retailers' combination, fathered and set in motion over a year ago by the Wellington Coal Company and associates to protect themselves from loss by reason of high freights from British Columbia, has finally succumbed by the action of the Seattle Coal Company and one or more city retail dealers who felt aggrieved by the workings of the combination and feeling its injustice to all householders who have for twelve months or more been compelled to pay fancy prices for all the coal they consumed. Imports continue large and free. Since our last, several cargoes of British coals have been sold en route at prices which show no improvement. The quantity here, afloat and loading, startles buyers, although ruling rates are very seductive to purchasers, being the lowest ever known here. If there should be any marked decline in outward grain freights, coal must relatively advance. Recent arrivals of Cumberland egg and lump have eased the market somewhat. For some time past, the press of this coast have been estimating the output of Mount Diablo coal. The actual receipts thereof for the first nine months aggregate 77,959 tons, against 117,519 tons received during the same period in 1881, and 95,446 tons in 1879, showing a decrease in the receipts this year, as compared with those of 1880, of 39,560 tons. The following table shows the amount received from each mine during the present year:

	Pittsburg.	Black Diamond.	Empire.
	Tons.	Tons.	Tons.
January	4,328	6,477	1,000
February	3,496	4,628	1,000
March	2,854	4,867	1,000
April	2,194	4,504	1,000
May	2,178	4,870	1,000
June	1,917	5,611	1,000
July	1,551	5,117	1,000
August	1,985	4,625	1,000
September	2,329	5,428	1,000
Totals	22,832	46,127	9,000

Imports for the week include the following: Cromartyshire from Cardiff, 2300 tons; Glenmore, 129 tons from Hamburg; Atalante from Shields, 776 tons; Ellerslie from Liverpool, 2000 tons; City of Delhi from same, 1645 tons; Drumpark, from Newcastle, N. S. W., 2165 tons; Munster from same, 2151 tons; Belle of Bath, 2300 tons Wellington; Brodick Castle, 2485 tons from Dundee; Hercules from Newcastle, N. S. W., 755 tons; Ella from Greenock,

1403 tons; Largo Law from Glasgow, 1890 tons; Corona from Cardiff, 873 tons coke; Victoria from Nanaimo, 1685 tons; Lizzie Williams, 1280 tons Seattle. The total imports for October were 14,898 tons, and for ten months 743,682 tons. We submit the following schedule of rates:

	Prices to arrive.	Spot rates.
Australian	\$6.12½ @ \$6.25	\$6.25 @ —
Liverpool Steam	5.50 @ 5.62½	6.62½ @ —
West Hartley	6.25 @ 6.27½	6.25 @ —
Scotch Splint	5.75 @ 6 —	5.75 @ —
Lehigh Lump	13 — @ 13.25	18 — @ —
Cumberland Bulk	10 — @ 10.25	12 — @ —
Egg Hard	11.50 @ 11.75	16 — @ —
Cardiff	6 — @ 6.12½	5.75 @ —

The imports of foreign coals during the month of October were very large, while from the Victoria, Coo Bay, and Departure Bay mines, combined, the receipts were only 12,753 tons. No shipments were received from the Carbon Hill mine, which has passed into the hands of the Railroad Company. The following table shows the imports of coal for the month of September, and the total for the first ten months of 1881:

From.	Month of October.	Ten months of 1881.
	Tons.	Tons.
Domestic (Eastern)	4,376	20,205
Australian	35,993	112,219
Coo Bay	1,000	18,704
Departure Bay	8,500	97,929
British Columbia	3,253	38,383
Seattle	13,390	121,219
English	34,314	141,025
Scotch and Welsh	32,342	94,675
Carbon Hill	—	12,640
Mount Diablo	8,500	86,453
Chili	230	230
Totals	141,898	743,682
Same time in 1880	83,562	492,511
Increase in 1881	58,337	251,071

The above receipts for the month of October include 2233 tons coke. The Great Western brings 2250 tons Carbon Hill to Central Pacific Railroad.—Commercial Herald.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ending Nov. 5th, and years from January 1st:

Tons of 2240 lbs.	1881.		1880.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co.	76,066	3,013,780	68,777	2,514,820
D. L. & W. RR. Co.	98,440	3,593,928	83,594	2,949,474
Penn. Coal Co.	38,024	1,183,578	27,181	936,069
L. V. RR. Co.	22,586	959,061	39,873	841,414
P. & N. Y. RR. Co.	2,445	84,917	882	33,025
C. RR. of N. J.	24,711	1,942,503	23,065	1,371,873
Penna. Canal Co.	15,160	403,630	12,838	424,601
	277,432	11,181,397	256,210	9,071,276
Lehigh Region.				
L. V. RR. Co.	102,300	3,775,475	75,108	2,880,358
C. RR. of N. J.	29,774	1,829,946	35,977	1,792,042
S. H. & W. B. RR.	—	10,426	—	9,015
	132,074	5,615,847	111,085	4,681,413
Schuylkill Region.				
P. & R. RR. Co.	146,031	5,829,103	119,806	5,027,892
Shamokin & Lykens Val.	11,900	860,795	17,035	756,795
	157,931	6,689,898	136,841	5,783,687
Sullivan Region.				
St. Louis & Sul. RR. Co.	1,254	54,083	697	30,586
Total	568,691	22,541,225	504,833	19,576,972
Increase	63,858	3,964,253		
Decrease				

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

Total same time in 1876	15,165,480 tons.
" " " " 1877	16,790,306 "
" " " " 1878	14,283,208 "
" " " " 1879	22,123,522 "

The Production of Bituminous Coal for the week ending Oct. 29th was as follows:

Tons of 2000 lbs., unless otherwise designated.	Week.	Year.
	Tons.	Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	46,877	1,757,004
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs	9,098	317,100
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	3,043	164,938
East Broad Top	1,811	68,826
Clearfield Region, Pa.		
Snow Shoe	2,737	98,413
Tyrone and Clearfield	55,024	1,948,434
Allegheny Region, Pa.		
Pennsylvania RR.	5,366	230,006
Pittsburg Region Pa.		
West Penn RR.	5,819	235,878
Southwest Penn. RR.	975	23,123
Leun & Westmoreland gas-coal, Pa.		
RR.	23,424	760,320
Pennsylvania RR.	14,303	549,565

The Transportation of Coke over the Pennsylvania Railroad for the week ending Oct. 29th, and year from Jan. 1st:

Tons of 2000 lbs.	Week.	Year.
	Tons.	Tons.
Penn. RR. (Allegheny Region)	1,884	80,504
West Penn. RR.	3,730	101,526
Southwest Penn. RR.	27,001	1,142,476
Penn. & Westmoreland Region, Pa. RR.	4,860	162,131
Pittsburg, Penn. RR.	5,325	468,775
Show Shoe (Clearfield Region)	329	10,007
Total	43,326	1,965,449

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OLNEY, ILL. Drs. MARSHALL & LONGACRE.

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	6	1/2	\$1.50	\$4.23	\$11.64	\$20.69	\$28.39	\$34.35
	9	1/2	2.25	5.81	15.84	27.65	37.71	47.17
	12	1	3.00	7.46	20.04	34.70	47.09	60.00
	15	1 1/2	3.66	9.28	24.49	42.42	57.49	73.55
	18	1 3/4	4.31	10.76	28.95	51.14	67.93	86.70
	21	2	5.00	12.44	33.41	57.86	78.42	100.05
	24	2 1/2	5.67	14.10	37.87	65.59	88.89	113.40
	27	3	6.20	15.58	41.85	72.48	98.23	125.32
	30	3 1/2	6.86	17.07	45.83	79.38	107.28	137.25
	33	4	7.45	18.55	49.81	86.28	116.33	149.17
1/4 Column	36	4 1/2	8.05	20.04	53.80	93.18	126.28	161.10
	39	5	8.58	21.37	57.38	99.38	134.68	171.82
	42	5 1/2	9.12	22.70	60.97	105.58	143.69	182.55
	45	6	9.66	24.03	64.57	111.78	151.49	193.27
	48	6 1/2	10.20	25.37	68.14	117.90	159.90	204.00
	51	7	11.17	27.79	74.64	129.27	175.19	223.51
	54	7 1/2	12.15	30.22	81.15	140.55	190.48	243.00
1/2 Column	57	8	13.05	32.46	87.16	150.96	204.58	261.09
	60	8 1/2	13.95	34.70	93.18	161.37	214.69	279.00
	63	9	14.84	36.95	98.84	171.17	224.97	295.95
	66	9 1/2	15.74	39.22	104.50	180.97	241.26	312.90
	69	10	16.51	41.95	109.96	191.42	255.03	329.25
	72	10 1/2	17.38	44.90	115.42	199.87	270.81	345.61
1/4 Page	75	11	18.09	45.01	120.83	208.28	283.55	361.75
	78	11 1/2	18.99	47.03	126.28	218.69	295.29	377.99
	81	12	19.72	49.07	131.77	228.19	309.19	394.45
	84	12 1/2	20.55	51.12	137.26	237.70	322.15	411.00
1 Column	87	13	21.41	53.26	143.02	247.68	333.67	428.25
1/2 Page	90	13 1/2	22.27	55.41	148.78	257.67	345.19	445.51
1/4 Page	93	14	23.79	58.93	157.37	271.55	361.55	463.27
Full Page	96	14 1/2	24.65	61.05	162.47	281.55	373.27	478.27

Double these rates for outside front, add 8 per cent for outside back page, and 50 per cent for page next reading matter.

DIVIDENDS.

DEADWOOD-TERRA MINING COMPANY,
18 Wall Street, New York, November 9th, 1881.

DIVIDEND NO. 12.

A dividend of thirty thousand dollars, being fifteen cents per share, has been declared for October, payable at the office of the transfer-agents, Wells, Fargo & Co., 65 Broadway, on the 21st inst. Transfer-books close on the 15th inst.
H. B. PARSONS, Secretary.

OFFICE OF THE ONTARIO SILVER MINING COMPANY, 18 Wall Street,
New York, Nov. 5, 1881.

DIVIDEND NO. 73.

The regular monthly dividend of FIFTY CENTS per share has been declared for October, payable at the office of the transfer-agents, Wells, Fargo & Co., 65 Broadway, on the 15th inst. Transfer-books close on the 10th inst.

H. B. PARSONS,
Assistant-Secretary.

OFFICE OF THE STORMONT SILVER MINING COMPANY, No 2 Nassau Street,
New York, Oct. 19, 1881.

DIVIDEND NO. 5.

The Board of Trustees have this day declared a monthly dividend of FIVE CENTS per share, payable on the first day of November, at this office.

The transfer-books will close on the 26th inst., and reopen November 2d. WILLIAM S. CLARK, President.
JOHN R. BOTHWELL, Secretary.

OFFICE OF THE GREEN MOUNTAIN GOLD MINING COMPANY, of California, No. 18 Wall Street, New York, October 13th, 1881.

DIVIDEND NO. '8.

The Trustees have this day declared a dividend of SEVEN AND ONE-HALF CENTS per share on the capital stock of this company for the month of September (being the 28th consecutive monthly dividend); and making a total to date of \$203,000, payable on the 26th inst. Transfer-books close on the 19th, and reopen on the 28th of September.
J. JAY PARDEE, Secretary.

HORN - SILVER MINING COMPANY,
office, 44 Wall Street, New York, Oct. 15, 1881.

The Board of Directors have this day declared a

DIVIDEND OF \$300,000,

being three per cent on the capital stock, payable to the stockholders of record on the 15th of November next, at the office of the company.

Transfer-books will be closed on November 7th, and reopened November 16th.

W. S. HOYT,
Secretary.

OFFICE OF THE TOMBSTONE MILL AND MINING COMPANY, No. 432 Walnut Street,
TWENTIEFH DIVIDEND.

PHILADELPHIA, Oct. 31, 1881.

The Executive Committee of the Board of Directors of this Company has this day declared the regular monthly dividend of \$50,000, being ten cents on each share of the capital stock of the company, payable on and after November 15th at this office. Transfer-books closed from 10th to 15th inclusive.

GEORGE BURNHAM, President.

W. J. CHEVNEY, Secretary.

DIVIDENDS.

THE ROBINSON CONSOLIDATED MINING COMPANY, No. 18 Wall Street, New York, Nov. 1, 1881.

DIVIDEND NO. 8.

The Board of Trustees have this day declared the regular DIVIDEND OF FIFTY THOUSAND DOLLARS, also an EXTRA DIVIDEND (No. 3) OF FIFTY THOUSAND DOLLARS, making one hundred thousand dollars, payable on and after November 15th, 1881, at the office of the company. The transfer-books will close at 3 o'clock P.M. of the 5th, and remain closed until 10 o'clock A.M. of the 16th inst.
JAMES K. SEILECK, Secretary.

DIVIDENDS.

OFFICE COPPER QUEEN MINING COMPANY, 34 Thomas Street,
New York, October 15, 1881.

The Board of Directors of this company have this day declared a monthly dividend (No. 5) OF TWENTY-FIVE THOUSAND DOLLARS, payable to stockholders on and after November 1st, 1881.

Transfer-books close October 29th, and reopen November 3d. A. A. HAYES, Jr., President.
L. ZECKENDORF, Secretary and Treasurer.

NEW YORK, Nov. 2, 1881.

THE STANDARD CONSOLIDATED MINING COMPANY to-day declared its regular monthly dividend of

SEVENTY-FIVE CENTS PER SHARE,

payable Nov. 12th, 1881, at the Farmers' Loan and Trust Co., 26 Exchange Place, New York. Transfer-books close Nov. 5th, and open on 14th inst.
M. R. COOK, Vice-President.



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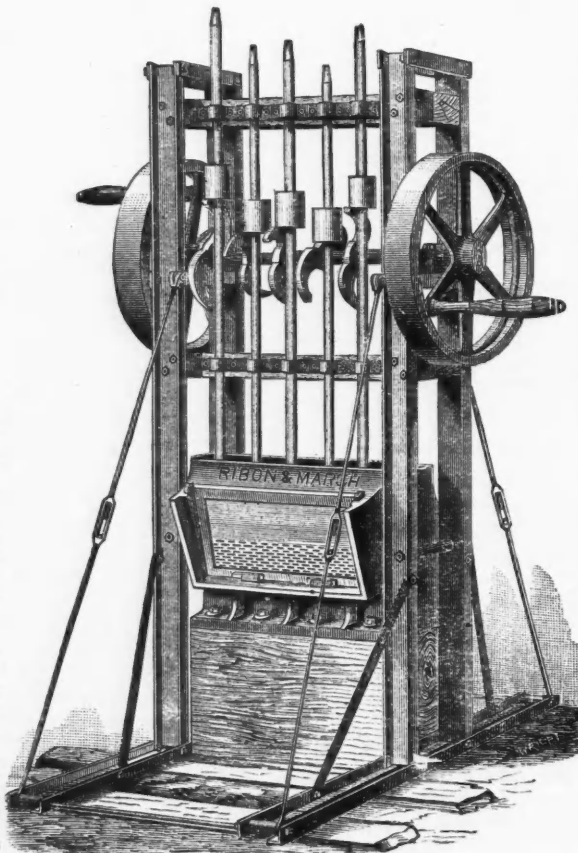
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