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## Hunt's Coal and Ore Railroad.

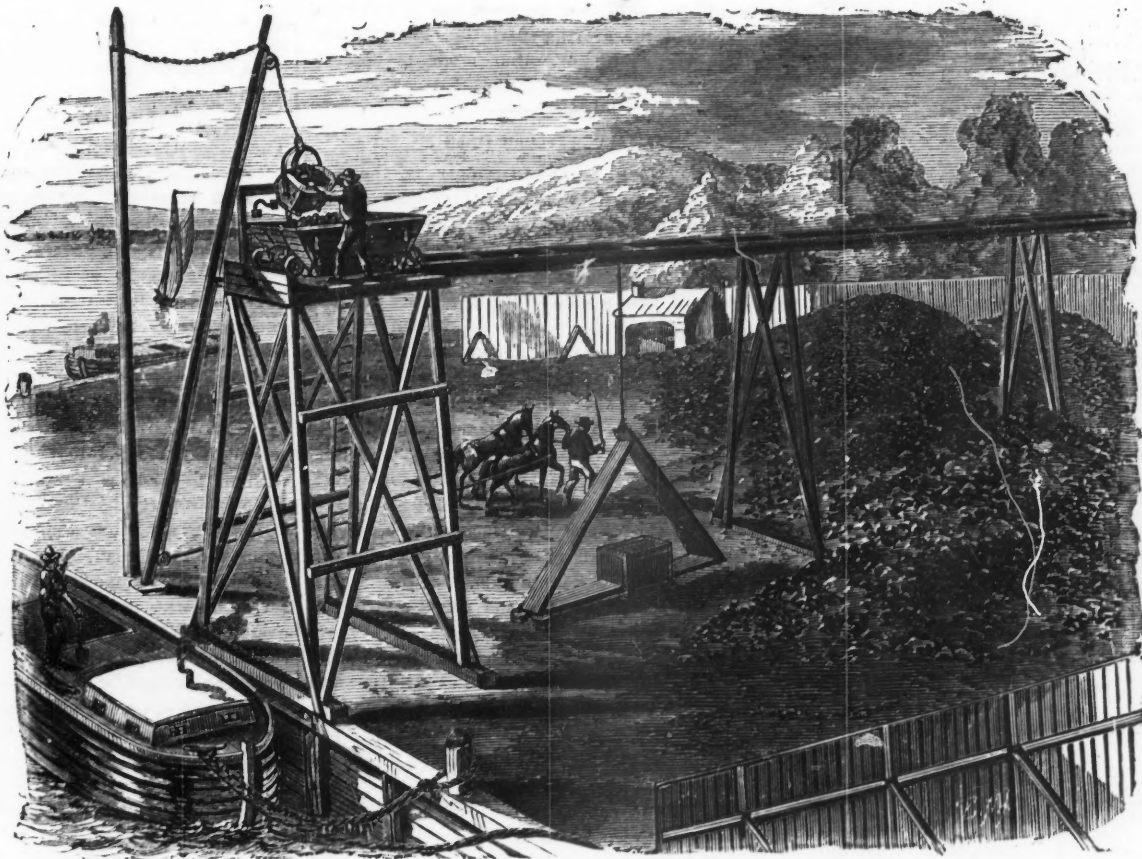
MR. C. W. HUNT of West New Brighton, Staten Island, has invented a most ingenious method of reducing the amount of manual labor necessary in unloading coal, ore and other bulky material, a kind of work, which, from its magnitude, offers one of the best fields for labor saving contrivances. This is a self-acting railway by which a car is made to run from the boat, or other coal holder, to be unloaded, and back again, by the aid of one man, who remains at the unloading station. The annexed cut shows a com-

and can be fixed at any place where it is desired to dump the load.

The automatic arrangement which causes the empty carriage to return consists of an endless wire rope, which is first attached to the framework of a small wheel, which travels on a rail underneath the main track. The rope then passes over a sheave at the loading end of the road, thence through openings underneath the car, the latter working freely upon it, thence over another sheave at the further end of the railway, and, finally, back underneath the track,

momentum, or inertia, of the loaded car; a force which usually wastes itself in useless, or even hurtful shocks. When the car reaches the end of its journey it has raised a weight to a certain height; the fall of this weight, through this height, is sufficient to send the empty car back to its starting point. In the load, which has now been discharged, was stored up power enough to give the surplus force needed to enable the car to regain its first position.

As soon as the car unloads itself by the mechanism we have spoken of in the beginning of this arti-



HUNT'S COAL AND ORE RAILROAD.

mon method of unloading and hoisting the coal to the car which is placed on an elevated railway.

On the hoisting stage is a platform scale, which weighs the coal as it is unloaded into the car. It is necessary for the certain operation of the mechanism, that the loaded car should not fall below a given weight, and though the filling to the required amount can also be accomplished by the eye, after a few trials, weighing has other advantages, which are apparent to all.

The track is slightly inclined and a push starts the car on its journey. When at the end of the track, or at any stopping place desired, the car strikes a block of wood, which, acting upon a lever, releases the sides of the car and the load is discharged. This block moves in a groove in the side of the railway

until it is attached to the opposite side of the framework of the wheel first mentioned. To the axle of the latter is fastened, by means of hinged rods, the triangle of planks under the track shown in the engraving, to the lower side of which a heavy weight is applied.

When the car is started by the workman, it first strikes a metal block placed on the endless rope, and with a proper weight (the ordinary load of coal cars is amply sufficient) the car carries the rope along with it. The rope moves the wheel under the track and the wheel tilts up the weighted triangle, which is fastened to the ground at one angle, in order to keep it from partaking of the horizontal motion.

From this description it is plain that the invention is simply one which makes use of the force of mo-

cle, the weight acts. It acts on the rope, running it back in the opposite direction from its first movement, and the rope moves the car. Of course the weight does not rise through a height equal to the whole length of the track. Its object is only to give the car a start, its own momentum then carrying it on its way.

Care has been taken to make the raising of the weight a gradual movement, so that no sudden strains are brought on the various parts. One man, as we have said, works the whole mechanism with ease, and the celerity of the movements is wonderful. Trials have proved that a loaded car can travel a distance of 175 feet, discharge its contents and return to the starting point in thirty seconds. For the transportation of coal and ore within the bounds of

works, this arrangement from its simplicity and cheapness, both of first cost, and subsequent working must find favor.

**New Mining Incorporations.**

We give below the tabular statement which we have prepared, of the number, capital, location and shares of the new mining incorporations which were organized during the first six months of this year. Of these, 14 were formed in January, 8 in February, 31 in March, 64 in April, 69 in May and 15 in June. The total number is 201, embracing a capital (on paper) of \$558,000,000, divided into 4,815,950 shares. It will be observed that of this number 126, or nearly two-thirds are located in Nevada, representing over two-thirds of the capital stock. Much the largest part of this immense aggregate may no doubt be attributed to the recent stock excitement in this city. What influence this large increase of stock may have upon legitimate mining, it is difficult to say; but the accompanying table can not fail to be very suggestive of the great and general interest which is being taken by the community in the great leading industry of the Pacific Coast.

CALIFORNIA.			
LOCATION.	INCOR.	CAP STOCK.	NO. SHARES.
Amador County.....	3	\$4,750,000	72,500
Butte ".....	1	1,200,000	12,000
Calaveras ".....	6	11,300,000	113,000
El Dorado ".....	8	21,300,000	213,000
Inyo ".....	1	2,500,000	25,000
Ken ".....	1	600,000	6,000
Lassen ".....	1	5,000,000	50,000
Mariposa ".....	1	5,000,000	50,000
Mono ".....	1	5,000,000	50,000
Napa ".....	1	300,000	3,000
Nevada ".....	5	10,000,000	100,000
Placer ".....	4	8,000,000	80,000
Plumas ".....	4	7,000,000	70,000
S. Lu. Obis ".....	1	5,000,000	50,000
San Diego ".....	1	5,000,000	50,000
Sierra ".....	2	3,000,000	30,000
Tuolumne ".....	1	3,000,000	30,000
Location not stated.....	3	6,000,000	60,000
<b>Total.....</b>	<b>45</b>	<b>\$104,950,000</b>	<b>1,159,500</b>
NEVADA.			
Ely Dist., Lincoln Co.....	34	\$92,350,000	929,200
Lincoln Co.....	4	10,500,000	105,000
Devil's Gate D., Lyons Co.	4	11,100,000	111,000
Coleman's D., Lyons Co.	1	1,500,000	15,000
Eureka D., Lander Co.	9	36,500,000	365,000
Gold Hill D., Storey Co.	27	79,700,000	797,000
Virginia D., Storey Co.	8	17,000,000	170,000
Flowers D., Storey Co.	1	3,000,000	30,000
Storey Co.	9	16,600,000	166,000
Philad's D., Inyo Co.	2	9,000,000	90,000
Bristol D., Inyo Co.	1	3,000,000	30,000
Twin River D., Inyo Co.	1	3,000,000	30,000
Inyo Co.	1	5,000,000	50,000
White Pine D., W. P. Co.	3	9,400,000	94,000
Sabell Creek D., W. P. Co.	4	13,000,000	130,000
Ruby Hill D., W. P. Co.	1	3,000,000	30,000
Sacramento D., W. P. Co.	1	5,000,000	50,000
Railroad D., Elko Co.	2	3,000,000	30,000
Hot Spr'g D., Humb't Co.	1	3,000,000	30,000
Humboldt Co.	1	3,000,000	30,000
Esmeralda Co.	2	7,850,000	78,500
Columbus D.	1	5,000,000	50,000
Truckee D.	1	2,000,000	20,000
Silver Star D.	1	4,000,000	40,000
Location not stated.....	6	18,300,000	183,000
<b>Total.....</b>	<b>126</b>	<b>\$365,500,000</b>	<b>3,018,700</b>
UTAH.			
Little Cottonwood.....	5	23,500,000	235,000
Camp Floyd.....	2	5,500,000	55,000
Tintic.....	1	3,000,000	30,000
Gphir.....	1	3,000,000	30,000
Location not stated.....	6	11,000,000	110,000
<b>Total.....</b>	<b>14</b>	<b>\$46,000,000</b>	<b>460,000</b>
ARIZONA.			
Wallapai District.....	6	\$16,700,000	167,000
IDAHO.			
Location not stated.....	3	\$8,450,000	84,500
LOWER CALIFORNIA.			
Location not stated.....	1	\$200,000	2,000
GENERAL MINING BUSINESS.			
Location not stated.....	6	\$16,200,000	162,000
SUMMARY.			
California.....	45	\$104,950,000	1,159,500
Nevada.....	126	\$365,500,000	3,018,700
Utah.....	14	\$46,000,000	460,000
Arizona.....	6	\$16,700,000	167,000
Idaho.....	3	\$8,450,000	84,500
Lower California.....	1	\$200,000	2,000
General Mining.....	5	\$16,200,000	162,000
<b>Total.....</b>	<b>201</b>	<b>\$558,000,000</b>	<b>4,815,950</b>

—Mining and Scientific Press of July 20.

**Hot Journal Detector.**

Some months since the *Journal of the Franklin Institute* recorded the discovery, by Mensel, of certain double iodides, which possessed the curious property of changing color very readily upon the application of comparatively very little heat.

This discovery has lately called forth a practical suggestion from Prof. A. M. MAYER, in which he employs one of these iodides, (that of copper and mercury; prepared by adding to a warm solution of mercuric iodide in potassium iodide, copper sulphate and then sulphurous acid,) for obtaining a precise method of tracing the progress, and of determining the boundary of a wave of conducted heat; a question of much interest in the higher departments of physics.

The article concludes with the suggestion that a more useful application may be made of this, or of several other sensitive compounds, by painting them on the *pillow blocks*, and other parts of machines, which are liable to injurious heating from friction. As the iodide in question changes within the limits of the freezing and boiling point of water, from a brilliant carmine red to a brown-black becoming regularly darker with each additional increment of heat applied—the thoroughly practical character of the suggestion becomes apparent. There would be little difficulty in accurately gauging the amount of color-change for different temperatures, and in recording the corresponding tint, where great accuracy were needed; while ordinarily, optical inspection would be sufficient to show the operator the temperature of the moving parts of his machines, often inaccessible to any other mode of observation.

**The Underground Road.**

Mr. J. H. BUCKHOUT, chief-engineer of the New York Underground Railroad has furnished to the daily papers some particulars of the method by which the work of digging that road will be carried on. Within two months work will be commenced at intervals of half a mile and in two years the road will be finished. Probably seven depots will be used, the dimensions of which will depend on location and business. The one at Union Square will be about eight by twelve feet above the surface. The arrangements of the depots for convenience and safety to passengers are as complete as possible. On entering, the passenger will descend to the track level, and when at the foot of the stairway, will find himself on a platform between the two tracks, which diverge near the stations and afford space for a platform sufficient to accommodate a large number of passengers. Thus passengers going in either direction will not need to cross the tracks.

The connection with the Harlem road, above Forty-second street, will be made by switches at Fifty-sixth street, where the grades of both tracks coincide. From this point the present Harlem tracks will run to the Grand Central depot as at present, while the grade of the rapid transit tracks will decline to the east of the Grand Central depot. The central depot will be entirely independent of the down-town road, which will follow the course of Fourth avenue and the Bowery to Pell street, and thence to the City Hall Park. Here will be built a large underground depot. The depots along the line will terminate at Fifty-ninth street, where there will be a large one for the accommodation of visitors to Central Park.

The road will be so graded as to run beneath the surface throughout the entire length, and no viaduct will be necessary at any point. The lowest point on the line is at Pearl street, where the track will be four feet above high tide. On the Bowery, after leaving the Five Points, the lowest point is at Grand street. The Pearl street sewer will pass above the Underground road. During the building of the road, temporary bridges will be built at the crossings of the streets running east and west so that business will not be impeded. It is supposed by many that passengers will be transferred at the junction of the

rapid transit and the Harlem road. The trains, however, which leave the City Hall Park depot will be through trains, no transfer taking place at any part of the route. The cars will be constructed with doors on either side; the seats being athwart by this arrangement, but little time will be lost in the entrance and exit of passengers. The entire distance from the junction at Fifty-sixth street to City Hall Park is about four miles, and the running time, including six stoppages, will be about ten minutes.

From Thirteenth to Nineteenth street, and from Thirty-second to Fifty-sixth street, are solid masses of rock, through which open cuts will be made.

**The Westinghouse Air Brake.**

Mr. J. H. ETCHER of the Little Miami Road, gave his brother master-mechanics some interesting information upon this valuable addition to the life and property saving apparatus of railroads. He said:

"It has been about a year since the first was put on, and on cars it works uniformly well. It requires but little more care than the ordinary hand-brake. The air-cylinders require a little oil often, in order to prevent the brake from sticking after being put on, and also to prevent the use of too much air in applying them. This sticking, or failure of the brake to let off quickly, is to some extent an objection in approaching wood and water stations, where it is required to stop at a certain point; but in making ordinary stops at stations, where that exact nicety is not required, the air may be let off before the stop is fully made, and the motion of the train will in a great measure relieve the tendency to stick. I think it may be safely stated as a fact that with the required amount of air in the air-drums the brake works well. The difficulty, as at present constructed, lies in the failure of the auxiliary engine working the air-pump to work regularly. When everything is nicely adjusted and well oiled, it works well. But to keep it in this fine working order is more than it is possible for the engineer to do at all times, and frequently it is necessary to start it by hand several times between stations to keep up the supply of air. This takes the attention of the engineer from the track, and is extremely dangerous. This can, however, and should be avoided.

"The Westinghouse Air Brake Company should see that this really valuable brake is relieved of this incubus as soon as possible. As to the saving of life and property by this brake, I do not hesitate in the least to say it has done both of these since first applied on our road. I will mention one instance where it saved property and possibly life. The latter, of course, cannot be positively known. By an oversight of the conductor of a fast passenger train in not informing his engineer that the switch at M. would be opened for them to enter a side track, meet and pass an approaching train, the engineer, having sufficient time, concluded to run by the station and back in on the other end of the switch. As he approached the station he applied the brake to see if all was right, merely taking up the slack of train, and then letting it off, and as he did so he saw the switch was open and cars standing on the track ahead of him. He applied the brake. The passengers surged forward in their seats and remarked, "Something has happened." Being on the train, I stepped forward to see what was the matter, and found the engine broken loose from the tender and standing about fifty to seventy five feet ahead of the train, where it had run into some cars, breaking the pilot and doing some other slight damage. The train had not touched the cars, and the engine had been snapped, like the cracker off of a whip, from the tender and received all the damage that was done."

He also discussed the question whether this brake saved the wheels from wear, and gave his opinion that the wear was really greater with the compression brake than with those worked by hand. In this he was supported by most of the others who reported on this question. But Mr. BOON of the Pittsburg,

Fort Wayne and Chicago road took the opposite view. He said: "On the Fort Wayne Railroad the Westinghouse Air Brake was put on in April, 1870, and was run during that summer on fast trains. We tried it on trains making probably the fastest schedule time made in America. After we commenced using them I noticed a decrease in the return of defective wheels. There is a complete record kept of every wheel put on the road, the time it is put in, when it is taken out, and the cause of removal. I noticed in the monthly report a great falling off in the number of wheels, and I visited the shop to inquire why there was such a decrease in the number of wheels, and I became satisfied it was from the use of the air brake. Our trains make a mileage of 3,000 miles per week, and before we commenced using the air brake we would average 1200 new wheels a year. Since we have used the air brake, we have averaged about 400. That is all we need last year. There has been a continuous falling off." During this time there was no change in the pattern or make of the wheels.

All agreed that the principle of giving the engineer full power over his train was right. Mr. SETHCHEL spoke the sense of the whole meeting in his letter. "I do strongly favor and urge the adoption of the practice of putting the braking power entirely in the hands of the engineer. I would not advise doing away with the hand-brake or the brakemen, but the braking can be done ordinarily better by the engineer, especially in the night; for he alone has a proper conception of the speed of the train, the condition of the rail and the distance within which he must stop his train. In a case of extreme danger, a train can be stopped with the Westinghouse Air Brake before the brakeman can get out of the car; yet this is in its infancy, and there are many improvements that can and should be made, but it is undoubtedly the true principle, and it must, it is bound, to succeed."

It is interesting to note the extent to which mechanical or self-acting brakes have been adopted in this country.

Twenty-one master mechanics report as having in use on their respective roads compression brakes, eighteen have in use the "Westinghouse Atmospheric Brake," one the "Creamer," one the "Olmstead Electro-Magnetic," and one the "Electric;" no name given of the latter—either of road or brake.

#### Copper Mining in the West.

The rise in the price of copper has caused a general revival of work in the mines of that metal, and all the old dumps are being picked over for shipping ore, and some of the mines are being reopened. The Union mine at Copperopolis will resume operations, and the engines are probably by this time pumping out the water. When this is completed a large force of men will be put at work. The Newton at Copperopolis will also shortly be producing ore. The English Company's at Battie Mountain, Nevada, have been producing from 20 to 30 per cent. ore for the past two or three years, which has been shipped to Liverpool. Good ore is coming out of the Globe mine, in Alpine County, California, and the Leviathan, in the same county, will probably be worked as soon as negotiations concerning its sale are completed. There are numerous ledges in Elko County, Nevada, that are being reopened. Those near Reno, which were worked some years ago, will probably be opened again if the state of the market warrants it. The southern portion of the State, particularly Los Angeles County, abounds in copper ore, and Catalina Island, off San Pedro, which was recently sold to capitalists for \$1,250,000, contains some of the most valuable deposit on this coast. The Ella mine, Elko, Nevada, has commenced work again, and begun to ship ore to this city. They have a large ledge assaying from 25 to 33 per cent. They had proposed last month to ship about 75 tons per week, but the rise in the price of freight on the railroad has interfered with their plans. We might mention hundreds of other mines and localities, but the few enumerated

will show that a general activity is beginning to prevail.

#### FREIGHT BY RAIL.

During the month of May, the shipments of copper ore over the line of the Central Pacific railroad were rapidly increasing, and the miners were satisfied with the results from their ore; but since that time the railroad company have seen fit to advance the rates of freight \$4 or \$5 per ton. This action has nearly put a stop to all kinds of low grade ores coming to this market, as rates of freight will not justify parties in shipping anything under 16 or 18 per cent. ore, at any great distance from this city. The company make no distinction in regard to quality or quantity, 20 per cent. and 40 per cent. costing the same, one ton or one hundred. Ores shipped from Ogden or Salt Lake are delivered here nearly as cheap as they are one-half the distance on the same road; so the location of the mine makes little difference as to freight. Moreover, they will not take into consideration the fact that shippers dispose of their ore, and make their calculations on 2,352 pounds as a ton of copper ore, but charge the same as for silver ores which sell by the ton of 2,000 pounds. This is, of course, an important item where any large amount is shipped.

Shippers say that if the railroad company would look at the net returns from the ores, they would see that their rates are too high to make copper mining for anything under 20 or 25 per cent. ores profitable. But they say they cannot afford to bring them for less, so the only alternative is for the miners not to ship. Three years ago copper was not high enough to make it worth while to mine for it in many localities, and up to this month the railroad company has charged, from Elko for instance, \$11 per ton. This month, when 20 per cent. copper ores may be disposed of here at \$3 05 per unit; 25 per cent. \$3 10 per unit; and 30 per cent. ore at \$3 25 per unit, the company charge \$15 per ton. It seems strange that they could afford to bring it here from that locality for \$11 when it was low, and now the markets are higher they cannot bring it for less than \$15 per ton. A fraction of a ton is charged double rates—\$30 per ton.

Freight to England is very high, and ships scarce. For cargoes of ore the same price is charged as for wheat, about \$19 or \$20 per ton. Ores in small quantity can occasionally be shipped for less, but at present, as there is considerable offering, a full rate will have to be paid.

There is no other reason why we cannot make money out of the mines of this coast than the high price of freight. A great change has come over the business of mining generally, since the majority of these mines were worked, and it has come to be looked upon more as a business than a venture. Extravagance has been checked, more experienced superintendents employed, and the fact that mining has its definite business restrictions is now recognized. The "ring," which is said to exist in New York, will, no doubt, keep up the price for some time. The reports concerning it are, however, contradictory; some saying that it has bought up all the copper in the market; others saying it has contracted for the product of all the principal mines in the United States for a certain period. It is understood that this ring has contracted, at a stipulated price, for the product of the prominent Lake Superior mines for a certain length of time, (reported all the way from six to twelve months.) We have not heard of any contracts having been made with any of the Pacific coast mines.

#### CONSUMPTION AND SUPPLY OF COPPER.

The consumption of copper is, it is said, increasing the world over, while the supply is not increasing, or rather it is falling off. This enlarged consumption is due to the unusually large amount of copper and brass used in the construction of locomotives, cars, etc., the manufacture of ornamental hardware, increased amount of copper pipe and pans for use in sugar refineries, distilleries, etc., large amount of metallic cartridges manufactured, the manufacture of

soldering irons used in the large trade in canned goods, etc. The consumption in this country last year, which averaged over 1,320 tons per month, exceeded the supply by more than 2,350 tons during the year, showing a great increase in consumption, since it was, until the first of this year, supposed to be, as it had been for some years past, about 1,000 tons per month. The total production of the United States in 1871 was 13,500 tons, and the total consumption 15,850 tons. Chili, which exported about 52,000 tons in 1870, only sent 42,400 tons in 1871. The English mines yielded last year, it is said, only 6,500 tons. The probabilities are that the price of copper will not fall very much for some time, the influence of the tariff, the firmness of the metal market, the "ring," etc., combining to keep it up.—*Mining and Scientific Press, July 20.*

#### Accident in a Lake Superior Mine.

A serious accident has occurred in the Copper Falls Mine, Lake Superior. On Monday morning, July 15th, a portion of the roof left standing after taking out the mineral from the prominent deposit known as the "ash bed," in the Copper Falls mine, gave way at the seventy fathom level, and fell a distance of nearly 200 feet, producing a concussion so great as to not only extinguish all the lights in that portion of the underground works, but also those in the "change house" on the surface, which is connected with the mine. Sixty men were in this part of the concern when the accident occurred, forty-six of whom reached daylight without serious mishap. Of the remaining fourteen miners four were taken out uninjured, three were badly burnt and three were dead, and the remainder are also probably killed. The roof was supported by pillars, but it is said its condition has been long known to be dangerous.

#### American Institute of Mining Engineers.

##### OFFICIAL BULLETIN.

##### Announcements to Members and Associates.

I. The dues for the year ending May, 1873, are now payable. All members and Associates who have not paid their dues are requested to do so at once, by sending in postal orders, or checks, or money, ten dollars to the Secretary.

All members and Associates who pay their dues for each current year, strictly in advance, will have sent to their address, regularly and weekly the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute and all notices of meetings. Back numbers cannot, as a general rule, be sent.

II. It is expected that the more important papers read before the Institute, and the debates thereon, will be published in annual or occasional volumes to which these members and Associates will be entitled when they have paid their dues.

III. Members and Associates are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called in connection, to Rules 12 and 13.

IV. A new rule has been amended, so that there shall hereafter be three meetings a year in February, May, and October. The meeting next October will be held at Pittsburg, Pa.

MARTIN COREYELL, Secretary.

Pittsburg, Pa.

On Tuesday morning last, A. J. Cassett, General Manager, Assistant General Manager Jackson, and Dr. Cresson, A. C., Geologist and Mineralogist of the Pennsylvania Central Railroad Company, and J. L. Anderson, of the Belvidere Delaware Division of the Central road, passed up the latter division on a tour of inspection through the slate lands of Northampton County. At Martin's creek they left the cars and in carriages, provided by our townsman, Chas. Broadhead, Esq., of the Lehigh and Lackawanna Railroad, were conveyed to the quarries at Bangor, the Pennsylvania and Chapman, and lesser quarries, all of which they inspected.—*Bethlehem Times.*

The Amalgamation of Gold Ores.

BY JOHN A. CHURCH, E.M.

In the paper upon the Lend process for treating pyritiferous ores of gold and silver, reference was made to the view held by many German authorities of the principle upon which the amalgamation of gold, as an industrial process, takes place. As that is a subject which will be new to many American mill-men, a fuller explanation of it is now given.

It is commonly supposed that mercury takes up gold by reason of "affinity," which causes the union of the metals whenever they are brought in contact; and, in the use of amalgamated copper plates for catching the gold, the Americans have, with their usual thoroughness, trusted the success of their gold mills entirely to this action. In Austria they proceed on a different basis. There, they acknowledge the affinity of mercury for gold, but confine it within narrow limits, considering that small proportion of gold which remains with the mercury after filtering, as the gold held by affinity; while the remainder is only mechanically suspended in the fluid metal. I do not mean to discuss this point thoroughly, but merely to point out some facts in relation to Colorado ores, which, on this hypothesis, give a ready explanation for the poor yield of those ores in the mill.

The principle on which the separation of gold from its ores is effected, by mechanical means, is easily explained. If we have a substance composed of two elements, one having a specific gravity of 10, and the other of 5, it is clear that if we can provide a liquid with a density, say of 7, the former can sink in it, and the latter can not. To accomplish the separation of the two, we have only to crush the substance to a certain fineness and place it on a bath of the liquid. As soon as each particle of gravity 10 comes in contact with the fluid, it sinks, and we have only to agitate the sand and bring every particle of it in contact with the fluid, to produce perfect separation. We have then the two elements, one at the top, the other at the bottom, of the liquid.

This is precisely what takes place in the so-called amalgamation of gold ores. Gold has a specific gravity of 19.33 and mercury 13.60. The iron pyrites, in which the gold of Colorado is found, has a specific gravity of about 5, and quartz, another constituent of these ores, 2.6. It would appear, then, that in a mixture composed of gold 19.33 sp. gr. and pyrites 5 sp. gr. there should be no difficulty in effecting the separation, when the ore, in a finely divided state, is passed over mercury, in which the gold can, and the pyrites cannot, sink. The Austrian gold mill was devised to satisfy these conditions, and it works perfectly, when the ore is in the state of sand and not of too fine slime. In it, mechanical contact between the gold and mercury is effected in the most thorough way, and the mercury lying in a bath 1-1 5 inches deep, is in a condition to act either by affinity or merely as a fluid of medium density, or by both means. And yet this apparatus fails to extract all the gold from most of its ores, and the tailings are sent to the smelting works, if they can be made to pay the cost of treatment. In some cases, as for instance at Zell, spoken of in the beginning of the paper on the Lend process, the ore, worth only \$2 and less a ton, is unable to bear any expenses but amalgamation, and it could not bear even this, were it not for the fact that its gold is fine and contains little silver.

There is a difficulty in treating gold ores with mercury, in the explanation of which we may, perhaps, account for the trouble experienced in Colorado. Native gold is rarely or never pure; it is alloyed with silver which has a specific gravity of 10.56. An alloy of the two metals, therefore, has a specific

gravity between 19.33 and 10.56 depending upon the proportion of the alloyed metals. With gold 35 and silver 65 parts, the specific gravity of the alloy is about the same as that of mercury, and it cannot sink in that fluid. That is, it will not "amalgamate." The question is, then, do the ores of Colorado contain more than 65 of silver to 35 of gold? Let us calculate the assays given by Mr. Hague, and we have the following table, the 35 of gold and 65 silver being taken as a normal alloy:

	Gold.	Silver.	Gold.	Silver.
Normal Alloy			35	65
Consolidated Gregory lode	5.6oz.	20oz.	22	78
Illinois lode	4	20	16	84
Gardner lode	3.5	11.5	23	77
California lode	3	18	15	87
Burroughs	6	12	33	67
Average Milling ore	4.4	16.3	22	78
Burroughs, 1340 tons,	1	4.5	18	82

The Colorado gold, then, will not sink in mercury, and yet, I have been answered, it amalgamates. That is true; a certain amount of it does amalgamate. In that respect, it exactly resembles the Lend ore, in which a part of the gold amalgamates and a part will not. The explanation is that Colorado ore contains 1. free gold; 2. alloyed gold, and perhaps 3. silver not alloyed with gold. Mr. HAGUE thinks that the mills extract about 55 per cent. of the gold in the first operation, and 15 per cent. more by a repetition.

If we construct a table for Colorado ores, such as I have given for the Lend ores, we shall have something like the following, in which the calculations are made on the basis of 26 assays of retort bullion by Messrs. Warren, Hussey & Co., bankers. These assays extended through nine months in 1867 and 1868. The average fineness of the melted bar was 816 gold, 173 silver and some copper. Neglecting the copper, which is but little, we have the proportions, 824 gold and 176 silver. If we consider that the alloy amalgamated was composed of an average of 30 gold and 70 silver, the bullion would be divided as follows: 707 free gold and 293 alloy, composed of 117 gold and 176 silver. Of the 70 per cent. extracted, therefore, 49.5 per cent. would be free gold, 8.2 per cent. gold in alloy, and 12.3 per cent. silver in alloy. This would give the following proportions:

	Amalgamated.			Not Amalg.	
	Free Gold.	Gold.	Silver.	Gold.	Silver.
Gregory, oz.	2.77	0.46	0.69	2.37	19.31
Illinois, oz.	1.98	33	49	1.69	19.51
Gardner, oz.	1.73	29	43	1.48	11.07
California, oz.	1.48	24	37	1.28	17.63
Burroughs, oz.	3.46	53	36	1.96	11.64
Average	11.42	1.90	2.34	8.78	79.16
	2.23	0.32	0.46	1.76	15.83
			0.78		17.59
Average	Free Gold.		Alloy.		
	2.23		18.37		

Thus we see from this table that of the above Colorado ores only 57.7 per cent. of the gold and 2.9 per cent. of the silver is extracted by amalgamation. These proportions are, of course, hypothetical; but we may regard them as near the truth.

The Burroughs milling ore contains 1 oz gold and 4.5 oz silver. At the same rate of yield the proportions would be:

	Amalgamated.		Not Amalg.	
	Free Gold.	Gold.	Silver.	Gold.
Burroughs Milling, oz.	0.495	0.085	0.127	4.373

The value of the Burroughs milling ore is therefore \$12.15 in gold and silver that will amalgamate; and \$14.42 in gold and silver that will not amalgamate, or 45.5 per cent. of the value for the former and 54.5 per cent. for the latter. Thus we see that the loss of the silver is no small matter in the Colorado ores. Losing 97 per cent. of that reduces the total yield, under the best circumstances from 70 to 46 per cent.

These figures which have been taken from Mr. HAGUE's report are confirmed by those published by Mr. REICHENECKER in his paper on the mill process in Colorado (see report of the Commissioner of Mines for 1871). He divides the mines into two classes,

one of which furnishes about 10 parts of rich ore to 90 of milling ore; while the other gives no rich ore at all. We thus have three sorts of ore, to which he assigns the following values:

First Class Mines. Rich ore.	
4.5 ounces gold	\$93.00
18 ounces silver	23 40
9 per cent. copper	18.00
	\$134.40
do. Milling ore.	
1.4 ounces gold	\$28.94
5.6 ounces silver	7 28
2.8 per cent. copper	5.60
	\$41.82
Second Class Mines. Milling ore.	
1 ounce gold	\$20.67
4.1 ounce silver	5.33
2 per cent. copper	4.00
	\$30.00

The proportions between the gold and silver in these several grades of ore are as follows:

	Gold.	Silver.
First Class. Rich ore	20	80
First Class. Milling ore	20	80
Second Class. Milling ore	19.6	80.4

Mr. REICHENECKER does not give exact assays, and from the close correspondence of these proportions it is probable that he has assumed the average proportions of gold and silver in Colorado to be 20 to 80. His long experience with these ores makes his opinion quite as valuable as the evidence of individual assays; and it will be seen from a comparison of Mr. HAGUE's data with his assumed values, that there is perfect unanimity in the results of these two observers. They agree that the total silver in the ore amounts to about four times the total gold.

But though a much greater portion of the gold, than of the silver is removed by amalgamation, it is to be remarked that the tailings contain these metals in about the same proportions as the ore before treatment. The following tables giving assays of tailings, taken from Mr. HAGUE's book, show that both gold and silver have been removed in amalgamation and in about the same proportion:

	Gold.	Silver.
1.....	1.05 oz.	4.32 oz.
2.....	.66	2.63
3.....	2.34	3.87
Average.....	1.35	3.61
Proportion.....	27	73

Compared with 23 gold and 77 silver which is the average of the ores, these figures show that both silver and gold have disappeared, and about equally, in the process of milling. Though hardly necessary I will repeat that nothing in the bullion explains this fact, for that is composed of 824 gold and 176 silver on an average. The cause of this is undoubtedly defective concentration. The ores probably contain proper silver minerals which are very brittle, reduce to a fine powder in crushing and are carried off on the stream. It may be, too, that the small portion of galena found in the gold ores is highly argentiferous. This would partly account for the loss of silver; for when galena is stamped through a mesh of 25 to the inch, and then concentrated in a buddle, even greater care than Western millmen give their operations, will not prevent very serious losses.

It must not be supposed that the above table in which the gold of Colorado ores is divided into free gold and argentiferous silver is correct in its proportions. In the ore there are probably an unknown number of distinct alloys; and the gold we obtain comes from (1) the fine gold, and (2) from those alloys which contain more than 35 per cent. gold. The great fact remains that if we accept the Austrian explanation, the Colorado ores ought not to amalgamate well, and when we examine the results of practice we find that they do not. This may be only a coincidence, but if so it is one sufficiently remarkable to make us reconsider the determination we have apparently formed, to force ores to amalgamate which do not appear to be suited to that treatment.

TO BE CONTINUED.

\* What follows is partly taken from an article by me in the *Scientific American* of October 7, 1871. In that article an error was made in putting the "normal alloy" as 35 silver and 65 gold. It should have been the opposite—35 gold and 65 silver. That error, however, does not affect the application of the article.

THE COAL TRADE.

New York, August 3, 1872.

Prices are again lower, as will be seen by the following comparison of the Sales of Delaware, Lackawanna and Western Company's coal, this month and last.

Table with 4 columns: Item, July, August, Decline. Rows include Lump, Steamer, Grate, Egg, Stove, Chestnut.

The New York Lehigh Coal Exchange issued its circular July 31, continuing for August the prices which have ruled through July.

The rates are:

Table with 2 columns: Item, Rate. Rows include Lump, Broken, Egg, Stove, Chestnut.

Business is dull, and what with the slight decline, people begin to talk again about the probable effect of so much and so long continued depression. But there is no prospect that there will be any suspension, at least of the large companies.

In the Bituminous trade the demand is fair, and in some quarters good. The dealers do not complain of inactivity. Prices remain as they were.

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending July 27, 1872, compared with the week ending July 29, 1871.

Table with 4 columns: COMPANIES, WEEK, TOTAL, 1871, 1872. Lists various companies and their coal transport statistics.

\* These figures are for the week and fiscal period commencing Nov. 30

† Less coal transported for Co's use and Bituminous coal.

Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of transportation for the week ending July 27, 1872, compared with week ending July 29, 1871.

Table with 4 columns: COMPANIES, WEEK, YEAR, 1871, 1872. Lists companies and their bituminous coal transport statistics.

Total, Decrease, Increase.

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, July 27, 1872.

Large table with multiple sections: BY RAILROAD - ANTHRACITE, PASSING OVER MAIN LINE AND LEB. VAL. BRANCH, FOR SHIPMENT BY CANAL, SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD, SHIPPED WEST OR SOUTH FROM PINE GROVE, CONSUMED ON LATERALS, LEHIGH AND WYOMING COAL, BITUMINOUS, RECAPITULATION.

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending July 27, 1872, with totals to date compared with same time last year.

Table with 3 columns: WHERE SHIPPED FROM, WEEK, TOTAL. Rows include Wyoming, Hazleton, Upper Lehigh, Beaver Meadow, Mahanoy, Mauch Chunk, etc.

DISTRIBUTED AS FOLLOWS.

Table with 3 columns: WHERE SHIPPED FROM, WEEK, TOTAL. Rows include Forwarded East from Mauch Chunk by rail, To East, To P. & N. Y. R. R., etc.

Penn. and N. Y. R. R. - Coxton, Pa.

Coal tonnage for week ending July 27, 1872.

Table with 3 columns: Week, Total, Tons, Cwt. Rows include Anthracite received, Distributed, Total.

Table with 4 columns: Total for Week, Corresponding week last year, Increase and Decrease. Rows include Passing over Main Line and Lehigh Valley Branch, For Shipment by Canal, etc.

Table with 4 columns: Total for Week, Corresponding week last year, Increase and Decrease. Rows include Total Anthracite paying freight, Total Tonnage for Week, etc.

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending July 27 - Compared with same time last year.

Table with 4 columns: WHERE SHIPPED FROM, WEEK, YEAR, 1872, 1871. Rows include Wyoming Region, Upper Lehigh Region, etc.

Table with 3 columns: Total, Tons, Cwt. Rows include Shipped north from Towanda, Shipped south from Towanda, Northern Central R. R., etc.

Table with 3 columns: Total, Tons, Cwt. Rows include Grand totals transported, Anthracite, Bituminous, etc.

Delaware and Hudson Canal Company.

The following is a statement of Coal Transported by the Delaware and Hudson Canal Co. for the week ending July 27, 1872.

Table with 3 columns: FOR THE WEEK, FOR THE SEASON. Rows include By Delaware and Hudson Canal, By Railroad, East, West, South, etc.

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, July 27, 1872.

Table with 3 columns: WEEK, SEASON. Rows include North, South, Total 1872, Corresponding time in 1871, etc.

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, July 27, 1872.

Table with columns: WEEK, YEAR, Tons. Cwt. Shipped North, Shipped South, Total, For the Corresponding time last Year, Increase, Decrease.

Lehigh Canal Coal Trade.

Shipped for the week ending July 26, 1872.

Table with columns: Week, Tons. Cwt., Total from Mauch Chunk Region, Beaver Meadow, Mahanoy, Hazleton, Upper Lehigh, Wyoming, Total, Corresponding week last year, Increase, Decrease.

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, July 27, 1872.

Table with columns: From Schuylkill Haven, Port Clinton, Total for week, Previously this year, Total, To same time last year.

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending July 27, 1872.

Table with columns: WEEK, YEAR, Tons. Cwt., By Railway, Canal, Total, Increase 1872, Decrease 1871.

Statement of Coal Transported over Cumberland and Pennsylvania Railroad.

During the week ending Saturday July 27, and during the year 1872, compared with the corresponding period of 1871.

Table with columns: WEEK, YEAR, To C. & O. Canal, To B. & O. R.R. C., Total, 1871, 1872, Increase, Decrease.

Cumberland Branch R. R.

Table with columns: WEEK, YEAR, To C. & O. Canal, To P. & O. R.R. Co., Total, 1872, 1871, Increase, Decrease.

Prices of Coal by the Cargo.

Table with columns: AT NEW YORK, AT PHILADELPHIA, SCHUYLKILL, LEHIGH, SPECIAL COALS.

Company Sales.

Table with columns: August, 1872, L, Str, Gra, Eg, Sto, Chest, Scranton at E. Port, Pittston at Newburg, Lackawanna at Weehawken, Wilk'bre at Hoboken, Old Co. Lehigh at Pt. John's, Lehigh at E. Port.

Prices at Baltimore—August, 1872.

Table with columns: Wholesale Prices to Trade, Wilksbarre, by cargo or car load, Pittston and Plymouth, do, Shamokin Red or White Ash, do, Lykens Valley Red Ash, do, Zebra Valley, Treverton, By retail, all kinds per ton of 2,240 lbs., George's Creek and Cumberland f. o. b. at Locust Point for cargoes, Fairmont and Clarksburg gas f. o. b. at L. Point.

Table with columns: BITUMINOUS COALS, Kiltaning Coal Co.'s Phoenix Vein, f. o. b. at Phila., Lemon, Cumberland Vein Coal, Consolidation Coal Co.'s on board, N. Y., Maryland Coal Co.

Prices at Georgetown, D.C., and Alexandria, Va.

August, 1872. George's Creek and Cumberland f. o. b. for shipping \$ 4 75

Prices at Havre de Grace, Md.

Table with columns: August, 1872, Wilksbarre and other White Ash for Cargoes, Lykens Valley, Shamokin Red or White Ash.

Bituminous Coals (Cumberland).

Table with columns: Georgetown, F. o. b., Baltimore, New York.

Prices of Gas Coals.

Table with columns: August, 1872, Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y. Course Slack, Block House, Goria.

Table with columns: August, 1872, Corrected weekly by Bird, Perkins & Job, 27 South street, Pitcon, Sydney, Langan, Caledonia.

Table with columns: AMERICAN, Westmoreland, Fairmont Gas Coal Co. of N. Y., Dussard Coal Co., Penn., Newburg Orrel Gas, West Fairmont Gas Coal.

Freights.—August 1, 1872.

Table with columns: Cumberland, Anthracite, TO EASTERN PORTS, Ameshury, Bangor, Bath, Boston, Bridgeport, Bristol, Chasnet Nar'owe, Derby, Dighton, Cambridge, Fall River, Hackensack, Hartford, Hoboken, Jersey City, Middletown, Mystic, New Bedford, Newburyport, New Haven, New London, Newport, New York, Norwalk, Norwich, Pawtucket, Portland, Portsmouth, N. H., Providence, Rockport, Salem, Sag Harbor, Salein, Stamford, Stonington, Taunton, Warren, Washington, TO RIVER PORTS, Albany, Catskill, Cocksack, Coeyman's, Cold Spring, Fishkill, Haverstraw, Hudson, New York, Nyack, Poughkeepsie, Rhinebeck, Rondont, Sangerties, Sing Sing, Stayresat, Tarrytown, Troy, West Point, Yonkers.

Prices of Foreign Coals.

Table with columns: August, 1872, Duty 7 1/2 c. per ton, Corrected weekly by ALFRED FARMELL, No. 32 Pine street, N. Y., Liverpool Gas Caking, Cannel, House, Orrel, Per ton 2,240 lbs., ex-ship, PRICES FROM YARD, Liverpool House Orrel, screened, Cannel, Per ton 2,000 lbs. delivered.

Foreign and Provincial Freights.

Table with columns: August 1872, Foreign, Newcastle and Ports on Tyne, per keel of 21 1-5 tons f, Liverpool, 5 per cent primage, Provincial, Sydney, Langan, Port Caledonia, Little Glace Bay, TO BOSTON, Sydney, Langan, Cow Bay, Port Caledonia, Little Glace Bay, TO HOBOKEN, L. V. R. R., Mancho Chunks to Phillipsburgh, Morris & Essex R. R. Phillipsburgh to Hoboken, Shipping expenses, Wharfrage, TO SOUTH AMBOY, L. V. R. R., C. R. R. of N. J., Phillipsburgh to Elizabethport, Shipping Expenses, Wharfrage, PENN HAVEN TO ELIZABETHPORT, L. V. R. R. Penn Haven to Phillipsburgh, C. R. R. of N. J. Phillipsburgh to Elizabethport, Shipping expenses, Wharfrage.

Rates of Transportation to Tide Water.

Table with columns: BY RAILROAD, TO PORT RICHMOND, PHILADELPHIA, Philadelphia and Reading Railroad, from Schuylkill Haven for consumption (\$1 85 less 50c drawback), For reshipment, MAUCH CHUNK TO ELIZABETHPORT, L. V. Railroad from Mauch Chunk to Phillipsburgh, C. R. R. N. J., Phillipsburgh to Elizabethport, Shipping expenses at Elizabethport, Wharfrage, TO HOBOKEN, L. V. R. R., Mancho Chunks to Phillipsburgh, Morris & Essex R. R. Phillipsburgh to Hoboken, Shipping expenses, Wharfrage, TO SOUTH AMBOY, L. V. R. R., C. R. R. of N. J., Phillipsburgh to Elizabethport, Shipping Expenses, Wharfrage, PENN HAVEN TO ELIZABETHPORT, L. V. R. R. Penn Haven to Phillipsburgh, C. R. R. of N. J. Phillipsburgh to Elizabethport, Shipping expenses, Wharfrage.

MARKET REVIEW.

IRON.—After a period of unusual excitement, this market has relaxed into a quiet condition. The advices received from the other side continue to be of a tone to strengthen the market here, and importers are very firm in their views, declining, in most cases, to sell at anything less than previous asking prices. Purchasers, however, are not inclined to pay these rates, and the business done has been light. We note sales of 100 tons Glengarnock at \$53 50; and 100 do. Gartsherrie at same price, now held for \$53. Eglinton is now in light stock—we quote it \$52a53; Gartsherrie, \$55a56; Glengarnock, \$54a55, and Coltness, \$56a57 50. In American there is no change to note, the market being very firm and very little No. 1 to be had; we quote No. 1 \$52a55; No. 2, \$50 a52, and Gray Forge, \$48a49—a sale of 500 tons No. 1 is reported at \$54 50. New English rails are somewhat firmer, and 2,000 tons, from store, have been sold at \$73 gold. Old Rails are quiet at about \$50 gold; 550 tons, on the spot, changed hands at a price not transpired. American Rails are quiet: we quote at Mills in Pennsylvania, \$85, and here, about \$87. Scrap Iron is very quiet at \$52 50a55 from yard, and \$50a51 ex-ship. The tendency of the market for Bar is still upward, though there has been no advance since our last.

PHILADELPHIA, July 22.—(From Circular of Edward Samuel.)—In Pig the market is firm. In Bar an advance is reported to 5 cents, but sales, generally, are reported at 4.7a4.8 cents. We quote American No. 1 Foundry Pig at furnace \$51a52; No. 2, \$48a50; No. 3, Forge \$49a50, and No. 4, White and Mottled, \$42a44; American Refined Bar, (Mill price), 4.8a5 cents.

We extract the following from a circular of D. Brown, dated London, July 20th. In Iron freights to the United States very little has been done, and the market is almost bare of orders; 17s. 6l. to 20s. and 5 per cent. is offering for New Orleans, New York, 18s. and 5 per cent., City Point, 19s. and 5 per cent., Galveston, 22s. and 5 per cent.

LEAD.—The stock of common Pig is moderate and the market is firm at 6 1/2 cents gold. The Government is not now selling. The European accounts advise higher prices anticipated. Corroders seem to be pretty well

supplied with fine, having bought freely previous to the enactment of the new tariff and have worked up but little since. Bar 9 1/2 cents, Sheet and Pipe 11, Tin-Lined Pipe, 15, and Block Tin Pipe 65, all less 10 per cent. to the Trade.

COPPER—Manufacturers make no change in prices and we quote as before, say, New Sheathing 43 cents, Bolts and Braziers 45, Bronze and Yellow Metal Sheathing 30, and Y. M. Bolts 32 cash. The price of Ingot has been advanced 1/2 cent per lb., but buyers do not respond very readily, and the business at the higher rates has been small, embracing about 75,000 lb. Lake at 32 1/2 cents, cash, and 200,000 lb. for forward delivery, on private terms; 34 1/2 cents is bid for October to December and 35 is asked. The rise in America caused rather more inquiry for English, and sales have been made of 405,000 lb. Best Selected at 33 cents.

SPELTER—There is a little more inquiry, and we notice the sale of 25 tons Silesian, for August delivery, at 7 cents gold; 30 tons American Zinc Co., Arkansas, sold at 10 currency.

STEEL—The market is very firm for parcels as wanted from store. English in smaller stock than for several years past.

TIN—The demand for Pig is very limited, but prices are without quotable change: 50 Slabs Straits sold at 36 cents gold, for immediate delivery; for August, 35 is the nominal price for Straits and English. The latest cable quotes English £160. A sale will take place at Batavia 3d prox. Plates are in good demand, and prices are very firm; the sales are (all for August delivery) 1000 bxs. Charcoal Tin at \$12.25 for I. C.; 500 do. Charcoal Terne, \$11.75; 2000 do., \$12; 500 do., 20 by 28, \$24.50; 1500 do. Coke Tin, 14 by 20, \$12.25; \$12.50; 250 do. S. T. P. Charcoal Terne, \$12, all gold, and 500 do. Charcoal Tin, and 500 do. Charcoal Terne, on private terms; 350 bxs. Charcoal Terne, 20 by 28, sold for immediate delivery at \$25 gold.

ZINC—Sheet continues firm, but not very active at our quotations. Mosselmann, from agents' hands, 9 1/2 cents less 4 per cent. gold. Metallic 10 1/2; Am. Dry 8 1/2; Manganese 4 1/2.

METALS.

New York, August 1, 1872.

IRON.—Duty: Bars, 1 to 1 1/2 cents # b; Railroad, 70 cents # 100 #; Boiler and Plate, 1 1/2 cents # b; Sheet, Band, Hoop, and Scroll, 1 1/2 cents # b; Pig, \$7 1/2 ton; Polished Sheet, 3 cts. # b; Galvanized 2 1/2; Scrap Cast, \$6; Scrap Wrought, \$8 per ton.

Table listing various metal items and their prices, including Pig, Scotch No. 1, American No. 1, American No. 2, American Forge, Bar Refined, English and American, Bar Swedes, assorted sizes gold, Bar Swedes, refined, Bar Refined, Large Rounds, Soroll, Ovals and half-round, Band, Horse Shoe, Hoops, Nailrod, Sheet, Russia, Sheet, Singles, D. and T. Common, Sheet, D. and T. Charcoal, Sheet, Galv'd, list 10 per cent discount, Rails, English (gold), Rails, American, at Works in Pennsylvania, currency.

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents # b; Manufactured, 45 per cent. ad val.

Table listing copper items and prices: Copper, New Sheathing, Copper Bolts, Copper Braziers, 16oz. and over, Copper Nails, Copper, Old Sheathing, &c. mixed lots, Copper, Old, for chemical purposes, 14 @ 18 oz., Copper English Pig, Copper, American Ingot, Yellow Metal, New sheathing & Bronze, Yellow Metal Bolts, Yellow Metal Nails.

LEAD.—Duty: Pig, \$2 # 100 #; old Lead, 1 1/2 cents # b; Pipe and Sheet, 2 1/2 cents # b.

Table listing lead items and prices: Galena, Spanish (gold), German, English do., Bar, Pipe, Sheet, Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. # b.

STEEL.—Duty: Bars and ingots, valued at 7 cents # b or under, 2 1/2 cents; over 7 cents and not above 11, 3 cents # b; over 11 cents, 3 1/2 cents # b, and 10 # cent ad val. Store prices.

Table listing steel items and prices: English Cast (2d and 1st quality), English Spring (2d and 1st quality), English Blister (2d and 1st quality), English Machinery, English German (2d and 1st quality), American Blister "Black Diamond", American, Cast, Tool, American, Spring, American Machinery, American German.

TIN.—Duty: Pig, Bars, and Blocks, 15 # cent. ad val.; Plate and Sheets and Terne Plates, 25 # cent.; Roofing 25 ad val.

Table listing tin items and prices: Banca, Straits, English.

Table with columns: PLATES, Pair to Good Brands, Gold, Currency, I. C. Charcoal, L. O. Coke, Coke Terne, Charcoal Terne, SPELTER—Duty: In Pigs, Bars & Plates, Plates, Foreign, Plates, Domestic, ZINC—Duty: Pig or Block, Sheet.

San Francisco Stock Market.

BY TELEGRAPH.

New York, August 1, 1872.

Our report from the San Francisco Stock Market is dated the 30th inst. With the exception of slight advance in Imperial the list has declined. Releher not to be out of fashion comes out in a new dress in the shape of an increase of its stock some three or four hundred per cent. the exact amount of which we have not learned as yet. The new issue is quoted at \$110, the report is as follows.

Table listing stock market items and prices: Savake, Crown Point, Yellow Jacket, Kentuck, Ohollar Potool, Gould & Curry, Selcher "New Issue", Imperial, Hale & Norcross, Eureka G. V., Uphir, Alpha, Raymond & Ely, Amador.

It is remarkable how little the miner is disposed to avail himself of inventor's improvements in blasting. It was long ago proved that if a blank space were left in the cartridge, the effect of the powder would be much greater. The blank space is easily obtained by placing a wooden plug, shaped like a spool, in the hole before charging the powder. When the explosion takes place the gases fill the annular space around the centre of the spool. But this simple expedient turns up every year or two as an "invention." A well-known Austrian engineer has just introduced another style of spool by which the powder space is greatly increased. His spool is of steel, has a length of 12 or 14 inches, and a diameter of 1 to 1 1/2 inches at the ends, and 1/2 to 3/4 inches in the middle. It is inserted in a cylindrical paper bag, and the powder or dynamite filled between the reduced diameter and the paper. It is then placed in the bottom of the blast hole, covered with a certain thickness of tamping, and fired in the usual way, through a channel in the center.

Cement roofs are coming into very extended use in Prussia. The cement is ground in steel mills and laid on with a thickness of only one-eighth of an inch. The roof is therefore a light one, weighing less than eight pounds to the square foot. With German prices, the coat is 52 cents a square foot.

The heat of Friday expanded the iron of the railroad bridge on the Pennsylvania Railroad, at Newark, so as to make it for the time impossible to use the bridge.

60 Tons Per Hour.

AUTOMATIC RAILWAY,

For the use of Coal Yards, Furnaces, &c., requires neither STEAM OR HORSE POWER.

Address, C. W. HUNT,

West New Brighton, Staten Island, N. Y.

F. F. VAN WAGENEN, E. M. Mining and Consulting Engineer, DENVER, COLORADO. Examinations and Reports on Mineral Property. Reliable Lodes bought and sold. Contracts arranged and mines taken charge of and worked. Care WINNE AND PARSONS, Denver, Colorado.

A MINING ENGINEER, GRADUATE OF A Mining School and experienced in all branches of his business, desires an engagement. Address July 30-31 S. S. this office.

THE SCIENTIFIC PRESS, FOR 1872. VOL. XXIV.

The weekly issues of the Press will contain reliable Information for Practical Miners, Treating on the Opening of Mines, Mining of Ores, Milling of Ores, Smelting of Ores, Separation and Roasting of Ores, Amalgamation, Saving of Gold and all Precious Metals, New Processes of Metallurgy, New Discoveries of Mines, Mining Engineering and Hydraulics.

For Inventors, Mechanics and Manufacturers. All new and important developments in Scientific and Mechanical Progress, Patents and Inventions of the Pacific States, Progress of Home Industries, Hints for Local Manufacturers, Illustrations of New Machinery, Reports of Popular, Scientific and Industrial Lectures.

Our Mining Summary Gives the progress of mining work from week to week in the various counties and districts throughout the principal mining regions of the United States, arranged in alphabetical order. It is the most extensive record of mining operations published in the world. It affords the intelligent miner a rare opportunity to know and profit by the work and experience of his neighbors. Miners have few sources of practical information in their calling, and should embrace every reliable means for improvement. Mining Operators and Shareholders, at home and abroad, weekly examine our Summary with increased interest and profit.

Our "Domestic Economy" Embraces new and important facts which should be known in every cabin and household. Short and interesting—the articles under this heading are freely read and practiced with profit and improvement to the readers. The Press is not strictly a "paper for professional, scientific men" but rather a

Liberal Popular and Scientific Journal, Well calculated to make practically scientific men from our intelligent masses. This is our stronghold for accomplishing good. Plain, correct and pleasing language, easily comprehended by all, confined mostly to short articles, is our endeavor.

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## A Peculiar Theft.

Chemistry owes much of its greatness as a science to a theft, a piece of downright burglary, for it was by this means that BERZELIUS, a man who deservedly bears the title of Father of chemistry, obtained his first retort. Passing the door of his professor's room one day, he saw a freshly cleaned retort. Chemical apparatus was so rare and costly at that time, that to own a thermometer was enough to give a man scientific repute, and the temptation was too great for the young man, in whom genius was budding. The retort slipped into his hands as if it acknowledged its master, and the young student proceeded to make analyses that brought him into dispute with the first men of his time.

This story (or is it fable?) of old times has a remarkable parallel in a theft which lately took place at the Alleghany Observatory. A valuable *object glass* has been stolen from that institution. The *Pittsburgh Dispatch* gives the following account of this remarkable burglary: "One evening, about two weeks ago, Prof. LANGLEY and his assistant left the Observatory, fastening the doors, according to custom. When they returned next day they found the object glass gone. It was a valuable instrument, and, it is said, could not be replaced for less than several thousand dollars. At first they were at a loss to account for the circumstance, but subsequently ascertained that a professor who had formerly been employed at the observatory, and had been frequently heard to admire the glass, had also disappeared from his boarding-house on Anderson street, leaving his baggage behind him. It was stated that he almost idolized the instrument, being next to insane upon the subject, and his sudden disappearance, coupled with his previous manifestations respecting the glass, led to suspicion being attached to him. Upon inquiry it was ascertained that he traveled in the direction of Chicago, and thither Mr. Alderman BOWDEN, of Alleghany, was some days ago dispatched, with the expectation of finding him. The person to whom suspicion attaches has always borne a character for the strictest integrity and excellence in private life, and if it is he who is really responsible for the affair, it resolves itself into a strange eccentricity."

Professor LANGLEY is said to be as deeply plunged in grief, as the unhappy robber, probably, is in perplexity. The latter person can hardly hope to win forgiveness by services to astronomy, as great as those of BERZELIUS to chemistry, and as for selling the glass, that would be difficult, if not impossible. Difficulties of sale, however, do not deter scientific thieves. Some years ago the metallurgical world of Europe was stirred by the news that a platinum retort, for concentrating sulphuric acid, had been stolen. It was large and valuable, and had but very few compeers in the world; for at that time sulphuric acid works were less numerous than now, and but few of those in operation possessed platinum stills. The question that puzzled all was, how could the thief realize on his venture? There were, at the most, only two or three works in the world which had the appliances necessary for working up the metal. Their owners were above the suspicion of being capable of receiving stolen goods. It was next to impossible that the thief could melt the retort up himself, and as the sale of such an article was matter of publicity to the whole world, a market among the acid factories could hardly be found. The retort was never discovered, and the mystery of its final disposition remains as great as ever to-day. It was conjectured that it might have been cut up, and sent in fragments into Russia, to be returned from that country as ore, but whether that is the real state of the case is not known.

The unfortunate professor who has eloped with the object glass he loved, can hardly be suspected of a pecuniary aim. His act was the result of uncontrolled affection, and he should be an object of sympathy as well as of condemnation.

## The Red Color in White Lead.

A Bannow and G. Krämer in the "Berichte der Deutschen Chemischen Gesellschaft" recount a series of experiments made with eight samples of lead obtained from English, Belgian and German lead-works, each sample weighing about 50 kilos. It should be observed that the red color sometimes met with in white lead is considered to be due to the presence of silver in the lead. The authors, abstaining from any *a priori* opinion on this question, have tried to solve it experimentally, and have therefore made accurate analyses of the samples, with the special view to estimate the impurities (foreign metals) in lead, and for the estimation of sulphur in metallic lead. The authors have devised an ingenious method, which consists in the conversion of the lead, while molten, into chloride of lead, the sulphur being converted into chloride of sulphur, which, being decomposed by water, is converted into sulphuric acid. In addition to tabulated forms containing the results of analysis, this lengthy memoir contains the account of another series of experiments, made with different samples of lead converted into white lead by processes industrially used. It appears that, provided the quantity of silver present in lead is, as is usually the case in soft lead, very small, the reddish tinge occasionally observed in white lead is due, not to the presence of silver, but to a defective process of manufacture. This extensive memoir is a valuable contribution to the practical knowledge of white-lead manufacture, and also the metallurgy of lead.

## The Dangers to Oil Tanks.

Mr. DAVID BROOKS in a paper read before the Meteorological section of the Franklin Institute spoke of the danger to oil tanks, from lightning and pointed out that iron, instead of being a good and safe material for their construction, really invites their destruction.

Oil tanks are usually well connected to the earth, that is, electrically, by pipes running to the distilleries, and for the purposes of filling and discharging these tanks, the connecting pipes being buried in the ground. There have been explosions and fires involving great loss, connected with the manufacture and storage of petroleum, supposed to have originated by being struck by lightning. Do the lightning-rods we see placed so numerous about these tanks, have any effect to prevent these catastrophes? In my opinion not the least.

These tanks are immense air tight vessels, with the upper portion in the form of a dome. The lighter portions of these oils rise to the top of the dome. These lighter and more volatile oils are very inflammable, and when mixed with air are as explosive as gunpowder. The iron tank being electrically well connected to the earth, is a conductor exercising great attraction for the electricity of the clouds, and should a discharge from the cloud take place, the stroke would centre upon that portion of the dome most elevated, and directly upon the plate of iron in contact with the explosive compound. The iron becomes instantly melted or intensely heated, causing an explosion of the vessel, followed most probably by a frightful conflagration. This tank, which would upon the first sight seem to be of a material most safe to protect the contents from fire or accident of this nature, is, upon reflection, exceedingly defective, and in imminent peril during times of thunder storms.

Magazines for the storage of gunpowder have been constructed in a very similar manner in the countries in the south of Europe, and although protected, or supposed to be protected by lightning rods, were really exploded by these very devices, involving, in some cases, fearful loss of life.

An iron rod fastened to the side or bottom of the tank, and made to extend say twenty or thirty feet above the dome, would be to that part of the tank as a conductor. The point of the rod would be the point to receive the discharge. The lightning might melt

an inch or so of the projecting point of the rod, but would not raise the temperature of any portion of the tank proper, or that in contact with the explosive or inflammable contents. Oil tanks could in this manner be safely protected from the effects of lightning.

## Engineering and Mechanical Notes.

A French chemist proposes to put out fires by throwing *resinous material* upon them! This is first suspended in water, and the reasoning is that by means of this mixture the water penetrates instantly such bodies as it meets with, in place of passing away in the form of steam; the resinous matter, moreover, produces an intense smoke which chokes the flames, and extinguishes everything that is burning. The smoky part of this theory, at all events, won't "hold water." Hunter's Point has been enveloped in a smoke, dense enough to quench any fires produced by human agency, if dense smoke were a preventive. But instead of going out a fire there is now three days old and still burning.

The old project of laying dust by sprinkling the streets with water, in which salt and chloride of calcium is dissolved has been revived by the Brooklyn Board of Health. That subject has been discussed enough by the New Yorkers, and the use of calcium chloride ought to have received its *quietus* at the hands of Dr. Chandler. The only effect of its use, if there were any effect at all, would be to keep the streets continually damp, and to give us all the "snuffles." While if sea water is used and the calcium chloride is not added, the salt, when dry, will make just as fine a dust as that which now troubles us, and much more irritating. The introduction of sea water for cleaning the streets is certainly desirable on the score of relief to the Croton, and the rains would prevent the concentration of much salt in the mud except at particular seasons. But that it would have especial value in keeping the dust down is not proven, and is extremely doubtful.

The French propose to use aluminum for coins. Hardness will be obtained by the addition of 1 or 2 per cent of nickel. The lightness of aluminum makes it particularly acceptable for what are popularly known as "coppers."

The important effect which one great railway enterprise may have upon the iron business of the country is seen in the statistics of the Northern Pacific road. This road has purchased fifty thousand tons of railroad iron from Pennsylvania manufacturers, besides an immense quantity of spikes, frogs, switches, cars, chains, etc., the outlay of which, in Pennsylvania alone, during the last eighteen months, has been upwards of \$5,000,000. The same road having forty-eight locomotives already upon its line, has just closed a contract with the Baldwin works for fifty more. But all is fish to the ironmaster's net. The rebuilding of Chicago, it is said will call for 800,000 tons of iron, within the next three years.

The *Painesville Advertiser* says that the unfinished narrow gauge road to Youngstown has been sold to a construction company, in which prominent citizens of Youngstown are interested, who propose to complete it immediately.

The mining and treatment of mercury ores will perhaps one day be almost an American monopoly. The California mines are of great importance, but they are by no means all that this country contains. In the Yellowstone region the Indians procure cinnabar to decorate their heads, and trappers, who are familiar with that country, report that the quantity is very great. The exact place of the deposits is known to but few; it is on the Indian reservation, and though the Colorado prospectors have often talked of organizing to take those and other mines by force, the project has happily always fallen through. But there is good reason to expect that one day there will be important mines opened there. Cinnabar is also reported from Oregon.

Mr. James Robertson, of Glasgow, has invented a rotary squeezer, especially adapted for the treatment of the large Danks blooms.



**THE ENGINEERING AND MINING JOURNAL.**

ROSSITER W. RAYMOND, Ph. D.  
JOHN A. CHURCH, E. M.  
Editors.

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**Boiler Explosions.**

Within the ten years comprised between 1860 and 1870, Belgium had 90,578 steam boilers at work, with a total of 71 explosions, 96 deaths and 65 wounded. In England, from Jan. 1, 1861, to July 1, 1870, 411 explosions occurred, killing 639 persons and wounding 782. It is worth noting that in France, Belgium and England, the proportion of deaths to explosions is very nearly 1½ to 1. No such similarity exists in the proportion of wounded. There is, however, no regularity at all, when we consider the occurrences year by year. These facts were brought out at the meeting of the Alumni Association of the School at L'ège, Belgium, and they were collected with a view to ascertain whether some accordance could not be discovered which would increase our knowledge of the causes of explosions.

This was not arrived at, but other facts were developed, which are of great importance. For instance, the Boiler Insurance and Steam Power Company of England, made, by its inspectors, 49,163 visits in 1871, and found 1,963 safety valves in bad

order or overweighted, 676 mano-meters out of order and 452 water level indicators also in bad condition. Here were 2,820 opportunities for explosion, which a good Providence saved the English from, and the discovery of which shows that these disasters can be prevented by proper care.

These investigations into the cause of boiler explosions from a part of that general inquiry into industrial disasters, undertaken for the purpose of relieving humanity of the fearful risks which attend the operations of man on their present extended scale. We cannot afford to throw away steam because it has its victims, for steam now moves the world. But study and constantly narrowing restrictions upon carelessness and more rigid inspection, will undoubtedly relieve us of very much of the danger to which our operatives are now subjected.

**Trade and Wages in England.**

The disputes between the puddlers of South Staffordshire and their masters have been settled by the accountant ascertaining that the average price of bars during the last three months was £11.11s. 7d. a ton. Upon this basis the puddlers receive 12s. 6d. a ton, an advance of 2 shillings, and the millmen's wages are advanced 20 per cent. "Higher wages," says the *Colliery Guardian*, "were never known in the iron trade. Further advances in iron are feared as the result, alike throughout Stafford and elsewhere. This award is being looked for in every iron making district, for it will affect them all. It gives South Stafford puddlers 1s. 3d. a ton more than is received by the North of England puddlers who were ahead of all the rest before. The men employed at the blast furnace, in making pig iron will also have to be raised; so likewise the price of pig iron."

The building of new furnaces continues, and it is estimated that when the improvements, now in progress at the Scotch works are finished, the capacity of those works will be increased fully one-fourth. Workmen are still giving trouble. They appear to think that they can now dictate their own terms. Coal mining is especially embarrassed by the attitude of the men, and it is feared that the present high prices will experience a still greater increase. With all the good prospects of trade some coal masters have been forced to lock their men out, and others are said to be contemplating a similar course. Many concessions have been made, but the men are obstinate and a real coal famine is by no means an impossibility.

With all this, the export of coal and coke from England not only does not halt, but is even increasing, in face of the high prices. The first six months of this year show an increase of 736,000 tons over 1871 and 814,000 tons over 1871.

**Mining Prospects.**

The rapidity with which the mining business responds to the least encouragement is illustrated by the statistics given on another page, which set forth the number of new mining corporations embodied since the present mining "excitement" began. To call it excitement is hardly fair, for it is quite different from that phrenzied rush to new fields, supposed to be of fabulous wealth, which we have so often seen going on in this country.

Nevertheless, the present improvement in business is not free from the glitter of a real excitement. It is partly an honest improvement and partly a puffed-up and really unsound expansion. Were there nothing positively known about the individual concerns, it would be impossible to believe that our mining field has developed, within one or two years, prospects valuable enough to warrant the investment, either of 558 million dollars or of any fair proportion of that sum as a real cash capital. Utah is one of the finest depositories of ore on the face of the earth, Nevada can point to still undeveloped riches of wonderful amount; but there are bounds to the sum which can, with good prospects, be invested in any field within a few months. Undoubt-

edly many of these companies of large promise resemble that one which started with a capital of \$3,000,000, based upon one or two tunnel claims, the tunnels having nothing especial to run for, and a couple of ordinary claims which did not show ten tons of ore.

But with all that, there is real development. The country is now in the midst of a new movement in mines, and when we compare it with the scenes that have accompanied such movements formerly, we see signs of great improvement, and a promise of greater stability in the results. At present iron, copper, lead, gold and silver mining receive great encouragement, and are certain to make a lasting improvement. The manufacture of zinc is increasing as much in this country as in any other in the world, and perhaps more. We are busily hunting for tin, and may very shortly see an important establishment for the manufacture of nickel, cobalt and copper established. Altogether, we may look upon the state of the mining industry as very flattering. Nothing but coal mining is under a cloud, and that certainly cannot complain of its quantity. Everything points to two or three years, if not more, of great activity and good profits.

**The Emma Suit.**

The Emma Mining Company comes off conqueror in a suit instituted by it to restrain a rival company, whose workmen, last April, broke into the Emma works. This was the Cincinnati and Illinois Tunnel Company. When they made their appearance in the Emma the workmen of the latter blocked up the opening, but shortly afterwards the "cave" in the Emma occurred, and cut the owners off from that part of their workings where their rivals had entered. When, after some delay, the fallen rock was penetrated they found the Illinois men in possession of all that part of the Emma works, and the workmen of the latter mine were resisted in attempting to take possession of it.

The Illinois men claimed that the ground on which they stood did not belong to the Emma mine, but was separated from that vein by a clear space of about thirty feet, which was filled with barren rock. The present suit was then brought to decide the ownership of this part of the property. The Illinois men produced affidavits from some gentlemen who professed to be experts, and also from a number of discharged workmen, formerly in the employ of the Emma company. These gentlemen went into the mine and peering around in places where the ore had been altogether removed declared that they found no ore. Measuring the foot-wall they found it 30 feet wide at that spot, and assumed that for that distance there never had been any ore, and that the ground held by the Illinois people was accordingly separate and distinct from the real Emma vein.

On the other side the owners of the Emma brought up men who had been constantly familiar with the mine during the time when that part of the ground was worked out, and who declared that ore had been taken out of every foot of the distance said to be barren. Assayers also went into the mine and taking samples from spots at distances of two feet, along the whole width of the so-called barren space, found that all that rock carried silver, the lowest assay being more than \$75 per ton. On this evidence Chief Justice McKean declared that the testimony failed to prove any disconnection between the ground acknowledged to be the Emma mine, and that in dispute. He also gave expression to the opinion that the Emma company had a right to follow their ore outside of their own surface limits into neighboring ground; in accordance with the law which says that the patentee may follow the "vein or lode, with its dips, angles, and variations, to any depth, although it may enter the lands adjoining, which shall be sold subject to this condition."

We have told this story as we find it in the summing up of the Chief Justice. The case is an important one. Owners of a tunnel-right are ousted

by owners of a mine, the record of which is later than the record of the tunnel claim, from property, of which both stand in physical possession. This is but a repetition of the lesson that a United States patent, once issued, neutralizes all claims which are not so secured. The tunnel company did not, so far as we can learn from the judge's summing up, even prefer a prior claim to the ground. They did not say, it is ours because our record is the oldest, and all ground that we can "trace out" is ours by prior right. They based their demand entirely upon the proof that there was a break in the Emma ore beyond which that company had no right to go.

We submit that this is the clear meaning of the law. The United States issues its patent as a final decision upon the ownership of the mine which the patent covers. The holder of the instrument is the master of his vein, no matter what its windings may be. And this is the best condition of mining rights.

United States patents would lose their value, if the mines they protect could still be taken possession of by men who, a year or two before, had laid down an indefinite tunnel claim to all the ore they could possibly find in the line of their tunnel. This tunnel business, as we have before said, ought to be disposed of once for all, by Act of Congress. If any man wishes to run a tunnel and can point to a definite body of ore which he expects to reach, he ought to have the right to that ore, for the length of time it takes him to reach it by reasonable diligence. But how many of the tunnel claims in the Territories have been prosecuted with what, by any stretch of the imagination, can be called "reasonable diligence?" Not one in a hundred. Whoever examines that country finds in every district, tunnel "stakes," marking locations that have never had a pick struck into them, or else have been seriously neglected. This style of mining has not borne fruits sufficient to entitle it to the protection it enjoys. It is extremely hazardous to the other, which we may call in contradistinction, the *straightforward* style of work.

We can but feel pleasure at the victory of the Emma company in this case. Whatever criticism that concern is open to on other points, it at least deserves the credit of having worked its property with fair diligence. This is the only return the American people ask for the free gift of their mining property, and to this they are certainly entitled.

#### On Pyro-Plating.

BY J. BAINES THOMPSON, IN THE *Chemical News*.

The end of pyro-plating, like that of all other methods of plating, is to affix to a baser metal a sheet of one of the superior metals; but this method is applicable where none of the other methods can be applied with success.

"Close plating," whether with hard or soft solder, cannot be applied with success to any cutting instrument, as a knife or a pair of scissors, &c. Hard soldering would completely destroy a knife-blade or a pair of scissors. The soft solder plating can be applied to a knife or a pair of scissors without destroying the steel, though with difficulty; with the scissors the first attempt to cut would shear off the plating, and with the knife, if it were sharpened so that it would cut, the plating would chip off in using it. Common electro-plating is not applicable to steel or iron, as by that method these metals cannot be got perfectly clean, that is—chemically clean, therefore by that method no adhering coating can be obtained.

In fact, for all manner of plating or soldering, the first requisite is, that the two metals that are to be applied to each other must be chemically clean, or no proper adhesion can be obtained.

This cleanness is obtained in various ways. In soldering, by various fluxes; in electro-plating such metals as that method is applicable to, by dipping the article in an acid which will readily dissolve the metal of which it is made—and not only so, but the salt formed by this solution of the metal in the acid used, must be readily soluble in water, or no clean

surface can be obtained. There is still another condition to be considered, that is when the surface of the metal has been made thoroughly clean, it must be protected from contact with the air in its transit from the cleansing-baths to the solution wherein it is to be coated. This condition not being recognized in the first attempts at electro-plating caused many failures and much trouble, till it was discovered that a film of mercury prevented the contact of the air with the cleaned metal. Moreover, mercury has this advantage, that it amalgamates with the metal to be coated, and with the coating. Though this amalgamation is not absolutely necessary, yet it facilitates the coating of metals with other metals, by electro-deposition, when the two metals will readily amalgamate.

There are cases where amalgamation is not possible; for example, where one of the metals will not amalgamate, as with steel and iron coated with copper, gold or silver; or when neither will amalgamate, as with steel or iron coated with aluminium or nickel; not that it is impossible to form an amalgam with these metals, for even steel can be amalgamated by the intervention of sodium, but it is not possible for plating purposes, as a diluted solution of a mercuric salt must be used.

Now for all such cases as these where the amalgamation process cannot be used, pyro-plating is especially applicable. The name pyro-plating is given to this process to distinguish it from the electro-plating process, and because the coating is driven into the surface of the metal on which it is put by means of heat and pneumatic pressure. It is not confined to coating with silver as its name might indicate, but it is at present applied to coating with gold, platinum, silver, nickel, aluminium, copper, brass, or bronze and aluminium bronze.

The *rationale* of the process is very simple; but the various details require much care and attention.

The end to be obtained is simply this. That the metal to be coated shall be "chemically clean" when immersed in the solution in which it is to be coated. There are several ways in which the attainment of this end may be prevented. By inadequate means for cleansing, by the passage through the air of two or three feet after being cleansed, by the metal being positive in the coating solution—in this case the metal is fouled on contact. This refers to cyanide solutions, to sulphate and chloride solutions, to double sulphates and chlorides, as of nickel and ammonia, and of platinum and potash or soda. All of these may be used in certain cases for pyro-plating, but they are not used. There is a special solution used for pyro-plating in all cases, because most of these solutions leave matters in the metal that is being coated, if it be in the slightest degree porous or "roaky," as is the case with steel that has been badly faggoted, and on the article passing through the furnace these matters volatilise, and cause an eruption in the coating. The method used for cleansing steel and iron articles is as follows: They are first boiled in caustic alkali to free them from grease; they are then mechanically cleaned with fine emery flour and brushes in water; they are then brushed with steel wire brushes under a stream of solution of carbonate of soda; then they are wired and hung in the same solution ready for being made chemically clean. This is done by means of nascent hydrogen in a hot alkaline solution. The water of solution is decomposed on the article by means of a strong current of electricity, the article being made negative. If the solution be kept strong and not carbonised, a film of this solution is sufficient to protect the article from contact with the air in its quick transit from the last purifying process to the solution wherein it is to be coated. The time for it to be transferred can easily be seen by the experienced eye; the article assuming gradually a more silvery appearance. After the proper amount of metal is put on in the coating both the articles are taken out and washed and dried. The amount of metal put on is ascertained by having a test surface put in with the articles, and the

exact time of putting in and the exact weight of the test noted, and this test is carefully weighed from hour to hour till the amount desired is put on. After being dried, the articles are put into the furnace to have the silver or other metal driven into the surface of the coated metal. The firing furnace, as it is technically called, is of simple construction. The conditions to be observed in its construction are two, namely, to obtain a bright red heat in the chamber where the articles are put, and to secure the articles from coming in contact with the fuel or products of combustion.

In firing knife-blades and other cutting instruments, care has to be taken that they are not carried higher than between 450° and 500° F. This is ascertained by trials on a pad of prepared test paper; a blade is taken out from time to time and tried upon the pad and the color is noted—whether it scorches it straw-color, yellow, pale brown, deep brown or black. Alum-water is used for regulating this paper as to the color for the proper degree of heat. After the proper degree of heat is attained the blade is instantly quenched point downwards in cold water and all that were in the firing chamber with it. For articles that do not require tempering or that are made of metal that will not temper, as iron, copper, good brass, or German silver, the heat may be higher. Even if a steel article should be carried so high as to soften it, it can be re-hardened and tempered with the silver or other metal upon it, without in any way injuring the coating. The theory of this part of the process which is technically called "burning in," is this. The coating metal in all cases is one of the superior metals as compared with the coated metal, and is less porous whether cold or hot.

The article being heated, it naturally expands and becomes more porous, as of course, both article and coating do, but their relative porosity remains the same, consequently on expansion there will be an infinite number of small cists into which by atmospheric pressure the coating will be driven on attaining the proper heat. Then on the instantaneous quenching in cold water, the coating is seized and retained by the sudden contracting under metal. This is seen to be the case on filing or grinding the coating off the under metal; for though the coating may be filed or ground off till both coating and under-metal are filed or ground off together, yet the under-metal remains spotted all over with an infinity of little points of the coating metal.

#### About-Town Jottings.

##### BUSINESS AND PERSONAL.

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- Utica Steam Engine Co. (formerly Wood & Mann Steam Engine Co.) 42 Cortlandt street, N. Y.
- Post & Goddard have removed to No. 111 Liberty street. Dealers in Taps, Dies, Reamers, Drills and supplies generally.
- American Submerged Pump. Power attachment—cheapest and best in the market, 55 Chambers street, N. Y.
- Roper Caloric or Hot Air Engine, 124 Chambers St.
- Blake Bros., New Haven, Conn., manufacture Stone Breakers for crushing ores and minerals of every kind into small fragments, preparatory to their further comminution by other machinery.
- The Niagara Steam Pump Works, 23 Adams street, Brooklyn, N. Y., are now working to their fullest capacity.

On one or two occasions recently, we have spoken of developments in oil going on up Hunter's Run about three miles, on land adjoining that of Azro Copeland. Well. The developments have reached a culmination in the shape of a twenty barrel well. It is said that it will be torpedoed, when it is expected that a large well will be the result. Parties owning land in that vicinity are looking tickled, and we have now a prospect of a large oil excitement in the immediate vicinity of Tionesta. More wells will at once be put down. Leases are being let rapidly.—*Tionesta Republican*.

## Tessie du Motays Copper Process.

We have before noticed this method of treating pyritiferous ores, but as M. du Motay is making considerable effort to introduce the methods of treatment which bear his name into this country, we print below his description filed at the Patent Office.

"It is well known that sulphuric and chlorhydric acids employed singly or together dissolve but little or not at all, the sulphurets and the double oxy-sulphurets of copper and iron containing or not containing gold, silver, lead, antimony, and arsenic.

"It has been impossible heretofore to successfully treat these ores in a crude or roasted state, either by sulphuric, or chlorhydric acid, or by a mixture of these two acids. The solutions of persulphate of iron used alone, cold or warm, to dissolve these ores act very slowly, and for this reason they cannot be successfully employed to melt the copper contained in the complex pyrites, containing this metal alone or mixed with gold, silver, lead, antimony and arsenic.

"We have discovered a new dissolvent—positive and economical—of the ores of copper, carbonates, oxides, and double or multiple sulphurets, and also mats and black coppers containing or not containing gold, silver, lead, antimony, and arsenic.

This dissolvent—which has for its object to rapidly dissolve the sulphurets and oxy-sulphurets, and all other copper ores, roasted or not—is a mixture of persulphate of iron and chlorhydric acid, or, what amounts to the same, a bath of persulphate of iron, through which passes a continuous current of gaseous chlorhydric acid.

"The iron, copper, antimony, and arsenic rapidly and entirely dissolve in this compound. The iron, copper, and antimony, dissolved first to a state of chloride, finally return, in yielding their chlorhydric acid, to the state of sulphates, while the arsenic remains in solution, in a state of chloride. The other metals, such as silver and lead, are attacked first by the chlorhydric acid, and finally precipitated in an insoluble state, in the form of sulphates. The gold, unattacked, follows them into the insoluble residuum. This residuum, separate from the liquid part, is first roasted and afterward reduced, in the presence of lead, in the cupel. The liquid bath, containing the sulphates of iron, copper and antimony, and the chloride of arsenic in solution, is evaporated to dryness. During the concentration of the bath, a part of the chloride of arsenic volatilizes, while the other part remains in the liquor.

"The salts, after evaporation, are recovered by the water; the sulphate of antimony is precipitated to the state of subsulphate of antimony, nearly insoluble; and the chloride of arsenic, remaining, passes to the state of arsenious acid, likewise not soluble; while only the copper and iron remain dissolved in the liquor.

When, during the evaporation, all the chlorhydric acid has not been expelled, and only the antimony and arsenic are left in a chloride state in the liquor, similar reactions to those before described occur—that is to say, the chlorides of arsenic and antimony, recovered by the water after evaporation, pass away, the first in a state of arsenious acid, and the second in a state of oxychloride, insoluble. The double sulphates of copper and iron remaining in solution are treated by means of metallic iron, which precipitates the copper by the process of cementation. The protosulphuret of iron remaining is treated, in either a moist or hard state, by the oxygen of the air, or by a mingling of air, chlorine, or nitrous vapors, which brings it to a state of persulphate. The hydrated peroxide of iron remaining insoluble from this operation is separated by decantation and set aside. Subsequently treated, and dissolved by sulphurous acid liquid, in connection with air, it produces sulphate of peroxide of iron, which serves to replace the quantity of sulphate lost in the preceding operations. In this manner the chlorhydric acid is displaced by persulphate of iron, which serves

the same purpose as the persulphate in the other operation.

It sometimes occurs that in the double liquid of sulphate of copper and iron a small portion of sulphate of silver remains insoluble. To precipitate to a metallic state the silver contained in this sulphate we cause the reaction of plates of copper or lead, which adhere to the silver, and which we add to the insoluble residuum before being treated in the cupel.

*Claim 1.* The mingling of persulphate of iron and chlorhydric acid, which constitute a new and positive dissolvent of the ores of copper, carbonates, oxides, and double or multiple sulphurets, likewise mattes and black coppers containing or not containing gold, silver, lead, antimony, and arsenic.

2. The reactions above described for obtaining in an insoluble state salts and precious metals contained in copper ores treated by our dissolvent.

3. The separation of the copper in a pure state and the removal of the antimony and arsenic.

4. The incessant regeneration of persulphate of iron and chlorhydric acid, constituting our dissolving liquor.

5. The employment of persulphate of iron with sulphuric acid, in the same manner as we have used chlorhydric acid.

## MINING SUMMARY.

## Nevada.

The Reese River *Reveille* of July 13, has the following

## MINING REVIEW FOR THE WEEK ENDING SATURDAY, JULY 13.

Work in the mines, with the exception of a few of the principal ones, is not being pushed with the energy which has been noticeable for some months past. Many of the smaller mines have shut down, most of them temporarily, and a large number of "chlorides" have been gradually quitting work in different localities till but few are now employed in this kind of mining. The reasons assigned by them for discontinuing are that they have to wait too long to get their ore worked, and that the cost of reduction renders all the low grade ores—from \$30 to \$50 rock—utterly valueless. Being, as a class, men of limited means they are unable to work on an extensive scale, and small operations do not pay. We are not qualified to judge, from observation and experience, of the extent of the causes assigned. That our mining interests are not in a prosperous condition is plain enough, and that they should be in a flourishing state, we sincerely believe. The objection first stated may be removed when the Manhattan Co. have completed the enlargement and improvement of their already extensive reduction works, though it will probably take some time to get their improvements made and work up the large amount of ore now out. As to the second objection, it is one the district has always had to contend with and probably will be burdened with till some cheaper means of successfully reducing our peculiar class of ores is discovered. Wood is very high, freights are very high, labor in mills commands high prices and deserves it for that matter, if any class of labor ever did, for it is heavy work, disagreeable and unhealthy.

It has been asserted often, by parties who pretend to know, that all our ores can be worked at a good profit to the mill for twenty-five dollars per ton, and this would render our forty and fifty dollar ores, of which there are unlimited quantities, available, and materially assist in working mines containing plenty of low grade and small quantities of high grade ore; the amount of high grade ore not being sufficient to pay the working. But these same gentlemen have signally failed in every effort at mining at twenty-five dollars per ton for crushing. How is that? They assign a number of other causes for failure, and causes, too, which are easily overcome, but don't go to work to remove them. This leads to one inevitable conclusion, viz., that they cannot do what they say can be easily done. We know nothing of milling, hence have to judge by means of results attained. If all our various classes of ores can be worked at a cost of twenty-five dollars per ton, this district can be made one of the most prosperous in the State. We believe that the means by which it can be done will ultimately be discovered. We do not believe from results obtained as before stated, that it now can be done. If any Yankee has yet discovered the means, he, very unfortunately for

himself and this community, has not strayed into this neighborhood. If it can be done we all want to know it and adopt the system—would be glad to reduce the expense to thirty dollars even.

Under existing circumstances, for the community to anticipate a better state of affairs and increase prosperity, is simply financial blindness.

One of the worst features of all is the fact that most of our old "chlorides," who are well acquainted with the formation of the country and familiar with the ores, are abandoning their claims, and many of them preparing to leave for other districts. Should the prices for reduction be reduced in the immediate future, the places of these men will have to be filled by others, who are strangers to the peculiarities of the mines and the various classes of ores. They could not live where our present "chlorides" could do well, and months would be required for them to acquire the knowledge necessary to success.

The mines look as well, if not better, than ever, their permanency is established beyond all doubt, but the present cost of reduction, whatever may be the cause, is absolutely closing them up and strangling all hope or prospect of prosperity to miners, merchants and every class of the community.

EMANUEL.—Incline being sunk on the ledge, which promises well and has good ore.

STAR OF NEVADA.—Main tunnel going ahead; but little done elsewhere.

PRUIN & PULLEN.—Shut down.

FLORIDA.—Prospecting continues; 8 men at work; some first rate ore coming out, but in small quantities.

LANE AND FULLER.—(Pacific Co.)—Some new contracts have been let; large force employed; last month's yield from the mine now being worked at the Manhattan Mill.

FREEHOLD.—On account of bad air work has been suspended on the ledge for two weeks past. An air shaft is being sunk which will soon be completed, when the extraction of ore will be resumed.

MORGAN & MUNCY.—Ten men working in different parts of the mine; looks well at all points; ore good.

DIANA.—Shut down the first of the week.

SOUTH AMERICA.—This mine is to be started up again soon.

GROVE TUNNEL.—Turner & Co., who have a lease in the 200 foot west level, are getting some high grade ore; mine generally looks fair.

ISABELLA.—Still looks well at all points. A crushing of ore from this mine last week went \$1,000 dollars per ton.

GIRARD.—Work progressing slowly; a little good ore coming out.

SAYBROOK.—Good ore coming out from the 150 foot level.

DOLLARHIDE INCLINE.—Shut down.

OREGON SHAFT.—Heavy work going on as usual, lots of ore in the mine; large number of men employed.

SARATOGA.—Continues good; sent forty-five tons of beautiful ore to the mill yesterday.

IRONCLAD.—Work suspended.

WHITLATCH UNION.—Same as last report.

CAMAROO.—Shut down.

BOOTJACK.—Didn't visit this mine, but hear that owners are doing well.

## YANKEE BLADE.

KLING & KELLEY.—Been raising an air chute for six weeks past. Now stopping at the 150 foot level; ore fair.

SOLAN & COOPER.—Sinking incline on the ledge; now down about 80 feet; some of the ore coming out is first class.

ENSIGN & SOUTHAL.—Getting good ore from their incline; no material change.

VIRGINIA.—Running a new tunnel to cut the ledge at a greater depth.

PATRIOT.—Sinking from the tunnel and are still getting good ore.

## ELKO COUNTY MINES.

From the *Elko Independent* of July 13. Railroad District, situated about twenty-eight miles from Elko, is, we have reason to believe, in a fair way to become one of the best districts for smelting ore in this State.

It has had many setbacks, on account of bogus capitalists, and men who presume to know everything about the reduction of ore, when in fact they knew nothing. No less than four furnaces have failed in that district, simply because no one was connected with the enterprise who understood the business. We have faith that the present enterprise projected by the New York Company, under the supervision of J. W. Hussey will be a success. The capacity of the furnace will be twenty tons of galena or carbonate ore per day. We do hope for the sake of the hard working miners who have stuck to Railroad so long, that Mr. Hussey will leave no "corner" to be made

in his present operations. We hope he won't start up until he is fully ready, both in the completeness of his works, and in a large supply of ore, so that the next effort may be a success in quality and quantity of bullion. We feel confident that the ore is in that district, and we want to see some of it come out. We have often spoken of the copper shipments by Raulstone. Of that we shall only say that he is gradually developing his mines, and constantly shipping ore.

A correspondent from the District tells us that the old Walla Walla Chief mine, now being opened by L. E. Morgan, and H. H. Peyton, has developed a large body of high grade ore, and is bidding fair to become one of the leading mines of this already magnificent district. This mine is principally owned by the above named gentlemen, and is one of the oldest locations in the camp. The Bullwhacker copper mine is also looking remarkably well, showing a large body of good ore. It is a comparatively new location, but is being developed rapidly.

#### BRUNEAU DISTRICT

we can say but little of, as the summer's work, as far as we can learn, is somewhat limited. Mr. William Rogers, the pioneer of the mine, was in town on the 4th, and still speaks with confidence of its future. He says, and is undoubtedly correct, that there is no smelting ore in the district, and that the great mistake has been in entertaining the opinion that there was. He reports a new location a few rods west of the Old Miner's Delight, in which a four foot vein of good milling ore is found. Mr. Rogers says he does not announce that he is sure of a fortune in his new discovery, but simply that he thinks the prospect is good. From a personal observation of that district, we feel as though a thorough development of some of the discoveries on Silver Hill would produce a favorable result.

#### MINERAL HILL,

of late, has been rather quiet. Her misfortune has undoubtedly had rather a depressing effect upon the business of the place, but can not, as we see, in any way affect the mines. It is reported that but one of the English company's mills is at work, and that on tailings. The Austin company have resumed their work on the mines, and it is reported that they will erect a mill this summer. Of this we are doubtful, as there are plenty of stamps already in running condition. We can not regard the district as failing in its supply of ore, but too much mill power is no help to a place, or to the mines.

#### COPE DISTRICT

has now little to say for itself. We believe that at present the indications are not remarkably good, although the quality of the ore is the same as ever.

#### BULL RUN.

contains, we have no doubt, a large supply of rich ore, and why a greater degree of energy is not shown there, we cannot surmise. The mines belonging to the Chellis Company, have yielded more than fairly. It is reported that a party of practical men are now at Bull Run, taking a view of the situation. We feel fully satisfied that the district is rich, and that somebody will make a fortune there.

#### BUEL OR LUCIN DISTRICT

still keeps head above water, and prospectors are making valuable discoveries. It is reported that the Buel smelting works will be started up under a lease. The mines are favorably located, and to even a person unused to mining, present the appearance of being inexhaustible.

#### RESERVOIRS FOR IRRIGATION.

Mr. Kittridge, who has a ranch about three miles to the north of Elko, has adopted a plan for saving and economizing his water which is worthy of notice, and in many places might be adopted, affording an ample supply of water, where now there is none. He has run a small dam across the mouth of a rocky canyon, above his place, which he allows to fill during the night, and in the morning the gate is raised to its full height, thus giving head and momentum enough to bring it across that portion of the creek, at which, with regular head of water, it would disappear. At the expense of five hundred or a thousand dollars, he thinks that water enough from the spring run could be saved to irrigate fully his whole ranch.

#### SPRUCEMONT MINES.

A new mine has been struck at Spruceмонт. It is on the opposite of the Fourth of July, on the other side of the gulch. The vein is from five inches to two feet wide. It is a true fissure vein, and gives every evidence of permanence. The assay reaches nearly nine hundred dollars. Whitlatch of Old Reese River, and lately of Montana notoriety, has visited the new discovery and was more than pleased. He bonded a mine, and has no doubt but he will effect a sale.

A. J. Raulstone's shipment of ores from Railroad District for the month of June was 207,442 pounds, or about four tons per day.

#### Utah.

The Salt Lake Tribune of July 6 has the following correspondence, dated June 27, from

#### OPHIR DISTRICT.

Business at this place is in a flourishing condition. New buildings are in course of erection, additions are being made, teams loaded down with merchandise are arriving daily, and in fact the whole town is on the "improve."

In company with several others, we paid a visit to the new water power mill of the New Jersey Milling and Furnace Company, situated half way between the Pioneer Mill and Ophir City. An immense wheel is attached to this mill, the largest in Utah, with a power almost equal to the engine at the Pioneer. They also have three large arastras completed, three more in course of erection, together with two furnaces, and when completed entire, will be one of, if not the best, water mills for the reduction of ores in Utah. The owners are Messrs. Hendrickson & Knauss, of New Jersey, and Mr. Faucett of this city. With this and Walkers' Mill, our mines will have good sales for their ores and need not be waiting for "Capitalists" to come and buy them out. Large forces are being employed on the mines of Lion Hill, furnishing the Pioneer with ores extracted. Much better this course than have the same laying idle; and I am glad to see that our miners owning mines view it in the same light. Wages are higher here than elsewhere; from \$4 to \$4.50 per day.

The Silver Exchange have purchased a new patent windlass, together with an engine (4 horse power), which will be here in a few days, when they will employ from 30 to 40 men to extract the rich chloride. The owners of this mine understand "biz."

It is rumored here that the Silver Chief on Lion Hill was sold this week for \$50,000. E. S. Blackwell, Esq., manager of the English Company's interest at this place, arrived last evening, and in a few days they will start up their works here.

The Cliff, on Ophir Hill, shows a fine body of ore, and is being extensively worked. This mine is destined to rank in front file with Utah's best. Large forces are on the Naboh and Rip Van Winkle; results—dumps stacked with tons of metal. In fact, all the mines in the different hills in this vast district are being largely developed, and sales take place nearly every day. The mines in Dry Canyon are looking fine. The Mona, on Snow Storm Hill, has yielded some fine rock within the past week. One assay went 78 per cent lead, and \$3,694 silver per ton. An average of ore, sold to the Ophir Smelting works, yielded 70 per cent lead and \$700 in silver. Ophir district challenges comparison; the ores and papers are here to verify the above.

#### Montana.

From the Deer Lodge Independent of July 13.

VIPOND DISTRICT.—Mr. Wm. Spurr, just in, says that work is being prosecuted on seven lodes at the present time. The ore is very rich and all the lodes are looking well and continue to retain their regular width as the shafts go down. At a low estimate, there is now over 800 tons of ore out, and a splendid opening is offered for some one to erect a quartz mill. In one part of the district the ore is all free milling ore, and in the other part it is smelting ore. Let some of our quartz operators take look at Vipond. It is, no doubt, one of the richest quartz districts ever discovered.

HENDERSON GULCH.—Mr. W. H. Smith of Emmetsburg furnishes us with the following mining items: Messrs. Ferguson & Co. cleaned up on Monday last \$2,000 from two weeks' run. Seven men are interested in the claim and they have ground that will last five years. It averages from \$15 to \$20 per day to the hand. Chas. Carlton, Jas. Burns & Co., next below, are making from 15 to \$20 per day to the man. Cartwright, O'Connor & Co. are making from \$30 to \$50 per day to the hand. McDermott, Hennessy, & McAndrews are making from \$20 to \$24 per day to the man. The next Company below are putting down their flume, intending to work a back channel on the bar. Walworth, Terrill & Davis are running two hydraulics and are making money.

#### Oregon.

#### THE RICHEST GOLD MINE.

The Oregon Sentinel gives an account of a gold mine near Auburn, Baker County, and claims that it is the richest in gold ever discovered on the coast. In brief, the ordinary quartz from the lode yields \$800 to the ton, but it is the pockets in the same where the riches come in.

In one pocket the discoverer, White, secured \$4000 of the precious stuff in four days, and others have been found richer. Stacy, a reliable gentleman of Auburn, who visited the mines, states that he saw nuggets of two inches in diameter. White has four men employed in guarding his mine of treasure, and no person but those well and favorably known can ever visit it. In consequence of this extraordinary discovery, property in the town of Auburn has taken a sudden rise, and lots and houses, which a week ago could have been purchased with a song, have quadrupled in price. Captain Ainsworth is said to be the principal owner of this wonderfully rich mine.

### Advertisements.

The special advantages of the ENGINEERING AND MINING JOURNAL, as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself, and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is doubly valuable as a permanent means of keeping an advertisement before the public. It is the Organ of the AMERICAN INSTITUTE OF MINING ENGINEERS, and is regularly received and read by ALL THE MEMBERS AND ASSOCIATES of that large and powerful society. THE ONLY ONE OF THE KIND IN THE COUNTRY. It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country, and presents the very best means of reaching that very important class of men.

#### Rates of Advertising.

The rates of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.

Back Page ..... 40 cents a line.  
Inside Pages ..... 35 cents a line.  
Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

### MISCELLANEOUS.

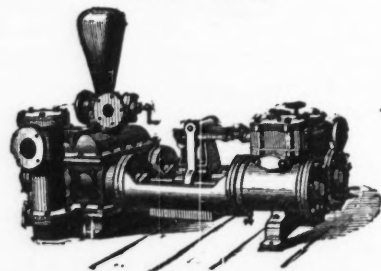
#### HYDRAULIC WORKS.

#### MANUFACTORY.

#### BROOKLYN, N. Y.

Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps.

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Water Meters, Oil Meters; Water Pressure Engines. Steam and Gas Pipe, Valves, Fittings, etc. Iron and Brass Castings.

Send for Circular.

Jan 2-ly

H. B. WORTHINGTON,  
59 Beekman street, New York

ASBESTOS FOR FELTING AND PACKING Machinery, Fluorspar, Felspar, Flint-Quartz—all the Metallic Oxides, for sale by

L. & J. W. FEUCHTWANGER,  
55 Cedar street, N. Y.

### "ENGINEERING."

"The leading Engineering Journal of the world," indispensable to every Civil, Mining, or Mechanical Engineer, can now be obtained post-paid at \$9 30 currency, by remitting Post-Office order to NEW YORK OFFICE "ENGINEERING," 176 Broadway.

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Price, \$1.00 per year.

April 23:tf

CIVIL AND MECHANICAL ENGINEERING at the RENSSELAER POLYTECHNIC INSTITUTE, TROY, N. Y. Instruction very practical. Advantages unsurpassed in this country. Graduates obtain excellent positions. Reopens Sept. 11th. For the Annual Register, containing improved Course of Study, and full particulars, address PROF. CHARLES DROWNE, Director. June 24-6t.

MISCELLANEOUS.

TO OWNERS OF MINES.

The "St. Louis Smelting and Refining Co.," will commence operations on the 1st of July, when they will be prepared to smelt ores of Silver and Gold, or refine Base Bullion, on commission or to purchase the same. Correspondence is solicited from all parties having these materials for sale or reduction, stating the character of the ore and the amount which may be depended on for regular supply, whenever such parties propose to furnish material regularly.  
Address: J. H. HOWARD, Gen'l Sup't,  
June 4-2m 515 Chestnut street, St. Louis, Mo.

THE STOLBERG MINING AND SMELTING CO.

AIX LA CHAPELLE, RUENISH PRUSSIA, has requested their undersigned agent to negotiate for either consignments or the purchase of American Lead and Zinc Ores. Parties in possession of such ores may find it to their advantage to address for particulars to  
W. PAULSEN.  
P.O. Box, 5,292, New York.  
June 23:2m

BLAST FURNACES FOR LEASE

AT MOUNT SAVAGE, MARYLAND.

The UNION MINING COMPANY, Proprietors of the old MOUNT SAVAGE IRON CO., offer for lease their Blast Furnaces (two) of 13 and 16 feet bosh respectively, capable of producing 300 tons per week. The situation of these Furnaces in the heart of a country offering coal and limestone of the best quality at the lowest cost, and within short and cheap reach by railway connection of the ore-beds of Pennsylvania, presents to capitalists a favorable opportunity for investment. Within a few weeks a thorough connection by rail between the Furnaces and Philadelphia and New York will be completed. For terms apply to

JAMES S. MACKIE, President,  
71 Broadway, New York.  
or JAMES A. MULLHOLLAND, Vice President,  
Mount Savage, Maryland.

SUPERIOR RAIL MILL.—CAPACITY: 1,000 TONS PER WEEK.

Harbaugh, Mathias and Owens, Manufacturers of

RAILROAD IRON,

Office, corner Fifth Avenue and Smithfield Street, Pittsburgh.

Our central location enables us to draw from both sides of the Allegheny Mountains Metals and Ores best adapted for making a No. 1 Rail, and together with our Improved Machinery, are a sufficient guarantee of our ability to produce Rails of a quality unsurpassed for durability and strength, by any foreign or domestic manufacture.

New Patterns, of any desirable weight, made to order on Short Notice.  
We respectfully solicit orders for New Rails, or Re-rolling.  
June 25:1y

COOPER'S GLUE AND REFINED GELATINE

COOPER HEWITT, & CO.,

NO. 17 BURLING SLIP, NEW YORK.  
Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel Wire of all Kinds, Copperas, &c., &c.

RAILROAD IRON, COOPER WROUGHT IRON BEAMS AND GIRDERS,

Martin Cast-Steel, Gun-Barrel and Component Iron,

PUDDLED AND REFINED CHARCOAL BLOOMS, Ringwood Anthracite and Charcoal Pig Iron.

Works at Trenton and Ringwood, N. J.  
May 17:1y

TIN-LINED LEAD PIPE

Is a Block-Tin Pipe, heavily coated with solid lead. It is the best and cheapest Water Pipe when strength and durability are considered. By its use, iron rust, lead and zinc poison are all avoided, and general health promoted. Price 15 cents a pound for all sizes. Circulars and sample of pipe sent by mail free.



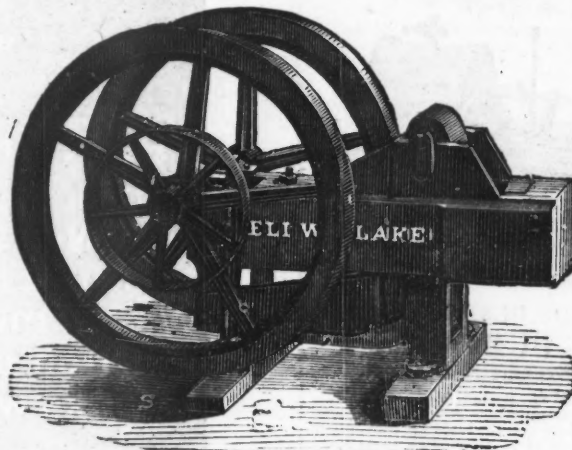
Address the COLWELLS, SHAW & WILKINS MFG. CO., No. 213 Centre Street, New York.  
Also, Manufacturers of Block-Tin Pipe, Sheet-Lead, Lead-Pipe, Solder, &c.  
Orders solicited and filled at sight.  
June 4:6mos

OXIDE MANGANESE, BEST AND HIGHEST test for Steel and Glass Makers' use. For sale by the Importers,  
L. & J. W. FEUCHTWANGER,  
55 Cedar street N. Y.

BLOODSTONE AND LOADSTONE, METALS of Cadmium, Bismuth, Antimony, Tin, Cobalt, Arsenic, Platina, Aluminium, for sale at Lowest Prices by  
L. & J. W. FEUCHTWANGER,  
55 Cedar street, N. Y.

MISCELLANEOUS.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent facer jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

Mch. 14-1y.

BLAKE BROTHERS, New Haven, Conn.

JOHN A. GRISWOLD,  
ERASTUS CORNING,

ERASTUS CORNING, JR.,  
CHESTER GRISWOLD.

JOHN A. GRISWOLD & CO.,

(PROPRIETORS OF THE

RENSSELAER IRON WORKS,  
TROY, N. Y.

Bessemer Steel Works, Fort Edward Blast Furnace and Columbia Blast Furnace  
MANUFACTURERS OF PIG IRON, RAILROAD, MERCHANT AND SHIP IRON,

Bessemer Steel Rails, Axles, Tyres, Shafting Plates and Steel Forgings,  
OF ALL DESCRIPTIONS.

Office in New York, No. 56 Broadway.

May 17:1y

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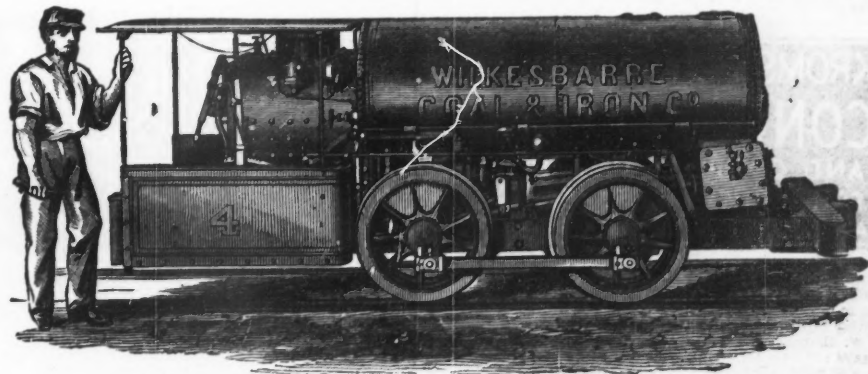
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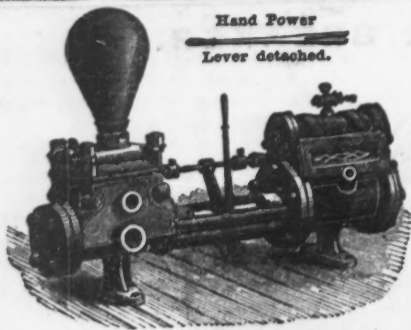
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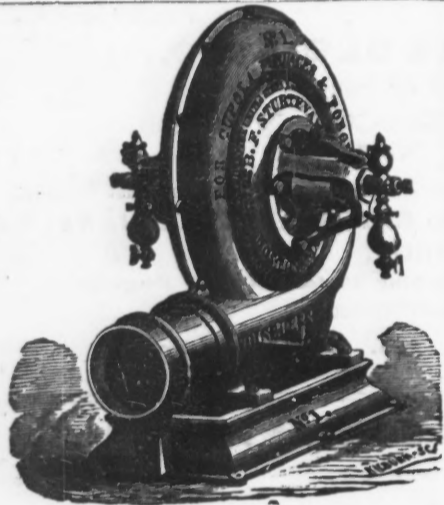
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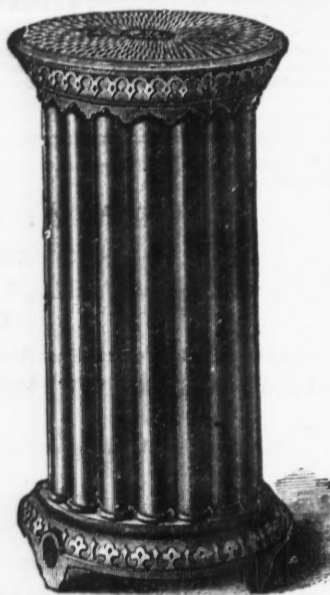
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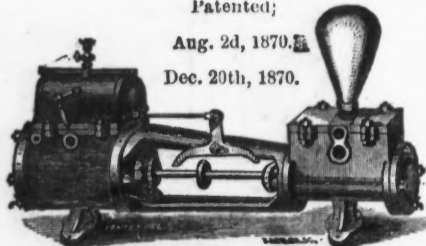
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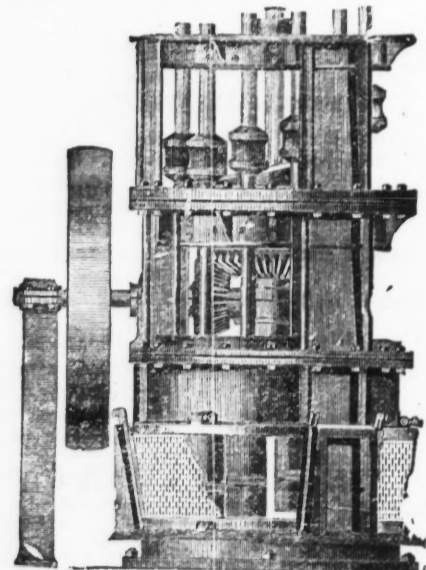
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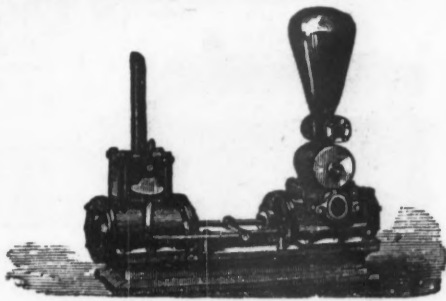
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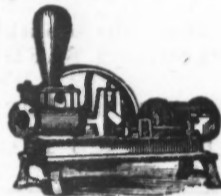
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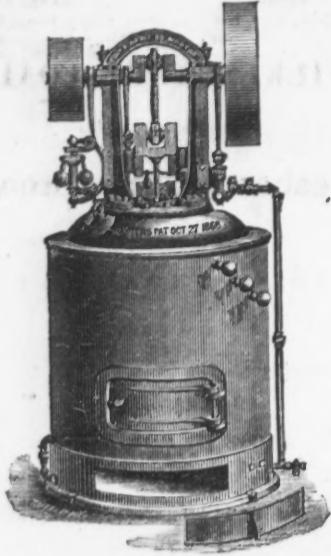
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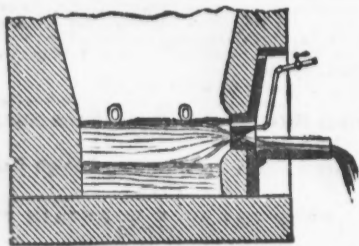
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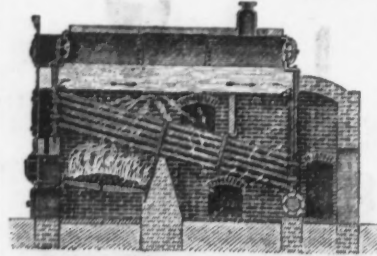
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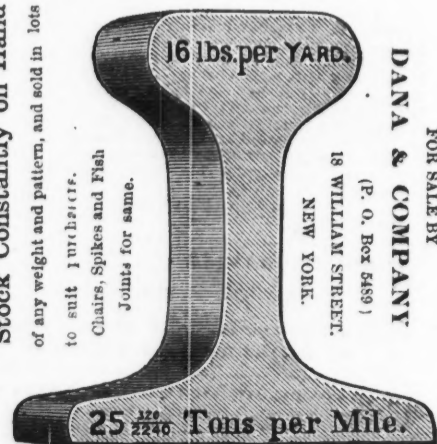
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