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VOLUME V.

JANUARY TO JUNE, 1868.

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VOLUME V.—Number 1. New Series.

NEW YORK, JANUARY 4, 1868.

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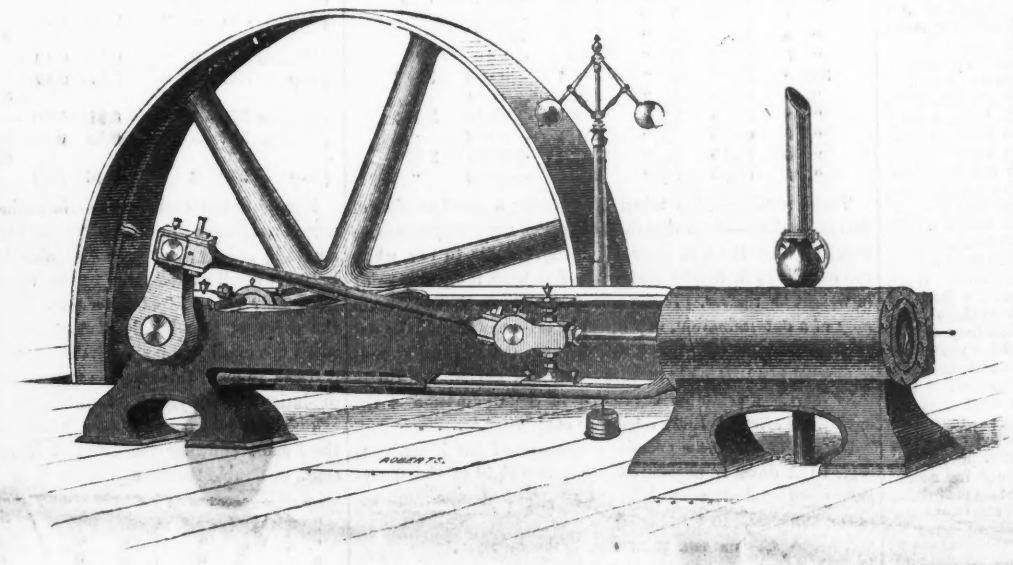
IMPROVED CUT-OFF IN ENGINES.

The inventors of the engine herewith presented to the public make no pretension to the introduction of radical improvements in the principle of using steam expansively, but they have devised and perfected a new and simple method of operating and controlling the action of the valves for admitting and cutting off the steam, by means of which better results are obtained than by the devices heretofore in use.

There is no necessity at the present day to argue the superiority of an engine regulated by the cut-off to one regulated by the throttle, so far as economy of fuel or regularity of speed are concerned. Practical business men have settled that question for themselves by experience, and no shrewd business man will purchase a throttle valve engine when he can procure one which automatically adjusts the supply of steam to the exact amount required for the work in hand. There are occasional situations, where the load is constant and the engine and pressure of steam are exactly adapted to the circumstances, when a fixed cut-off will give nearly or quite as good results as an automatic cut off, but a change in the load or pressure of steam will disturb the conditions so as to destroy the equality. With a perfect automatic valve gear and regulator the variation of load or pressure within reasonable limits will not materially affect the economy; while there is no other possible means of regulating the speed and power of an engine with the perfection which is attained by a governor attached directly to a sensitive cut-off valve gear. This engine has a novel construction of the governor, by which the variation due to the pendulum action of the ordinary governor is overcome, and a regulator produced which will give the same speed whether the engine be light or heavily loaded, or the pressure of steam in the boiler be greater or less. The governor as invented by Watt, and adopted by modern engineers with rare exceptions, gives only an approximation to equal speed, requiring a variation of from five to thirty per cent. between the extremes of motion.



THE BABCOCK AND WILCOX STEAM ENGINE.

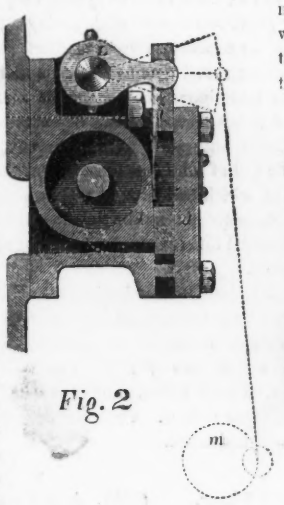


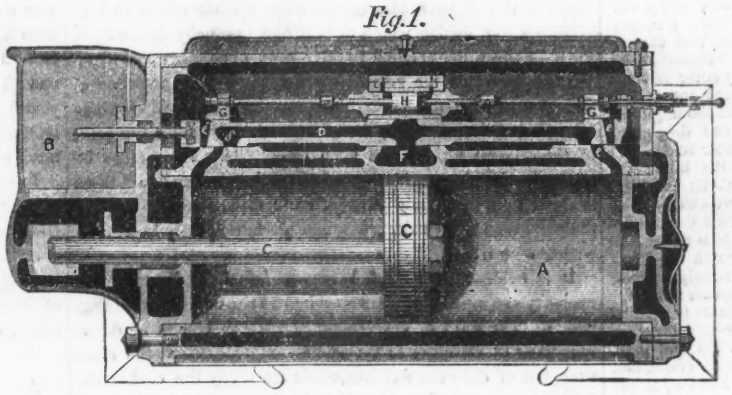
Fig. 2

In designing this engine it has been the object of the inventors not only to introduce their own peculiar ideas and improvements, but to combine therewith all those features which long practice has proved to be most conducive to economy of fuel, and the durability of all the working parts. The steam jacket has been much neglected in this country, though in almost universal use by the best engine makers of Europe: and so little is its theory and advantages understood here, that in most cases where it has been introduced in this country it is filled with the exhaust steam, thus defeating the very object for which it was designed. This engine is jacketed with live steam from the boiler in both heads as well as around the cylinders, thereby keeping the metal of the cylinders as hot as the hottest steam which enters it.

The valves which effect the distribution of the steam in the steam engine are the most important part of the machine, as upon their properly performing their functions depends the efficiency of the working mediums. They must not only admit, exhaust, shut off, and close, at the proper periods, but they must be perfectly tight when closed, and when open admit the steam with the least possible resistance. They should also permit of such a relation to the cylinder as to give the least practicable lost space or clearance. There are four distinct varieties of valves used for this purpose, viz.: the plug or cock, the piston, the seat valve or poppet, and the slide. The first variety is never used now by competent engineers, having but one good quality, viz.: the equal pressure of steam on its sides, to balance its many bad features, such as leakages, sticking from expansion, and unequal wear. The piston valve is also nearly out of use owing to the excessive lost space inherent in its construction. The same objection applies to the poppet valve, with the additional ones of great liability to leakage, and inability to open and close quickly, from the fact that it opens immediately on starting, and is not closed until brought to rest. It is impossible to start or stop the valve instantaneously, therefore the opening and closing must be correspondingly so slow as to be objectionable except on slowly moving engines.

The universal experience in this country and Europe is in favor of the slide valve for opening and closing the ports of all quick moving engines. It is simple and easily fitted, admits of the least lost space, opens and closes the ports with the quickest possible motion, and is the least liable to become leaky from use of any form of valve. Of the two forms of slide valve the flat is much preferable to the curved, from the greater facility of accurate fitting, and the more equal wear of two planes as compared to inner and outer cylindrical surfaces.

Fig. 1.



An important condition of equal wear in a slide valve, however, is a constant travel. Where the induction valve is made also to act as a cut-off valve, as in a link motion, and in detachable valve gear, this condition cannot obtain, and as a consequence we find that such valves are always wearing leaky.

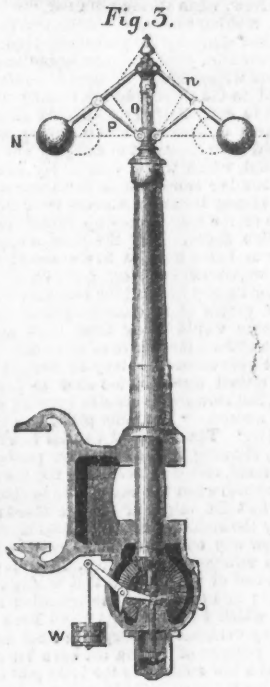
The adaptation of a cut-off mechanism to act in conjunction with a plain slide valve, the latter to admit and exhaust the steam, and the former to close the port at any desired point in the stroke, has been a favorite pursuit of engineers for the past half century, but in all arrangements previous to the invention of Babcock and Wilcox, the motion of the main valve had more or less effect upon the action of the cut-off, and the latter would not work with the desired rapidity at all points, nor would it admit of a range of motion throughout the stroke of the piston. Nine-tenths of all the expansion engines now built in Europe have some modification of this form of valve gear, and the engines of Messrs. Farcot and Sons, which received the Grand Prize at the late Paris Exposition, was of this class.

CONTINUED ON PAGE 10.

The Steam-Jet Cupola.

The use of the steam-jet to create a draught in a narrow chimney has been understood, says *Engineering*, ever since Trevithick thus employed it in 1803, or, at least since Nicholson fully described its action, and patented certain applications of it, in 1806. A steam-jet was tried many years ago at Caerphilly, in the wide throat of a blast-furnace; but Mr. Edmunds, who made the experiment, soon found that it would not answer merely because the throat of the furnace was so wide that the jet drew its air, not through the charge below, but from the large space immediately about it. In the small chimney of the locomotive, as used by Trevithick and by Hedley, long before George Stephenson could bring himself to see its advantage, the steam-jet, whether of waste steam or live steam, is effective, and is found not to be greatly more costly, even with live steam, than would the working of mechanical blowers delivering the same volume of blast, at least where the blast is to be delivered under the slight pressure required for cupola furnaces. Messrs. Woodward Brothers, of the Queen's Foundry, Ancoats, Manchester, have now erected upwards of sixty cupolas having closed tops and charging-hoppers, and having a narrow sheet-iron chimney-flue, taken off at the side, through which a jet of live steam is discharged as the only means of producing a draught. Engines, fans, or other blowing machinery are thus completely dispensed with. Some of these cupolas have been at work since April, 1865, and among those who have been supplied with them are Messrs. Robert Stephenson and Co., Messrs. Galloways, of Manchester, Messrs. Beyer, Peacock and Co., Messrs. Dobson and Barlow (Bolton), the Manchester Steel and Plant Company, Messrs. Jack and Co. (Liverpool), and many other well-known firms. The Norton Iron Company, whose furnaces are near Stockton-on-Tees, state that they are melting in these cupolas at the rate of one ton of iron to one cwt. of

Fig. 3.



coke, and in general practice we are informed, upon good authority, that 1¼ cwt. of coke to the ton of iron suffices, except with very small castings, when the coke rises to 1½ and even 1¾ cwt. The consumption of coal under the boiler to supply steam for the draught is 1 cwt. for each ton of iron melted, and often the cheapest slack, worth less than one-fourth or even one-sixth as much as coke, is used for this purpose. The rate of melting is about 15 cwt. per hour, per foot of diameter of outside casing, although, with more steam, a greater cast may be made. It has been alleged, too, that the iron cast from the jet-blown cupola is somewhat stronger than that cast from fan-blown furnaces, but we have no positive information on this point. Messrs. Hopkins, Gilkes and Co. have sent two of Woodward's cupolas to Madras, to melt down the iron for their contract with the Madras Railway Company, for 10,000 tons of cast-iron chair-sleepers.

More about the Iowa Walled Lake.

INTERESTING LETTER FROM THE STATE GEOLOGIST.

IOWA CITY, December 9.

From time to time, during the past ten or fifteen years, the public have been treated to accounts of the so-called walled lakes in Northern Iowa, one of them situated in Wright, and the other in Sac county, and almost every writer seems to have entertained the belief that the "walls" were the work of human hands, and those were the hands of a departed race of men who, ages ago, inhabited that region. While making examinations of the peat marshes of that part of the State during the past season, I had excellent opportunities to examine both of the lakes just named. The "walls," or, more properly, embankments, are really very interesting natural objects, and it is not surprising that they have attracted some attention. They vary much in height and width, as well as in the materials which compose them. Sometimes they are principally of boulders, but more often of sand, gravel and earthy material thrown out of the bed of the lake. In many instances where a peat marsh extends out like an arm of the lake, it is entirely separated from it by an embankment of turf thrown up by the same agency, but of turf, because that, and no other material, was within reach of the ice. These turf embankments sometimes have a growth of willows upon them, and have been called beaver dams; but beavers never attempt to dam still waters. They dam running streams to obtain ponds of still water. These turf embankments very much resemble the material thrown out of a ditch in draining a marsh, but their origin is unmistakable. When the embankments are composed principally of boulders, they are usually thrown up from two to four feet high, and from five to fifteen feet wide, and imbedded in sand, gravel and earth, the outside of the embankment being usually as steep as the inner or lake side; the latter often faintly resembles an artificial levee. Although they sometimes have a degree of regularity, the boulders which compose them are never arranged in any order, nor is there an appearance of any work of art upon them. The embankments always separate a piece of low ground from the lake, but when the adjacent land is higher than the highest water of the lake, no embankment is formed, but the materials are simply crowded against the shore until a bold, steep bank, often covered with boulders, is produced. When they are composed principally of sand and gravel, a broadly round ridge is formed such as we would expect from those materials; but when composed of more earthy materials they are often very steep and very narrow, and supported by a growth of vegetation upon them. Such as these were seen on the east side of Rice Lake, where they are in some instances so narrow that two persons cannot walk abreast upon them, although they are from four to six feet high. In other places they are often wide enough for a wagon, but never sufficiently even for one. The water in these lakes is almost always low in the latter part of the year, and the frosts of winter still further reduce the actual depth, so that very little unfrozen water remains in some of them. This is often known to be the case, and only a few winters ago nearly all the fish in Wall Lake, in Wright county, were killed by that means. It is evident that whenever the ice became frozen to the bottom of the lake, it would freeze fast to, and in many instances inclose the boulders and gravel which were strewed upon the bottom. Now, when spring returned, the ice being raised by the rains and melting snows, would be carried with its burdens to the high-water shore by the prevailing wind. Let this process be repeated year after year, from age to age, and it is evident that all the boulders within reach of the ice would in time be taken up and carried to the shore, and left exactly where the force of the ice ceased to act. Added to this, the almost constant dashing of the waves against the beach during the warmer parts of the year, would have the effect of carrying out large quantities of gravel and sand, which would completely imbed the boulders. There is also another cause, which doubtless assisted more than any other in giving the embankments their definite form. The whole surface of the lake freezes up almost simultaneously, and to a considerable depth. Now the natural expansion of a solid cake of ice, from half a mile to five miles in diameter, has, as every one knows, enormous power, quite equal to any amount required to throw up any and all the boulders we find in the embankments, or crowd them quickly against the steeper shores. No natural force would bring them back again, and the annual repetition of the forces above referred affords sufficient explanation of those phenomena. It may be thought by some that the processes described would be too slow to produce the results which we see, but slowness is quite in keeping with the mightiest operations of nature. "The mills grind slowly, but they grind exceedingly fine." The shores of Crystal Lake show two sets of embankments, showing that, at a remote period, the lake occupied a higher level, and that its surface was lowered by the deepening of its outlet, when the second embankment was formed. Seeing then, that the origin of these embankments can be accounted for by the action of natural forces alone, it is difficult to understand how any one could suppose that human hand had anything to do with their construction. There is certainly nothing in the arrangement of the material that in any respects indicates such an origin; and the liveliest imagination refuses to suggest any object for which human beings could have desired them, or to point out any evidence of design in their location and plan. No associated remains of human art have been discovered, and the existence of a few mounds in the town plat of Sac City is the only evidence we yet have that a former race inhabited the region of these lakelets.

C. A. WHITE, State Geologist.

Railways in Russia.

Russia now possesses a network of 7,225 verstes of railway, of which 4,325 verstes are already opened to the public. Of the lines existing, six have been constructed at the expense of the Government, while twenty-one others owe their existence to private initiative, powerfully seconded by the State by means of guarantees, subventions, or direct participation in the placing of the securities issued.

London Coal Trade.

In 1864, the consumption of coal in London was 5,468,048 tons; in 1865, 5,903,271 tons; in 1866, 6,013,265 tons. In 1864, the coal brought by sea amounted to 3,116,703 tons; by railway to 2,351,442 tons; in 1865, by sea, 3,161,683 tons; by land, 2,741,588 tons; in 1866, by sea, 3,033,193 tons; by land, 2,980,072 tons.

Original Papers.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

ON THE PROXIMATE ANALYSIS OF COALS.

By Professor GUSTAVUS HINRICHS, Chemist of the Geological Survey of Iowa.*

Continued from Vol. IV., p. 402.

B. DETERMINATION OF THE MOISTURE.

A flat-bottomed iron pan, of 20 centimeters in diameter, was filled evenly to the depth of 1½ centimeters, with sand, and the latter was covered with a copper plate, on which the watch glass containing the coal was placed. A thermometer (scale to 370°C.) was, by means of a rubber stopper, inserted in an iron arm of the tripod supporting the iron pan, and held with its bulb about half a centimeter above the copper plate. By means of a Bunsen burner it was found very easy to keep the thermometer perfectly constant at 115°C. This apparatus I consider a good substitute for Fresenius' iron plate.

The coal to be dried was finely pulverized, direct experiments having convinced me that the application of fragments was not only very much slower, but also erroneous, on account of the peculiar property of bituminous coal treated of below.

In order to show the accuracy of this method, I transcribe the following examples from my journals:

No. of Coal.	Weight of Portion.	Time.	Moisture Per cent.	Deviation from Mean.	Mean.
390 e	0.961	1 hour	4.888	—0.004	4.892
" f	0.919	1 "	4.896	+0.004	"
" e	0.961	2½ "	4.16	+0.01	4.15
" f	0.919	2½ "	4.14	—0.01	"
339 e	1.452	1 "	8.26	+0.07	8.19
" f	0.975	1 "	8.12	—0.07	"
" e	1.452	3 "	7.16	+0.17	"
" f	0.975	3 "	6.83	—0.16	"
338 e	1.415	1 "	3.852	—0.029	3.881
" f	0.805	1 "	3.911	+0.030	"
" e	1.415	2½ "	3.287	+0.123	3.164
" f	0.805	2½ "	3.042	—0.122	"
" e	1.415	5½ "	2.722	+0.088	2.634
" f	0.805	5½ "	2.546	—0.088	"

These results—a few taken from among a great number of determinations—show that the loss (called moisture) decreases regularly after the first hour of drying, that is to say, while the coal loses in weight during the first hour, it steadily gains in weight thereafter. It appears, furthermore, that the accuracy of a determination, expressed in the smallness of the deviations from the mean, is greatest at the end of the first hour of drying, least after about three hours of drying, and thereafter increases again as expressed in the diminution of the deviations after 5½ hours drying in coal No. 338.

On account of these peculiar properties of our bituminous coal, I put down as *moisture* the loss in weight of the finely-pulverized coal after one hour's drying at a temperature between 105° and 110°C.

C. ON THE SLOW OXIDATION OF COAL.

This increase in weight after the first hour's drying I have found in ALL Iowa coal investigated as yet. I have also found it to occur in a sample of coal (Steinkohle) from Benthen, Silesia, which showed a loss of 3.62 per cent. at the close of 1 hour, and in 4 further hours drying *gained* again 0.42 per cent. It was not noticed in brown coal from Bilin, Bohemia, nor in Anthracite from Pennsylvania. I am therefore inclined to believe this to be *a property peculiar to pit-coal* (steinkohle).

On page 401 of Vol. I, P. I, of the Iowa Geology, Prof. WHITNEY remarks: "A remarkable fact, in connection with the determination of the water present in the specimens of coal, has been noticed. In numerous instances, after the sample, in the form of a coarse powder, had been dried for several hours in the air bath, at a temperature a little above that of boiling water, during which time it had gradually lost weight until all the water seemed to have been expelled, on continuing the operation for some time longer, a slight increase of weight would become perceptible, and the coal would continue to grow heavier, until a gain of several tenths of a per cent. of the original weight had been made. This appears to be owing to the slow oxidation of the sulphur which all these coals contain in a finely divided state, disseminated in invisible particles through the mass, and, perhaps, partly in combination with iron."

It is evident, that Prof. WHITNEY failed to discover this property as a *general* one, because he had the coal in coarse fragments. The want of correspondence in the results of determinations of moisture in the same sample, dried at the same time, but of different weights, made me apply the coal in the form of *powder*. Thereby the turning point was reduced from "several hours" to less than *one* hour, the "numerous instances" extended to *all* samples investigated, the "slight increase of several tenths of one per cent." became often 2 and even 4 per cent! Instead of numerous exceptions we now discovered a general *law*.

We have failed, as yet, to notice any "sulphur" disseminated through the Iowa coal; what popularly is called sulphur is pyrites. Prof. WHITNEY has given no proof of the existence of real "sulphur" in the coal. It is therefore unsatisfactory to ascribe this property of the bituminous coals to such "sulphur."

Pyrites might well be the cause of this phenomenon; the red ashes obtained in many cases (in Van Buren county, Iowa, invariably from the upper part of the coal bank), may well be ascribed to *pyrites* disseminated through the coal in invisible particles. Two $Fe S_2$ will give $Fe_2 O_3$, + 4 S O_3 by exactly *doubling* their weight.

In order to decide the question, I select the following results from my analyses:

INFLUENCE OF TIME OF DRYING.

Top-coal.	Number of samples,	4	3	2
	Time of drying,	2	3	4–5 hours.
	Mean gain per cent.,	0.45	0.71	0.96
Bottom coal.	No. of samples,	3	5	2
	Time of drying,	2	3	4 hours.
	Gain, per cent.,	0.49	0.50	0.96
Mean of above.	No. of samples,	7	8	4
	Time of drying,	2	3	4–5 hours.
	Gain, per cent.	0.46	0.63	0.96
	Gain, per hour	0.23	0.21	0.24

or, on the whole, for 19 samples of coal, very nearly proportional to the time, this being not more than 4 hours. It also appears, that no essential difference is apparent in regard to the position of the sample in the coal bank.

By this means we may compare the following determinations, referring to 2, 3, or 4 hours drying. We find:

Coal. Place—No.	Time.	Increase. Total.	Per ct. per hr.	Difference.	Color of Ashes.
top 390	2 hours	0.75	0.38		pale brown.
				0.22	
bottom 384	2 "	0.35	0.16		white.
bottom 395	4 "	0.80	0.20		red and white.
				0.04	
top 375	4 "	0.64	0.16		white.
top 346	3 "	0.68	0.23		reddish brown.
				0.08	
bottom 371	3 "	0.45	0.15		white.
top 336	3 "	0.76	0.25		gray.
				0.06	
bottom 334	3 "	0.58	0.19		gray.
top 333	3 "	1.17	0.39		pink.
				0.09	
bottom 340	3 "	0.91	0.30		light gray.
middle 357	3 "	0.55	0.18		white.
				0.03	
top 370	3 "	0.46	0.15		reddish.

Except in the coal from the last mine, we notice that the more ferruginous ash does correspond to a slightly greater increase in weight; but we notice also that this difference is but very small as compared to the total amount of increase, being only 1-5 to 1-3 of the whole. Arranging these coals in the order of this hourly increase, we find the color of the ashes not at all forming a regular series from white to red, as it ought to be, if this increase was mainly depending upon the oxidation of the pyrites. Besides, the mean of the 4 white-ash coals is 0.16 per cent. hourly increase, while the mean of the 4 coals showing the greatest increase is only 0.33 per cent., or double the former.

Coal, 333	Increase, 0.39	per cent.	Ash:	pink.
" 390	" 0.38	"	"	pale brown.
" 340	" 0.30	"	"	light gray.
" 336	" 0.25	"	"	gray.
" 346	" 0.23	"	"	reddish brown.
" 395	" 0.20	"	"	red and white.
" 334	" 0.19	"	"	gray.
" 357	" 0.18	"	"	white.
" 375	" 0.16	"	"	white.
" 384	" 0.16	"	"	white.
" 371	" 0.15	"	"	white.
" 370	" 0.15	"	"	reddish.

The greater increase of the pyritiferous coals is accounted for by the oxidation of the pyrites they contain; the comparatively great increase of coals giving a pure white ash seems to force the conclusion upon us, that *the bitumen of the coal itself oxidizes*, and that to this oxidation the main increase of all these bituminous coals must be ascribed. Remembering now our result regarding the deportment of bituminous coal from Silesia, anthracite from Pennsylvania, brown-coal from Bohemia (all of which gave ashes very nearly of same shade, and all of which had been in my air-heated laboratory for two years), it seems not unlikely that this is another characteristic chemical difference between bituminous coals and other fossil coals.

In conclusion I will only give two additional determinations, showing a very considerable increase in weight, and also that *the process of oxidation is completed in about six hours for two-thirds grammes of coal*. For No. 329, containing 8.30 per cent. of gray ashes, gained, in 5 1-2 hours, 2.05 per cent. of its original weight. Coal No. 348, with 6.00 per cent. red ashes, weighed 0.693.

		Change: Weight.	Per cent.	Total loss: Per cent.
After 2-3 hour,	0.630	loss	0.063—9.091	9.091
" 2 hours,	0.625	"	0.005—0.722	9.813
" 5 1-2 hours,	0.656	gain	0.031—4.474	5.339
" 8 3-4 "	0.656	"	0.000	5.330

D. DETERMINATION OF THE ASHES.

The best way to determine the ashes in coal I found to be the coking of the finely pulverized coal in a small platinum dish (weighing about 8 grammes) with subsequent incineration of this coke in the same vessel. The incineration takes place with great ease and rapidity, and the results are perfectly satisfactory. Thus 3.022 grammes of coal No. 333 gave 2.35 per cent., and 5.263 grammes of the same coal gave 2.58 per cent., deviating from the mean 2.46 by +0.11.

In regard to the ashes of our Iowa coals, I have found, that they are very much more uniform in their distribution throughout the coal fields than usually thought possible. In Van

* Published in advance of the Official Report.

Buren county, I find the "bottom" coal giving a white or light colored ash, the "top" coal of the same bank a *red* colored ash; a fact, which I intend to make use of in a subsequent paper on the origin of our coal. I also find the amount of ashes to increase quite evenly (in this county) toward the margin of the coal field, from about 2 to 7 per 100 combustible.

E. DETERMINATION OF SPECIFIC GRAVITY.

Coarse fragments, freed by means of a sieve from all small particles, and averaging 1-10 cubic centimeters in volume, were introduced into a fifty-gramme flask, provided with thermometer stopper. The constants for this flask for temperatures varying from 50° to 80° F. had been carefully determined.

The given specific gravity corresponds to the coal perfectly soaked, so that all its pores were filled with water. That required, on the average, 12 hours, permitting two determinations per day, one in the morning, another in the evening.

That this is not at all trifling, may be seen from the following example. 2.760 grammes coal (No. 350) gave the specific gravity 1.309 at 64° F., immediately after filling the flask with water; after about 12 hours soaking, the specific gravity had increased to 1,328, for the same temperature According to this latter determination, a cubic foot of this coal would weigh 82.76 lbs.; according to the former, only 81.58, or 1.18 lbs. less. This shows a considerable degree of porosity of the coal; and indicates the absurdity of giving the weight in pounds of a cubic foot of coal with four decimals, although no statement in regard to temperature or time of weighing is made! Such accuracy we meet with in some of the official reports!

F. CALCULATION OF RESULTS.

Referring to my paper in No. 22 of the AM. JOURNAL OF MINING, it may be sufficient here to state, that besides the percentage composition of the coal, it is proper to reduce the composition to the combustible = 100, in order to obtain a proper comparative estimate of the character of the fuel itself (in regard to the proportion of bitumen and carbon) and of the amount and quality of the impurities (ashes and moisture). It has also been shown in the paper referred to, that for considerable areas of the coal field, the *sum* of the constituents on the scale of combustible = 100 is the proper caloric equivalent, and that the percentage of the combustible in the fuel gives a proper estimate of its value.

According to this method a considerable number of analyses of Iowa coals have already been made, and a greater number are yet to be executed. It is believed that the results will be strictly comparable for the entire coal-field of Iowa, and that the conclusions, both practical and theoretical, will deserve some confidence.

GAS-FLAME REACTIONS—IX.

By R. BUNSEN, Professor of Chemistry at the University of Heidelberg. Translated for the AMERICAN JOURNAL OF MINING, by H. ENDEMANN, Ph. D.

Continued from Page 386.

23. REACTION OF THE TIN COMPOUNDS.

a. On the Charcoal-rod, the compounds of tin are easily reduced to a white, malleable, lustrous, metallic button. The metallic particles obtained in the mortar, and transferred to a piece of glass, dissolve with difficulty in a drop of muriatic acid, to a liquid which, when absorbed in filter paper, gives a red precipitate with selenious, and a black precipitate with tellurous acid. A mere trace of a solution of nitrate of bismuth being added to this solution, a black precipitate of the protoxide of bismuth is produced by an excess of hydrate of soda. The original metallic button, treated with nitric acid, gives white, insoluble oxide of tin.

24. REACTIONS OF THE MOLYBDENUM COMPOUNDS.

a. On the charcoal-rod with soda, molybdenum may be reduced to a gray powder, but with such difficulty that its determination in this way is not convenient. Some compounds of this metal give in the upper reduction-flame an imperfect metallic coating on porcelain, which is extremely difficult to produce, and impart to the flame a greenish color. Molybdenum may, however, be best detected as follows:

b. The assay, finely pulverized with the steel-blade, FIG. 4, *a*, on the porcelain plate, FIG. 3, is mixed in the hand with soda, obtained by melting a soda-crystal to the pasty condition most convenient for the mixture. The mixture is melted for a moment in the flame, being held in a spiral of the finest platinum wire, two or three millimeters in diameter. While yet liquid, and white-hot, it is removed by rapping from the spiral to the lamp-plate, where it is treated with two or three drops of water, and gently heated. The clear liquid is then drawn off from the residuum, by means of three or four strips of not too fine filter paper, which absorb it.

a. One of these strips, moistened with muriatic acid, does not change color, but an additional drop of ferrocyanide of potassium produces a reddish brown color.

β. A second strip, gradually moistened with a few milligrammes of the protochloride of tin, assumes, either while still cold, or when gently warmed, a blue color. If it turns yellow, or yellowish-brown, a little of the original solution, b, must be added, through a capillary tube, to produce the blue color.

γ. A drop of sulphide of ammonium colors the third strip brown, and the addition of muriatic acid gives a brown precipitate, in the neighborhood of which the paper, round about, often becomes blue.

δ. The yellow precipitate with phosphoric acid, from a molybdenic acid solution, containing nitrate of ammonia, may be produced in a similar manner.

c. Borax-pe rl.—Not very characteristic, colorless in the oxidation-flame, or resembling bluish enamel, when much molybdenum is present; in the reduction-flame, dark with precipitated oxide of molybdenum.

25. REACTION OF THE TUNGSTEN COMPOUNDS.

A reduction on the charcoal-rod with soda is possible, but not convenient for the separation or recognition of the metal. The compounds of tungsten are to be treated therefore like those of molybdenum, namely, by absorbing into strips of coarse filter-paper the liquid obtained by smelting with soda and digesting with warm water.

α. The strip moistened with muriatic acid remains white, but turns yellow when treated. Ferrocyanide of potassium produces no change of hue.

β. The second strip, moistened with protochloride of tin, becomes blue while yet cold, or upon being warmed.

γ. On the third strip, a drop of sulphide of ammonium, produces, neither before nor after the addition of muriatic acid, any precipitate; but the paper turns blue or greenish, especially when warmed.

26. REACTION OF THE TITANIUM COMPOUNDS.

With "phosphorus-salt" (phosphate of ammonia and soda) in the oxidation-flame, a colorless bead or pearl, which assumes in the reduction-flame a faint amethystine color. After the addition of a little green vitriol the pearl shows, in the lower zone of reduction, the peculiar red color of venous blood, while the light brown color of the peroxide of iron may be reproduced as often as it is placed in the oxidation-flame. Melted with soda, titanium compounds dissolve with ebullition, and are transparent while glowing, but opaque when cold. Treated while still hot, with protochloride of tin in drops, and held in the reduction flame, the mixture becomes a gray mass, which dissolves with faint amethystine color, when warmed on the lamp-plate with muriatic acid.

27, 28. REACTIONS OF THE TANTALIUM AND NIOBIUM COMPOUNDS.

The same as those of titanium.

29. REACTIONS OF THE SILICIUM COMPOUNDS.

I refer here only to the compounds of silica, or the silicates. These, when treated with soda in the oxidation-flame, fuse with more or less ebullition. The glowing mass, alternately moistened with protochloride of tin, and re-heated, shows, when evaporated on the lamp-plate, no trace of a blue color. This distinguishes silicic from titanic, tantalic, and niobic acids. Neither does it produce, in a pearl containing the oxide of iron, the blood-red color which is caused by those acids. The melted mass, carefully treated with water and acetic acid, and evaporated on the lamp-plate, precipitates gelatinous hydrate of silica. Fine splinters of silicates give, in the bead of phosphorus salt, a gelatinous, floating segregation, known as the silica-skeleton, which may be observed in the bead both before and after cooling.

30. REACTION OF THE CHROMIUM COMPOUNDS.

a. In the Platinum Spiral with Soda.—Melted, with the repeated addition of saltpeter, these compounds give a clear, yellow mass, which dissolves, when pulverized, with water, on the lamp-plate, giving a yellow solution. This solution, poured carefully off from the residuum, and acidulated with acetic acid, becomes yellowish-red; and, being then absorbed in strips of paper, gives respectively to a solution of the oxide of quicksilver a red, to a lead-solution, a yellow, and to a silver-solution a reddish brown, precipitate. Sulphide of ammonium or protochloride of tin, or evaporation with aqua-regia on the lamp-plate, color the solution green.

b. The Borax-bead.—Emerald-green in the oxidation-flame, and not losing color in the zone of reduction.

31. REACTION OF THE VANADIUM COMPOUNDS.

a. Smelting with soda and saltpeter in the platinum spiral gives a light yellow mass, the aqueous solution of which, acidulated with acetic acid, gives a yellow precipitate with nitrate of silver. The original product of melting, digested and evaporated with aqua-regia, gives, not a greasy, but a yellow or yellowish-brown solution, which becomes blue when protochloride of tin is added. If the melted mass contains much vanadic acid, its solution will give, with an excess of concentrated muriatic acid, cold, a yellowish-brown color or precipitate.

b. The Borax-bead is colored by the vanadium compounds, greenish-yellow in the oxidation, and green in the reduction-flame.

TO BE CONCLUDED.

ANNUAL MINING REVIEW.

Gold and Silver.

The decrease in the product of the precious metals, compared with that of former years, demands serious attention. The aggregate production for 1867 is estimated at $75,000,000, while that of 1863 was probably about $83,000,000. The causes of this difference are too numerous to be fully discussed at the present time. We point out a few, of a general character, leaving the more local ones to be mentioned under the heads of the various mining States and Territories.

1. The universal dullness and prostration of business, affecting unfavorably every branch of business. This is ascribed to the disordered state of our currency, to the abnormal political condition of a large portion of the country, to the burden of ill-adjusted taxation, &c.; but the cause is deeper than any of these. The destruction of valuable material, and the waste of productive labor involved in years of civil war, have left the nation by so much the poorer. Individuals may have grown rich; a temporary factitious prosperity may have attended trade; some branches—among which we may reckon mining—may have even been stimulated for a time by the employment of capital, left idle by the failure of other enterprises; but under all these appearances, the great absolute loss has steadily made itself felt; and, sooner or later, every department of labor must be affected by it.

2. The reaction of speculation. Ever since the rude but easy and profitable exploitation of "diggins" by individual miners began to give place to organized deep mining ("quartz-mining") calling for the assistance of capital, the total annual production of gold and silver has been an illusory standard of annual gain to those engaged in the business. The country has been the gainer, not the capitalist; and the conviction of this fact, forced upon the public mind by much bitter experience, has produced a growing disinclination toward investments in mining, intensified by the eager activity of speculation which it follows, as a chill follows a fever. We need hardly say, that both the extravagant hope and the extravagant despair are equally unreasonable; but they remain as facts, powerfully influencing the history of American mining enterprise during the past year.

3. The growing difficulties in mining and metallurgical engineering, attending the extraction and reduction of our gold and silver ores. These difficulties increase as our mines grow deeper; since, on the one hand, the problems of timbering drawing, hoisting, and ventilation assume more serious proportions, and, on the other hand, the ores extracted in depth, have not been prepared, by the processes of natural decomposition, for easy reduction, and present themselves to the unskilled miner in the most intricate and obstinate mineral combinations. It is true, that the solution of these problems requires no new discoveries in metallurgy; but it is equally true, that the science and experience of Europe cannot be directly applied to them, any more than the crude materials of Europe can be used in the arts among us, without suitable manufacture. Foreign metallurgists can extract from our ores a larger proportion of gold and silver than we are now doing; but the cost of labor, fuel, and material, is so different from the same element of calculation in Europe, that this increased accuracy of operation is too dearly purchased with a diminution of net returns. What we need is the application of the *principles* of science (which are the same the world over,) to the economical conditions of each particular case. Neither European engineers, nor European processes, will compensate for the absence of a sufficient number of American engineers, thoroughly educated *in America*, and the diffusion throughout our country, from a common centre of information and instruction, of correct notions as to the primary operations of mining and metallurgy.

4. A result of the foregoing evil has been the abandonment of regular mining operations by large numbers of men, and a great expenditure of time, labor, and money in "prospecting." Thousands of men, who should be increasing by steady work our annual yield of bullion, are living vagabond lives, or sitting doggedly on their "claims," which they cannot develope themselves and which they prevent others from developing, until they can "sell out," at a price far greater than the value of the time or skill laid out in the discovery. We do not say that the labors of our prospectors have been useless; but only that they do not swell the actual, tangible results of mining for the year.

The lapse of time, the recovery of the nation from its political and financial embarrassments, and, above all, the establishment of a National School of Mines, and the consequent introduction of an element of scientific order and certainty into what has hitherto been a chaos of darkness and conflicting errors, will remove all the sources of loss we have indicated. The sourest pessimist does not dare to affirm that the fountains of our wealth are running dry; the most sanguine optimist has scarcely been able to over-estimate their yet untouched treasure. We have only to *stop the leaks in our channels*, and these springs of golden bounty will irrigate and fertilize, for a thousand years to come, every field of American industry and commerce.

CALIFORNIA.

The total production (mostly gold) of California is estimated at $25,000,000. Nevada county, including the famous quartz mines of Grass Valley, and the great cement or gravel claims on the Yuba, preserves its position as the foremost producing district of California. The Pacific Railroad, which passes near the centre of this region, will increase its prosperity. The North Star mine, which is approaching nine hundred feet in depth, and is the deepest in Grass Valley, and claimed to be, next to the Hayward in Amador county, the deepest in the State, has produced, from its lowest levels, quartz of a very favorable quality—a fact which, taken together with the continued (and, indeed, increased) prosperity of the Hayward, now 1200 feet deep, goes far to overthrow the general notion, already discarded by many eminent mining engineers, that gold veins become comparatively barren below certain depths, or, more precisely, that the deep barren zone found in most quartz mines is the *ultima thule* of profitable exploitation. Next to Nevada, we may mention Calaveras, Yuba, and Amador counties, as giving evidence of continued activity and success in quartz and gravel mining. But these do not by any means

exhaust the list of producing districts. There are more than 420 stamp-mills running in the State, with some 3,500 stamps; and a simple operation of division, due allowance being made for the gold produced by alluvial and hydraulic workings, without crushing, will suffice to show that these mills must have produced twenty dollars per stamp daily; and we may conclude therefore that the average yield of the quartz has been above, rather than below, twenty dollars a ton. A very good sign is the fact that the capital invested in California quartz-mining is mostly home capital. The companies owned and managed in San Francisco are saved from many evils attending the administration of affairs in remote territories from headquarters on the Atlantic coast. On the whole, the progress of the year towards steady, business-like mining operations is clearly evident in California; and we can congratulate the mine-owners of that State on their prospects for the future.

NEVADA.

The production of the Comstock Lode has been about $17,000 000, against about $14,000,000 for the year before. As the mills of Washoe save but 65 per cent. of the precious metal in the ore, the loss in tailings must exceed $9,000,000; —a sum so enormous that one would think the attention of stockholders must be arrested by it. Strange to say, these tailings are not saved; but very generally dumped into the river, and lost. The fact is, the great production of these mines has blinded the eyes of their owners to the extravagance with which they have been worked; and the past is now beyond retrieval. The large yield of the Comstock for 1867 has been produced by desperate means, in many of the mines; and we cannot feel sure that this apparent prosperity will continue. (See our article on this subject, Vol. IV., p. 328, Nov. 23, 1867.) We hope to chronicle, by the end of another year, the progress of the needed deep tunnel, and the commencement of the new era of economy, industry, and solid success for Washoe.

The eastern districts of Nevada have recovered, during the year, to a large extent, from the reaction which followed the first excitement of speculation, and the "giving out" of the rich surface ores in many mines. Reese River District has much to contend with, in the way of narrow and broken veins, and high prices; but the success of the Manhattan, and a few other companies, is surrounding Lander Hill once more with the old halo of silvery splendor. The monthly production of the Manhattan is about $90,000; and the prospects of the company are brilliant. The Philadelphia, or Silver Bend, District has steadily produced bullion, but not yet in such aggregate amount as to verify the high opinion entertained of it by the miners. When the mill of the Combination Company is running, we shall know what is the real capacity and quality of the celebrated Highbridge Lode. Twin River District continues to be a scene of busy activity. The Twin River Company, on the Murphy ledge, are achieving a splendid success. The gross product of the mine for the year will probably exceed $400,000—the greater part of which has been consumed in running expenses, improvements, dead work, stock of tools and provisions, &c., leaving the company in a position to declare a dividend at once, and to follow up that pleasing practice through the next year, every month. We do not yet hear of the dividend, and we presume it has been determined to accumulate first a handsome reserve, and postpone dividing profits until February. The Manhattan will doubtless follow a similar policy. These two companies have furnished at least one-fourth of the bullion product of Eastern Nevada for 1867—the aggregate of which we put at about $3,000,000.

In regard to thoroughness of metallurgical treatment, these districts have an advantage over Washoe, in the use of the Freiburg amalgamation, which enables them to extract with ease 80 per cent., and frequently much more, of the silver, as determined by fire assay. The great improvements necessary are in the direction of economy of fuel and labor. In this respect, the new chloridizing furnace, invented by Mr. Chas. A. Stetefeldt, of Austin, and in use at the Twin River Mill, promises to be a great blessing to the silver mines of Eastern Nevada and other States. It is said to save, in actual practice, 7 per cent. more of the silver than the ordinary reverberatories, with the expenditure of one-third the labor and fuel; and thus to decrease the real cost of reduction some forty per cent. If these reports, which we draw from official sources, be correct, the next year will show a great advance in net profits from Reese River, Twin River, Philadelphia, Cortez, and other similar districts. Humboldt has scarcely recovered yet from the desolation to which she was at one time given over. The railroad will help her, however, more than it will the southern part of the State.

From Pahranagat we have few definite returns. There is talk of the discovery of gold there—which we almost regret, as it will prolong the era of speculative restlessness, and delay the period of regular work.

ARIZONA.

Little or nothing has been accomplished during the year in this territory. The Indians have been troublesome, though scarcely more so than in former years. Many gold miners have been troubled with sulphurets. The copper mines on the Colorado are not yet well developed; and enterprise in that quarter is waiting for the establishment of regular navigation of the river. It is proposed to ship ores from the mines to New York, and even European markets; but this is all *in futuro*.

NEW MEXICO.

The condition of enterprise in this territory is also quite dull. A few gold-mining companies are at work, but with what results is not publicly known. The latest report of the New Mexico Mining Company has been noticed in our columns (Vol. IV., p. 185, Sept. 21, 1867.)

UTAH.

The policy hitherto pursued by Brigham Young, in opposing the development of the mineral resources of "Deseret," has been gradually overpowered by circumstances; and even the Mormons are said to be engaging in mining. The Indians have hindered the operations of mining to some extent, and the most advanced workings—the mines and furnaces of Meadow Valley—have not yet made regular returns.

MONTANA.

Our readers will not have failed to notice, in our weekly Mining Summary, that the territory of Montana maintains itself as the most productive, after California and Nevada, of the gold and silver mining regions. Last year, it produced $16,500,000; this year its total yield of bullion may not exceed $12,000,000; but the progress of regular mining, milling, and smelting operations is calculated to inspire confidence for the future. Our limits will not allow us to enter into details: but our mining summary for the year will have kept our readers fully informed.

IDAHO.

The yield of Idaho has fallen from about $10,000,000 to about $6,000,000. The failure of the Poorman Lode, after its extraordinary productiveness in the Autumn of 1866, is naturally disquieting to the New York owners. At that time they produced nearly half a million dollars in ninety days: now they are scarcely paying expenses. There is no real reason to believe, however, that the vein is exhausted, or that rich ore will not be struck again. Indeed, the latest advices are more encouraging, we understand, than any the company has received for months. New river and placer diggings continue to be discovered in Idaho, and worked with varying success. It is almost impossible to estimate the results from "diggin's"—especially when Chinamen are the operators. They carefully conceal the amount of their profits. These laborious, economical, queer specimens of humanity, have made their way into Idaho and Montana. They seem to be ordained of Heaven to work over tailings.

COLORADO.

The total production of the precious metals in Colorado, for 1867, is estimated at about $2,500,000—perhaps a little more. Mr. Hollister, an excellent authority, says in his book on the silver mines of Colorado, the last chapter of which is devoted to the gold mining speculations in Gilpin county:

"The three banks of Central City have bought and shipped $1,200,000 worth of gold during the year ending Nov. 1, 1867. There are thirty mills and reduction works in operation in Gilpin county. Some details in reference to the leading companies may not be out of place.

"The Black Hawk Company, running eighty 800-lb. stamps, have crushed 10,000 tons of rock, 33 per cent. pyrites, from Gregory mines, during the year, the rock producing 11,797 ounces of gold, which sold for $275,000. Of this, $165.000 has gone to pay the expenses, leaving $90,000 profit. Of this sum $12,000 has been put into the Bobtail mine, which is now producing ore, but from which no returns have been received; and nearly $50,000 has been incurred on account of inadequate draining machinery. Mr. Lee estimates the cost of delays and repairs of pump at $20,000, the extra expense of mining on account of bad drainage at $27,000. In other words, with an adequate pump and by confining operations to the Gregory mine, the profits of the year would have been almost doubled. They are now putting in a 10-inch pump. The pump-shaft is 470 feet deep, the mine has a crevice the entire length (300 feet) from two to four feet wide, and is in better shape to supply ore than ever before. It is the intention to run this through stamps as taken out, buddling and saving the tailings, of which the Company have on hand some 3,000 tons. The Bobtail ore is being saved for smelting. There are 50 tons on hand, considered worth $200 a ton.

The Sensenderfer Company have taken out in the last eighteen months, 6,937 ounces of gold, worth $155,000, of which amount, $110,000 has been paid to the stockholders in dividends, showing the expenses to have been $45,000, less than 30 per cent. of the gross yield. They have run their own 20-stamp water mill nearly all the time, crushing about 60 tons a week, and they have had considerable rock crushed by custom mills, probably about 4,000 tons in the eighteen months. They have been pumped to death as well as the B. H. Company.

"The Smith & Parmelee Company have run their 20-stamp mill steadily during the last ten months, crushing about 27,000 tons of rock, realizing 3,447 ounces of gold, worth $76,000. They had 15 tons of second-class ore treated at the California Reduction Works. The first lot yielded $76 a ton, the second $57. They are having another lot of ten tons reduced there. The pump shaft is 420 feet deep, the last 30 feet below where the mine has yet been worked. Mr. Belden, the agent, considers the mine in better condition for supplying ore than ever before.

"The Ophir Company has been idle two months of the last twelve, putting in an eight-inch pump. Otherwise they have run their 24-stamp mill steadily, crushing about 25,000 tons and realizing 2,863 ounces of gold, worth $63,000. They have saved and sold to the smelters 47 tons of copper ore, 22 tons of blanket tailings assaying 12 ounces of gold per ton, and 46 tons of buddled tailings. The pump shaft is 510 feet deep and shows a fine vein of ore. The pump is worked only half the time, there being nothing but surface water. The mine is in shape to keep the mill supplied with ore.

"Mr. George R. Mitchell, for the Alps and Granada companies, working the Alps and Mackie lodes, has taken out 8,566 ounces of gold, worth 78,500, with a 12-stamp mill, in the last sixteen months. In that time he has crushed about 2,500 tons of rock. The mines are in good shape for this country, although the pay-vein in both shafts and drifts is somewhat pinched at the present writing.

"The Bobtail company have done a great deal of work in their mine, sinking through cap, two shafts, each more than 100 feet. About three months ago they commenced running twenty stamps, which were soon increased to thirty, on second-class rock. They have crushed to date about 350 tons, realizing an ounce of gold per ton, sold 52 tons of first-class ore, assaying above $100 a ton, and have about the same amount still on hand. In the mine they are opening about as much ground as they are breaking, have ore in the bottoms of two shafts, and in a level 10° feet from the bottom of the third. A portion of their mine is drained by the confederate Bobtail pump, and they expect it all to be eventually, since that pump drains No. Eleven, on the Gregory. The hoisting works and arrangements generally for working the mine, are complete.

"The Union Company have been and are running a 20-stamp quartz mill in Chase Gulch crushing about 60 tons and realizing 80 to 100 ounces of gold a week. They have a thousand tons of rock broken in the mine, two-thirds of it pay, and 200 tons of choice ore saved up, which, if not worth $200 a ton, is not for sale at less. They are preparing to sink their main shaft, and open up two or three new lifts. Their property is on the Bates Lode.

"The Black Hawk, Smith & Parmelee, Sensenderfer, Ophir, Alps and Granada companies have together crushed, in round numbers, 22,500 tons of rock, which has produced 28,700 ounces of gold, about one and a quarter ounces per ton, worth, with the premium at 40, $28.00. In the gross yield should be counted at least 6,000 tons of buddled tailings, containing $20 to $30 a ton, and a small amount of choice ore, saved for smelting. The cost of mining and milling per ton we cannot get at so closely, but suspect it to range between $12 and $15. These companies have run in the aggregate 167 stamps, showing a capacity, with their weight and speed, of 135 tons each year, not quite half a ton per day."

The silver districts of Colorado are attracting a great deal of attention, and increasing in importance every month. The reduction works at Georgetown (a city which has taken a new lease of life) are obtaining excellent results from the ores furnished, but not working on a sufficiently large scale to produce a great amount of bullion. For metallurgical accuracy, Mr. Martine's administration of them is justly celebrated; and we believe that another season will see the due reward of intelligence and perseverance bestowed upon the first silver reduction works of Colorado.

For our views concerning the past and present method of treating the sulphurets of Colorado, we refer our readers to our articles, Vol. IV., pp. 40, 376, 392, and the remainder of the series, now publishing from week to week on our editorial page.

THE SOUTHERN STATES.

Georgia, North and South Carolina, Alabama, and Virginia have been the field of considerable activity, and a few districts, especially the neighborhood of Charlotte, N. C., and Dahlonega, Ga., which were both mining centres before the war, may be said to be fairly reopened to regular operations. We hope the forthcoming report of Mr. Taylor, the commissioner of mining statistics for the States east of the Rocky Mountains will contain a detailed account of the enterprises now in progress in these States. At present, we will only say, that a few companies in Georgia (among others the Yahovla and Lewis, and Col. Pride's company at work on the Pigeon Roost, near Dahlonega) are doing well. Ives' Mills, on the creek near the town of Dahlonega, are supposed, for some unexplained reason, to be barely paying only. The Bullock Mills, in Georgia, are generally unsuccessful, and the regular California stamp mill is coming into favor. At the Glade, near Altoona, a combination of patent crushers and amalgamators has been erected at great cost, but has, so far, given no results. It is, perhaps, too early to condemn it. Concerning the mines near Acworth, there are no definite reports. In North Carolina, several companies are active, and Morey & Sperry, of this city have furnished a number of first class stamp mills to that region. A few gold bars have been shipped to New York, but rather in the way of a "show" than of regular working returns.

NEW ENGLAND.

New Hampshire, Vermont, and Maine, have been heard of from time to time, as gold fields; but we have no trustworthy statistics of actual returns. At Bridgewater, Vt., things are apparently standing still; at Lisbon, New Hampshire, there is a professed success, which time may render less dubious than it appears at present.

NOVA SCOTIA.

The year's production of the gold mines of this province may be set down at about $600,000.

AUSTRALIA.

The gold exported to England from Australia, during 1867, may be set down in round numbers as about $28,000,000. This is a falling off from the production of 1866, but a gain upon some previous years. The whole history is epitomized in the following table, from the London *Mining Journal*:

1853	£9,061,733	say	$43,000,000
1859	8,624,566	"	42,000,000
1860	6,710,000	"	32,500,000
1861	6,331,225	"	31,000,000
1862	6,701,753	"	32,500,000
1863	5,995,568	"	29,000,000
1864	2,655,971	"	13,700,000
1865	5,051,179	"	24,000,000
1866	6,859,764	"	33,000,000

Copper.

Complete returns of the production of copper mines on the Portage Lake and Ontonagon District, and in other States and Territories, are not yet at hand. We prefer to await fuller information, and content ourselves with saying that the year has been an extremely unfavorable one in point of profit to the copper mining interest. The temporary rise in the market for copper, produced by the Chilian war, has not made amends for the general depression; and many companies, having lost heavily in 1865 and 1866, are nearly or quite unable to stand the burden of 1867.

In view of the depressed condition of copper mining at Lake Superior, there is a vigorous call from that quarter for protection against foreign competition, especially in the crude ores. The high duties favoring the iron interest are cited as a precedent, and the fact is adduced, that copper cannot be produced at Lake Superior for less than twenty-five cents per pound. We fear that the effect of the remedy proposed would be to stimulate the activity and increase the profit of the mines of Tennessee, Virginia and North Carolina, where the cost of production is much less, and that the industry of Lake Superior would receive only a new competition, not a permanent relief.

Copper mining in California is also prostrated by economical difficulties. Its fate for the present year is not easily foretold; but it seems unlikely that any immediate change will take place.

Mining Summary.

GOLD AND SILVER.

Nevada.

Washington District—According to a correspondent of the *Reveille* of December 10, the works of the Zaunchill Silver Mining Company, situated in Webster Carryon, are progressing rapidly towards completion. The writer says: "In the short space of twelve days they have built a furnace house 30 by 45, a boarding house 20 by 30, a blacksmith shop 10 by 16, an ore house near the mine 25 by 30, and a shed from the tunnel to the ore house 30 by 8 feet. I was informed that all this work had been done at a cost not exceeding $1,500. The smelting furnaces are being erected rapidly under the skilful superintendence of Terry McGinnis of your city, and every branch of the work will be constructed upon the most systematic plan. They have begun to sink upon the Santa Elena mine from the tunnel, and are pushing the work with all the force that can be used to advantage. Professor A. H. Everett, the agent of the company—a gentleman of considerable experience and fine attainments—will be shipping bullion to the company in less than sixty days. There are now about three hundred tons of ore upon the dump, the whole of which will give a good yield of silver. The mines of the company are under the superintendence of A. H. Rutherford, formerly of Gold Hill, who is an executive officer of surpassing ability. He will carry on the work of the company in a thorough, expeditious, and economical manner. The Utica and Herkimer Company, under the management of G. W. Pine, is getting its machinery upon the ground preparatory to building a fine fifteen-stamp mill. In the meantime the mines are being worked, and will produce a good supply of ore for the mill."

Northumberland District.—The company which purchased the original location upon the great Northumberland ledge in the district of that name, is quietly doing its work there. The *Belmont Reporter* has learned that the tunnel which was projected to cut the vein has been driven into the hill nearly two hundred feet. It is an important undertaking, and its completion will add another fine mine to the long list in Nye County. Some busy prospectors in the district discovered recently several small veins holding exceedingly rich ore, which they are extracting to send to mill. The owners estimate that the ore will produce from $500 to $1,000 of silver per ton. Northumberland is situated a few miles north of Silver Bend district, near the centre of the Smoky Valley range of mountains, and gives promise of developing several superior mines.

Mining Districts South of Austin.—The *Reveille* of the 9th ultimo says: "Less than two hundred miles south of Austin, and near the boundary line of this state and California, there are several districts containing valuable mines, some of which are now receiving proper attention. The section embraces the districts of Silver Peak, Palmetto, Lone, Pine, Cerro Gordo, and Kearsarge. It is not only a good mining region, but it contains much excellent agricultural land, including Fish Lake and Owen's River valleys. Mining operations have been undertaken in several of those districts upon a scale of unusual magnitude. The *Belmont Reporter* has been informed that the Great Salt Basin and Silver Peak Company, organized last year by Messrs. Martin and Harker, is driving work with a force of sixty to eighty men, and will employ more as soon as quarters can be built for their accommodation. The company is grading for the foundation of a mill of great capacity, which is to be connected with the mines by a railway. The work is in charge of accomplished engineers, and a considerable portion of the required material is on the ground. Without any exaggeration the company may be said to own the finest mining property held by any single corporation in the world. At Palmetto district Col. Catherwood has a force of thirty men employed in working the Champion ledge, which is reported to develop beautifully, and produces large amounts of ore of a high grade. The Kentucky ledge, owned by another company, has been explored to a considerable extent, and is found to be of great size and wonderfully rich. Next spring a large mill will be erected in the district. At Kearsarge a mill is already at work with satisfactory results, and is well supplied with ore. The least favored locality of the region appears to be the district of Lone Pine, which is rich in minerals but destitute of wood and water. A correspondent furnishes the following account of the characteristics of the district: 'I find the mines here much richer and more extensive than I expected. They consist of silver and lead mines, and are of that character generally that are easily reduced by smelting, the lead being a great aid to the process. Some of the ledges, however, contain large amounts of milling ore. To tell the truth, it is one of the richest mineral localities I have ever seen and is destined to become the abode of a dense population, besides a place at which much capital will concentrate. If there is not a big rush of people into this district next summer it will indeed be strange, as there are many inducements for all classes. The mines are located in Inyo mountains, nearly due south from Palmetto, and, as a matter of course, a short distance within the California line. They are about ten miles east of Owen's River valley, and the mountains in which they occur are rough and nearly destitute of water and vegetation. There is a number of small furnaces here which have been erected by Mexicans for smelting, from which, in the aggregate, no inconsiderable amount of bullion has been produced. The ore yields from $100 to $500 per ton. The region mentioned, lying within the borders of Nevada and California, contains mineral wealth sufficient to build up and maintain an empire. The scope of country is great, but it will be explored and its treasures seized by skill and industry and given to the commerce and art of the world.'"

Bullion Shipments from Austin.—The *Reivelle* brings the gratifying intelligence that during the month of December there were shipped from Austin by Wells, Fargo & Co., 277 bars of bullion, weighing 19,672 pounds, and value at $298.762 11; also that during the month of November the Manhattan company shipped $105.583 10.

The Comstock.—The San Francisco *Commercial Herald* thus reviews the Mining Stock Market for the week ending the 30th ult: The general list of mining stocks during the past week shows a very material appreciation over prices that have ruled for some time past, the upward tendency having been gradual and without any undue excitement on the part of speculators. The enhanced value of Imperial seem to have been the initiatory steps towards a sympathetic feeling; however, the intrinsic merits of the advance is warranted in a number of cases. All things considered, the present condition of the mines on the Comstock Lodge is much better than was anticipated less than a month ago. Crown Point was in better request, advancing from $620 to $710, receding to $670, and closing at $640. The latest advices state that in the north drift, on the 700-foot level, they are nine feet in the face from where they cut quartz and pay ore on the 22d instant, and now continue to quartz with spots of pay. It is said that about seven feet of the ground will yield $35 per ton at the mill. The south drift runs in porphyry and quartz. Hale & Norcross continues to be well maintained, selling within a range of $800a 850, closing at $820. The vein running toward the Savage ground, fifty feet below the 780-foot level, is about ten feet wide, and produces an average yield of $34 to the ton. The general average product of this mine during the current month runs a little less than $31 to the ton. At a meeting of the stockholders of this company, held on the 27th inst., seven hundred and twenty-four out of eight hundred shares being represented, it was unanimously voted that the value of the shares be increased from $500 to $1,500 each, making the capital $1,200,000. This increase will enable them to levy a larger assessment—which will be done very shortly—than could have been made with a capital of only $400,000. Kentuck has been somewhat unsteady during the period under review, rising from $144 to $182 50, falling to $147 50, and closing at $164. We have nothing of special interest concerning this mine. The bullion receipts from the 1st to the 29 instant amounted to $36,955. At the meeting of the stockholders on the 27th instant, the following gentlemen were elected officers to serve the ensuing year: Thos. Sunderland, President; A. Hayward, James C. Flood, James W. Bicknell, and William Sharon, Trustees; H. C. Kibbe, Secretary. From the reports submitted by the President and Secretary we make the following extracts: The west drift, 420 feet from the surface, yields about forty tons of ore per day, of the average assay value the present month, up to the 18th, of $81 04 per ton, sixty-five per cent. of which would give $52 62. It is estimated by parties experienced in mining that this west body of ore, mined as it is the present month, will last for eight months. The future of the mine, however, is dependent upon the east body, partially developed by the Crown Point and Yellow Jacket Companies, and lying about four hundred feet to the east of the Kentuck shaft. The lowest level of the Crown Point (700 feet) is three hundred feet below the lowest level of the Kentuck; and the north drift in the former mine is being run jointly by the two Companies, and on the dividing line. According to the report of the Superintendent of the Crown Point Mine, he had, up to the 22d instant, run through ore in this drift which, if concentrated, would make a compact body of eleven feet; since which time the drift has improved in going east, and is now in pay ore. This east body of ore, at the five hundred foot level of the Crown Point Company, runs through the Kentuck Mine ninety-five feet to the Yellow Jacket ground, and is now being worked through the Yellow Jacket shaft. It yields about thirty tons per day, of $25 to $30 mill ore. About the same quality of ore is found on the Kentuck line in the Crown Point Mine, twenty-eight feet below the latter's six hundred foot level, but no prospecting has been done on the Kentuck ground at this level. So far as can be ascertained, the Kentuck ground seems to cover the centre of the chimney of ore in the east, as does the west body. The mine, to be worked with economy, cannot be made to yield above eighty tons of ore per day. During the last month an attempt was made to increase the dividends by extracting a large quantity of ore, and 3,719 tons were taken out and worked. While that quantity largely increased the expenses of mining and milling, the product was little more than it would have been with 2,400 tons, or eighty tons per day. This company has never collected an assessment. Money was borrowed to the extent of about twenty thousand dollars to open the mine, and an assessment levied to secure the party making the loan, but before it was collected the prospects of the mine were so flattering that it was rescinded, and the loan paid off by the product of the mine. The first bullion received from the mine was in January, 1866, and amounted to $1,930 23. In February it amounted to $3,127 33. The first dividend was paid in September, 1866, and including that, the company has disbursed to the present time, the sum of $592,000 in dividends, or $6,231 57 per foot of ninety-five feet, the actual quantity of ground in the claim. The company has also paid legal expenses and to quiet title the sum of $44,801 76. The gross yield per foot of ninety-five feet, as above, has been $16,288 48, and the dividends 38¼ per cent. of the total bullion produced. The Secretary submitted the following report, extending from November 1st, 1865 to November 21st, 1867:

RECEIPTS.

Bullion	$1,574,647 35	
Sundries	63,124 10	
		$1,637,771 45

DISBURSEMENTS.

Expenses	$1,025,406 42	
Dividends, No. 1 to 14	592,000 00	
Cash in Treasury	20,365 03	
		$1,637,771 45

One statement from May 1st to November 1st, 1867: Tons worked, 15,834½; average yield of bullion per ton $43 86; average cost of mining and milling per ton, $24 72; average net yield per ton, $19 14. Savage continues to be actively dealt in and at better prices, advancing to $112 50, then selling at $107 50, and closing at $109. The amount and approximate value of the ore extracted during the past six weeks compare as follows:

	TONS.	VALUE PER TON.
November 23d	1,813	$37 62
November 16th	1,626	36 20
November 9th	1,706	35 52
November 2d	1,821	38 80
October 26th	1,921	38 55
October 19th	1,944	39 90

The north mine, on the third station, continues to produce the largest amount, having yielded 888 tons of the aggregate reported for week under review. Dispatches of the 25th state that the south drift, on the fourth station, passed through ore eleven feet wide, and they are now working south to reach the drift from the winze. In the east drift, from the same winze, the ore is said to be fourteen feet wide. It is reported that all part of the mine have generally improve in quality.

Colorado.

The bullion shipments from Central City, per Wells, Fargo & Co.'s Express, for the month of December up to the night of the 16th ult., says the *Register*, amounted to $50,122. ....The affairs of the Georgetown Smelting Co. are to be straightened out, and the works put in operation again, shortly.....Mr. Stille, of Georgetown, says that he has struck the best of indications sixty feet from the surface, on the Tunnel lode, Kelso mountain, vicinity of the Baker. He is confident he has as good a mine in the tunnel as there is in Colorado. The Washington Mining Association, of which he is agent, are going on to complete their furnace and works, in the hope that their crucibles will be just the thing for rich zinc and such like difficult ores.....The *Register* has also the following items of news: We have seen a sample of fine ore from the surface, the vein of pure galena and iron and copper pyrites, is three feet wide, and essays on the average $45 per ton.....S. H. Wright, a practical mill-man of Black Hawk, has leased of the Loker company their 8 stamp mill in Chase gulch, just below where the Bates lode crosses. He intends to run a few pans in connection with the stamps, and will no doubt do well. This mill has not been run for four years.....Dr. Johnson has shut up the smelting works at Georgetown. It is understood that another man will be in charge when they are again opened.....We hear that the Briggs company will soon commence work again.....The tunnel of the La Crosse Company has arrived at a depth of about 700 feet, and is still being carried forward. On the Burroughs they drifted 52 feet one way and 40 odd the other, the vein being badly pinched. Toward the east they broke through into the working of the Burroughs Company, giving them air. They are now in a thick stratum of quartzose matter, conglomerate, coarse gravel, pebbles as large as one's fist, with a little pyrites of iron disseminated through it. Mr. Clark regards it as pretty good indication of something better. The American Flag is not being worked now.....The Denver *News* of the 18th inst. has the following: Hon. E. N. Stearns has kindly shown us a private letter from the Cimaron mines, which asserts the existence of the gold there. One Colorado company took from "Last Chance" gulch, $40,000 in three months. Water is now very scarce, and only one company is at work. Mr. Maxwell is bringing water from the Red River, which will give an abundant supply. Many gulches prospect from three cents to fifty cents to the pan, and Grouse gulch as high as $3.00 to the pan. On Spanish bar one company is at work with eight-inch boxes, and with a limited supply of water are making from $5 to $15 to the man per day. There are from 300 to 500 men there, who own three hundred feet square. Fun is expected there in the spring, on account of jumping claims. .....A gentleman kindly furnishes us with the following items concerning silver lode property. The yellow quartz of the Malabar, the king lode of Peru district, stratum four or five feet thick, produced $68 per ton, and 70 per cent. of lead, two different runs at the Georgetown Smelting Works. The Silver Eagle, one and a half miles up Watson Creek from Georgetown, produced at the rate of $219.04 per ton, two tons treated at Garrott, Martine & Co's. Half the lode belongs to Tiffany Roworth & Welch. Lode strikes across the creek, may be worked by adit from the creek level, gaining greatly in the matter of drainage and hoisting. The Hartwell Lode, owned by Tiffany, Roworth Welch, and J. H. Reed, on same creek, mile or so above Silver Eagle, produced at the rate of $240 a ton at Stowell & Litchfield's experimental works, Georgetown. The two lodes last above-mentioned are in a most favorable locality for working. The ores may be delivered immediately on a good wagon road but a short distance above town. The trial shows them to be rich. The Malabar, from its great strength, can well afford to be poorer. It is twelve feet between walls, is in short the strongest lode we saw in the whole silver country.....The same paper has the subjoined correspondence, dated Georgetown, Dec. 9: Considerable work is being done this winter near the top of Summit Mountain. The Magnet Lode, which was discovered last September by the Charles and Whitford Bros., has been worked ever since, and they are now fixed to work it all winter. It is situated about half a mile south of the Summit Lode, near the head of Taylor Gulch. A good substantial shaft house has been erected which covers the shaft and tunnel; the latter is in about twenty-five feet. A platform 20x40 feet has been made, and also a good comfortable cabin. The lode is looking well, showing a vein of first class ore a foot wide, together with about three feet not quite so good. Five tons of the ore have been delivered at Martine's works, from which the owners confidently expect a good return. The "Comet" and "Alice Jones," both in the same vicinity, are also being worked with satisfactory results to the owners. On the former, a shaft has been sunk to the depth of 25 feet; on the latter, there are two shafts, one 20 and the other 30 feet. This little settlement of miners is perhaps the highest in the Territory at this time, with the exception of the Baker Co. It really seems higher than the Baker, because the ascent is so abrupt. Maj. Hill makes it three thousand feet above the level of a lake, the angle between 30x35. It is now pretty generally understood that the lodes which crop out near the top of Summit Mountain, are among the richest in silver which have been discovered in this country. None have been thoroughly developed but they have been analyzed by the most skillful assayers in the Territory, who are unanimous in pronouncing them first class in every respect. The quantity of silver per ton is enormous, the component parts of the ore are of such a nature as to render the working of them easy and successful. As to the quantity, any one can satisfy himself by a single glance. You can see tons exposed by a few days' labor. The vein is before you, and your knowledge of true silver veins (the world over) tells you that the energy, skill, and perseverance of man has as yet failed to exhaust a true vein of silver ore. This is not the right side of the mountain to work these lodes. It will cost an immense sum of money to make a wagon road up to the summit. But it is not necessary. The grade down Chicago Creek is easy; two or three hundred dollars will make a good road to Idaho. Within three or four miles of these lodes there are the finest water powers in the Territory, and plenty of good timber. The California *Miner* has the following: It is through the kindness of Messrs. Carpenter & Simmons, we are enabled to lay before our readers the yield of the Equator mine, since it passed into their hands in August last. At the Georgetown Smelting Works, seven tons and a quarter of first class ore has been treated, the yield of which was 4,532 ounces of silver bullion, coin value $6,118.20, currency value $7,953.66. The yield per ton was $839. This ore is the richest yet reduced in this district, in bulk, and shows that the Equator takes the front rank of the lodes of this district. Twelve and one-third tons of second class ore, was reduced at the works of Garrott, Martine & Co., which yielded silver bullion to the amount of $1,470 91, coin value, $1,912 18 currency value. The owners have now on hand 31 tons of second class ore, full as good as the twelve and one-third tons treated by Garrott, Martine & Co. Work is still progressing in the east shaft, and will probably be continued during the winter. Early in the coming season works will be erected by the owners of this fine property, by which they will be enabled to reduce their own ore .....C. W. Bramel & Co. have purchased and are now actively working the Andy Johnson lode, situated on Leavenworth mountain, about two miles above Georgetown. The lode crops out where it crosses the creek, and at this point they are running an adit on the lode, now in fifteen feet, and under contract to be driven fifty feet. The crevice is full eight feet in width, between solid, smooth walls, carrying its full width a very fine gangue, interspersed throughout with argentiferous galena, and some little zinc blende. Considerable blue and green carbonate of copper is intermixed with the ore. C. S. Stolwell, Esq., recently made a test of three pounds of selected ore from this vein, that gave $281 50 in silver, coin value, to the ton of ore. The lode is admirably situated for being worked by adit, and the owners have exhibited good judgment in opening it in that manner.....Messrs. Gray & Archibald are still pushing work on the Monticello lode, Columbia mountain. They have erected a good, substantial shaft house for protection from inclement weather. The shaft is now forty feet in depth, showing a crevice full five feet in width, between solid walls, and an ore vein three feet in width, composed of rich sulphuret ore.

Idaho.

The Silver City *Avalanche*, Dec. 7, says: A careful and impartial survey of the Oro Fino Mountain with reference to its mineral wealth, cannot fail to infuse any one at all acquainted with mining, with unbounded confidence in its prodigious wealth-giving capabilities, and strengthen the belief that Owyhee is the richest quartz mining country that has yet been discovered. It comes not within our present purpose to speak of but a small portion of this famous mountain; therefore we shall confine our remarks to a section running nearly north and south, and a little more than two thousand feet in length, embracing the Oro Fino and the two newly opened mines—the Ida Elmore and the Golden Chariot (North Star.) The Oro Fino may be considered the oldest and best developed mine in Owyhee. The richness of its ores increases with depth of working. Gold predominates and is plainly visible in a large portion of the quartz in the vein. The company keep their mill (the Morning Star) constantly at work crushing the ore. We are unable to state the exact amount that it turns out per ton at present, but know that it pays handsomely. A tunnel is now being vigorously pushed forward seventy feet below the present working level, and will connect the north and south shafts, which are 400 feet apart. When this tunnel is completed, there will be ready for stoping a body of ore 400 feet in length, 70 feet deep, and from four to six feet wide; so that by

next spring 40 stamps can bo furnished with ore with but little more labor than it now requires to supply eight or ten. Besides the vast amount of work above described, a tunnel is being run from the south shaft in a southerly direction on the ledge. It is truly a remarkable mine. Had it been properly managed, the former proprietors thereof. Messrs. More & Fogus, instead of being bankrupts, as it were at present, might have been millionaires. Just south of the Oro Fino, and nearly on the same line, some believe the same ledge, but the truth of which future developments alone will prove, is situated the Ida Elmore, with ore quite as rich and very much of the same character as the Oro Fino. Work was commenced on this mine not much more than two months ago, but has progressed so rapidly that it is now one of the best opened mines in camp. We learn that the ore is now taken from the mine about 80 feet below the surface. The ledge is from two and one-half to three feet wide. Steam hoisting works are erected, thereby saving much time and expense. Large and substantial buildings for the reception of ore and other conveniences, as we stated not long since, have been erected. Contracts have been let for hauling quartz to the mill all winter, and taken altogether the Ida Elmore is in splendid shape for successful operation. Immediately south of the Ida Elmore, and on the same ledge, is the Golden Chariot—also known as the North Star. A cut or shaft from which most of the ore hitherto worked has been taken is down about 36 feet. A tunnel 130 feet long, and running at nearly right angles with the ledge, taps it at the bottom of the shaft, where it shows a width of nearly five feet between the casings. The main body or "rich streak," of quartz shows a width of from two to two and one-half feet, the remainder being composed of horses of granite and veins of quartz a few inches wide, as is a natural consequence of being a portion of the same ledge, the ore is about of the same quality of richness as that of the Ida Elmore. The gold can be seen in almost any of it that has been examined, as every one who has visited the mine can testify. The car track leading from the tunnel to the ore house is substantially covered over, so that the miners will be subject to no inconvenience from the storms of winter. It is to be regretted that disputes have arisen in regard to the ownership of mines of such unequalled richness; yet such is the truth. However, we are pleased to know there is prospect of amicable settlement among the contesting parties, and we earnestly hope that the day is not far distant. Without deeming ourselves too sanguine, we are confident that the three mines we have just described, if properly worked and managed, besides affording immense fortunes for their lucky possessors, would sustain and enrich a population of 5,000, from which a faint idea can be obtained of the bright future that awaits Owyhee county when the mines of Flintand scores of others of unbounded richness shall be in successful operation.....Several tons of ore from the Woodstock mine have just been crushed in the N. Y. & O. F. Co.'s mill, on Sinker creek, from which the amalgamator, Mr. Kennelly, has obtained the following result: The first-class ore turned out $357 per ton, and the whole amount crushed averaged a little above $157 per ton.....Seventeen tons of refuse ore from the Surplus Oro Fino, have recently been worked in the same mill, yielding under the skillful treatment of Mr. Kennelly the snug sum of $327 15. We are informed that previous to this working the same ore never paid more than $8 per ton. These clean-ups certainly speak well for the above-named mill, as well as for the mines from which the ore was taken.

Minnesota.

A lon of quarts from the Vermillion Lake Gold Mines, the discovery of which created considerable excitement about two years ago, recently reduced at St. Paul, yielded, according to the *Press* of that place, over eight pounds of bullion, between four and five hundred dollars.

MARKET REVIEW.

Gold and Silver Stocks are dull, and show a general decline. Consolidated Gregory sells, s.3, at $1 90, and Bentou at 25c. Others are quoted as follows:

	Bid.	Asked.		Bid.	Asked
Alameda Silver	— 80	90	La Crosse Gold	— 27	30
American Flag	— 35	50	Liberty Gold	— —	5
Atlantic and Pacific	— 15	50	Manhattan Silver	120 00	— —
Bates & Baxter Gold	— —	60	Midas Silver	— 70	1 00
Benton Gold	— 27	35	Montana Gold	— 12	17
Bobtail Gold	— —	3 00	New York	— 50	60
Black Hawk G	6 00	7 00	New York & Eld'o	— —	1 45
Bullion Consolidated	— —	1 00	Nye Gold	— —	4
Columbian G. & S.	— 5	8	Owyhee Mining	8 00	20 00
Combination Silver	50 00	65 00	People's G. & S. of Cal	— 10	25
Consolidated Gregory	4 85	4 95	Quartz Hill	91	95
Corydon Gold	25	32	Reynolds Gold	— —	4
Edgehill Mining	3 30	3 40	Rocky Mountain Gold	— 10	12
Gold Hill	— —	4 00	Scaver Gold	— —	— —
Gunnell Gold	90	1 10	Smith& Parmelee Gold	2 75	2 80
Gunnell Union	— —	45	Sensenderter	— —	8 00
H'n G & S. bs	— —	92	Symonds Fork Gold	— —	1 00
Harmon G. & S. bs	— —	12 00	Texas Gold	— —	12
Holman	— —	10	Twin Riv. Sil.	— —	— —
Hope Gold	— —	25	Vanderburg G	— —	75
Kipp & Buell Gold	— —	30	Yellow Jacket	— —	— —

Copper Stocks remain dull and nro quoted:

	Bid.	Asked.		Bid.	Asked.
Caledonia	....	10 00	Gardiner Hill	....	1 25
Canada	....	50	Hilton	....	1 00
Central	15 00	....	Knowlton	....	1 50
Davidson	42	49	Rockland	....	6 00

Petroleum Stocks.—Pit Hole Creek sells, s.3, at 80c.; United States, same. Quotations range:

	Bid.	Ask'd.		Bid.	Ask'd.
Beanehoff Run	2 00	2 20	N. Y. and Alleghany	....	3 00
Brevoort	30	50	Pit Hole Creek	80	81
Buchanan Farm	35	37	Rynd Farm	16	20
Bilven	....	....	Second National	....	....
Central	....	70	United Pet. Farms	....	12
Clinton Oil	1 00	1 50	United States	1 75	1 95
Manhattan	....	10	Union	1 75	....
National	....	3 00	Webster	....	....

Government Stocks—The bond market is quiet but firm at the following quotations: Registered, 108⅛@108⅛; coupon, 1881, 108⅜@108⅛; five twenties, registered, 1862, 105⅛@105⅛; five-twenties, coupon, 1862, 105⅛@108⅛; five-twenties, coupon, 1864, 105⅛@105⅛; five-twenties, coupon, 1865, 105⅛@106; five-twenties, coupon, 1865, January and July, 104⅜@104⅜; five-twenties, coupon, 1867, 104⅜@104⅜; ten-forties, registered, 101⅜@102; ten-forties, coupon, 101⅞@102; June seven-thirties, 184⅜@104⅛; July seven-thirties, 104⅜@104⅜; May compounds, 1865, 117⅛@117⅜; August compounds, 1865, 116⅜@116⅝; September compounds, 1865, 116@116¼; October compounds, 1865, 115⅜@116.

Miscellaneous Stocks.—Walkill Lead sells at 4, a considerable decline from last week's figure; Rutland Marble, $10; Cumberland Coal, 33@33½; Quicksilver Mining, 20⅛@22; Mariposa Mining, 7@8½; Mariposa preferred, 12½@13; Pacific Mail, 112⅛@113; Atlantic Mail, 113@113⅜; West. Union Telegraph, 26¾@37; New York Central, 117¼@117⅜; Erie, 71⅞@72; Erie preferred, 73⅜@74½; Hudson River, 131⅛@132½; Reading, 91⅝@91¾; Wabash, 42⅛@42½; Milwaukee and St. Paul, 46⅛@47; Milwaukee and St. Paul, preferred, 63¾@63⅞; Ohio, 29⅝@29⅞; Michigan Central, 107@107¼; Michigan Southern, 85⅛@85⅜; Illinois Central, 132@133; Pittsburg, 87⅜@88; Toledo, 97⅝@98; Rock Island, 94⅜@94½; Northwestern, 58⅛@58½; Northwestern preferred, 70⅝@70⅞; Fort Wayne, 97@97¼; Merchants' Union Express, 38¾@38⅞; Wells, Fargo & Co., 46.

Foreign Exchange is firm. The price of the best bankers' sixty-day sterling bills is 110½, do. at short sight, 110⅝. We quote: Bills at 60 days on London, 109@110 for commercial, 110@110⅛ for bankers'; do. at short sight, 110½@110⅝; Paris at 60 days, 5.17½@5.12½, do. at short sight, 5.11¼@5.10; Antwerp, 5.17½@5.12½; Swiss, 5.17½@5.12½; Hamburg, 36⅛@36⅜, Amsterdam, 40⅛@41¼; Frankfort, 40⅛@41¼; Bremen, 79@79⅛; Prussian thalers, 71⅜@72⅛.

Statement of business at the United States Assay Office at New York, for the month ending December 31, 1867:

Deposits of gold:

Foreign coin	$ 2,000 00
Foreign bullion	23,000 00
United States bullion	465,000 00
	$490,000 00
Deposits of Silver, including purchases:	
Foreign coins	12,000 00
Foreign bullion	5,000 00
United States bullion (contained in gold)	6,000 00
Colorado	2,000 00
Lake Superior	1,000 00
Nevada	15,000 00
	$41,000 00
Total deposits, payable in bars	237,000 00
" " " coins	294,000 00
	$531,000 00
Gold bars stamped	$722,000 00
Transmitted to U. S. Mint, Philadelphia, for coinage	392,131 18

American silver sells at 5½@6⅝ cents below the price of gold. Mexican dollars are quoted at 103@103½ in gold.

The steamship Chicago, from this port on Wednesday for Europe, took out $300,000, and the Hermann on Thursday, took out $1,500,000 in specie.

Money is easy at 6@7 per cent, and was offered in large amounts to dealers in Government stocks. Commercial paper sells at 7@9 per cent. for best, and 10@12 for second grade.

Quicksilver.—The San Francisco *Commercial Herald* says: This year's production, outside of the new Almaden mine, has been very considerable. Up to 1864 there was no competition worth speaking of—now the production otherwise is computed at 2,000 flasks monthly, say in all 4,000@5,000 flasks. In April next the three year contract purchase expires, this fact, taken in connection with the large production outside of the combination, has long had a depressing effect upon the general market, and rendered it difficult for us to give reliable quotations. From present indications prices are likely to rule low for the future. The present jobbing price is, however, 60 cents ₱ lb.

Gold is excited and quite firm at 133¼@133¾.

Petroleum is dull, at 10½c. for Crude, and 23½c. for Refined in bond.

Receipts for the week ending Dec. 31, packages	7,432
Exports for the week, gallons	745 020
" from January, gallons	33,451,778
" same time last year, gallons	33,992 394

THE IRON TRADE

NEW YORK, January 3, 1868.

Domestic.—The Iron market of this week is dull in the fullest sense of the word. The sales of Pig have been in small lots only, amounting in the aggregate to but 250 tons. We hear of sales of 1,000 tons old rails, also in small lots. The market is much depressed, and yields to a decline in prices. The Fall trade has been attended with discouraging results. There has been almost nothing done in Pig, at least none of the confident expectations were realized. The close of the season, however, finds the makers with little or no stock on hand, which would argue that the consumption has been very nearly equal to that of last year. The apparent contradiction of this statement with what we have just before said, is amply explained by the fact that the business done in the Spring was very large, and sufficiently so to offset the shortcomings of the Fall trade.

Foreign.—The depression in the English Iron market is as apparent as in our own. Pigs are declining in demand and price, which fact has greatly tended to produce the present like state of circumstances here. Sellers are shy and not willing to give time.

WEEKLY STATEMENT OF NEW YORK IRON IMPORTS.

The following table shows the quantity and value of iron imports at the New York Custom House, for the week ending and including Dec. 27, 1867:

	QUANTITY.	VALUE.
Iron, Bp., tons	20	724
Iron, Pig, tons	381	5,641
Iron, Railroad bars	6,451	35,263
Iron, Sheet, tons	2	261
Iron tubes	10	754
Iron, other, tons	1,383	52,495
Nails	83	923
Old metal	2	2,942
		99,567

Boston Iron Imports of 1867.

	From Russia.	From Sweden.	From G. Britain.	Coastwise.
Bars	....	168,388	668,667	102,623
" tons	....	12,902	2,150	2,617
Railroad bars	....	....	5,415	258
" tons	....	....	685	122
Bundles	872	....	105,727	82,642
Plates	....	....	3,457	31,217
Scrap, tons	....	....	6,412	6,396
Pig, tons	....	....	39,180	9,114

Comparative Statement of Boston Iron Imports.

The following is a comparative statement of the imports of Iron at Boston for 1865, 1866 and 1867:

	1867.	1866.	1865.
Bars	939 678	1,041,620	442 670
" tons	7,669	14,057	8,045
Railroad bars	5,673	2,553	351
" tons	767	877	966
Bundles	198,241	192,987	79,018
Plates	34,672	66,348	38,099
Scrap, tons	12,808	7,202	3,090
Pig, tons	39,374	36,936	27,623
Boiler, tons	....	....	62

Lehigh Valley Iron Trade.

The following table shows the amount of Pig Iron transported over the Lehigh Valley Railroad for the week ending Dec. 28:

From	Tons.	Total from Oct 5, 1867.
Carbon Iron Co	80	2,885
Lehigh Valley Iron Co	156	1,924
Thomas Iron Co	1,030	10,300
Lehigh Crane Iron Co	150	3,898
Allentown Iron Co	70	5,725
Robert Iron Co	90	2,005
Glendon Iron Co	530	4,865
Other shippers	406	1,473
Total	2,512	30,575

San Francisco Iron Imports from November 16 to December 1.

Iron, Railroad, bars	2,659
" Pig, tons	716
" Bar, bars	4,338
" " bundles	2,683
" Pipe, bundles	652
" " pieces	574

Shipments of Black Band Iron Ore,

Sent over the Mill Creek Railroad, Pa., for the week ending Saturday, December 21, 1867:

Week	194 07
Previously	4,840 04
	5,034 11

Iron Shipments from Liverpool to the United States.

The following are the shipments of iron from the port of Liverpool for the week ending Dec. 14, 1867:

CHAINS AND ANCHORS.—Boston, 2 tons chains; New Orleans, 9 tons chains; New York, 5 tons chains.

IRON, BAR AND BOLT, tons.—Boston, 114; New York, 20; San Francisco, 16; IRON CASTINGS, tons.—Boston, 11.

IRON, HOOP, tons.—Boston, 2; New York, 10.

IRON, NAILS.—New Orleans, 44 bags.

IRON, PIG, tons.—New Orleans, 150; Philadelphia, 100; San Francisco, 101.

IRON, PLATE, tons.—New York, 50; Portland, 9.

IRON, ROD, tons.—Boston, 72; New York, 27.

IRON, SHEET, tons.—Boston, 2; New York, 5; San Francisco, 2.

IRON WIRE, tons.—San Francisco, 15.

STEEL, tons.—Boston, 65; New York, 66.

Market Prices.

NEW YORK, Jan. 3, 1867.

DUTY.—Bars, 1 to 1¼c. per lb.; railroad, 60c. per 100 lbs.; boiler and plate, 1¼c. per lb.; sheet, band, hoop and scroll, 1¼ to 1¾c. per lb.; pig, $9 per ton; polished sheet, 3c. per lb. Payable in gold.

Anthracite, No. 1, best	$39 00@40 00	6 to 12x¾ to 5-8	165 00
" " 2x, fdry, 36	00 38 00	Common Iron	
" Grey Forge, 30	00 36 00	¾ to 2 in. round and sq	95 00
Scotch Pig, from vessel, 35	00 — —	1 to 6 in. wide by ⅜ to 1 th.	95 00
Charcoal, coal blast	50 00 60 00	1 to 6 in. wide x⅛ to 5-16 th.	105 00
Old Wrought sc'p, tin yd. 42	00 45 00	½, 9-16, 5-8, 11 16, r'd & sq.	105 00
" " " fm. vsl.	— — — —	2½ to 3 inches	105 00
English rails, gold	52 50 53 00	Refined Iron.	
American " at works	78 00 80 00	¾ to 2 in. r'd and sq	105 00
Nails and spikes	5 75	1 to 6 in. wide x ⅜ to 1 th.	100 00
Old Railroad Iron	48 00@....	3¼ and 3½, round and sq	115 00
Hoops, ¾ per ton	$190 00	Rods—5-8 and 11-16, round & sq., per ton	105 00
" ¾ "	160 00	½ and 9-16 round & square	110 00
" ⅞ "	150 00	7-16, round and square	120 00
" 1 "	140 00	⅜, " "	125 00
" 1¼ "	137 50	5-16, " "	130 00
" 1½ to 2 per ton	137 50	¼, " "	138 00
Scroll Iron—½x14 per ton	180 00	3-16, " "	165 00
" 12 "	170 00		
" 10 "	160 00	Horse Shoe Iron	127 50
" 3-16 "	150 00	Band—1 to 6 in. x 3-16 to No.	
" ¼ "	140 00	10	132 50
" ⅝x14 "	160 00	1 to 6 in. x No. 11 and 12	132 50
" 12 "	160 00	Ovals and half Rounds.	
" 10 "	150 00	⅜ to 1⅛	127 50
" 3-16 "	140 00	⅝ & 11-16	132 50
" ¼ "	135 00	½ & 9-16	137 50
" ⅞x14 "	150 00	Nail Rods, per lb.	
" 12 "	150 00	"	
" 10 "	140 00	"	9@10¼
" 3-16 "	135 00	Norway Shapes	8½c
" ¼ "	132 50	Spring Steel	10½c
Swed'h I'n, ord'y sizes, ⅞ to 2 in. sq., per ton	155 00	Tire " ⅞ to ½x¼ & 5-16	10½c
1⅛x¾ to ½ and ⅝ in sq	160 00	Toe Cork Steel	10½c
1¼x¾ to ⅝	165 00	Sleigh Shoe Steel	10½c
		Plow Steel—6 to 14x¾ to ⅜	11c

[From Boston Shipping List.]

BOSTON, Jan. 1, 1868

Swedish—common ass'd	$150@155	Scotch Pig, No. 1	
English—com	90 95	Gartsherrie	$42@43
do refined	100 105	No. 1, other brands	40 42
do sheet, per lb	6½@10c.	American, No. 1	40 45
Russia, sheet	15@17c		

PITTSBURGH, Dec. 28, 1867.

Pig-Iron and Bloom Market.—Extreme dullness prevails in the market for crude irons, and from present indications a very meagre business may be anticipated until after the advent of the new year. Receipts of raw irons continue light, and as yet there is no accumulation of the better grades of standard forge descriptions.

In foundry irons the demand is unusually light, and prices depressed. We quote the following sales:

BITUMINOUS COAL SMELTED FROM LAKE SUPERIOR ORE.

250 tons	inferior Forge, deliverable at furnace	$34 00—4 mos.
100 "	Open Gray, from yard	40 00—4 mos.
50 "	Open Gray, from yard	40 00—4 mos.
50 "	Close Gray, medium	39 00—4 mos.
160 "	Mahoning Valley, low grade	88 00—4 mos.
20 "	Mahoning Valley foundry	45 00—cash.

ANEHRACITE.

30 tons	No. 2 Foundry	$44 00—4 mos.
50 "	Red Short	38 00—4 mos.
50 "	Mottled Mill Iron	37 00—4 mos.
40 "	No. 1 Foundry	46 00—cash.

BLOOMS.

30 tons	No. 1 Foundry	$97 00—4 mos.

PIG-IRON RECEIPTS FROM SHENANGO VALLEY.

Per C. Boat Valley, 60 tons	Nimick & Co.
Per C. Boat Luzarne, 60 tons	Nimick & Co.
Per C. Boat McGill, 60 tons	Nimick & Co.

Iron Bars and Nails.—The past week has been an active one in the shipping departments of the iron houses of Pittsburgh. For some three months past there has been a steady accumulation of orders for shipment by river to Louisville, Evansville, Cairo, New Orleans and St. Louis, and it is estimated that over one thousand tons were shipped to these points on Monday and Tuesday of this week. The mills all stopped on Tuesday evening for the Christmas holiday, and with the exception of two of them, will not resume operations until after new year's. Little inquiry is expected for iron bars or nails until after the first of January, but it is then anticipated that there will be a good demand for both nails and iron. There has been no change in prices since our last report.

Steel.—Since our last weekly report there has been no change in prices. The market is generally reported dull.

LONDON, Dec. 21, 1867.

(From the London *Mining Journal*.)

Bars, Welsh in Lond.	£6 10 0@..	To arrive	10 5 0 10 10 0
Ditto to arrive	6 10 0	Do. railway, Wales	£5 0 0@£5 10 0
Nail rods	7 0 0 7 10 0	Do, merch. Tyne or	
" Stafford in Lond.	7 10 0 8 10 0	" Tees	6 10 0 .. ....
Bars	7 10 0 9 10 0	Pig, No. 1, in Clyde	2 13 9 3 1 0
Hoop	8 10 0 9 12 6	Do. t.o.h. Tyne, Tees	2 9 6 .. ....
Sheets, single	9 5 0 10 0 0	Do. Nos 3, 4, f.o.b. do	2 6 6 2 7 0
Fig. No. 1, in Wales	3 15 0 4 5 0	Railway chairs	5 10 0 5 15 0
Refined metal, ditto	4 0 0 5 0 0	" spikes	11 0 0 12 0 0
Bars, common, ditto	5 15 0 6 0 0	Indian Charcoal Pigs	
Do. Swd. in London	10 5 0 10 10 0	in London	7 0 0 7 10 0

STEEL.

Swed., kegs (rolled)	14 5 0	Swed., in faggots	16 .. .. ..
" (hammered	15 5 0 15 10 0	English, spring	17 0 0 23 .. 0

THE COAL TRADE.

NEW YORK, January 3, 1868.

The Coal market, both wholesale and retail, has been extremely quiet during the week just closed. In the former sales have been few and unimportant, while the latter has been somewhat shackled by the amount imprisoned in the canals. Some of the smaller sizes are in fair demand, but the supply is rather short. Stove coal is particularly scarce, with active inquiry. Prices and freights are unchanged.

The fifty-seventh auction sale of Scranton Coal is announced for next Wednesday at the regular place, when 40,000 tons will be sold. The amount is rather small, and will, therefore, probably not affect the market much, whatever may be its result. The strikers at Elizabethport have resumed work on the terms proposed.

The following table shows the quantity of Coal shipped over the principal roads for the week ending December 28, 1867, compared with that shipped the same time last year:

	1866.		1867.		
	WEEK.	TOTAL.	WEEK.	TOTAL.	DECREASE.
Phil. & Reading R.R.	.....	3,425,418	.....	3,101,049	324,369
Schuylkill Canal	.....	1,296,357	.....	1,032,925	263,432
Lehigh Val. R. R	.....	1,730,474	.....	1,948,385	217,911
Lehigh Canal	.....	1,066,302	.....	1,006,603	59,631
Del & Hudson	.....	1,302,894	.....	1,401,120	98,229
Scranton North	5,417	425,961	9,741	502,989	77,028
Scranton South	19,450	1,084,836	7,961	1,205,700	120,864
Penn'a Coal Co. Rail	15,594	510,475	19,337	840,560	322,604
" " Canal	.....	24,909	.....	21,169	3,740
Wyoming North	.....	106,992	.....	82,376	24,616
Wyoming South	.....	461,664	.....	369,099	92,565
Shamokin	.....	552,339	.....	475,718	76,600
Trevorton	755	51,628	415	54,081	.....
Short Mountain	245	111,851	732	86,347	.....
L. V. Co	224	37,611	1,014	75,481	37,870
Broad Top	2,493	265,043	5,079	242,262	22,781
Williamsto'n	.....	67,643	.....	123,109	.....
Total	44,178	12,522,397	44,279	12,569,973	.....
1866	.....	.....	44,178	12,522,397	.....
Increase	.....	.....	101	47,576	.....

The subjoined table exhibits the amount of Coal shipped over the stated roads for the same week of their new year:

	WEEK.	TOTAL.	WEEK.	TOTAL.	INCREASE.
Phil. & Reading R.R.	14 998	99,132	25,497	197,068	97,936
Lehigh Valley R.R.	10,334	42,804	28,524	131,219	88,415
Williamston	.....	.....	.....	.....	.....
Grand Total	25,332	141,936	54,021	328,287	.....
1866	.....	.....	25,332	141 936	.....
Increase	.....	.....	28,689	186 351	.....

The following are the shipments of Lykens Valley Co. up to Dec. 31, 1867:

	WEEK	TOTAL.	WEEK.	TOTAL.	INCREASE.
Lykens Valley Co	35	37,647	624	76,105	38,458

Lehigh Coal Trade.

SHIPPED FOR THE WEEK ENDING DECEMBER 28, 1867.

SHIPPERS.	CANAL. Week. Tons.	CANAL. Total. Tons.	RAILROAD. Week Tons.	RAILROAD. Total Tons.
FROM MAUCH CHUNK.				
Lehigh Coal & Navigation Co	....	....	....	....
Summit Mines	....	....	....	....
Room Run Mines	....	....	....	....
John Lanbach & Co	....	....	....	....
Other Shippers	....	....	....	....
Total	....	....	....	....
FROM S. M. REGION.				
John Connery	....	....	....	....
W. T. Carter & Co. (Coleraine)	....	....	724	2,656
Spring Mountain Coal Co	....	....	867	5,469
Thomas Iluil & Co. (N. Y. & Lehigh Co)	....	....	208	3,983
Honey Brook Coal Co	....	....	1,135	7,373
German Peunsylvania Coal Co	....	....	606	2,806
Beaver Meadow (D. W.)	....	....	....	....
Other Shippers	....	....	....	25
Total	....	....	2,532	22,313

FROM MAHANOY REGION.				
McNeal Coal and Iron Co	....	....	302	2,113
Knickerbocker Anthr. Coal Co.	....	....	607	3,485
North Mahany Mines (Mahanoy Col. now B. & C.)	....	....	52	1,256
Delano do	....	....	....	....
Primrose Mines (Rathbun, Stearns & Co.)	....	....	....	550
Walter, Brothers & Co. (now Bedford & Cox)	....	....	....	....
Mount Etna Coal Co.	....	....	101	235
Trenton Coal Co.	....	....	....	....
Glendon Coal Co. (Glendon Colliery)	....	....	331	1,172
Thomas Coal Co.	....	....	274	2,147
Williams & Herring	....	....	77	600
E. S Silliman	....	....	2,007	7,664
East Boston	....	....	....	....
New Boston Coal Co.	....	....	813	3,394
Shamokin Coal Co	....	....	....	....
Caledonia M. & M.	....	....	351	954
Other Shippers	....	....	....	15
Total	....	....	4,919	23,591
FROM HAZLETON REGION.				
A. Pardee & Co. (Hazleton)	....	....	3,892	11,618
G. B. Markle & Co. (Jeddo)	....	....	1,662	8,510
Wm. S. Haisey & Co. (Mt. Pleasant)	....	....	231	1,400
Buck Mountain Coal Co.	....	....	....	3,444
Sharpe, Weiss & Co. (Council Ridge)	....	....	1,490	4,419
Coxe, Brothers & Co. (Cross Creek)	....	....	553	2,129
Ebervale Coal Co	....	....	1,858	6,868
Stout Coal Co.	....	....	708	3,105
Harleigh Coal Co.	....	....	855	3,988
Ashburton Coal Co	....	....	....	....
East Sugar Loaf	....	....	1,899	8,559
Upper Lehigh C. Co.	....	....	1,773	3,944
Highland	....	....	1 203	4,570
Mount Hill	....	....	....	219
Woodside	....	....	353	679
Latimer	....	....	451	1,694
Other Shippers	....	....	....	....
Total	....	....	15,162	66,590
FROM WYOMING REGION.				
Newport Coal Co.	....	....	....	....
Warrior Run Mining Co.	....	....	463	738
Parish & Thomas	....	....	806	2,533
New Jersey Coal Co.	....	....	125	976
Lehigh & Susquehanna Coal Co.	....	....	....	....
Germania Coal Co.	....	....	119	474
Franklin Coal Co	....	....	....	....
Audenried Impr'v't & Coal Co.	....	....	...	40
Valley Coal Co.	....	....	....	....
Wilkes Barre Coal and Iron Co.	....	....	699	2,699
Baltimore Coal Co.	....	....	....	....
Union Coal Co	....	....	....	242
Wyoming Coal & Transp'n Co.	....	....	135	571
Everhart Coal Co	....	....	....	....
Morris & Essex Mutual	....	....	37	514
H. B. Hillman & Co	....	....	197	790
Bowkley, Price & Co.	....	....	73	98
T F. Hunt & Co	....	....	....	....
G. B. Linderman	....	....	....	....
Harvey & Bro.	....	....	....	168
John Horton	....	....	....	....
Mineral Springs	....	....	169	901
Consumers	....	....	83	83
Plymouth Coal Co.	....	....	....	152
Enterprise Colliery, J. H. Swoyer	....	....	451	1,729
Washington Coal Co.	....	....	....	....
West Pittston	....	....	....	....
Shawnee	....	....	....	....
Other Shippers	....	....	....	260
Total	....	....	3,366	13.334
Grand Total	....	....	28.524	131,219
Total 1866	....	....	10,334	42,804
Decrease	....	....	....	....
Increase	....	....	18,189	88,414

Schuylkill Coal Trade.

BY RAILROAD & CANAL, FOR WEEK ENDING JAN. 2, 1868.

	Railroad.	Canal.
St. Clair	17 907	.....
Port Carbon	2 339	.....
Pottsville	255	.....
Schuylkill Haven	2 431	.....
Auburn	502	.....
Port Clinton	2,063	.....
Total for week	25,497	.....
Previously this year	171 571	.....
Total	197,068	.....

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

At New York, January 4, 1868.

Schuylkill R. A., choice	$5 75@$6 00		Lehigh Broken	5 25	....
" Ordinary	5 25	5 50	" Egg	5 25	....
" W. A., Lump	5 25	5 50	" Stove	6 80	....
" Steamboat	....	5 25	" Chestnut	4 20	...
" Broken	....	....	Wilkesbarre Lump	5 25	....
" Egg	....	....	" B'ken & Egg.	5 25	....
" Stove	5 70	5 75	" Stove	5 50	....
" Chestnut	4 00	4 25	" Chestnut	4 75	....
Lehigh White Ash Lump.	5 37	...			

SPECIAL COALS.—DEALERS' QUOTATIONS.

Diam'd Vein R. A., Seh'kill	....	....	H. Heils, E. S'kln, Lorb.	5 50	....
Locust Dale W. A., "	....	....	New England Red Ash	$5 25	....
Honey Brook " Lehigh.	5 50	....	Broad Mountain	5 25	....
Harleigh " "	5 50	....	Wyoming	5 00	....
Spring M'n " "	5 50	....	McNeal Co	5 50	....
Sugar Creek " "	5 50	....	Locust Mount'n (Repplier)	550	....
Ashburton " "	5 50	....	Duncan Red Ash "	6 00	....
Fulton White Ash	5 50	....	W'harro Coal & Iron Co.	5 25	....
Stout	5 50	....	New Burgh Orrell Gas Coal	9 00	....
Old Co.'s " "	5 50	....	Despard Gas Coal	9 00	....
Buck Ridge W. A., Sh'kin.	5 00	....			

Dealers in these Coals may be found in our advertising columns.

At Philadelphia, January 4, 1868.

Lehigh Lump and St'mb't.	$5 00@....		Schuylkill Chestnut	2 75	....
" Broken and Egg	5 00	....	Locust Mount Lump and Steamboat	4 25	....
" Stove	5 00	....	" Broken	4 25	....
" Chestnut	3 75	.	" Prepared	4 25	....
Schuylkill R. A. Prepared.	4 25	4 50	" Chestnut	2 87	....
" Chestnut	2 75	....	Lorberry Coal	4 25	....
" W. A. Lump and Steamboat	4 25	....	Shamokin	4 75	....
" Broken	4 25	....	Franklin, (Lykens Valley)	4 75	....
" Egg and Stove	4 25	....	Broad Top	4 75	....

Scranton Coal at Elizabethport, January 4, 1868.

(Corrected weekly by D. L. & W. R. R. Co.)

Lump	$4 25@....		Egg	5 00	....
Steamer	4 50	....	Stove	5 50	....
Grate	4 75	....	Chestnut	4 40	....

Prices for Pittston Coal at New York, January 4, 1868.

(Corrected weekly by Penna. Coal Co.)

Lump, per ton of 2240 lbs.	$5 40@....		Egg " " "	5 40	....
Steamer, " " "	5 40	....	Stove " " "	5 60	....
Grate " " "	5 40	....	Chestnut " " "	4 90	....

Lackawanna at New York, January 4, 1868.

Lump	$5 50@....	Grate	5 75@....
Steamer	5 50@....		

Lehigh Coal at Elizabethport, January 4, 1868.

Lump	5 50@....	Chestnut	4 50	....
Steamboat and Brokenc	5 25	....	Stove	5 50	....
Egg	5 25	....			

At Baltimore, January 4, 1868.

Wilkesbarre & Pittston W. A. by cargo or car	$5 50@5 75	From wharf or yard, 75c. to $1 per ton additional.
Lykens Valley R. A. by cargo or car	5 75@ 6 25	Retail, del'd, per 2,240 lbs	7 00@7 75
Sunbury & Shamokin R. or W. A. by cargo	5 50 5 75	George's C'k and Cumberland f. o. b. at Locust P't for shipping	4 85@5 00

At Havre de Grace, Md.

Wilkesbarre or Pittston, W. A., on board	$4 85@5 10	Sunbury or Shamokin, R. or W. A., on board	....@5 25
		Lykens V'y. R. A. on b'd.	5 60@5 85

The above rates are only nominal. Shipping at this port is suspended for the season.

At Georgetown, D. C.

George's Creek and Cumberland on board ..... $4 25@ 4 50

Wilkesbarre Coal at Elizabethport, January 4, 1868.

(Corrected by Wilkesbarre Coal & Iron Co.)

Lump	$4 50	....	Egg	5 00	....
Steamer	4 50	....	Stove	5 25	....
Broken	4 75	....	Chestnut	4 50	....

Ten cents additional on shipments from Jersey City.

Prices of Provincial Coals.

[CORRECTED WEEKLY BY LOUIS J. BELLONI, JR., 43 PINE STREET.]

Duty $1.25 per ton.

Block House (on board)	$2 00	gold	Little Glace Bay	1 87½	"
Gowrie "	1 75	"	International Co's	1 75	"
Lingan "	1 75	"	Slack Coal, B. H.,	75	"
Sydney "	2 25	"	" L. G. B.,	1 00	"
Pictou "	2 25	"			

Prices of Foreign Coals.

Duty $1.25 per ton.

Corrected weekly by PARMELEE BROS., 32 Pine Street, N. Y.

Liverpool Gas Caking	$11 00	Liverpool House Cannel	—@20 00
" " Cannel	14 00	" " Orrel	16 00@18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverpool Orrel, screened	$18@20	Liverpool Caunel, scr'd	22 00@— —

per ton 2000 lbs. delivered.

Coal Freights.

(Corrected Weekly.)

From Baltimore.

To Philadelphia	$1 40@— —	Boston	2 25@ 2 50
New York	2 10 — —	Sound Ports	2 25@ 2 50
Washington	1 10 — —	Norfolk	1 00@— —
Annapolis	75 — —	Richmond	1 30@— —

From Elizabethport.

Albany	$ 90@— —	New London	1 25@— —
Boston	1 90	2 00	Newport	1 40 — —
Bridgeport	1 00 — —	New York	55	60
Fall River	1 40 — —	Norwalk	1 00 — —
Hartford	1 50 — —	Norwich	1 30 — —
Hudson	1 00 — —	Pawtucket and towing	1 50 — —
Lynn	— — —	Portland	1 60 — —
Middletown	1 25 — —	Portsmouth	2 15 — —
New Bedford	1 45 — —	Providence	1 50 — —
Newburyport	2 00 — —	Salem	1 80 — —
New Haven	1 15 — —	Taunton	1 40 — —

From Washington, N. J.

Hackettstown	$ 58	Iron Dale	$ 1 19
Waterloo	81	Dover	1 24
Stanhope	90	Paterson	1 80
Port Morris	99	Pompton	80
Rockaway	1 32	Bloomfield	1 60
Denville	1 33	Newark	2 00
Boonton	1 44	Belleville	2 10
Little Falls	1 70	Communipaw	2 10
Drakesville	1 08	Jersey City	2 20
Dickerson's Basin	1 11	New York	2 20

From Georgetown or Alexandria.

To Philadelphia	$1 50 — —	Boston	2 75	2 50
New York	2 15 — —	Sound Ports	2 25	2 50

Provincial Freights.

	Currency.
Sydney to N. Y.	$2 75
Sydney to Boston	2 75
Lingan	3 50
Lingan to Boston	3 00
Cow Bay	2 75
Cow Bay to Boston	2 75
Cow Bay to Portland	2 50
Big Glace Bay	3 87
Little "	2 50

Foreign Freights.

New Castle and Ports on Tyne	£17 keel.
Liverpool	12 6@15s. ton

Rates of Transportation to Tide Water, June 1, 1867.

PHILADELPHIA & READING RAILROAD.

From Pottsville to Philadelphia	$2 17
" " Port Richmond	2 07
" " New York, drawback off	2 80

SCHUYLKILL NAVIGATION.

From Pottsville to Philadelphia	2 08
" " New York, drawback off	2 88

Wyoming Valley Canal.

	Tolls.	Freights.
From Wilkesbarre to Havre de Grace	97c.	$1 55
" " Columbia	69	1 20
" " Middletown	67	1 10
" " Harrisburg	65½	1 05

OTHER AVENUES.

From Mauch Chunk to Philadelphia, Canal, including unloading	1 88
" " Philadelphia, via North Penna Railroad	2 00
" " Elizabethport, via N. J. Central Railroad	2 03
" " Port Johnson	2 10
" " New York	2 47
" " New York via Del. Div. and Raritan Canal, including unloading	2 67
" " New York via Morris Canal	2 39
" " Hoboken via Morris & Essex Railroad	2 10
" " New York	2 20

From Elizabethport to Buffalo, via New York Canal, a distance of about 455 miles—freight, $2 62, toll 78 cents 3 40

The shipping expenses at Elizabethport and Port Johnson vary from 25 to 30 cents.

BOSTON STOCK MARKET.

BOSTON, December 20, 1867.

Copper Falls	15	Huron	—
Allouez	2½	Boston Water Power	20
Calumet	—	Isle Royal	—
Hecla	—	Minnesota	—
Canada	—	Quincy	13
Franklin	—	Cary Improvement	7⅛
Hancock	4¾	Rockland	—

Sales at Boston Stock Exchange, January 2.

15	shares	Bates M. Co.	100	150	shares	Hancock	4⅞
100	do.	Water Power	b.20 20¼	200	do	Humboldt	68
2 0	do.	do	20	50	do	Powable	4½
50	do.	do.	b.60 20¾	100	do	do.	4¾
50	do.	Cary Imp	7½	30	do.	do.	4⅛
		SECOND CALL.		1709	do.	Ophir G	1 40
5	shares	Hancock	4¾	1000	do.	do.	b.60.1 45⅞
150	do.	do.	5	50	do.	Water Power	19

SAN FRANCISCO STOCK MARKET.

A telegram from San Francisco, dated the 28th ult., to Messrs. LEES & WALLER, Bankers, 33 Pine street, this city, quotes Nevada silver and other stocks as follows:

Stocks.	Bid per ft.	Stocks.	Bid per ft.
Gould & Curry	345	Belcher	135
Savage	2,340	Imperial (per share)	165
Chollar Potosi	125	Alpha	450
Ophir	60	Kentuck	245
Hale & Norcross	1,175	Cal. Steam Navigation Co.	80½
Crown Point	700	Cal. State Telegraph Co.	31
Yellow Jacket	765	Greenbacks	75

Monthly Metal Circular.

NEW YORK, December 31st, 1867.

I refer to my last Circular of the 2d inst. December has been another dull month and thus closes a year which has proved a most disastrous one to the commerce of the whole world. It is unnecessary to allude to the causes of the great depression which prevails here in all branches of trade; they begin to be well understood by the people, but it seems doubtful whether their representatives in Congress will apply the proper remedies.

There has been nothing done in Congress in regard to the financial measures, but the temper seems to be against contraction of the currency, and the Secretary of the Treasury has stopped it. Many think that this will occasion an improvement after New Year.

GOLD.—The lowest point was 132 per cent. in January, the highest 140¾ per cent. in September. During this month it declined from 136½ per cent. to 133 per cent.

Yesterday it was quoted 133¼ per cent.

Exchange on London, 10½ per cent.

TIN—Is quiet without wholesale business. Straits is quoted 24½ c. Banca, 26 c. English, 23½. Gold,

The price advanced from 21¾c. for Straits on the 2d of January to 26c. in September; declined again to 23c. in November, and has since gradually risen. The stocks are small both in first and dealers' hands. From the East Indies 23,000 slabs are on the way, one-half of which are overdue.

The position of the article is a very favorable one, for the advices received during the summer of a decrease in the supply from the East Indies are fully confirmed. The shipments from Java for the first nine months of this year show a falling off of 37,000 slabs.

The imports of 1867 at Boston and New York amount to 5,100 slabs Banca, against 15,000 in 1866, 10,750 in 1865, 6,200 in 1864; 34,200 slabs Straits, against 70,000 in 1866, 42,800 in 1865, 11,590; 710 tons equal to 21,300 slabs English, against 750 tons in 1866, 900 in 1865, 609 in 1864. Total 60,600 slabs.

Against 107,500 slabs in 1866.			71,200 slabs in 1862.		
80,550	"	1865.	40,900	"	1861.
35,700	"	1864.	72,800	"	1860.
45,000	"	1863.			

To-day's stock are estimated at ..... 5,500 slabs Straits.
1,200 " Banca.
40 tons equal to ..... 1,200 " English.

Total in Boston and New York ..... 7,900 slabs.

Against 30,600 slabs on the 31st Dec.,		1866		37,400	1862
19,700	"	"	1865	21,300	1861
11,490	"	"	1864	29,500	1860
24,950	"	"	1863		

To the stocks of January 1st, 1867 ..... 30,600 slabs.
I add the import of ..... 60,000 "
91,200 slabs.
and deduct export to London 6,200
and to-day's stock of ..... 7,900 14,100 "
and estimate the deliveries for consumption this year at ..... 77,100 "

Against 84,669 slabs in 1866			55,100 slabs in 1862		
72,340	"	1865	47,300	"	1861
49,160	"	1864	63,000	"	1860
57,450	"	1863			

The London market gave way a little in the middle of December and Straits was quoted 89s. stg.

SPELTER has scarcely varied ¼ cent during the whole year. In January Silesian was quoted 6¾c. gold; from May to July 6¾c.; and since then it has been steady at 6¼c., without important transactions. The domestic article supplies a certain class of trade, and the consumption of foreign has materially decreased.

Imports for the year	1,950 tons; against	4,375 tons in 1866.	
		2,400 "	1865.
		3,400 "	1864.
The stock is	700 tons; against	1,300 "	1866.
		350 "	1865.
		1,000 "	1864.

The deliveries for consumption have been 2,550 tons, against 3,400 tons in 1866, and 3,000 tons the average of former years.

COPPER has further declined to 20¾@22c. for Baltimore, 21c. for Detroit, and 21¼c. for Portage Lake.

On the 1st of January, Baltimore was quoted 26c.; it fell to 23¼c. in June; during the summer it advanced again to the figure of January, but since October it has steadily fallen. Large purchases for investment were made in June and July, both here and in England, under the impression that the production would be effected by the low prices, but the effect of any decrease has been neutralized by the dullness of trade and the London quotation of the middle of December; £77 10s. for best selected is lower than the price of June last.

With the present rate of gold 20¾c. for Baltimore is equal to 15½c. gold; the lowest price known before this year was 17¾c. gold in 1861—the highest 30c. in 1857, and 23c. was considered an average price.

The following are the estimates of the yield of the Lake Superior Mines since 1856, viz:

In 1856	4,008 Tons.	In 1860	6,500 Tons.	In 1864	6,500 Tons.
1857	4,031 "	1861	7,500 "	1865	6,500 "
1858	4,127 "	1862	7,500 "	1866	7,000 "
1859	4,070 "	1863	7,000 "		(2,000 lbs.)

The product of 1867 will, after all, be equal to 1866.

Several mines have stopped work, but others show a better yield. The total is estimated at 14,000,000 lbs. ingot copper, of which 10,500,000 have come East, and 3,500,000 were used in the West. The Atlantic smelters have made less than in former years. Both consumption and production have fallen off three to four million lbs. against 1866. The consumption may be put down at 18,000,000 to 19,000,000, against 22,000,000 in 1866, and 25,000,000 in previous years. The supply for 1867 has probably been in all 21,000,000 against 24,000,000 in 1866, and the stock is estimated at 10,000,000 against 9,000,000 last December. It is impossible to say what influence the present low price will have on the production of next year.

We have had no importations of ingot copper, but have exported 600 tons, mostly Minnesota, to France and Germany. The stock of this brand is reduced to a mere trifle.

LEAD is quoted at 6½c. gold for ordinary foreign. On the 2d of January the price was 6¼c. gold; in March it declined to 6½c., and this has been the quotation ever since, although occasional sales have been made a fraction higher or lower.

Since the introduction of the Atlantic Cable manufacturers possess increased facilities for giving direct orders, and the sales in the open market have become less important.

The imports for the year amounted to 23,800 tons.

Against 27,150 tons in 1866.		36,200 tons in 1862.	
13,600	" 1865.	5,700	" 1861.
27,900	" 1864.	21,900	" 1860.
12,600	" 1863.		

Of the above 10,600 tons were German lead, 4,150 tons English, 6,500 tons Spanish, and 2,550 French.

The stocks are estimated at 3,800 tons.

Against 2,000 tons on the 31st Dec.,	1866.	5,100 tons on the 31st Dec.,	1862.
1,000	" "	1862.	1,500 " "	1861.
5,100	" "	1864.	5 600 " "	1860.
none		1863.		

And the deliveries for consumption at 22,000 tons

Against 26,150 tons in 1866.		35,850 tons in 1862.	
18,500	" 1865.	15,000	" 1861.
24.600	" 1864.	21,000	" 1860.
29,200	" 1863.		

RUDOLPH C. WINTERHOFF, 66 Beaver street.

London Copper Trade Circular.

Messrs. Vivian, Younger and Bond (Dec. 13) write:—Since our last, about 1,500 tons of Chili bar copper has been taken off the market, 800 tons of which were sold last week, but the price was not allowed to transpire at the time. The price was £69 at Swansea. Later 700 tons in all have been sold, at £70 for favorite brands, spot and to arrive, and £69 for Lots in Liverpool. A cargo of regulus has been placed at 14s. At Swansea a cargo of Cobre ore fetched 14s. 3d. per unit. Transactions in English raw have been very restricted, and at low rates. Nothing doing in fine foreign.

London Weekly Metal Report.

LONDON, Dec. 13, 1867.

The Metal Market continues without improvement, and those who have orders to execute can generally obtain a concession upon the quoted prices.

IRON.—Welsh bars have been offered at £5 10s. for very good make in Wales. Rails are steady. Staffordshire iron, at the lowest prices more buyers have come forward, and the market is steady. Scotch pigs have fallen to 52s. 9d. cash sellers.

COPPER.—The market is without change. In Chili a large business has been doing at £69 to £70. English remains dull. India sheets at £78 to £79. Tough, nominally £75 to £76.

TIN is a trifle weaker, a parcel of about 100 tons Straits being reported on the way back from America, but the export business continues good, and the consumptive demand fair. We quote Straits £89 to £89 10s. Banca, £93. English tin steady. In Holland the price keeps stiff at 54½.

TIN PLATES without change; prices still in buyers' favor.

LEAD is very dull; £19 for good English pigs; L. B. £19 10s.

SPELTER flat. Silesian has declined to £20 12s 6d. for London delivery. Specials Outports, quite nominal, $71 to £2t 5s.; V. and S. £20 5s.; Belgian, £20.

☞ A new process for the manufacture of carbonate of soda is given to us in a French patent by M. Kessler; whether patented in England we do not know. The inventor starts with common salt, which he mixes intimately with sesquioxide of chromium, either alone or with oxide of manganese. Chromate of iron or chromate of lead may also be used, and probably a good chrome iron ore would answer the purpose. The ingredients above named are placed in a furnace and heated to about redness in a current of steam. When the evolution of hydrochloric acid ceases, the charge is withdrawn and mixed with a proper proportion of coal. It is now reburned without steam, and thus the chromate of soda is transformed into carbonate with the reproduction of sesquioxide of chromium. The carbonate of soda is separated by lixiviation. The sesquioxide of chromium is reserved for future operations, and may be used for an indefinite time. This looks like a practicable process, and may be worthy the attention of alkali manufacturers.

☞ Years ago, when the project of a route to the West through the Hoosac Mountain was first started, the Rev. Thomas Whittemore, President of the Vermont and Massachusetts Railroad, was in the Western part of the State, and an enthusiastic tunnel man was urging the importance and feasibility of the enterprise. "Why," said he, "look at the route. It seems as if the finger of Providence has pointed it out." "What a pity," said the old minister, "the finger hadn't been run through the mountain!"

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Mr. T. P. PEMBERTON is editor of the Mechanical Department and agent for the AMERICAN JOURNAL OF MINING.

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☞ The American JOURNAL OF MINING has a larger circulation than any other paper of the kind in the United States.

NEW YORK, SATURDAY, JANUARY 4.

CONTENTS OF THIS NUMBER.

THE NATIONAL SCHOOL OF MINES—III.

We give, this week, a review of the year's operations in the the most important branches of mining enterprise in this country, and enumerate, by way of introduction, the causes which have brought about the striking decline in the yield of gold and silver. We have already based upon this state of things an argument in favor of a National School of Mines. But we are met with the objection, that this decrease is not a matter of national loss. It is individuals, we are told, who lose, and the nation is no more called upon to interfere, than in case of depression in any other branch of business. In answer to this, we desire to look a little more closely into the distinction between individual and national loss, and determine what is the nature of the national interest in the matter we are considering.

That there is a distinction, no one will deny. Individuals and whole classes may be enriched by events which impoverish the nation; and the nation may reap lasting benefit and wealth from enterprises which ruin their projectors. An instance of the first class is furnished by the war, which has created many private fortunes, while it has left the country poorer by the destruction of thousands of millions of dollars in property, the accumulation of an equal amount of debt, and the waste of double both these items in the labor of a million and a half of men, either withdrawn for a time from useful fields, or utterly destroyed by untimely death. No "shoddy" prosperity can hide the commercial results of such fearful loss. In vain we flaunt the silks and laces of our fancied wealth; the naked elbows of our poverty peep through. The load we carry is lead, no matter how much we try to believe that it is feathers. On the other hand, an instance of national gain from individual loss and ruin is furnished by the history of almost all the railway enterprises, which have been like the veins of life-blood in our new States, diffusing vigor and healthful growth over the land, multiplying production, simplifying exchange, augmenting wealth, and yet, in general, not remunerating their owners, nor paying the interest on their bonds, until after long experience of bankruptcy or desperate financiering.

It is evident, then, that individual and national losses are not necessarily the same. If a man fails in business, it is an individual or relative loss only. If his house burns down, it is an absolute, and therefore a national loss, though the house may be insured for thrice its value, and the owner may get rich by its destruction.

In the particular case before us, we do not think as much money has been lost by individuals, during the past year, in gold and silver mining as during the year before. There has been a diminution of about ten per cent. in production, and at least fifty per cent. in new capital invested; the actual operations of 1867 have been, on the whole more profitable to individuals than those of 1866. Mining is fast becoming a business, and, as such, will regulate itself according to the laws of self-interest. People who are not making money will stop; only the best mines will be worked, and those only in such parts and for such periods as will secure quick and large dividends. The mines of the country will be "robbed," and individuals will be enriched, while posterity, looking for the sources of continued supply, will find exhausted diggings, abandoned shafts, and heaps of "tailings." Who can fail to see that the immediate gain of the miner may thus be won at the price of great national loss?

A word or two as to "tailings." It is a favorite apothegm with many of our theorists that the refuse of to-day will be precious to-morrow; and there seems to be a general impression that it is no matter how rudely we mine, or how wastefully we treat our metallic ores, if we save the tailings for our successors to work over with greater skill and economy. Even this degree of prudence is not too common, and we would not extinguish the faintest spark of intelligence in mining operations. We do not, therefore, discourage the saving of tailings; but we must point out that such a measure makes but shabby amends for careless working in the first place. The greater part of the precious metals in our tailings will never be recovered. Suppose the mining and reduction of a given ore costs ten dollars per ton, and ten dollars per ton is unnecessarily lost in the operation: individuals may buy, concentrate and utilize the tailings, just as ragmen collect and make use of rags; but the original loss is not retrieved, any more than would be that of an unskillful tailor, who should waste half his cloth by bad cutting, and then sell the fragments to the ragman. Even more hopeless, if possible, is the case presented by irregular and reckless mining. The best mines can be irretrievably ruined by bad engineering. Millions of pounds have been spent in Mexico by English companies, in the vain attempt to free old mines from water, so as to render accessible the riches they were known to contain.

Herein lies a great difference between mining and agriculture. Errors in farming are not fatal. The mistakes of one year may be corrected in the next; and even soils, exhausted by years of wasteful culture, may be restored with wonderful rapidity by intelligent treatment: but the blunders of ignorance in mining and metallurgy have an element of the irretrievable in them.

But will not individual enterprise correct this evil? To this we have already answered, first, that it has not yet done so; and second, that we cannot afford to wait for so slow a process of reform, nor pay its frightful cost. The very extent of our mining territory is a fatal inducement to avoid, rather than to grapple with, the growing difficulties of the work. It is so much easier for ignorant men to try their luck on virgin ground than to learn how to exploit the ground already open, that, in the absence of an organized effort to enlighten the people on this subject, we may expect to see our vast mining fields overrun and pillaged, before their earnest and systematic development is undertaken. The praiseworthy efforts of single engineers to stem the tide, are almost insignificant, in comparison with the general tendency. One might as well expect the Indian to commence scientific stock-raising, while the prairie swarms with buffalo. He cuts out the hump and the tongue, throws away carcass and hide, and laughs at your notions of economy and industry. A despotic government would stop all this waste by arbitrary measures; a democratic government must stop it by teaching the people better. But we will not wrong our citizens of any class, by intimating that they need to be forced, either morally or physically, to reform. All they want is *a chance to learn*.

But will not local or State schools do this work as well as a National Free School?

This is a fair question, and shall be fairly discussed in another article. Several other points will then remain to be considered, among which we may mention the questions: How far is the proposed National School of Mines a "government interference?" What will it accomplish, and how, and how soon? Is the plan of organization contained in Senator STEWART'S bill the best that could be adopted? Is the location (so far as the bill fixes it) well chosen?

Our readers will see that they are likely to get a pretty thorough exposition of our views. The only apology we can offer for such prolixity is our deep conviction of the importance of the subject, and the necessity of facing it *now*.

COLORADO ORES—THE TERRACE FURNACE.

(CONTINUED.)

About a year ago, a Terrace Furnace was erected in Colorado, at the works of Mr. LYON, by Mr. A. WOLTERS, of Central City—a young metallurgist of skill and experience. The furnace was run for three days, with highly satisfactory results, in spite of a defective feeding-apparatus. The feed-rollers were turned by hand, instead of being connected with the machinery of the works, or moved by the power of the neighboring creek; and the wages of a laborer, at $4 for twelve hours, raised the running expenses to a high point. Since, moreover, the single Terrace Furnace was not adequate to the capacity of the smelting furnace, it was not attempted to run it regularly; and it has stood idle ever since, giving the false impression to the public that the experiment was a failure. This no one could believe who is aware of the rapid and successful introduction of the apparatus in Europe; and Prof. HILL'S Terrace Furnaces will doubtless soon dispel the error in Colorado.

In the construction of the first furnace in Colorado, it was found impossible to procure strong shelves or terraces of fire-clay, made in one piece. Mr. WOLTERS, therefore, caused them to be made in three pieces, and in the form of very flat arches, rising only an inch and a half in the centre from the horizontal line. He claims for this method the advantages, that the shelves are cheaper and more durable, that in two hours after being laid, while the mortar is yet damp, they will bear the weight of a man, and that they are not liable to "spring"—an evil to which the ordinary terraces are especially exposed, even when the clay is of superior quality, and the greatest care is used in heating the furnace. On the other hand, the solid terraces can be more easily put in place, since they do not need to be mortared into the walls; and they can be removed, when damaged or broken, without injury to the furnace. These reasons have influenced Prof HILL to prefer them; and he does not apprehend insurmountable difficulty in securing the necessary strength and durability. It may be added, that this construction is the one used in England and Germany.

Once in operation, as we have said, the furnace requires very little attendance. The regular feeding (which should be done by steam or water-power), the removal of the roasted product from below, and a periodical removal of the material which may "cake" on the shelves, with a general supervision of the process, are all that is necessary. Of course, skill and care are necessary in determining for each new material roasted the proper rapidity of feeding and amount of draught,—conditions upon which depends the temperature and the completeness of the process. Two workmen can, however, easily perform all the offices of attending four or five furnaces.

In the front wall, just over the end of every terrace, is an opening, six inches high and two inches wide, closed on the outside with an iron plate, in the centre of which is a round hole one inch in diameter. This hole is on a line with the crest of the ore, accumulated on the terrace. These apertures serve a double purpose. Through them, the air is admitted for the oxidation of the sulphur; and the amount of air can be easily and exactly regulated by opening a greater or less number of the holes, which are otherwise stopped with clay. Through them, also, the workman can observe the condition of the ore on every terrace; and, when an accidental excess of temperature has caused sintering to commence, he can at once remove, with a simple implement, the adhering material.

The furnace is of course heated, at the commencement of a campaign, with fuel, which is placed upon a temporary grate at the bottom. After careful warming, the firing is continued until a white heat has been kept up for at least twenty-four hours. Feeding then commences, and the fire is continued until the fourth series of terraces from the bottom begins to fill with ore. At this point the grate and fuel are removed, the sole cleared of ashes, and the openings used for the introduction and removal of the apparatus for firing closed with brick and mortar. The furnace is now in operation, and will continue, as long as it is supplied with ore, without further addition of fuel, or interruption of the process. Two years is not an uncommon campaign.

The cost of construction of a terrace furnace is $1,100 to $1,200, and the cost of desulphurization by its use is about $1 per ton, exclusive of a royalty to the patentees of 50 cents. The cheapness of this method, in a region so oppressed with high prices, may seem incredible; but it is explained by the fact that the two great elements of expense, fuel and labor, are reduced to a minimum,—their work being mostly performed by the sulphur of the ore, which costs nothing, and its free fall in space, which is as simple a motive power as could well be devised, and far less expensive than the men with pokers, who hang about the doors of reverberatories.

Professional metallurgists will not ask a more striking endorsement of the terrace furnace than is furnished by the fact of its successful employment in Mansfeld, Prussia, for the roasting of concentrated copper malt for the ZIERVOGEL silver-extraction—a roasting which is acknowledged to be one of the most difficult and subtle of metallurgical operations.

MORITZ GERSTENHOFER, of Freiberg, Saxony, was the first to invent and introduce this excellent apparatus in Europe, though American patentees have claimed equal antiquity for their discovery of the same principle. As all the parties have combined their interests, there is no possibility of dispute on this subject; and certainly the palm of success in the practical introduction of the furnace must be awarded to GERSTENHOFER, whose rights for the United States, together with those of STETEFELDT and PARTZ, are owned by the American Metallurgical Co., of New York.

The progress of the art of metallurgy has been slow, but sure. As the steam-engine has scarcely received an essential improvement since it came forth perfected from the brain of Watt, so the furnace of the smelter has remained for centuries

almost as it was in the days of Agricola. Were we called upon to name the most radical improvements of modern times in the department of metallurgy, we should include the BESSEMER process, the improvements of RASCHETTE and LURMANN in blast furnaces, the introduction of gas-furnaces, and the upright terrace furnace. These are what the Germans call "epoch-making" discoveries.

INTERNATIONAL COINAGE.

In another column will be found an article from the New York *Evening Post*, strenuously opposing the change in our gold coinage recommended by Mr. SAMUEL B. RUGGLES, late delegate from the United States to the International Monetary Conference at Paris. The view taken by the *Post* substantially agrees with the drift of the discussion of this important topic, at the Burlington meeting of the American Association, last August, and with the opinions which we ourselves entertain, in view of all the complicated relations of the proposed innovation. The Association was so impressed with the importance of the question, and so fearful, lest Congress might be betrayed into hasty legislation concerning it, that a resolution was passed, at the close of the Burlington meeting, reiterating the former declarations of the Association in favor of the metrical system, *but* solemnly protesting against any rash disturbance of the present relations of our gold and silver coinage, by altering materially the present American gold dollar.

The *but*, which we italicise above, is not in the remotest degree logical, and must be considered a mere concession to a certain vague popular impression that the new international coinage is in some way connected with the metrical system of weights and measures. It would have been far nearer the truth to say, "We protest against the new, Gallicized gold dollar, *because* we are in favor of the metrical system." For in point of fact, the French gold coinage, to which we are asked to assimilate our own, is as far from being "metrical," *i.e.*, commensurable in weight with the unit of the metrical system, as it could easily be. The weight of the French twenty-franc piece is 6451.6 milligrames; and the weight of the proposed dollar, corresponding to one-fourth of twenty francs, would be 1612.9. No less sum than $16129.00 could be integrally expressed, under this system, by metrical weights. Our present dollar, on the other hand, weighs a fraction over 1671 milligrammes, and a slight change of less than three-thousandths, would make it 1666.66 milligrammes; or, in other words, the present three-dollar gold piece of the United States weighs only 16 milligrammes more than five grammes. A trifling alteration, which would not be felt by the public, would give us an exactly metrical gold coin, while Mr. RUGGLES' coin, the adoption of which would be, on other grounds, a serious evil, is hopelessly remote from [illegible]ment with the metrical system.

The true method of seeking international monetary unity is to establish simple ratios of weight, *stamp the weight of every coin upon its face*, and *preserve unalterably a uniform fineness*. If the American three-dollar piece is stamped "Five Grammes," and known to be nine-tenths fine gold, it can be made current everywhere *by its weight*.

The five-cent nickel coinage of the United States is already metrical. Each coin weighs 77.16 grains, or exactly five grammes. The true course of American economists should be to extend this good beginning, and gradually engraft the decimal weights and measures upon the decimal currency. The world will come to us, if we are right, and maintain our position.

Thanks.

The following kindly notice of the AMERICAN JOURNAL OF MINING, and of our new Spanish paper, EL CORREO HISPANO-AMERICANO, from the New York *Times* of Jan. 3d., is extremely gratifying to our professional pride. Unsolicited praise, from such a quarter, is the best evidence that our labors are not in vain. We shall endeavor always to deserve the good opinion of the *Times*:

"A NEW SPANISH PAPER.—We are glad to see evidences of enterprise already manifest in connection with our approaching interests in the Spanish-American Islands. Nearly the whole trade of these places, and, what is vastly more, of all Spanish South America, is in the hands of the English and French. It is immensely profitable, their natural products being always in full supply to exchange for the needed manufactures of those European countries. We are nearer, and should be able to compete on terms of advantage with them; but they have the foothold, and the difficulty is for us to introduce there information of our own facilities for supplying the necessities of those countries. Seeing this obstacle, and foreseeing, also, the fine opportunities that are about to open for our people in that trade, the proprietors of the *American Journal of Mining* are about to issue a tri-monthly journal called *El Correo Hispano-Americano*, which, issued co-incidently with the sailing of the Pacific Mail Steamers, will afford the latest and most compendious bulletin of prices current and of general commercial and industrial matters. The journal will be in the Spanish language, largely a translation from the *Journal of Mining*, which stands very high as an accurate record and a competent authority in its specialty and in general scientific progress. But it will also contain full information regarding the commerce, manufactures, mechanical arts, railways, &c., of this country, which must make it a valuable medium of setting forth the advantages of our markets. We are glad to know that the enterprise has already received substantial encouragement, and honestly recommend it to all persons interested, the course of the parent journal giving excellent security for the conduct of the offspring."

BLACKROCK.

The Humboldt, Nev., *Register* contains a long exposition of the swindling operations alleged to have been carried on by one ISENBECK, a German charlatan, with the dark, soft mineral of the Blackrock mine, in Humboldt Co. This "argentiferous mineral wax," as it was pronounced to be, has been the object of sanguine hopes for more than a year. Various assays and mill tests failed to extract any silver from it; but ISENBECK continued to deceive his friends and followers with the notion that he had the secret of the only true way of treating the ore.

During the excitement, numerous samples of the rock were sent to the East, and submitted to Messrs. ADELBERG AND RAYMOND, with the whimsical condition that they should assay the rock "according to the method practised in Freiberg." As there are no methods of assaying *not* "practised in Freiberg," it may well be believed that this condition was not an onerous one. The cause of it, mysterious at the time, now appears to have been the pretension of ISENBECK to be a Freiberg metallurgist. The assay of the "wax" gave no silver, and the material was pronounced to be mere bituminous clay. We presume the matter will soon die out and be forgotten; but it seems there are still rumors of great results obtained in Washoe from Blackrock ore.

It is astonishing to reflect how much folly and delusion would be prevented by the diffusion of only elementary knowledge on such subjects among our citizens.

MINING TITLES.

The Silver Bend, Nev., *Reporter*, replies to our article on this subject in a temperate and judicious style, closing with a paragraph or two which are well worthy of consideration by all purchasers of mining property:—

"Our Representatives in Congress urged the passage of a law by which the most perfect title known to civilization can without difficulty be obtained to mining property by those owning it. This law has now been in operation near one year and a half, many titles are already secured under it, and assuredly those seeking a market for mines have had ample time to commence the steps necessary to insure a patent for their property, which, once obtained, is undoubted evidence that it is tangible and of real value, and likewise that it is safe and exempt from controversy in the possession of the patentee. Therefore, as an effective remedy against defective titles and other drawbacks, we advise our eastern friends who are about to purchase mining claims to demand of the vendor, in all cases, a patent for the property offered for sale. It is a bar to all future litigation as well as an assurance of intrinsic value. If no patent can be produced, treat all hawkers of mining property with suspicion, for if what they offer is valuable enough to seek purchasers thousands of miles from the place of its location, those who are asked to buy it should be convinced that the title is perfection itself. At another time we shall have more to say concerning titles to mines."

NEW PUBLICATIONS.

THE NATIONAL QUARTERLY REVIEW.—The December number of this ancient and respectable quarterly is not deficient in the vigor and decisiveness of youth. A glance at the table of contents shows that the classic and the modern, the historical and the scientific are well mingled. We have articles on "Greek Comedy—Menander," "Animal Magnetism," "Management of Our Finances; Ruinous Influence of Paper Money," "Lafayette as a Patriot and a Soldier," "Nebular Astronomy," "Martin Luther and the Old Church," "Mediæval German Literature—Eschenbach," and "Heraldry; Its Origin and Influence."

THE JOURNAL OF THE FRANKLIN INSTITUTE, Phila., presents in its December number an unusually interesting assortment of miscellany, and the valuable Memorial of General ROBERTS, on the reclamation of the waste lands of the lower Mississippi, an account of the U. S. Survey of the North and Northwest Lakes, and a biographical sketch, from London *Engineering*, of the celebrated German-American engineer, Mr. JOHN A. ROEBLING.

DISTRIBUTION A DOMICILE DE L'AIR COMPRIME, *comme Force Motrice, dans Paris*. We are indebted to the courtesy of Prof. J. E. NOURSE, of Washington, for this and other publications, from the Paris Exposition. The pamphlet before us is the prospectus of an enterprise, designed to demonstrate the advantages, and introduce the application, of compressed air as a motive power in dwellings and small establishments. We are not aware that this project, though now more than a year old, has ever been realized; but the delay is nothing conclusive against the plan, and the subject is important enough to deserve attention. We translate from the prospectus the following passages:

"The principle itself has been long since adopted by the scientific world, which has followed with the greatest interest the progress of the piercing of the Alps by the tunnel of Mont Cenis.

This force, which is transmitted like light, and is at the disposition of all, made its *debut* in great style; it came to aid powerfully in the execution of one of the most important works of our epoch. But what it still needs is popular diffusion, i. e., to be recognized and appreciated by the small workmen, to whom it might become so useful. If he has not seen this force practically employed upon work such as he is accustomed daily to perform, he will not believe: it is necessary that the progress of science shall open his eyes; compressed air must be made to exhibit its powers to the minds of those who need its aid, and who cannot travel to view its achievements at the foot of the Alps."

The plan is, to compress air by the usual means, and to convey it in pipes to the different points where it is required, selling it to the consumer at so much per cubic metre. We may have space hereafter to publish some of the interesting details of the scheme

THE NATIONAL FREEMASON is a neat weekly of sixteen pages, which represents with great vigor and enthusiasm the interests of the brotherhood, and contains, besides, much matter of literary and historical value. A friend, whom we suspect of a tendency to triangular breast-pins, gorgeous aprons and much hand-shaking, says the editors of the *Freemason* are worthy and well qualified, and their work is truly prepared, to which verdict we assent, using the words, however, in their ordinary signification, and not in their mysterious Pickwickian or Masonic sense, of which we are ignorant as well as innocent.

Correspondence.

[To insure insertion of correspondence in our columns, the full name and address of the writer must be given.]

Character of the Lesser Antilles.

ST. THOMAS, Nov. 10, 1867.

EDITOR AMERICAN JOURNAL OF MINING:

St. Thomas may be characterized as an island *without a mine*. Even the grandest mine of wealth we know on this globe, chloride of sodium, in the surrounding sea, is not utilized. Enormous fortunes annually flow and ebb on its rocky shores, and no man gathereth therefrom. Turk's Island, and others of less moment lying to the westward, gather immense riches from this unfailing and always abundant mine of wealth, as rich to-day as in the days of the Phenicians, who first evaporated the sea's invisible wealth, yea, as rich as in "creation's prime." The reason is this. Other islands lie low and flat, with low marshy margins, into which the waves of the ocean are permitted to flow, and there evaporate, leaving their saline ingredients behind, to be collected and transported into all parts of the world. But St. Thomas has no such facilities for evaporation. The island rises bold, almost abruptly from the sea; huge hills measured above the water level, but mountains measured from the bottom of the ocean, having their summits five or six hundred feet in the air. An enormous mass of trap and metamorphosed limestone, sans soil, sans plantations, sans groves, sans everything, except the beautiful city and harbour of St. Thomas. There is all the wealth, all the business, all the people of the island. Tortola, and all the small islands lying in the N.E. angle of the West India Group of Islands, are of the same rocky character and *mineless*. Porto Rico, a little to the west, and in sight, St. Domingo, further west, Cuba, still further in the same direction, Campeachy, also on the mainland of North America, all have mines of copper, so also Jamaica. The mountain on the Spanish main, on the south shore of the Caribbean Sea, are also cupriferous. The limestone and trap of all are supposed to be coeval. Trap usually is associated with this mineral. The rocky islands to leeward are only exceptions to a general law. They do contain a little, just enough to give the faintest exhibition, but not enough to form veins.

S.

International Coinage.

The able and interesting report of Mr. Samuel B. Ruggles, delegate from the United States to the International Monetary Conference at Paris, of which we gave an abstract on Saturday, brings before us a question which should not be hastily decided, since its decision is intimately connected with the profoundest problems of political economy. It is proposed that the United States, in view of the great advantages of a monetary unity "spanning the Christian world from San Francisco to the confines of Constantinople," shall reduce the value of its gold dollar about three and half cents, making it equivalent to the five-franc gold piece of France. This change only requiring, as Mr. Ruggles says, "a brief law of Congress, fixing the weight of the gold dollar at 1,612.90 millgrammes," bears such complicated relations to the important subjects of weights, measures and money as to require a more thorough discussion that we can give it in a single article. We propose to point out a few suggestive facts which our delegate has apparently overlooked. It is true that experience has proved the maintenance of a double standard—gold and silver—to be impossible. All commercial nations have practically abandoned this notion, and adopted gold as the standard, or, in other words, the "legal tender." But it is not true that the relative values of gold and silver coin may not be fixed by law, or that the ratio thus fixed is a matter of indifference. The history of French legislation in this connection is instructive. By the celebrated law of 1803, the ratio between gold and silver coins was established at fifteen and a half to one; and, as a uniform fineness of nine-tenths was adopted, the relative value of gold and silver coins was exactly reciprocal to their relative weight. The latter measure was highly important and wise; it was in fixing the fractional ratio that French economists erred. The sudden influx of gold from Australia and California upset their calculations. The market value of gold, as compared with silver, fell below this ratio; and the inevitable result was the remelting or exportation of the silver coin almost as soon as it came from the mint. It is important to note the nature of the mistake committed. No one can be blamed for not foreseeing the wonderful discovery of gold. The error was in placing the coin ratio so near the actual market ratio of the metals at the time, that any considerable change in the relative production would necessarily disturb the system; and this error had its source in the attempt to maintain a double standard. The true policy would have been to make gold the standard, and to adopt as the ratio 15 to 1, thus giving to silver a relatively higher value, and securing that part of the coinage which is the most necessary for the daily uses of the people, from those sudden disappearances to which it is peculiarly liable. Silver coin, not being legal tender in large sums, would not be hoarded; and being worth as coin more than its intrinsic value, would not be exported or remelted. This ratio of fifteen to one would not have been affected by the fluctuations of productions and is now in all human probability, the safest, as well as the most convenient that can be proposed. But the manner in which this error was remedied by the quadripartite convention of France, Belgium, Italy, and Switzerland is equally worthy of attention, since it is the gold coinage adopted by that convention which is now made the basis of a proposed international currency. The relative weights of gold and silver coins were adhered to, thus keeping up the old false ratio of fifteen and a half; but the smaller silver coins were debased, thus sacrificing the only perfect part of the old system and substituting for the simple, universal decimal standard of fineness, nine-tenths, the more complicated one of eight hundred and thirty-five thousandths. The true course would have been to correct the error where it originated, and to adopt the lower ratio in weight as well as value, increasing the amount of gold in the gold coinage, until it represented one-fifteenth instead of two thirty-thirds of the silver in the silver coinage. We are not particularly concerned with the debasement of the silver money of Europe. It is not intended for circulation here. But the United States, which has so adjusted its coinage as to be free from the evils which have been felt in Europe, is now asked to adopt that gold money, the value of which was, as we have shown, erroneously fixed in the beginning, and ought to have been changed by the convention of 1865. That change would have made the French five-franc piece almost exactly equivalent to the American dollar. In other words, the reason why our dollar must now be changed, if we accept the plan before us, is that we have a well-adjusted system already, and Europe has not. It would be very easy to pass "a brief law," taking three and a half cents from our gold dollar; but that easy step would disturb the relation between our gold and silver money, and bring upon us the evils both into and out of which France has blundered. If, as Mr. Ruggles claims, we are now to legislate for all the future, we must adopt the true system, or the future will not thank us for involving a world instead of single nations, in the consequences of our mistakes. Moreover, it is necessary, first of all, to consider the convenience and welfare of our own people. We shall always use our own money more than that of any foreign nation; and we cannot afford to sacrifice advantages in our internal and daily business for the sake of convenience in travel or exchange. We ought to have, and we are not far from now having, a coinage presenting the following advantages:

1. A gold standard.
2. A constant and uniform fineness.
3. A relative value of gold and silver coin, inversely expressed by their weight, and fixed by law at fifteen to one; an arrange-

ment which experience has shown is not likely to need alteration, and which bears, besides, a convenient relation to decimal calculations.

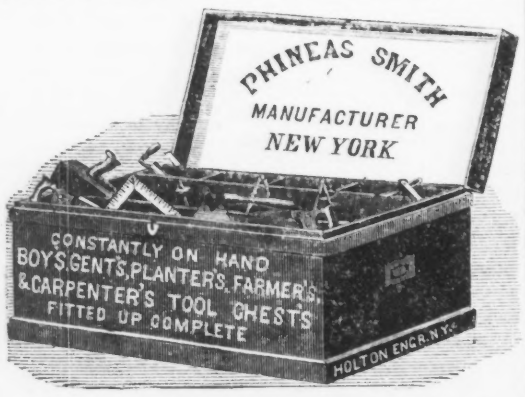
4. A simple ratio in size and weight between all coins and the system of weights and measures. The metrical system being the only complete decimal one, and having come into general use in many nations, is best adapted to be thus fitted to a decimal coinage.

5. The expression of the metrical weight and measure of every coin upon its face.

A few trifling changes in our present coinage, which is almost strictly metrical, would give us all these advantages in a day. The metrical system is already legalized among us. Our nickel coins are perfect weights and measures of that system, and our gold dollar is far more nearly so than it would be if we adopted the proposition now before us. We are asked to sacrifice all these advantages for the sake of gaining a dollar having the extremely unmetrical weight of 1,602.9 milligrammes; and France agrees to "make the concession" of issuing a twenty-five franc piece "to accommodate the United States. It is surprising that France, after forcing with unparalleled perseverance—we might almost say audacity—the metrical system upon the civilized world, should o utterly abandon all hope of a metrical coinage. But French spolitical economy, like French diplomacy, has relied a great deal upon persistent self-assertion for its authority. The metre itself, as a unit of measure, is acknowledged to be inconvenient, and based upon a mistaken measurement of a local meridian. The metrical system is the best in existence; but it might have been much better than it is if the experience of the world, instead of the iconoclasm of a revolutionary period, had presided over its inception. With all its faults, however, it is firmly established; and we are willing to see it extended over the world. If the French gold coinage had been enhanced when the silver was debased, as we have shown, fifteen francs in gold, or three American dollars (our dollar being diminished twenty-nine hundredths of one per cent., instead of three and a half per cent., as is now proposed) would weigh exactly five French or metrical grammes, and the great desideratum of commensurability between weights and values would be attained. Eminent French writers are earnestly opposing the present imperial monetary system, because it is hopelessly unmetrical; and we do not hesitate to say that its adoption would perpetuate and multiply grave evils for the sake of a premature and partly delusive "international unity." To Mr. Ruggles's argument that we could not ask the European states to coin over again their immense gold currency, and that we must yield because nobody else will, we reply, that we have what we want, and ought not to be seduced by the charms of sharing with other nations what we do not want.—*N. Y. Post.*

Tool Chests.

But a few years ago the workshops and manufactories in this and other countries were poorly furnished with hand tools. It was quite a rare thing, for instance, to find a journeyman machinist with a stock in trade exceeding a few files, a hammer, one or two cold chisels, and a straight edge. These were furnished, as they generally are now, by the proprietors of workshops, who hold their employees responsible for them. Yet it was seldom the eye would discover in a machine shop a locked drawer, or a neat box, containing some hidden treasure, in the shape of an iron square, or adjustable callipers—the private and guarded property of some industrious mechanic, who had probably worked at them during his meal hours. There is many a mechanic who can remember how he was constantly annoyed by anxious enquirers after those rare articles, made by his own mechanical skill. Now, however, one of the first things to be admired in a well-regulated machine shop is the systematic arrangement of closets, drawers, and tool chests, in which the workman can deposit and preserve all his hand tools, ganges, templates, &c. These accumulate rapidly, and the mechanics of to-day find the portable tool chest a useful piece of shop or house furniture. To a young man commencing to learn a trade, a stock of tools is of great value, as his small experience in work at that stage of life will not allow him to be mechanic enough to make all his own tools; and whether his business pertains to machinery, building, or carpentry, some of his first earnings should be judiciously expended in tools. The acompanying illustration represents tool chests as now manufactured in this city. At the



warehouse of the manufacturer, 25 Cliff street, they can be seen in every variety from the well-stocked carpenters' chest, containing two hundred and forty-two different articles, down to the less costly for boys and juveniles, with forty tools. To the gentleman, the farmer, the miner, the mechanic, and housekeeper, these neat and compact tool chests prove alike valuable and handy.

THE BABCOCK & WILCOX STEAM ENGINE

(Concluded from first page.)

One of the points in which the Babcock & Wilcox engine differs from the best engines which have preceded it, is the manner in which the cut-off valves are operated, viz.: by the action of the steam itself, independent entirely of the action of the main valve; thus insuring an instantaneous, positive, and easily controlled cut-off, at any desired point in the stroke of the piston. The distribution of the steam to the alternate sides of the piston, and its release from the cylinder when the stroke is completed, are performed in the manner most approved by experienced engineers, by means of a plane slide valve operated by the ordinary eccentric. But from the fact that the induction valve has in no case to effect the suppression of the steam—or, in American phrase, act as a cut-off valve—and from the further fact that the cut-off is actuated independently of the motion of the main valve, the functions of "lead," and "cushion" can be adjusted to any desired degree, without in any manner affecting the action of the cut-off valve. This is an important distinction between the operation of the main valve of this engine and those which have preceded it. In the ordinary three-parted slide valve, or in any other arrangement where the several functions of lead, cut-off, release, and compression, or closing the exhaust, are dependent on the motion of one eccentric, the "exhaust" functions—*i. e.*, the release and compression—must always be subservient to the "steam" functions—*i. e.*, the lead and suppression, or cut-off. In the Babcock & Wilcox engine, however, the cut-off being actuated by a separate and entirely independent mechanism, a single valve is capable of giving any degree of lead and compression which may be desired, as perfectly as with the most complicated valve gear. Another important difference between this engine and all previous adjustable slide or rolling valve cut-offs, lies in the fact that the valves have a constant travel under all circumstances, thereby insuring an equal wear. A valve which varies its throw to effect the cut-off, as in all detachable valve gear, cannot wear equally, and has a continual tendency to grow leaky. Again, this constant throw insures a wide, open port, and the least loss through throttling the steam by the action of the valve—or, in other words, enables us to obtain a pressure in the cylinder more nearly approaching that in the boiler, than can be realized with other valve motions. Another peculiarity of this engine is its extreme simplicity and the fewness of parts exposed to wear. At first sight, it has the appearance of one of the simplest styles of non-expansive engines having none of the catches, cams, dash-pots, springs, tappets, etc., which are common to other expansion engines. With the exception of the cut-off gear, the engine is a simple slide-valve engine, and can be used as such, should any accident occur to the cut-off. The cut-off mechanism itself is also of the simplest possible description, having the least possible number of parts, consistent with a proper performance of its functions. It consists of two cut-off slides, a miniature steam cylinder, and a valve for controlling the admission of steam to the same. This small cylinder, being enveloped in the steam, requiring no packing and having only the weight of its piston to produce wear, is, for all practicable purposes, indestructible. The cut-off slides are always balanced when they move, consequently they are not exposed to injurious wear. Another advantage of the Babcock & Wilcox engine is that it is easily comprehended by ordinary mechanics. The motions and adjustments are similar to those familiar to any one who understand a plain slide-valve engine; and any man who can adjust such an engine properly, can readily adjust this. The cut-off valve of this engine presents a convenient means of stopping at any desired point, simply by opening or closing the cut-off valve by hand, as the case may require. The engine may be warmed up, also, without danger of starting, by closing the cut-off valve by hand. In cases where it is desirable to back the engine, a starting bar may be readily slipped and the engine handled with the same ease as the plain slide. The bed or framing which has been adopted for horizontal engines is of the form first introduced by Horatio Allen, Esq., of the Novelty Iron Works. It is bolted to the end of the cylinder, and extends to the pillow-block, and the metal is so disposed as to give the greatest rigidity with the least weight. The cross-head is upright, and is supported on flat slides, a drip cut cast on the bed serving to catch all drippings, not only from the slides, but from all the stuffing boxes. The regulator or governor is driven by gearing, thus avoiding all danger of breakage or slipping of belts, and the consequent damage to the engine and machinery from the "running away" of the engine. In addition to the steam jacket for preserving the temperature of the cylinder, a covering of felt is employed around all the exposed parts, and this in turn is covered by a casing of polished metal. The latter is the best possible protection against loss by radiation. In the construction of these engines, no pains or expense is spared to procure the best material and workmanship, and the proportions and relative strength of all the parts are calculated with the utmost care, from formulas based on long experience, as well as a thorough knowledge of the qualities and peculiarities of the materials. Great attention is also paid to giving artistic forms to the various parts, every piece being designed with reference to rigid simplicity and a cultivated taste.

The largest engraving gives a perspective view of the engine. Fig. 1 represents a horizontal section of the cylinder and valves, showing the peculiarities of the cut-off motion. A, is the cylinder which is steam jacketed as are also the heads. B, is a portion of the bed piece, which forms also the front head of the cylinder. C, is the piston and C' the piston rod. D, is the main valve, e e' the induction ports, and is the F, exhaust port. The body of the valve is hollow and conveys the exhaust steam from either end of the cylinder alternately to the exhaust port, F, whence it goes into the exhaust pipe. The steam passes through ports e, in each end of the valve, into the induction ports of the cylinder, alternately as they are opened by the motion of the valve derived from an eccentric in the usual manner. On the back of the valve at either end is a slide, G, which can be made to cover the port at that end, and these slides are each attached to one end of a piston, H, fitting in a small steam cylinder bolted to the back of the valve, and so adjusted that when the port in one end of the valve is closed the other is open. Upon steam being admitted to either end of the piston, H, the piston is shot over and the corresponding side closed to cut off steam from that end of the main cylinder, while the port at the other end of the main valve is opened ready to admit steam to the other side of the main piston when the valve shall arrive at the proper position. It will be observed that the cut off slides, G, are always balanced when moved. The one about to close having steam of equal pressure upon each side, while the other one has been balanced by the main valve riding past the end of the valve face on the cylinder, thus admitting steam behind the slide, G. This condition obtains during the whole stroke of the piston until the steam is cut-off, after which the cut-off slides, G, remain stationary relatively to the main valve until ready to cut-off steam on the return stroke, previously to which time they have been balanced by the over-riding of the valve at the other end. These slides, have, therefore, literally no wear, and once fitted tight, they will remain so indefinitely. The piston, H, in the small cylinder, is turned to fit, and has no packing, neither have the rods stuffing boxes, as the pressure is equal on both sides except during the inappreciable time which intervenes between the exhausting of the cylinder, I, and the movement of the piston. The only tendency to wear in these parts is due to the weight of the piston and rods, which is supported on large surfaces. In fact, after twenty months constant use, none of these parts have worn sufficiently to obliterate the tool marks upon the surfaces. Steam is admitted alternately to each end of the piston, H, at every revolution of the engine, causing the cut-off slides to move at every stroke, cutting off the steam at the point determined by the governor.

FIG. 2 shows a cross section of the cylinder, I, and its valve. This valve if balanced by the plate J upon its back, and is operated by a toe upon the rock shaft, L, carried upon the main valve, and extending through the end of the steam chest where it receives motion from a crank, M, which is adjusted in its position by the governor. The exhaust ports of the cylinder, I, are made upon the bottom, and are at a little distance from the end, while the steam ports are upon the side and at the extreme end of the cylinder. By this arrangement the piston closes its own exhaust port and cushions on the remaining distance, thus dispensing with all dash pots or air cushions, and causing the valve to work without any noise. The valve I being balanced, and the rod L carried through its stuffing box by the main valve, there is the least possible power required by the regulator to adjust the crank, m, thereby insuring a more sensitive action than can be attained where the governor has labor to perform. The governor is peculiar, and is shown at fig. 3. The balls, N, are hung upon arms in the usual manner, which arms are jointed at their upper ends to a head attached to the rod, o, which slides within the hollow shaft that drives the balls, the motion being communicated through the radius rods, p, which are jointed at their lower ends to the gearing shaft, and at their upper ends to the centre of the arms, n. The rods, p, are half the length of the arms, n, measuring from the centre of the ball, and it will be readily seen that in consequence of this arrangement the arms, n, and rods, p, form a parallel motion, and compel the balls to move outward in a horizontal plane. In the ordinary pendulum governor the balls move in the arc of a circle and rise as they extend. It therefore requires an increased speed to maintain them in their advanced position. The engine must consequently run faster when the load is light than when it is heavy, and such is the case with all ordinary governors. In this improved governor it will be seen that the gravity of the balls has no tendency to move them in either direction, and exerts no influence whatever upon the speed of the engine. The centrifugal force causes them to diverge, and a weight, W, tends to bring them towards the shaft. When therefore these two forces are in equilibrium the balls will remain in the same position, but as either preponderates they are moved in a corresponding manner, thus affecting the speed of the engine by varying the amount of cut-off. The weight, W, is supported upon a bent lever, which is so proportioned, that the centrifugal force at any given speed will just balance the weight in all positions. The speed of the engine will therefore remain at that fixed point with all variations of load or pressure of steam; for any increase or diminution will cause either the balls or weight to preponderate and the point of cut-off to be changed until the speed is again brought to the standard where the two forces are in equilibrium. Any desired speed can be obtained by altering the weight, W, and the action of the governor will be as perfect in one case as in any other. A spiral on the rod, o, serves to advance or retire the crank, m, relatively to the main crank, so as to cause the cut-off to occur earlier or later in the stroke, as the balls diverge or converge; and the amount of this adjustment is such that the cut-off may be varied from nothing to seven-eighths stroke.

The Salt Mines of Salzburg.

A correspondent of the *Cincinnati Gazette* thus describes a visit to these celebrated mines: A visit to the salt mines in the neighborhood of the city was esteemed by some of our party to be very interesting. Mines are usually little more than long bores under ground. These are varied somewhat by several sliding descents, down which the visitor glides swiftly, seated on a miner's leather apron, which prevents his skin from taking fire. The curiosity of the place, however, is a large subterranean lake, made by the introduction of fresh water into the centre of the salt mountain. The water dissolves the salt on every side, [illegible] out the hill and making the cavity larger every month. When the fresh water is saturated with salt, it is let off through wooden pipes down the hill to the evaporating houses in the valley. This lake, as if it were some gloomy Avernus, was lighted up with a circle of dim oil lamps for our benefit, and we crossed it in a kind of Charon's boat. The roof above our heads was smooth and rotunda-like. There was a deep silence, broken only by the steady ripple of the wavelets under the boat's prow. Out of the darkness twinkled the lights, like faintest stars veiled in thin mist. This was all, and did not seem to me very remarkable, though many call it extraordinary. Beyond this vault, we came to a real underground railroad, and being seated astride on a board, placed on wheels, we were ordered to keep steady and not bump our heads against the rock through which our road ran, and then rattled along some two miles of rail. This was the most entertaining part of the trip. The rough rock on either hand and above our heads, within a few inches of us, the numerous alcoves past which we glanced along, like an express past the little way stations, the broken and ragged ceiling out of which the black, and white, and red stone gleamed in fantastic outlines, the rush of damp earth-smelling air, and the fickle glimmer of the guide's lamps, all combined to produce a weird, exciting effect. After a time, the entrance began to show far before us, like Jupiter at his rising, and continued to brighten and broaden till it shone like the full moon—and at last we stepped out into the perfect day all at once, and started homeward, feeling strange and alien in the common daylight. As we stripped off our miners' clothes, I thought that perhaps our experience might be like that of a saint who all his life had followed his conscience like a star, and at death steps forth into the full inheritance of the promises. These salt mines are in the solid rock, but there is no whiteness such as I had expected in the walls. Black and red were the prevailing colors. The galleries extend far under the dominions of the King of Bavaria, yet the whole mine is secured by special treaty to the Emperor of Austria. He gets one-fifth of his whole revenue from them. The salt is not cut in blocks at all, but is taken out by letting in and saturating fresh water, which is afterwards evaporated. The mines have been worked some four hundred years without intermission. They were also used some unknown centuries before, as is testified by the antique tools, shoes and props occasionally found in them at present time. The main adit, through which the railway runs, was forty years in getting dug. It was done by an Archbishop of Salzburg, and runs through ten thousand feet of rock, where no salt is. It is about five feet high and four wide, not with an arched roof.

Process for Amalgamating, Silvering and Gilding Iron or Steel.

A process for amalgamating, silvering, and gilding, recently published by Cailletet, deserves the attention of our readers, since it will enable them to attach the precious metals with ease to others which have hitherto resisted amalgamation. It is really the revival of the old process of water-gilding, with the addition of a little sodium to the amalgam. Iron, it is well known, resists the action of mercury alone; but if only one per cent., or even less, of sodium be added to the mercury, iron and steel are as readily attached as any other metals. Cailletet recommends that articles to be gilded or silvered should first be amalgamated with the sodium amalgam, and then dipped into the gold or silver amalgam. The double process is, however, unnecessary. The gold or silver may be combined with the sodium amalgam, and thus one operation suffices. Articles of iron or bronze should first of all be thoroughly cleansed by washing first with an alkali, and then with an acid. They must then be well rinsed, and while slightly wet should be rubbed over with the compound amalgam until it is evenly distributed over the surface. The mercury is then driven off by heat, and the coating of the

precious metal remains, and may be polished and burnished as required. Similarly, a covering of zinc may be given by mixing that metal with the sodium amalgam; and then the gold may be deposited by electrolysis from the ordinary gilding solution. It will be seen that this process is open to very extensive application for decorative and useful purposes.—*London Mechanics' Magazine*

Patent Claims.

Interesting to Miners, Millmen, Metallurgists, Oil-Men, and Others.

72,162—MANUFACTURE OF STEEL.—James R. Bradley and Moses D. Brown, Chicago; Ill.

We claim the improved processes for making steel of different kinds herein described, by mixing the several ingredients in the proportions, and melting the same with maleable or scrap iron, as specified.

72,182.—ORE CONCENTRATOR AND AMALGAMATOR.—Stephen Fountain, Silver City, Nevada.

I claim the box, D, having the valve, b, stems, n, or an equivalent device, together with their operating levers, d, and the rods, g, the whole constructed and arranged substantially as and for the purposes herein described.

72,201.—FURNACE FOR SMELTING PRECIOUS METALS.—H. Gengembre Herbert, New York city.

I claim. 1st, The combination of the boxes, D D' D'' D''', etc., the pistons E E' E,'' etc., and screws, F' F' F', etc., or their equivalents, with a cupola or blast furnace, A, the whole arranged and operating in the manner set forth.

2d. In blast or cupola furnaces, making the lining of a composition of ore and flux, and renewing said lining from the outside, by means and with the arrangement herein described.

3d, The combination of the box, M or M,' the piston N or N,' and press, P or P,' with a reverberatory furnace, arranged and operating in the manner specified.

4th, Forming the hearth of a reverberatory furnace of a concrete of ore and flux, and renewing the same from the outside, without stopping the operation of the furnace, by means and with the use of the herein described arrangement

72,204.—STEAM ENGINE GOVERNOR.—Oliver A. Kelley, Slatersville, assignor to Lamb, Cook & Co., Forestville, R. I.

I claim, 1st, The valve, M, constructed as described, with the triangular recesses, b b, and downward projecting pin, h, arranged in relation with the pin, i, and screw valve rod, L, as herein described for the purpose specified.

2d, The arrangement of the valve, M, pins, n, i, valve-rod, L, sliding rod, K, and pins, l k, as herein described for the purpose specified.

72,205.—APPARATUS FOR SAVING PRECIOUS METALS.—Wm. Chase Knight, Yankee Jim's, Cal.

I claim the V-shaped apparatus, with an adjustable partition, B, substantially as and for the purpose specified.

72,309.—PROTECTING STEAM BOILERS FROM CORROSION.—David Matthew, Prarie du Chien, Wis.

I claim a galvanic pile, which is composed of copper and zinc plates, or other metals equivalent in galvanic properties, applied upon a metal rod, which is provided on its ends with supporting disks, said pile being employed substantially in the manner and for the purpose described.

72,335.—MANUFACTURE OF IRON.—David Stewart, Kittanning, Pa.

I claim purifying the pig-iron or blast furnace metal from its carbon and other impurities by passing it in a stream through ozone, atmospheric air or other oxygen-bearing gas or vapor, substantially as and for the purposes hereinbefore described.

72,363.—STEAM PUMP.—A. S. Cameron, New York city.

I claim, 1st, The guide rod, D, resting in a socket, F, in the seat of one valve, and extending to the seat of the other valve, and operating in combination with the valves, B B, substantially as set forth.

2d, The projection, H, on the inner surface of the lock nut, G, in combination with the case, H, guide rod, D, valves, B B, and valve seats, C C', substantially as and for the purpose described.

72,383.—STEAM PUMP.—J. B. Gardiner and Edward H. Hyde, Springfield, Mass.

We claim, 1st, The arrangement of the valves, E and H, pistons, G G', ports, f and e, e' and f,' y and z y,' and z,' substantially as herein set forth.

2d, The arrangement in connection with the said valve gear, of the valve rod, e, steam piston, A, plunger, B, and reservoir, C, substantially as set forth.

72,387.—MACHINE FOR SQUEEZING PUDDLED BALLS OF IRON.—Samuel Gissinger, Lawrenceville, Pa.

I claim the corrugated jaws, A and B, constructed, arranged, and operating substantially as herein described and for the purpose set forth.

72,388.—MACHINE FOR SQUEEZING PUDDLED BALLS OF IRON.—Samuel Gissinger, Lawrenceville, Pa.

I claim squeezers constructed, arranged, and operating substantially as herein described and for the purpose set forth.

72,389.—COAL BORING BIT.—Samuel Gissinger, Manchester, Pa.

I claim the bit or cutter, A, provided with the entering point, B, scoring and cutting points, e and f, and guide, d, substantially as herein described and for the purposes set forth.

72,390.—COAL MINING MACHINE DRILL CARRIAGE.—Samuel Gissinger, Alleghany City, Pa.

I claim the drill carriage constructed as herein described, and provided with drill bars made operative through the medium of the wheels, w w1 w2 h and g, arranged and operating in the manner and for the purpose set forth.

Also in combination with the above the screw, e, and the clamp screw nut, x, constructed, arranged and operating substantially as herein described and for the purpose set forth.

72,414.—BURNER FOR HYDROCARBON FLUIDS.—Rufus S. Merrill, Boston, assignor to himself and William Carleton, Charlestown, Mass.

I claim, 1st. A burner for hydrocarbon fluids, in which the base or lower portion, when provided with a cap which covers or incloses the apertures leading to the fluid reservoir, is combined with the deflector and chimney holder of the said burner mounted upon the wick tube, substantially in the manner herein set forth and for the purposes specified.

2d. The combination with the wick tube and capped or covered base of the burner, of the chimney holder, deflector and sleeve, fitting upon said wick tube at a point above said covered base, under the arrangement herein shown and described.

3d. The combination with the wick tube, and the sleeve which carries the deflector and chimney holder, of the friction spring, for holding said sleeve upon the tube, substantially as set forth.

Special Scientific Brevities.

☞ The death of the inventor of the needle gun, Herr Von Dreyse, has been announced from Europe. Dreyse, of whom but little is known beyond the fact that he gave Europe one of the most effective modern weapons of warfare, and one which has played a conspicuous part in the recent political changes on the continent—was born in Sommerda, a small town near Erfurt, in Saxony. He was a journeyman blacksmith, and, according to his own statement, first conceived the idea of perfecting a weapon of the kind which has since made him famous, in travelling over the battle-field of Jena, in 1806, and observing the heaps of dead and wounded, torn and mangled by the missiles then in use. He subsequently worked for a man named Paul, in Paris, who was employed by the military authorities in the improvement of the flint musket. It was during that time that he revolved in his mind and conceived the idea of the needle gun, which was eventually perfected. He died at the age of seventy-nine, and was a few months ago, represented to be vigorous in mind and body. He was the inventor, also, of an improved hand grenade and several other destructive implements, none of which, however, have secured the popularity that has attended the needle gun.

☞ Prof. De la Rive, of Geneva, Switzerland, has invented an instrument for determining the transparency of the atmosphere It consists of a double telescope with a single eyepiece, by which two objects at known distances may be compared. Thus the effect of the stratum of air between them may be noted. The inventor thinks that a measure of transparency may be of great importance in a sanitary point of view. He agrees with Pasteur, who supposes that the light, dry fog which sometimes intercepts the light is caused by myriads of organic germs floating near the earth, which become transparent when saturated with moisture, and are swept to the earth by heavy rains. Vaillant, however, believes that the haze sometimes seen in fine weather is the effect of variations in the density of the atmosphere, for reflected light, passing through such a medium, would not give a distinct impression of distant objects.

☞ Copper amalgam, used in the reproduction of etched and engraved plates, is made by mixing mercury and pure powdered copper in a small quantity of nitrate of mercury. Lowe obtains powdered copper by adding to a saturated solution of sulphate of copper an equal quantity of hydrochloric acid, and placing in the mixture thin strips of zinc, when hydrogen gas is evolved and a porous mass remains, which falls into powder on being shaken. This powder, after being washed, first with hot water and then with pure alcohol, consists of particles of copper, quite freed of any oxyd of the metal. Powdered copper may also be obtained by subjecting the black oxyd of copper, when heated in a flask, to a stream of coal gas, carried in and out by means of two tubes placed in the cork.

☞ Dr. Maisonneuve, surgeon of the Hotel Dieu, Paris, read a paper before the French Academy on the advantages of a continuous method of aspiration in the healing of great amputations. The liquids exuding from the surface of the wound coming in contact with the air, poisonous putrifaction ensues; to arrest this action Dr. Maisonneuve, after dressing the wound with lint saturated with antiseptic liquids, brings into use his aspiratory apparatus, which consists of a sort of a burette of india rubber furnished with a tube of the same substance, a flask of three or four litres capacity, and an air-pump which exhausts by means of a flexible tube. By the use of this apparatus he removes the principal cause of danger from amputations.

☞ Mr. C. Tomlinson, of London, after a series of experiments arrived at the conclusion that the storm-glass was not acted on by light or atmospheric electricity, or wind, or rain, etc., but solely by variations in temperature; that is, it is a rude kind of thermoscope, vastly inferior to our ordinary thermometer, and has no meteorological value whatever. His position may be proved by dipping a piece of filtering paper into ether, and, placing it on to a bottle containing a little camphor, etc.; the cold thus generated will determine a deposit of crystals to any pattern or device we may choose to give the filtering paper.

☞ Dr. Swartz recommends the use of magnesite, a natural carbonate of magnesia, for obtaining the carbonic acid required in soda water. The gas, obtained by subjecting this mineral in a retort to a red heat, is pure and odorless, and the resulting magnesia will be found more valuable than the original material. But the supply of magnesite is not large. At Hoboken, N. J., it is found in small seams with dolomite and serpentine.

All Sorts.

☞ In the autumn of 1863, more than 13,000 old silver coins were found in Kooch Behar, a State in North Bengal, not far from Kunteswaree, the traditional capital of the once locally famous Rajah Kunteswar. The coins were contained in brass pots, which, being laid bare by a slip in the bank of the river Dhuria, were taken up and sent to the Imperial Treasury in Calcutta. Before consigning this treasure to the melting-pot, the authorities, considering the archæological value of the coins, ordered selections to be made for the cabinet of the local mint and the Museum of the Asiatic Society of Bengal. The task was intrusted to Babu Rajendra Lal Mitra, who, well versed in many branches of Sanscrit, examined the whole mass with so much care and skill, that the estrblishments above named are now enriched with a thousand specimens which otherwise might have been lost to numismatists. The coins are in excellent preservation, are for the most part of the district in which they are found, and date from six centuries ago. A detailed description of them, with historical particulars, is published in the first part of the Journal of the Asiatic Society of Bengal for the present year.—*Athenæum.*

☞ A vessel recently arrived at San Francisco with a large amount of goods from China, purchased at prices so remarkably cheap that the custom-house officers at that port would not believe in the veracity of the invoices, and seized the goods as falsely valued by the purchasers. The probability is, however, that the invoices are correct, it takes so little to sustain life in China and wages are so low. In the importation were handsome set of porcelain bought for four dollars the set. Beautiful fans, painted by hand in brilliant colors, with figures of dragons and Chinese beauties purchased at a cent each. Spades for garden use bought at a cost of a few cents each Straw hats of good quality invoiced at a cent each. Nice baskets, in sets of four, costing in the Celestial Kingdom but four cents a set, and other articles equally low.

☞ The Department at Washington has just granted a patent for a novel invention, called "a power, ice or street carriage," and which is intended for travel on ice or any other level surface, and the principle of which can doubtless be applied with the greatest advantage to hand-cars, boats, or any vehicle where a small expenditure of power and great speed is desired. The body of this new vehicle, which is part sleigh and part locomotive, is similar to that of a double sleigh, with seats for five, besides the pilot or driver. Its entire length is about ten feet, and underneath the rear of the body are ordinary sleigh runners of the ordinary rocker pattern, swung on a swivel, and which are turned in any direction by a helm, and so shape the carriage's course with the utmost precision.

☞ According to the reports of several Charleston journals, extensive deposits of guano are to be found in South Carolina. The new fertilizer contains from sixty to seventy-five per cent. of pure phosphate, and is of superior value to the Peruvian article which pays $90 per ton. From statements published, we are informed that the deposits cover an area of several square miles along the banks of the river Ashley, and can, when brought into market, immediately command a price of $10,000,000. The deposits are easily accessible, being only a few miles from Charleston, to whose business men they will furnish an article of exportation capable of restoring its former prosperity. One journal says that King Cotton is forever dethroned by King Guano.

☞ It has been generally conceded that the pen was the medium by which spoken utterances were placed permanently on record. Now, however, a means has been devised by which the organ of speech may pay back to the organ of record the debt due. That is, the tongue may do for the pencil what the pen does for speech. A paragraph going the rounds says that pencil writing may be fixed almost indelibly as ink by passing the moistened tongue over it. Even breathing slowly over the lines, after writing, renders them much less liable to erasure than when not subjected to that process. A trial of the experiment will readily satisfy any person of the utility of the idea.

☞ The Petroleum Association of Pittsburgh, Pa., recently adopted a resolution agreeing "to abstain from selling refined oil on a longer option to the buyer than fifteen days, provided the refiners generally of the United States adopt the same rule;" and earnestly recommend the refiners of oil throughout the United States to join them in their efforts to break loose from the present system of selling on thirty days' option.

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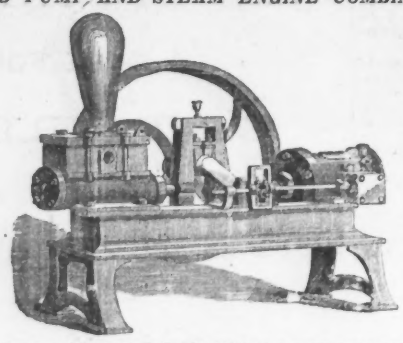

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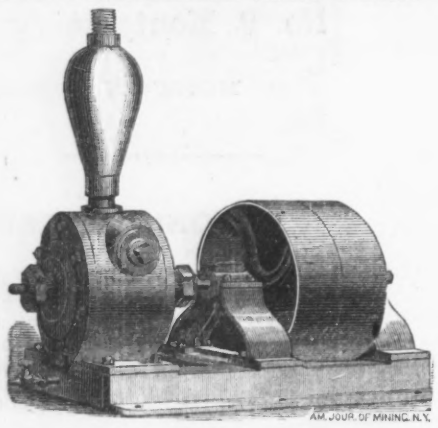

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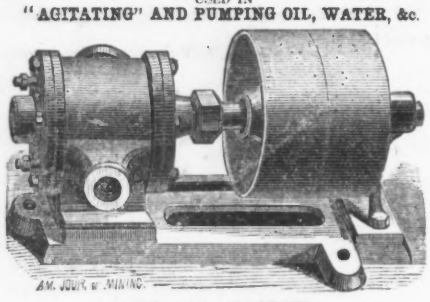

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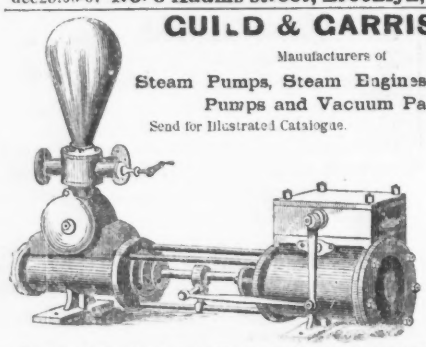

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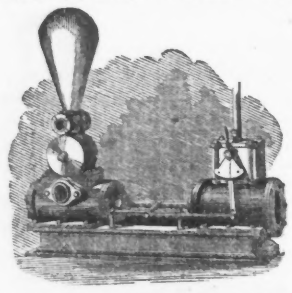

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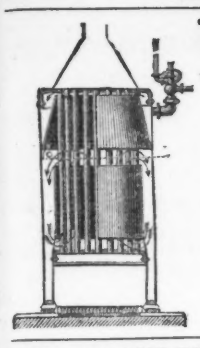

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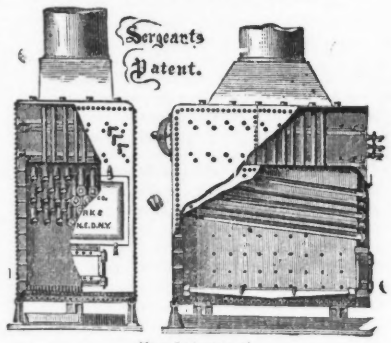

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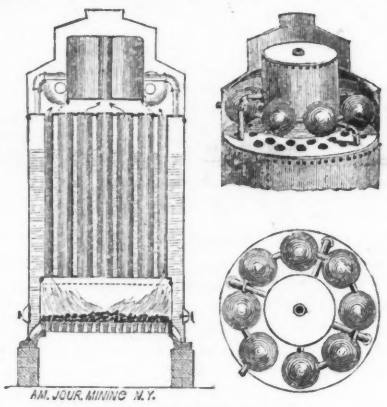

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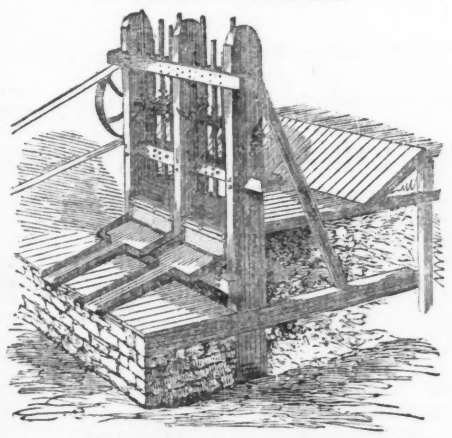

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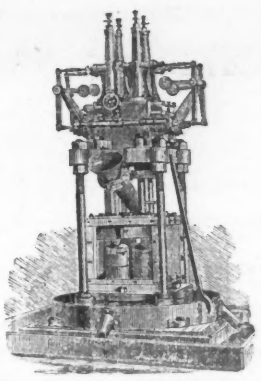

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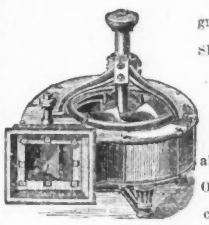

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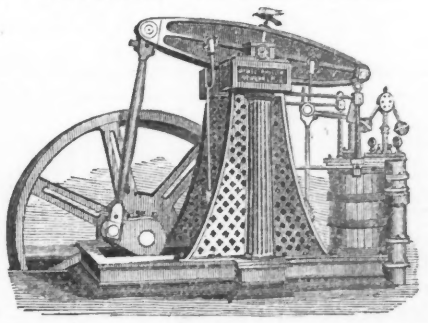

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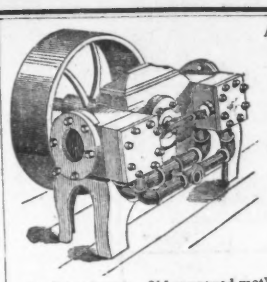

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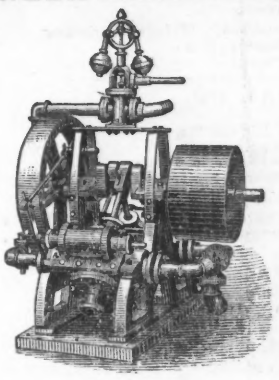

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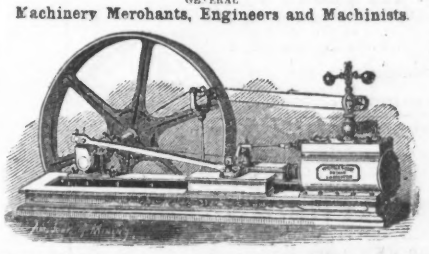

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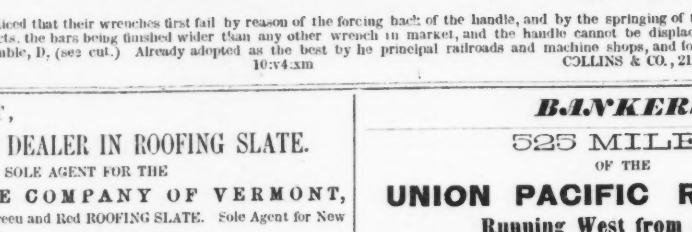

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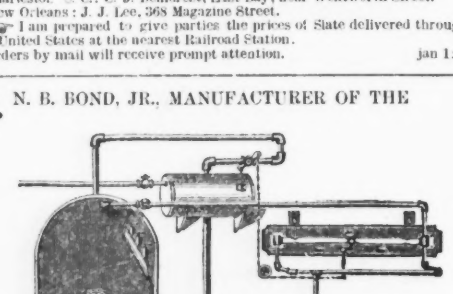

STEAM BOILER FEEDER.

PATENTED MAY 23d, 1865.

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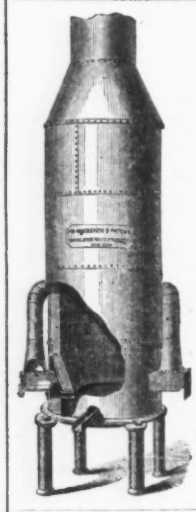

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OF THE

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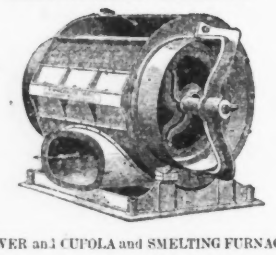

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Also, Mackenzie's Patent GAS EXHAUSTER and COMPENSATOR. Address

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95 Liberty street, N. Y.

Send for illustrated pamphlet. 13:4:xm:q

NOTICE.

HIKO, August 24, 1867.

CHARLES SCHENK, a resident of Pah-Ranagat Silver Mining District, and County Surveyor of Lincoln county, Nevada, begs leave to inform the mining public, that he is able and ready to give true and valuable information about mining property in this District.

CHARLES SCHENK, M. E.

References—Wm. A. Smith, Esq., 26 and 27 Nassau street.

Prof. Harper, New York, etc. oct12, '67:'68

PATENT

INTERLOCKING GRATE BARS,

MANUFACTURED BY THE

Salamander Grate Bar Company.

These Bars have been used and approved in upwards of **4,000** different Furnaces, in Factories, Steamers and Locomotives, and are superior to all others

In Durability and Economy in the Use of Fuel.

OFFICE, No. 32 Broadway, New York.

dec28:3m

FOR SALE.

FOR SALE

1 BOGARDUS QUARTZ MILL,

1 LARGE SIZE HEPBURNS & PETERSON PAN.

Apply at the MANHATTAN METALLURGICAL WORKS

dec7.3m 552 & 554 West Twenty-eight street.

SR. DON PEDRO M. LUELMO AND C. DE ST. CHARLES, Proprietors and fully authorized agents for the new mining districts of the State of Vera Cruz, Mexico, may be seen at room 17, 90 Broadway, corner of Wall, every day from 11 A. M. to 3 P. M. They have complete information of the mines of that region, and the largest collection of mineral samples ever brought thence into this country, and they will take pleasure in satisfying interested parties of the bona fide character and superior advantages of this new field of enterprise. 17.4.ps

BANKERS.

525 MILES

OF THE

UNION PACIFIC RAILROAD,

Running West from Omaha

ACROSS THE CONTINENT,

ARE NOW COMPLETED.

This brings the line to the eastern base of the Rocky Mountains, and it is expected that the track will be laid thirty miles further, to Evans' Pass, the highest point on the road, by January. The maximum grade from the foot of the mountains to the summit is but eighty feet to the mile, while that of many Eastern roads is over one hundred. Work in the rock-cuttings on the western slope will continue through the winter, and there is now no reason to doubt that the entire grand line to the Pacific will be open for business in 1870

The means provided for the construction of this Great National work are ample. The United States grants its Six Per Cent. Bonds at the rate of from $16,000 to $48 000 per mile, for which it takes a *second lien* as security, and receives payment to a large if not to the full extent of its claim in services These bonds are issued as each twenty-mile section is finished, and after it has been examined by the United States Commissioners and pronounced to be in all respects a first-class road, thoroughly supplied with depots, repair-shops, stations, and all the necessary rolling stock and other equipments.

The United States also makes a donation of 12,800 acres of land to the mile, which will be a source of large revenue to the company. Much of this land in the Platte Valley is among the most fertile in the world, and other large portions are covered with heavy pine forests, and abound in coal of the best quality.

The company is also authorized to issue its own First Mortgage Bonds to an amount equal to the issue of the Government and no more. Hon. E. D. Morgan and Hon. Oakes Ames are trustees for the Bondholders, and deliver the Bonds to the company only as the work progresses, so that they always represent an actual and productive value.

The authorized capital of the Company is $100,000,000, of which over $5,000,000 have been paid in upon the work already done.

EARNINGS OF THE COMPANY.

At present the profits of the company are derived only from its local traffic, but this is already much more than sufficient to pay the interest on all the Bonds the company can issue, if not another mile were built. It is not doubted that when the road is completed, the through traffic of the only line connecting the Atlantic and Pacific States will be large beyond precedent, and, as there will be no competition, it can only be done at profitable rates.

It will be noticed that the Union Pacific Railroad is, in fact, a GOVERNMENT WORK, built under the supervision of Government officers, and to a large extent with Government money, and that its bonds are issued under Government direction. It is believed that no similar security is so carefully guarded, and certainly no other is based upon a larger or more valuable property. As the Company's

First Mortgage Bonds

are offered for the present at NINETY CENTS ON THE DOLLAR, they are the cheapest security in the market, being more than 15 per cent. lower than U S. Stocks. They pay

SIX PER CENT. IN GOLD,

or over NINE PER CENT. upon the investment.

Subscriptions will be received in New York at the Company's Office, No. 20 Nassau Street, and by

CONTINENTAL NATIONAL BANK, No. 7 Nassau street,

CLARK, DODGE & CO., Bankers, No. 51 Wall street,

JOHN J. CISCO & SON, Bankers, No. 33 Wall street,

and by the Company's advertised Agents throughout the United States. Remittances should be made in drafts or other funds par in New York, and the bonds will be sent free of charge by return express.

A NEW PAMPHLET AND MAP, showing the Progress of the Work, Resources or Construction, and Value of Bonds, may be obtained at the Company's Offices or of its advertised agents, or will be sent free on application.

JOHN J. CISCO, Treasurer, New York.

November 23, 1867.

UNION PACIFIC RAILROAD CO'Y.

NOTICE.

THE COUPONS OF

THE FIRST MORTGAGE BONDS

OF THE

UNION PACIFIC RAIL ROAD COMPANY,

Due January 1st, 1868.

WILL BE PAID ON AND AFTER THAT DATE,

IN GOLD COIN,

FREE OF GOVERNMENTAL TAX.

At the Company's Office, No. 20 Nassau street, New York.

24:2t, **JOHN J. CISCO, Treasurer.**

DUNCAN, SHERMAN & CO.,

BANKERS,

CORNER PINE AND NASSAU STREETS, N. Y.

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MERCANTILE CREDITS

For Use in Europe, China, etc. Also Make

Transfers of Money to California & Oregon by Telegraph.

INTEREST ALLOWED ON DEPOSITS.

A PRACTICAL MINER, who has had sixteen years experience in California, Nevada and Montana, both as owner and operator, desires the superintendence of a mine, or will go out to make reports on mining properties. Can furnish the best of references. Address

ALLEN HEALD, Office Journal of Mining,

17-4-19t New York City.

PUBLICATIONS.

PROSPECTUS.

EL CORREO HISPANO-AMERICANO;

A Journal of Commerce, Agriculture, Mining, Mechanics, Railway Enterprise, &c., especially devoted to the interests of the Spanish American States, issued the 1st, 10th and 20th of Every Month.

The much-to-be-regretted absence of adequate commercial intercourse between the Northern and Southern continents of America is mainly to be attributed to two causes. The first of these is the lack of proper information, among the industrial and agricultural classes of the Spanish American Republics, concerning the facilities and advantages offered by the manufactures of the United States; and the second is the entire absence of direct communication between the producers of this, and the consumers of those nations; while those who are really aware of the favorable opportunities here offered are deterred from availing themselves of such advantages by the fact that the expense of importations is not infrequently tripled or quadrupled by the passage of merchandise through three or four hands before reaching its final destination. England and France have commanded hitherto the markets of South America for all kinds of manufactures, while the United States, excelling in almost every department, and offering in addition the inducement of low prices, have enjoyed but a small share of the trade. Few manufacturers in this country are aware of the vast extent and profitable nature of this commerce; but the conviction of this fact is rapidly making itself felt; and there is urgent inquiry for the proper means of turning this tide, which now flows to Europe, towards the shores of the Northern Continent. The possible acquisition by the United States, at no remote day, of an important foothold among the Spanish American islands gives the subject at the present time great additional importance. Our naval supremacy in those regions should be accompanied by the commercial supremacy which it is chiefly useful to defend.

The best and surest means to this end is to furnish the Spanish American consumer with full and accurate information regarding the commerce, manufactures, mechanical arts, mining, metallurgy, railways, &c., of this country, setting forth in these departments our superiority to the nations of the Old World, and explaining the advantages offered in our markets.

Our conviction of the usefulness of such a step, based upon long and careful examination of the subject, and thorough personal acquaintance with each one of the Republics in question, their resources, interests and requirements, has received, of late, additional confirmation from communications addressed to us, as Publishers of the AMERICAN JOURNAL OF MINING, by prominent and influential citizens of Mexico and the other Hispano-American Republics, pointing out the expediency of either translating our Journal into Spanish, or publishing a periodical in that language for circulation in those countries. These gentlemen have urged us to put the plan into immediate execution, and promised us their influence and personal support.

We have therefore resolved upon the issue of "EL CORREO HISPANO-AMERICANO," for the purposes set forth above; and we feel assured that the nature of the Journal itself, together with the facilities we possess for its publication, and the patronage already spontaneously offered and secured, will render it not only the best medium of publicity for the manufactures of the United States, but one which cannot be superseded in point of universal circulation, efficiency of advertising, and economy of terms.

It will at once be evident, that the "CORREO HISPANO-AMERICANO" will not, like newspapers in general, depend upon partisan or political beliefs for its popularity. Politics having no place in its columns, it will have no rivals, will be free from all shackles of party spirit or interest, and will be welcomed in all circles and by all classes as a real friend, the bearer of useful information on matters of vital interest to all. Hence, it cannot come into competition with political journals of the day.

Besides the matters of value to the Spanish American reader already enumerated, the CORREO will contain the most complete market reports, including the prices of all crude and manufactured materials in the production, exchange, or consumption of which its subscribers are interested. As the day of publication coincides with the sailing of the Pacific Mail Steamer, these reports, corrected to the last moment before going to press, will afford the very latest information which can be obtained, surpassing, in this respect, all other periodical bulletins of prices current.

We would respectfully submit the following facts for the consideration of

ADVERTISERS:

Our terms for advertising are 25 cents per line for each insertion on inside pages, and 40 cents per line for each insertion on the outside.

We feel confident that this tariff will meet the approbation of all concerned; and to those who have already advertised in the columns of South American papers, the difference offered in their favor by the "CORREO" will at once be apparent, especially when they reflect that, in order to secure an adequate advertisement, covering the ground offered by our new Journal, the "CORREO HISPANO-AMERICANO," they must have recourse to the columns of all the principal newspapers in all the chief cities of each Island and Republic. Now, there are no less than *forty-seven* such newspapers, charging at an average rate 5½ cents in gold (equal to say 7¼ cents in currency, at the present price of gold) per line for each insertion: that is to say, an advertisement of 10 lines costs for a *single time* $26.00 (Gold), or $36.40 (in currency). The same advertisement in the "CORREO HISPANO-AMERICANO" costs but $2.50 in currency, and gives, besides, a superior medium of publicity, and also an incomparably wider circulation than can be reached through the above papers; for the "CORREO" will circulate where those, for political reasons, if for no others, can never go, namely, Spain. There too our Journal will be received as the welcome harbinger of useful and profitable information for all classes of society, and chiefly for the mercantile, agricultural and industrial communities.

Need we mention the benefit advertisers will derive also from the considerable circulation the "CORREO" will have in the United States? This we deem superfluous, and so, shall add no more to the incontestable advantages already enumerated.

We hope our friends and the industrial community generally will make all possible dispatch in handing in their advertisements, for the time is now short for translation, &c., before the publication of the first number, January 10th, 1868.

TERMS OF SUBSCRIPTION.

$5 per annum, payable invariably in advance. Single copies, 15 cents.

The above prices are of course exclusive of postage.

All communications relative to the "CORREO HISPANO-AMERICANO" are to be addressed to

WESTERN & COMPANY, Proprietors,
37 Park Row, New York.

American Journal of Mining,

FOR 1868.

The Best and Largest Paper of the kind in the United States.

Of the numerous sources of wealth which this country possesses, none are more important, either in richness or extent, than her minerals. These have added largely to her prosperity, and afford a profitable means of investment for capital, and an extensive field for labor. THE AMERICAN JOURNAL OF MINING is acknowledged by the public and the press to be a faithful and accurate exponent of the important interests dependent on Mining, and to more fully meet the demands of circulating valuable and reliable information, it is now increased in size to sixteen large quarto pages, thus making it the largest paper devoted to mining on this continent.

It contains: Illustrated descriptions of the latest improvements in Mechanical appliances used in opening, working and draining mines; crushing and treating the ore.

Original Papers on Geology, Metallurgy, Assaying, Chemistry, and various Scientific subjects, contributed by able Scientists, in a popular style and with scientific method and exhaustiveness.

A Summary of Mining News, collected from all parts of the continent, and classified geographically and mineralogically.

Original Editorials, devoted to a review of the legislation affecting mining, to a denunciation of fraudulent speculation, to an advocacy of such measures as will advance the interests of miners or will increase public confidence in legitimate mining, and to a consideration of all other matters of value to those interested in mines.

Interesting Correspondence, giving the opinions of the public on topics of the day.

Miscellaneous Articles, culled from a selection of the leading scientific publications of Europe and America.

Reviews of New Publications on Science, Statistics, and other subjects immediately connected with the objects of the paper.

Reports of the Proceedings of the Polytechnic Branch of the American Institute, and other Scientific bodies.

Statements of the formation and progress of Mining Companies, of their meetings and dividends, assessments, &c.

A comprehensive and correct Market Review of Stocks and Metals.

Reports on the Slate Trade, now rapidly increasing in importance.

Coal Trade Reports that will be found to surpass in extent and accuracy those given by any other paper, comprising accurate tables showing the shipments of Coal over the principal roads and canals during each week, and the increase or decrease as compared with the same period of the preceding year, the prices of coal, home, provincial and foreign, the rates of transportation, and the various tolls.

Iron Trade reports and statistics, which, in point of completeness and accuracy, deserve the favor they have received. Each week contains carefully prepared statements of Iron imports, and productions in various sections of the country; Market prices in New York, Boston, Cincinnati, Pittsburg, and London; miscellaneous statements of great value, and special items of news invaluable to every Iron merchant or manufacturer, besides a correct and unbiassed review of the Market for the past week.

Reports on the Foreign Metal Markets.

Notices of Patent Claims interesting to Miners and Metallurgists, &c., and lists of Scientific Books.

The advertising columns afford a very full directory of the chief Manufacturers of Machines used in Mining, of Chemists, Assayers, Scientific Publishers, &c.

☞ As soon after the close of every year as possible there will be published in the AMERICAN JOURNAL OF MINING a complete and accurate review of each of the various Mining interests of the United States. These reviews will comprise carefully compiled statistics, which will show at a glance the progress, extent and operations of the whole country in every Mineral during the year past.

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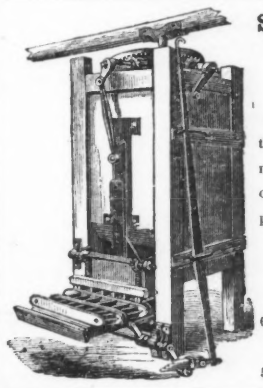

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The best, strongest and cheapest in the United States. We warrant it to make more and better Bricks than any other Machine now in use. It takes less power and help to run it.

Manufactured and sold by

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5:4:qp

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PURE WATER

PATENT LEAD-ENCASED TIN PIPE

Recommended by the medical faculty and approved by Water Commissioners.

COSTS LESS THAN LEAD PIPE, AND IS MUCH STRONGER.

Recent improvements enable us to supply this Pipe at a less price per foot than common lead pipe.

To furnish the cost per foot, please give the head or pressure of water and bore of pipe. Pamphlets sent free on application. Address the COLWELLS, SHAW & WILLARD MANUFACTURING COMPANY, foot of West 27th street, New York. 9 v4:6m

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THOMAS INGHAM,

BROKER IN PIG IRON, AMERICAN AND FOREIGN.

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Manufacturers of the

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This BAG-HOLDER is emphatically the Farmers' and Grain Dealers' friend. Does the work of two boys in holding a bag open, and with it a farmer can bag up grain, potatoes, apples, &c., as fast as two men in the ordinary way. Having large sales at the West, where first introduced. Retail price $5. Sent to any address.

THE SHINGLE BRACKET

is especially adapted for Builders, House Joiners, Masons and Carpenters. With it a scaffolding can be built in less time upon a roof and with greater safety, and taken down as quickly, without leaving a single nail-hole in the roof. Retail price $6 per dozen. Send for illustrated circulars on above. Orders promptly filled, at wholesale and retail.

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NEW STEAM COOKING APPARATUS,

which cooks all vegetables and meats together, without flavoring each other, and does away with all offensive odors. Saves Labor, Fuel and Time.

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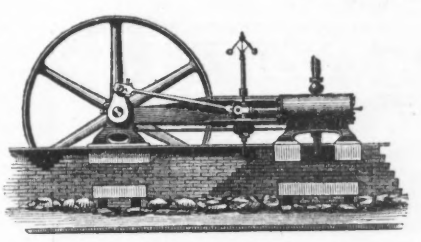

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Or at the Works in Brooklyn.

dec27.67:1y

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—MANUFACTURERS OF—

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205 & 207 EAST 22d STREET, N. Y.,

We are now prepared to supply the Trade with an extensive variety of our justly celebrated and very superior quality of

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AT THE VERY LOWEST MANUFACTURERS PRICES.

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Excelsior, or Walton's Favorite.

NEW YORK CLUB.

N. B.—These are packed one pair in a box,

THE PRIDE OF THE PARK.

LADIES' SKATES, with or without Straps. For sale by Dealers in Hardware. Orders may be sent to the manufactory, or to American Advertising Agency, 37 Park Row, New York, where samples and price list can be seen. Send for Illustrated Circular.

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Pre-eminently the best Piano ever constructed, unrivalled for tone, durability and elegance of finish. The Brooklyn Daily Times says: "It has in higher degree than any Piano that we have met with, the singing quality or character that musicians so much admire and seek for in a Piano; the bass notes reminding you of the deep-toned notes of a large organ. The middle octaves are more elastic and clear than in most other Pianos, while the upper or treble notes possess that pure, distinct, bell-like clearness that is so necessary to the correct rendering of difficult pieces of music, and that also lends such a charm to melody." Professor J. M. Abbott, organist of the Church of Our Saviour, in Brooklyn, says: "For elasticity of touch, for the singing quality so much sought for by artists, and for richness and purity of tone, it is unexcelled by any Piano I have ever used." Professor John W. Henry Canoll, editor of the American Educational Monthly, says: "* * * *, * Listen, however, to one of another class, for example, one of the Arion Pianos, made by Manner & Co.; how your head as the bass sends forth its riches, clear and unblurred; observe the singing, swelling melody that in its middle octaves so wondrously represents vocal expression, and which predominates above even the silvery brilliancy of the upper treble; then reflect that this is a scientifically constructed and durable instrument." * * *

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He refers to the Hon. Stephen J. Field, Associate Justice of the Supreme Court of the United States.

Jan. 1, 1867 13:12:qp

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Insulated Wire for Telegraph, Mining and Blasting Use.

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4-4-qp-q

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ATTENTION, LUMBERMEN!

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Is making both inserted and solid teeth Saws, that are preferred by those who use them above all other makes.

For further particulars send to Factory, 67 and 69 Laurel street. dec7:ps

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These saws are meeting with unprecedented success, and their great superiority over every other kind, both as to efficiency and economy is now fully established,

ALSO,

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(All Gumming avoided.) And

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The advantages which these Governors possess, are that the engines to which they are attached, will maintain a

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whatever may be the resistance of the work, or how suddenly it may be thrown on and off. The engine will run uninfluenced by the varying pressure of the steam, be it thirty or eighty lbs. In a moment's time the revolutions of the driving wheel can be changed to exactly the speed require.

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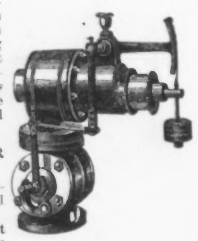

any of the mechanism, remaining perfectly governed wherever set.

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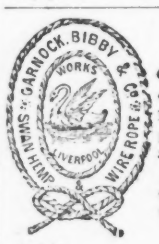

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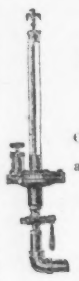

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