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What Are Cyclones?

Prof. MAURY says in *Popular Science Monthly* that the word cyclone has frequently, but incorrectly, been used as significant of an enormous or very violent meteor, as if its application were to be confined to the devastating hurricane of the West Indies or the terrific typhoon of the China seas. It simply means a storm which acts in a circular direction, and whose winds converge, by radials or sinuous spirals, towards a center, moving in our hemisphere in the opposite direction to that of the hands of a clock, and in the southern hemisphere in a contrary direction. Taking this as the definition of a cyclone, it seems clear, from observation alone, that all storms are to be regarded as cyclonic. Volumes have been written to prove that this is not the case. But we have only to examine a few series of weather-maps from week to week, to see that, wherever you have an area of low barometer, into its central hollow the exterior atmosphere from all sides will pour, and that in so doing a rotatory spiral or vorticose storm is generated. The tornado, the simooms, the dust whirlwind, the fire storm, even the slow and sluggish storm which moves on our western plains as the laboring wheel of the steamship buried in a heavy sea, all attest that a body cannot move on the earth's surface in a straight line. It is not more true with us that the Gulf Stream turns to the eastward, the Polar Stream to the westward, and the equatorial currents to the northward, than that every air-current, in obedience to the same law should turn to the right of the line along which, from any cause, it is called to move. The meteorist has therefore only to ascertain by observation where the barometer is lowest, to know at once the direction of the winds from the circumjacent districts, far and near, or at least to test the mathematical law by a grand experiment.

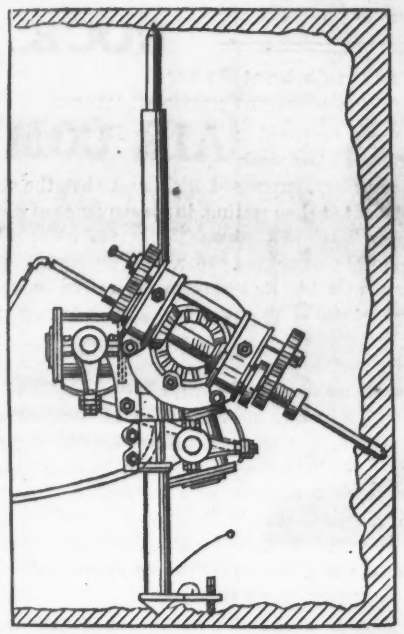
The Diamond Drill and its Work.

We suggested some months ago that it would be well to form a company for doing general mining work, and there is no doubt that in the progress of mining and smelting in this country such companies will play an important part. There is already one company of the kind in existence. The American Diamond Drill Company, of 61 Liberty street, New York, in addition to the manufacture and sale of the implement from which they take their name, undertake the prospecting of mineral lands and quarries and the boring of artesian, salt, and oil wells upon contract, at a stipulated price per foot; the execution of railroad, mining, and engineering rock-work of all kinds. They say, and with good reason for the assertion, that a company which makes such work a specialty should be able to "afford mining corporations, engineers, etc., a cheaper and more satisfactory and expeditious prosecution of their enterprises than has hitherto been offered."

Their intention is, of course, to use the diamond drill as a main dependence. The use of this tool seems to be almost synonymous with increased prosperity and intelligence in mining. Such great works as those at St. Clair, Pa., the Sutro tunnel, the old Girard tunnel, near Shamokin, Pa., the sub-aqueous blasting works of the government engineers, and many other important enterprises have had, are having, or will have the diamond drill in use. Considerable experience of a valuable kind has been collected in prosecuting these works, and every day some new question comes up in attacking some new rock, or working under new conditions. When General PLEASANTS began his work the whole question of blasting out shafts by means of continuous drill-holes, three hundred feet deep, was still to be decided. When that had been settled it was thought doubtful if that which was successful in the stratified rocks of Pennsylvania would do equally well in homogeneous eruptive rocks. That question, too, was practically decided, and in Pennsylvania.

The old Girard tunnel, near Shamokin, was run through the coal conglomerate, which every one knows to be of maximum hardness and maximum thickness. The drill-holes were put in horizontally and entirely in rock without seam. At first the tough and hard conglomerate refused to blow out well in the center holes. The engineers were of course determined to make it work, and put in large charges of dynamite and dualin. But they found that the larger the charge the less the rock blew out. The charges only served to enlarge the two-inch holes to the size of a hat, and failed to bring out the rock between the drill-holes, so that the outer charges had no "mining" to blow against. It was evident that the instantaneous action of the nitro-glycerine crushed the rock in the immediate neighborhood of the charge, and did not spread its force far enough. Observing this the engineers lessened their charges, and finally brought them down to a point where the center rock came out without difficulty. Since that they have had no trouble.

The Drill Company suggested that for rock of that kind, where there were no seams for the powder to pry open by its explosion, it would be better to sink no center holes, but only the outer ones. These could be filled with sand, and small holes sunk in the center to a depth of 3—5 feet, or more, as might be best. These center holes could be run diagonally, so as to throw out a cone-shaped mass, and leave a crater to form the "mining" of the deep holes. These center holes would have to be sunk after firing each charge. They can be put in by hand, but the company proposed to use their No. 2 mining drill, a small machine of about four hundred pounds weight. This is illustrated in the accompanying cut, and it will be seen that it is easily moved and especially designed for setting up in any possible situation. Two men can carry this over the rocks and set it up as soon as the center space is clear. It can bore in any direction, and by its use the toughest rock can be overcome. This mode of working was not pursued in the Girard tunnel, because it was not suggested until that work was through, or too far advanced to make a change desirable, but we believe the engineers who conducted it thought the method a good one.



The records of General PLEASANTS' work show how rapid and efficient these machines are. In 58 working days 6,357½ feet was drilled. The number of machines averaged two and eighth-tenths per day. The average number of feet drilled per day was 106, and the average number of feet by each drill was about 38. In a few months we shall be able to compare this with the records of the shafts on the Sutro tunnel. The rock there is a tough propylite and trachyte. It is the intention to put down deep holes, and the work will thus present, in igneous rock, an exact parallel to what has been done at St. Clair in sandstones. The comparison will be the more valuable for the reason that the Sutro machines have been made by ALLISON & BANNAN, of Pottsville, who made those for General PLEASANTS, and are of the same pattern, though of course embodying the improvements of his later machines.

The diamond drill is used quite largely by the government. The works at Hallett's Point, or Hell Gate, near New York, have been made famous by frequent descriptions. Something of a similar kind, though in some respects more difficult, is going on at Rocket's reef, in the James river, below Richmond, Va. The object of the work is to widen the channel. Two diamond drills are used there. United States Engineer TURPIN reports that, with 2½-inch drills, he has been able to bore perfectly circular holes, in a direction at right angles to the current, and inclined to the horizon. The machine was placed as much as 25 feet from the rock. Under these circumstances, much of the rock being that known as James river granite, the average progress of the bit has been 3 feet per hour, where the character of the work was unknown, and the drill was run at low speed. When the rock was known, and a higher speed could be used, as much as 5 feet an hour has been made. The repairs have been trifling, and due mainly to carelessness or want of experience. The aggregate penetration exceeds 1,500 feet, and the engineer expresses himself as exceedingly well pleased with the tool. He says, in a note to the President of the Company, "They (the

drills) have met my wants fully, and succeeded where other patent drills failed most signally to accomplish anything worth mention."

It is only lately that the diamond drill has been introdnced into the Western mines. In the South Anrora Company's mines it did its work perfectly well, and worked poorly below 500 feet, for the simple reason that the Snperintendent did not provide an engine of sufficient power. The use of the drill there as a means of exploration has attracted great attention, the character of the deposit not promising much for the operation. Still, the Superintendent thought that the ground opened by the drill was thoroughly explored. Another drill is in use in the tunnel of the Union Gravel Company, Columbia Hill, Nevada County, Cal. This is run by a "hurdy-gurdy" wheel, or small, narrow undershot, running with great velocity; a system which Mr. SUTRO proposes to adopt in his machines. The rock is very hard, but blows well, and the tnnnel advances at the rate of 2½ feet a day—a progress which delights all who are acquainted with the circnmstances.

Another deep shaft is going down by the aid of this tool. It is at the Princess Alexandra mine, Hillsborough, New Brunswick. This shaft has been sunk 1,040 feet withont accident, and the success of the work there indnced the Dominion government to purchase a drill.

As to the future work of the drill, it will undonbtedly have a veey wide nsefulness. Professor PUMPELLY, State Geologist of Missouri, advises each connty in that State to obtain a diamond drill and prospect, not for minerals, but for geological sections; and the snggestion is so good that it will probably be adopted. The company has recently furnished twelve machines for the Callao, Lima and Oroya Railroad, of Peru—a road in process of construction by Mr. HENRY MEIGS for the government of Peru. Eight of these machines were tunneling drills, and are to be used to drive a tunnel 16,000 feet above the sea level. These machines had to be made in parts weighing not more than 300 lbs. each. We have before spoken of this tunnel—the highest in the world, and a task of great magnitude.

From what we have said it will be seen that the diamond drill is playing a great part in the mining work of this country. It is destined, beyond doubt, to play a still greater part, and from the slowness of the Europeans to perceive its merits it bids fair to form a peculiar feature of American engineering.

Professor Rankine's Last Paper.

THE USE OF COMPRESSED AIR FOR ACTUATING MINING MACHINERY.

The following is a report of the paper prepared by Professor RANKINE in the last week of his life, to which we referred last week:

Professor RANKINE, through the secretary, expressed his regret that the state of his health prevented his being present at the meeting, in consequence of which the few remarks which he now begged leave to send would be made withont the advantage of having previously heard Mr. SIMPSON's paper. He understood that one of the questions to be considered would be that of the comparative economy of compressed air and wire ropes in transmitting power to places below ground for the driving of coal hewing or other mining machinery. He thought that it was almost, if not quite, impossible to give a decided answer to this question, which shonld be nniversally applicable; and that individual cases, or classes of cases, would have to be decided each on its own merits. From ordinary experience of rope haulage on mineral railways, the waste of power may be roughly estimated at abont 20 per cent. in a mile. On the other hand, in transmitting power by means of compressed air, there were great and nnavoidable losses of power in the air-compressing engine, arising mainly from the waste of the heat developed by the compression of the air. Those losses had seldom amounted to less than from 65 to 75 per cent. of the whole power of the compressing engine; and it could be shown that in extreme cases they might even exceed 90 per cent. On the other hand, the part of the loss of power whi·h arose from the friction of the air in the pipe, and which, therefore, increased with the distance to which power had to be transmitted, was comparatively small with well proportioned pipes, and might, he thought, be reduced to about 10 per cent. per mile.

From these reasonings, it appeared probable that wire ropes were the more economical means of transmitting power for short distances, and compressed air for long distances. He could give no opinion as to the probable value of the distance at which those two means were equally economical; but no donbt the information given by authors so able and experienced as Mr. SIMPSON would greatly contribute towards the answering of this question in a satisfactory manner.

For comparatively early information as to the transmission of power by compressed air, he might refer to two papers which had appeared in the Transactions of the Institntion of the Mechanical Engineers, one by Mr. CHARLES RANDOLPH in 1856, the other by Mr. NICHOLAS WOOD in 1858.

There was an advantage peculiar to the nse of compressed air which deserved serious consideration. It was the ventilating and cooling effects of the air discharged from the underground machinery. He might mention, in conclusion, that the best economy in compressed air apparatus was obtained by the nse of moderate pressnre; for with these the heating effect and consequent waste of power were moderate.

It may here be explained that when loss of power is stated at a certain percentage per mile—say, for instance, 20 per cent. per mile—that does not mean 20 per cent. of the whole original power on each mile; but 20 per cent. of the actual power in the first mile—20 per cent. of the power remaining after rednction in the second mile—20 per cent. of the power remaining after the second mile in the third mile, and so on.

It may also be explained that the two rough estimates of losses of power already given are based upon ordinary experience with the ordinary apparatus. There is a special form of apparatns in the case of rope traction in which the loss of power per mile, according to public accounts of experiments made in France, is between 1 and 1¼ per cent. only; bnt in that form of apparatns the rope which is hnng above ground at any required elevation has large supporting pulleys at intervals of abont 500 feet, between which it hangs down in curves with a deep deflection; whereas on mineral railways the usual interval is little more than 20 feet.

On the other hand, the loss of from 65 to 75 per cent., which occnrs in air-compressing engines, exceeds many times the loss theoretically due to the waste of heat; and we may therefore expect to see it greatly diminished through the gradnal improvement of the machinery.

Spiegeleisen.

This kind of pig iron which has become quite indispensable for the Bessemer steel process, has been for a long time made at the iron works of Schisshyttan, near Smedjebakken, in Sweden, from magnetic iron ore containing 13 per cent. of manganese, with English coke, and, though the fuel is very costly, the smelting pays well, the mine being close to the top of the furnace. This property last summer was transferred to the hands of some German capitalists. The principal locality, however, whence spiegeleisen is derived, is the county of Siegen, in Prussia, where very fine steel ores, carbonates, and hydrates of iron, with a large percentage of manganese, are prodnced at Stahlberg, Brüche, and Wildermann, near Müsen; Bantenberg, Einigkeit, and Kunst, near Bürbach, and Storch, and Schöneberg, Honigsmund, Eisenzeche, Alter Hamberg, Gilberg, Grimberg, Flossberg, Driesbach, Grauebach, and others near Siegen. All these ores are calcined in kilns before being smelted with charcoal, or coke, or both mixed, for spiegeleisen, steel pig, or Bessemer pig. When smelted for spiegeleisen the charge is composed of 1,700 lb. of calcined Siegen ore, 600 lb. red hematite, 1,000 lb. limestone, and 1,500 lb. coke or charcoal, and it is produced at an average cost of £5. 15s. per ton of 1,000 kilos. When steel pig for pnddle steel is made from it, the burden consists of 1,150 lb. of Siegen ore, 800 lb. red hematite, 350 lb. tapcinder, 1000 lb. limestone, and 1250 lb. coke, and it is prodnced at an average cost of £4. 17s., and is a very clean white forge pig. For the production of dark grey Bessemer pig the mixtnre is made of one-third Siegen ore, one-third red hematite, and one-third specular iron ore, which is found in that conntry of excellent quality. The charge is fluxed with a large qnantity of limestone, say about 42 per cent., and reqnires from 100 lb. to 200 lb. of coke more per ton than spiegeleisen. The smelting temperature is kept very high. The pig iron, when in a liquid state, shows on its surface a pecnliar change of groups of figures, which is the characteristic of spiegeleisen, and is the first indication of crystallization. The slag is, outside, in a vitreous state, of blueish or violet color, with a more stony or crystalline interior of a yellowish brown tint. The cost of producing Bessemer pig is 6s. to 7s. per ton less than for spiegeleisen.—*Engineering.*

Notes on a Metallurgical Journey in Europe.

BY JOHN A. CHURCH, E. M.

FREIBERG, CONTINUED FROM PAGE 52.

This operation is not one to be imitated except under peculiar circumstances, for it is so costly and its product of so little value, that the proceeds hardly more than cover expenses. At Freiberg, it is valuable for other reasons than pecnniary profit. One of the greatest defects of the Freiberg ore was formerly its lack of iron, a want which was one of the reasons that in former times led to the adoption of a reverberatory furnace process, after a trial of the shaft furnace had failed. Freiberg produces iron pyrites mixed with zinc, but this source of iron was useless until this method of eliminating most of the zinc, was discovered. To merely roast the ore and add it to the charge in the shaft furnace would cause the entrance of so much zinc into the slag that it would be both pasty and nearly infusible. But by distilling the zinc off, a residue rich in iron and comparatively poor in zinc, is obtained; and this forms a very acceptable addition to the lead ores.

REGULAR SERIES OF OPERATIONS.

From all the above operations we have the following products:

1. From Sulphur ores—Roasted iron pyrites containing some lead, copper and silver.
2. From Arsenic ores—Roasted residnes, having in the main the composition of roasted iron pyrites and still containing a certain proportion of arsenic, together with lead, copper and silver.
3. From Zinc ores—Dezincing residues, forming a slag, which contains much iron, 8—10 per cent. zinc, with lead, copper and silver; also a speise containing very much arsenic with iron, copper, lead, cobalt and nickel.

Besides these, the following ores remain for treatment: 1. Galena ores. 2 Lead bearing ores; (the average of the two is barely 40 per cent. lead and 0.15 per cent., (43¾ oz.) silver.) 3. Copper ores. 4. Dry ores.

The treatment now becomes that known as the Roasting and Reduction process; the ores being first roasted to a silicate and then redneed in the shaft furnace. In the former operation various purchased materials containing gold and silver, together with the residues from arsenic glass are added, and the products

mentioned above serve as flux in the blast furnace. It is for this reason that the ores from which they have been obtained have received the name *Fluxes*. The first step is to make the "ore-mixture" for roasting. This is done by spreading out in thin layers, one upon the other, the different lots of ore, so that by cutting the mass down vertically, the charges taken daily for the furnace will have a pretty uniform composition. This is of great importance in its effect, both upon the roasting and also upon the regular working of the shaft furnace. The mixture contained in 1867 :

60·645	lead ores.
18·114	"dry" or silver ores.
1·703	copper ores.
7·759	foreign ores.
11·779	purchased products and flux.
100·	

It contained on the average 0·2425 per cent. silver (70⅞ oz.), 29·08 per cent. lead, and 0.156 per cent. copper.

Roasting :—The mixed ore, which is in the state of powder, is roasted in the reverberatory furnaces before mentioned. Experiment has proved that a hearth of 47 feet length, and a grate of 25 inches width, is sufficient to insure a thorough

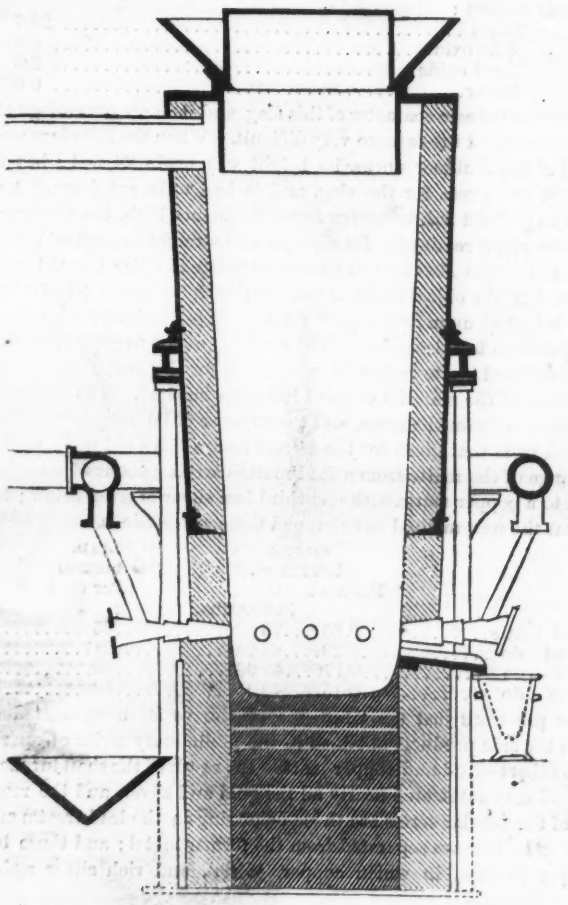


Figure 10.--Shaft Furnace at Freiberg. Vertical Section.

use of fuel with the above mixture of ores. The charge is made in posts of 1,650 pounds each, which are introduced every three hours, so that a furnace roasts 13,200 pounds in twenty-four hours. The thickness of the layer of ore is six inches. It should be remarked, however, that the new single hearth furnace, at the Halsbrücke works roasts 21,120 pounds daily: A great difference in the amount of labor is also apparent. The 76-foot, double hearth furnaces require eight workmen to twelve hours ; the 47-foot furnaces, five men. Fuel amounts to 22½ per cent. of the ore, but the coal is of very poor quality and will average 20—25 per cent. of ash. Well roasted ore contains 3—5 per cent. sulphur, and rarely reaches 6 per cent The ore is thoroughly fused and comes from the furnace as a silicate.

Reduction takes place in the octagonal or "Piltz" furnace as it is named after its inventor. This was as first made octagonal, but new ones are to be round. The earlier forms were wider at the top than at the bottom, but the new ones are to have straight sides. The new furnaces then will differ from the old 7-tuyere Stolberg furnaces only in having one tuyere more, in having tuyeres on all sides, (and therefore, being cooled on all sides,) and in being closed at the top ; their lower walls are only one brick thick, but this is a matter of convenience only and cannot have any material effect upon the working. Thinness of walls, in fact, has no other effect than to cool the hearth and thus prevent its rapid destruction.

The furnace is built in two parts. The upper part is built of any hard brick, is surrounded by a shell of strong sheet iron, and is carried upon eight iron columns. It stands 4½ feet above the sole of the hearth. Its shape being conical, and the base of the cone forming the top, the lining rests upon the iron shell, but the lower courses are also kept in place by a ring which is fastened to the shell by means of an angle iron.

The mode of supporting the shell upon the iron columns is somewhat peculiar. On four of the eight sides, a strip of angle iron is bolted to the shell. These rest upon an I beam bent to a square with rounded corners ; and this I beam rests on the columns. The columns are not placed equi-distantly around the furnace, but are assembled in pairs on those sides where the angle iron is bolted on. At the level of the distributing air pipe brackets are placed on each side of the columns. Those on the outside carry the distributing pipe. Those next the furnace, bear against angle iron knuckles which are bolted to the shell, on those sides which do not carry the angle iron strips further up.

The top of the furnace is formed by a round iron hopper or cone, the opening of which is about 20 inches less than the diameter of the furnace. From this an iron cylinder projects into the furnace, leaving an open annular space of seven inches between the cylinder and the lining. The top of this cylinder is closed by a plain cylindrical sheet iron cup, resting on the inner surface of the hopper. The discharge flue is placed in the side immediately opposite the cylinder.

The charge is made in the hopper, around the cup, and is thrown into the furnace by raising the cup. It falls into the cylinder, and thence passes to the body of the furnace. The gas produced by the combustion of the fuel not being able to leave the furnace by the throat, collects in the annular space around the cylinder, and passes off by the flue. The flue is lined with firebrick, three inches thick.

This, as will be seen, is an old form of charging apparatus, well known to iron smelters. Other methods are also in use at Freiberg, in which the gas passes off by a central pipe, running through the cup. The reason for making the change was, that the system of flues is not sufficiently large for the work it has to do and the furnace sometimes failed to draw. The central pipe permits a direct discharge into the atmosphere whenever necessary.

The foundation is carried deep into the ground, and is surrounded by 2-inch plates of cast-iron. It consists, in fact, of an 8-sided iron box, lined with masonry. The center is filled up with slag, rubble, clay and bricks. Upon the masonry the hearth walls are built ; and the hearth material, composed of clay and coke slack is laid on the bricks.

From this description, it will be seen, that the effective height of the furnace, that is, the height through which the products of combustion act on the charge, is that from the sole to the lower edge of the cylinder, or fifteen feet four inches.

The dimensions of the furnace, reduced from French measure, are as follows :

Height from sole to top	17	feet	10	inches.
" of cylinder	2	"	6	"
" of slag discharge over sole	1	"	2	"
" of tuyeres over sole	1	"	9½	"
Diameter at tuyeres	5	"	1	"
" at top	6	"	5	"
" of cylinder	5	"	3	"
" of tuyeres	0	"	2½	"
Number of tuyeres (water cooled)	8			
Hopper ; Height	1	ft.	9	in.
Diameter at top	8	"	9	"
" at bottom	4	"	8	"
Cup ; Height	2	"	4	"
Diameter	5	"	0	"
Blast pipes ; Diameter of distributing pipe (interior)	1	"	0	"
" of nozzle pipes	0	"	6	"
Discharge flue ; Diameter (interior)	1	"	3	"
Reception basin ; Diameter	4	"	0	"
Depth	1	"	5	"
Slag pot ; Height	2	"	1	"
Diameter	1	"	6	"
Columns ; Mean Diameter			6½	"
Height	14	"	2	"

The charge for the furnace is made up in layers like the ore-mixture, only no so carefully. Messrs. KAST & BRÄUNING give the following as its composition :

Roasted ore	100
Raw matte	15
Roasted pyrites from the kilns	15
Slag from the same operation	80—100
	210—230

But generally other products are worked into the charge such as arsenic residues, zinc residues, lead bearing products and purchased material, containing gold. Two furnaces (Stolberg) were in September, 1869, running on the following mixture of ores and products.

	I.	II.
Roasted ore	100	100
Slag from same operation	150	113.6
Raw matte	20	
Gold scraps	1·25	
Dezincing residue		10·9
	271·25	224·5

Freiberg ores contain gold, but in too small quantity to pay for extraction alone. But by increasing the proportion through the addition of gold scraps the

whole is obtained. We have already seen that the material treated in 1869, contained as much as 106 pounds of this metal.

Products :—Lead, containing 0·5 per cent. (146 oz.) silver.

Matte, 0·2 per cent. (58½ oz.) silver, 25 per cent. lead, and 6 per cent. copper.

Slag, 0·005 per—0·010 per cent. (0.6—1 oz.) silver, 5 lead.

Flue dust forms 1½ per cent. of the ore. It contains 0.005—0·01 per cent. silver, and 37—40 per cent. lead.

Of coke, containing 15—20 per cent. of ash, 10—11 per cent. is used. The pressure of blast is ¾—1 inch of mercury or ⅜—½ pound per square inch. One smelter, two chargers, and two to three slag men are required to each shift.

Although the amount of silica in the charge is less than is considered advantageous in most lead works, no effort is made to increase it, but on the contrary basic fluxes—limestone and fluor spar are added. The result is a slag which is but little above a proto-silicate. The regulation of the charge depends upon the amount of zinc present. To avoid the formation of an infusible zinc slag, the proportion of sulphur is kept up, either by not roasting the ore completely or by adding raw ores or matte. This insures the passage of part of the zinc into the matte while another part unites with the slag. The amount of zinc present also

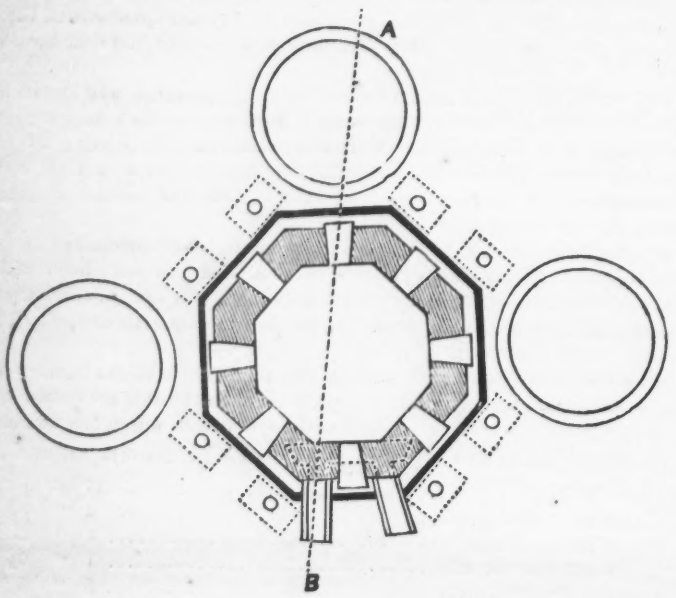


Figure 11.--Horizontal Section.

influences the proportion of slag repassed. At Halsbrücke, where the ores contain less zinc, the charge of slag from the same operation, is but one-half that used at the Mulden for zinciferous ores. This slag, according to Messrs. KAST & BRÄUNING, contains :

Silica	31·15	Barium Oxide	3·58
Iron oxide	41·31	Manganese oxide	2·10
Zinc oxide	7·85	Lead oxide	1·47
Alumina	3·18	Copper suboxide	0.16
Lime	6·45	Sulphur	1·85
Magnesia	1·06		
			100·17

The slag is received in conical iron pots. A certain amount of the lead and matte contained in it settles to the bottom and the points of the cones are broken off and sent at once to the next fusion. The amount of material treated in the lead process in 1867 was 18,359 tons, made up as follows :

9,071 tons lead ore.
3,330 " dry ore and copper ore.
5,303 " products containing iron (chiefly from the Preliminary Series of Operations.)
384 " arsenic residues.
270 " iron ore.

THE TREATMENT OF THE MATTE.

The matte is roasted in kilns or stamped and roasted first in the Gerstenhöfer furnace, and when it is desired to reduce the amount of sulphur, in the reverberatory furnaces also. It is then smelted with the addition of slag from the first fusion.

The operation is in fact a treatment of the first slag with addition of the matte, and it exhibits in the strongest manner the peculiarities of the Freiberg methods. Though the matte is altogether basic, little acid flux is added ; and even the slight amount of silica added, is swallowed up by the limestone and fluor spar which constantly form part of the charge. The aim is to produce a very basic, thin slag, which on account of its fluidity will allow the matte and lead to settle as perfectly as possible.

The charge varies very much, for this fusion is the general outlet of whatever the works afford of basic products. Messrs. KAST & BRAUNING give the following as a specimen : They, it will be observed, base the charge upon the amount of first slag it contains. This view is certainly correct, as this slag forms by far the largest part of the charge, and the operation is really a refusion of slag.

Slag from first fusion	100·0	Speise	1·0
Copper slag	4·0	Dezincing Residues	1·0
Copper matte raw	2·3	Limestone	2·0
Lead matte roasted in kilns	4.3	Fluor spar	2·0
Lead matte roasted in kilns and stalls	8·4	Hearth, etc	7·2
Pyrites	9·0		141·2

Thus, matte and ore form but 26 parts to 100 slag. On September 16, 1869, the charge was :

First slag	100
Roasted first matte	20
Fluor spar	10
Copper slag	5
	134

Labor and pressure of blast are the same as before. Of fuel 13—14 per cent. is consumed, equal to 17—18 per cent. of the slag ; or 70—75 per cent. of the matte and ore.

Products :—Lead=0.15—0·18 per cent. (44—52 oz.) silver.

2nd matte—0·10—0·20 per cent. silver, 21 per cent. lead, and 15 per cent. copper.

2nd slag=0·002 per cent. (½ oz.) silver, 1·5—2 per cent. lead. This slag is thrown away.

There are no full analyses of the slag, but the proportion of some of its constituents is as follows :

Silica	29·7
Zinc oxide	8·5
Lead oxide	2·5
Silver	0·0025

The extremely basic character of this slag, and its large percentage of zinc, make the management of the furnace very difficult. When the Piltz furnace was first introduced at the Muldner works, its height was made 22 feet ; but its reducing action was too great for the slag, and it had to be cut down. A new furnace which is to be built will be eleven feet eight inches high, the diameter of five feet four inches being retained. Its sides will be straight instead of inclined.

Third and Fourth Fusions :—The second matte is twice roasted and resmelted with first slag, the object being to concentrate it to about 23 per cent. copper, when it is looked upon as a copper matte. These fusions form successive steps in the operation last described. The working of the furnace is not stopped, but a second or third matte is merely substituted for the first, for a few days, or until the whole of the material at hand has been smelted. The other constituents of the charge remain the same, and the expense of labor and fuel is not to be distinguished from that given for the second fusion. An old table, showing the gradual change of the matte from a lead matte carrying about 57 ounces of silver to the ton, to a copper matte with one-third less silver is given below ; but it is very likely that the new method has changed these proportions.

	SILVER. Decreases. Per cent.	Oz. in 2000 lbs.	LEAD. Decreases. Per cent.	COPPER: Increases. Per cent.
1st matte	0.25	73	25	6
2nd do	0·23	66·24	21	15
3d do	0·17	48·96	13	32
4th do	0·15	43·75	13	42

In the processes just described, the ores have all been treated and resolved first into the side products obtained in the preliminary series of operations ; and into two others—lead and copper matte—the result of the shaft furnace treatment. In the lead is concentrated nearly all the gold and silver, and the remaining operations of the regular series are those belonging to the lead treatment, by which the gold and silver are separated from the former metal ; and those belonging to the copper process, in which copper, vitriol, and rich silver residues are obtained

TREATMENT OF THE LEAD.

The lead obtained in the foregoing operations contains a very appreciable amount of iron, copper, arsenic, and antimony. It is all refined by heating in a reverberatory furnace, with admission of air. The above metals are all more oxidizable than lead, and a product is obtained in which they are concentrated. This is used to make hard lead, while the refined metal goes through the Pattison process, for the extraction of its silver. The latter process has been so often described, that it will not be followed here. Fourteen kettles are in use, each of 27,500 pounds capacity ; concentration proceeds on the one-third system, and poor lead is obtained with 0·0015 per cent. silver, and rich lead of 1·5 per cent.—1.8 per cent. (437—505 oz.) silver. The consumption of fuel in twenty-four hours is 4,220 pounds.

Refining :—Two furnaces are in use, one shallow and one deep, the dimensions having a marked effect upon the consumption of fuel.

The shallow furnace treats 10 tons in 24 hours, with 2,200 pounds coal.

The deep " " 13·6—16 tons " " 1,320—1760 pounds coal.

In spite of this extreme difference in fuel, the saving by the deep furnace is, at Freiberg, but a few cents to a ton of lead; the coal being very cheap.

Products :—Lead, containing 0·6 per cent. (175 oz.) silver.

1st. Abstrich, which amounts to about 19 per cent. of the charge. It contains a great deal of lead arsenate and antimonate, and a little copper and iron sulphide.

2nd. Abstrich, forming 10 per cent. of the charge, and containing but little arsenic or antimony. This is returned to the first fusion for lead.

TO BE CONTINUED.

THE COAL TRADE.

NEW YORK, Jan. 30th, 1873.

The Scranton sale fully answered the expectations of those who hoped to see coal advanced in price. Indeed, it could hardly have failed to advance in the face of the higher rates made by the companies and published in this journal last week. The official averages are not yet made out, and the following may possibly require amendment next week.

10,000, steamer	$4 10	to	$4 12½
18,000, grate	4 25	to	4 35
15,000, egg	4 32½	to	4 35
27,300, stove	5 02½	to	5 10
7,850, chestnut	3 87½	to	3 95

The averages as made up, show the following comparison with those at the last sale.

	January.	February.	Increase.
Steam,	$3 75	$4 11¾	63¾c.
Grate,	3 90	4 27½	37½c.
Egg,	4 08	4 34¼	26¼c.
Stove,	4 77½	5 04¼	26¾c.
Chestnut	3 59½	4 00½	41 c.

The average advance is, therefore, thirty-nine cents. The Lehigh Coal Exchange makes the following prices.

Lump	$5 00
Broken	5 20
Egg	5 20
Stove	5 50
Chestnut	4 60

This advance of 34 cents will put up the tolls on Lehigh to the amount of 13½ cents or 40 per cent. on the advance. Higher prices have come sooner than was expected. There is nothing in the state of the market to warrant such an advance, and it is the act of the managers alone. We have before expressed our opinion that increased prices were not only inevitable, but would also be perfectly fair. The movement is accepted by dealers as a matter of course, and the public will find that there are sound reasons why coal should be dearer this year than last. The daily papers continue to discuss the question from the standpoint of popular sympathy, but they would do better to learn and tell the truth about the coal business as it has been during the last twelvemonth. Trade is reviving a little, but continues to be very quiet, as usual at this season. Though the winter is a hard one, and heavy snow storms are the feature of the day, and promise to last much later than they have for several seasons, there is no apprehension of a short supply.

Some very lively letters on the subject of the Reading controversy have appeared during the week. Mr. GOWEN is sharply attacked, and has to answer a thrust from one side or the other pretty nearly every day. He has one advantage of his opponents—he holds the reins, and whatever comes from him must be looked upon in the light of good-natured acquiescence in the demand for justification of his acts, rather than as forced from him. His schemes which have been maturing for years, were deeply laid, silently wrought out, and they have every prospect of success. He may fairly claim the honor of striking the most decisive blow ever dealt in the peculiar battle which he is waging. Certainly it is the last great movement of the kind which can affect the anthracite trade, and it will probably have the effect of ending forever the extreme low prices which have occasionally prevailed during past years. The business of anthracite mining is now practically confined to a few controlling companies, who may be counted on the fingers. The future price of fuel depends on them, and though they may, and probably will, not act recklessly, very slight moves on their part will have a great effect upon industry, and the comfort of the people. The dead lock in bituminous coal has increased, and its effects are decidedly serious. Prices are quoted at $9 in New York, but there is no coal to sell, and quotations are merely nominal.

Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Jan. 25, 1873, compared with week ending Jan. 27, 1872.

COMPANIES.	1872. Week.	1872. Year.	1873. Week.	1873. Year.
C. & O. Canal	..	....	....	....
B. & O. R. R.	18,709	68,418	19,048	68,599
Penn. S. Line	....	.....	1,365	5,666
H. & B. T. R. R.	6,151	17,941	6,151	25,281
*Harrisburg & D.	8,189	71,750	7,957	39,359
*L. V. R. R.	....	....	488	3,329
P. & N.Y.C. & R. Co.	5,204	43,953	4,793	39,254
Cumberl'd Branch Canal	....	....	....	....
" Railroad	....	....	2,449	4,089
Total	38,253	202,062	42,251	185,577
		185,577	38,253	
Decrease		16,485		
Increase			3,998	

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Jan. 25, 1873, compared with the week ending Jan. 27, 1872.

COMPANIES.	1872. WEEK.	1872. TOTAL.	1873. WEEK.	1873. TOTAL.
*Phila & Reading R.R†	48,957	402,909	59,110	468,149
*Schuylkill Canal	...	13,356	...	6,594
*Lehigh Valley R. R.	45,038	436,223	46,491	357,599
Lehigh & Sus. R. R.	31,092	99,782	35,778	125,596
Lehigh Canal	....	....	....	....
Scranton North	12,873	51,276	11,562	43,871
" South	35,561	164,276	34,114	126,372
Penn. Coal Co., rail	18,989	67,515	13,631	55,015
" " " canal	....	...	....	....
Del. & Hud. Canal Co.	....	....	....	....
" " East	10,640	49,066	5,163	27,329
" " West	8,565	28,384	7,918	28,693
" " South	7,693	28,704	6,872	23,757
Shamokin	5,986	21,941	8,209	34,756
Trevorton	....	.....	....	....
Lykens Valley Coal Co.	....	....	....	....
Wyoming North	....	.....	....	....
Wyoming South	....	.....	....	....
P. N. Y. C. & R. R. Co.	....	....	8,158	76,743
Williamstown Col'y	....	....	....	....
Big Lick Col.	....	....	....	....
Total	225,394	1,358,432	236,806	1,374,474
1870			225,394	1,358,432
Increase	..		11,412	18,042
Decrease				

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

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

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending January 25, 1872.

	Week. Tons. Cwt.	Total. Tons. Cwt.
Anthracite received:		
From Lehigh Valley R. R.	6,024 10	45,257 04
" Lack. & B. R. R.	22 17	5,203 13
" Pleasant Valley R. R.	1,700 10	20,913 00
" Sul. & Erie R. R.	410 03	5,369 13
Total	8,158 00	76,743 10
Same time last year	10,011 16	70,488 19
Increase		6,254 11
Decrease	1,853 16	
Distributed:		
To Lehigh Valley R. R.	174 00	6,001 11
To Lack. & B. R. R.	30 04	201 04
To S. Central R. R.	2,162 08	15,363 01
To Ithaca & A. R. R.	1,522 00	10,644 10
To Erie R. W. Pockets for shipm't.	1,481 06	22,585 12
To individuals on line of road	742 19	7,977 16
To points at & above Coxton for use of Co.	539 16	4,072 12
To points between Waverley and Elmira	1,505 07	9,897 04
Total	8,158 00	76,743 10
Bituminous received from BARCLAY R. R.		
Shipped north from Towanda	4 743 11	39,025 05
Shipped south from Towanda	50 00	228 07
Northern Central R. R.	....	
Total	4,793 11	39,253 12
Same time last year	5,204 08	43,953 08
Increase		
Decrease	400 17	4,699 16
Distributed:		
To Erie Railway	3,540 19	31,416 16
To So. Central R. R	1,190 04	7,514 04
To Ithaca Valley R. R.	12 08	71 08
Lehigh Valley, R. R.	31 09	142 13
To individuals on line of Railroad.	18 11	66 19
To points on line of road for use of Company		41 12
Total	4,793 11	39,253 12
Grand totals transported		
Anthracite	8,158 00	76,743 10
Bituminous	4,793 11	39,253 12
Total	12,951 11	115,997 02
Same time last year	15,216 04	114,442 07
Increase		1,554 15
Decrease	2,264 13	

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, Jan. 25, 1873.

	WEEK. Tons. Cw	YEAR. Tons. Cwt.
Shipped North	11,562 01	43,870 17
Shipped South	34,114 08	126,372 00
Total	45,676 09	170,242 17
For the Corresponding time last Year:		
Shipped North	12,873 07	51,276 11
Shipped South	35,561 09	164,276 00
Total	48,434 16	215,552 11
Increase		
Decrease	2,758 07	45,309 14

Northern Central Railway, Shamokin Division

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the 7 days ending January 23, 1873.

	Tons. Cwt.	Tons. Cwt.
East	633 10	
West	7,575 09	
		8,208 19
Same time last year		5,985 16
Increase		2,223 03
Decrease		.....
Total amount shipped to date		34,755 13
Same time last year		21,941 06
Increase		12,814 07
Decrease		

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Jan. 25, 1872.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair	14,376 04
" Port Carbon	3,562 13
" Pottsville	2,162 04
" Schuylkill Haven	18,307 04
" Pine Grove	269 09
" Tamaqua	6,583 04
" Harrisburg	
" Dauphin	45 09
Total	45,305 07

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	
" Mill Creek "	
" Schuylkill Valley Scales	
" Mt. Carbon "	
" Cressona "	
" Pine Grove "	
" Tamaqua "	
Total	

SHIPPED WESTWARD VIA CATAWISSA AND WILLIAMSPORT BRANCH AND NORTHERN CENTRAL RAILROAD.

Via Catawissa & Williamsport Br.	326 16
" N. C. R. R. passing Locust Gap	857 16
" " " Shamokin	3,731 19
" " " Herndon	....
Total	4,916 05

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	320 11
" Lebanon & Pine Grove Branch	43 03
Total	323 14

CONSUMED ON LATERALS.

From Frackville Scales	317 16
" Mill Creek	475 02
" Schuylkill Valley Scales	1,004 13
" Mt. Carbon "	1,099 13
" Cressona "	379 15
" Pine Grove "	4 03
" Tamaqua "	404 00
Total	3,688 07

LEHIGH AND WYOMING COAL.

Received via Silverbrook Junction, Sent East	3,100 01
Cat. & Wpt. Br. Sent West	15 12
" " Rupert, Cat. & Wpt. Br.	
" " Allentown, E. Penn'a Br.	129 16
" " Alburtis, "	15 03
" " Oreland, G. & N. Br.	976 06
" " Connecting R. R.	....
" " Willow Street R. R.	636 10
Total	4,875 07

BITUMINOUS.

From Harrisburg	6,372 10
" Connecting R. R., G. & N. Br.	
" Junction R. R.	
Total	6,372 10

COAL FOR COMPANY'S USE.

Anthracite	3,011 05
Bituminous	854 04
Total	3,865 09

RECAPITULATION.

	Total for Week.	Corres-p'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	45,306 07	38,947 04	i 6,359 03
For Shipment by Canal			
Shipped Westward via Northern Central R. R.	4,916 05	4,833 15	i 82 10
Shipped West or South from Pine Grove	323 14	499 17	d 176 03
Consumed on Laterals	3,688 07	3,683 16	i 4 11
Lehigh and Wyoming Coal	4,875 07	992 00	i 3,883 07
Total Anthracite paying freig't	59,110 00	48,956 12	i 10,153 08
Bituminous	6,372 10	8,189 05	d 18,161 05
Total of all kinds paying freig't	65,482 10	57,145 17	i 8,336 13
Coal for Company's use	3,865 09	6,805 05	i 3,060 04
Total Tonnage for Week	74,347 19	62,951 02	i 11,396 17
Previously this year	492,062 19	503,993 16	d 11,930 17
Total to date	556,410 18	566,944 18	d 534 00
SHIPPED BY CANAL.			
From Schuylkill Haven			
" Port Clinton			
Total Tonnage per Week			
Previously this year			
Total to date	6,594 00	13,355 16	d 6,761 16

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

Week ending January 25—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1872., tons ct	WEEK 1871. tons ct.	YEAR 1872 tons cwt.	YEAR 1871. tons cwt.
Wyoming Region	29462 05	33902 09	104196 05	85475 10
Upper Lehigh Region	3315 13	2149 06	13419 06	12115 08
Beaver Meadow Region	3769 00		13801 15	5309 03
Hazleton Region	166 02	861 03	990 08	885 16
Mauch Chunk Region	8630 06	285 08	25093 15	17147 03
Treskow Region				
Mahanoy Region				
Totals	45343 03	36698 06	157503 09	120936 05
Increase	8645 00		36567 04	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	35778 05	31091 13	125896 10	99781 17
Forwarded East of Mch Chunk by Canal				
Delivered at and above Mauch Chunk	1572 14	789 12	7673 00	5566 01
L. V. R. R at Packer'n	891 15	317 17	3494 04	1234 06
Delivered to L. & B. R. R. at Plymouth Bridge	1747 01		6909 00	
	5363 11	4499 04	13830 15	14354 01
Totals				
Of the above there was transported on acc'nt of L. C. & N. Co.	13823 03	835 09	45735 19	21301 16
W.-B. C. & L. Co.	15769 19	27471 14	53557 05	60788 05
Totals	29620 02	28307 03	99293 04	82090 06
Increase	1312 19		17203 03	
Decrease				

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending Jan. 25, 1873, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	12,426 03	86,185 07
" Hazleton	28,090 04	216,117 14
" Upper Lehigh	33 05	499 17
" Beaver Meadow	10,263 15	83,027 06
" Mahanoy	4,354 13	39,346 06
" Mauch Chunk	37 17	223 05
Total	55,185 17	425,399 17
Same time last year	53,925 15	491,547 00
Increase	1,260 02	
Decrease		66,147 03
Forwarded East from Mauch Chunk by rail	46,491 00	357,599 10
Same time last year	45,038 02	436,222 19
Increase	1,452 18	
Decrease		78,623 09

DISTRIBUTED AS FOLLOWS.

Forwarded East from Mauch Chunk by rail	45,329 19	350,157 10
do East for use L. V. R. R.	1,161 01	7,442 00
Delivered at and above Mauch Chunk for use of L. V. R. R.	1,179 15	9,693 02
To P. & N. Y. R. R.	6,024 10	45,257 04
To N. C. R. R., at Mount Carmel		959 19
To D. H. & W. R. R.	935 07	4,833 02
To L. & S. R. R. at Packerton for rail		
Delivered at M'h Chunk	256 01	1,988 02
Delivered on line of road above Mauch Chunk	116 14	666 12
To L.S.&R.R., at Penn Hav., for railroad	482 10	2,825 16
Do. for canal		1,541 10
To Lehigh Canal Manch Chunk		
To Catawissa Railroad		35 00
Total	55,185 17	425,399 17

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, January 25, 1873.

	WEEK.	SEASON.
North	36,284 09	141,187 06
South	6,672 01	23,757 06
Total 1873	42,956 10	164,944 12
Corresponding time in 1872 :		
North	49,352 09	180,074 06
South	7,693 04	28,703 18
Total	57,045 13	208,788 04
Increase North		
Decrease North		
Increase South		
Decrease South		
Decrease	14089 03	43,833 12

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, January 25, 1873.

	WEEK.	SEASON.
By Delaware and Hudson Canal	....	....
By Railroad, East	5,163	27,329
" West	7,918	28,693
" South	6,672	23,757
Total 1872	19,753	79,779
Corresponding time in 1871 :		
By Delaware and Hudson Canal	....	....
By Railroad, East	10,640	49,066
" West	8,565	28,384
" South	7,693	28,704
Total	24,898	106,154
Decrease	26,375	

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday Jan 25, and during the year 1873, compared with the corresponding period of 1872.

WEEK.

	C. & O. C'l. Tons. Cwt.	B. & O. R. R. Tons. Cwt.	Pa. S. Line Tons. Cwt.	Total. Tons. Cwt.
1872	—	19,048 02	1,365 02	20,413 04
1871	—	18,709 00	....	18,709 00
Increase	.....	339 02	1,365 02	1,704 04
Decrease	—	.....	....	

YEAR.

1872	—	68,598 12	5,666 10	74,265 02
1871	—	68,418 00	....	68,418 00
Increase	....	180 12	5,666 10	5,847 02
Decrease	—	....	....	....

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co. Tons. Cwt.	Total. Tons. Cwt.
1873	—	2,448 19	2,448 19
1872	—		
Increase	—	2,448 19	2,448 19
Decrease	.....	.....	.....

YEAR.

1873		4,088 11	4,088 11
1872			
Increase		4,088 11	4,088 11
Decrease			

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending January 25, 1872.

	1873. WEEK.	1873. YEAR.	1872. WEEK.	1872. YEAR.
By Railway	13,630 14	55,015 04	18,988 19	62,514 16
" Canal	....	....	....	....
Total				
Decrease 1873	7,499 12			

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK. January 31. R. A.	W. A.	AT PHILADELPHIA. January 31. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$— —	— —	
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	
Egg	— —	— —	— —	— —
Stove	— —	— —	— —	— —
Chestnut	— —	— —	— —	
Pea	— —	— —	— —	— —
LEHIGH. Freight to New York 50 cents.				
Lump, (on board)	— —	5 00	— —	— —
Broken	— —	4 75	— —	— —
Egg	— —	4 75	— —	— —
Stove	— —	5 10	— —	— —
Chestnut	— —	4 15	— —	—
Pea	— —	— —		
SPECIAL COALS.				
Honey Brook, Le'h W.A.	4 15@5 10		— —	— —
Spring Mountain " "	— —@— —		— —	— —
Sugar Creek " "	— —@— —		— —	— —
Sugar Loaf " "	— —@— —		— —	— —
Old Compy's " "	4 15@5 10		— —	— —
Room Run " "	4 15@5 00		— —	— —
McNeal " "	— —		— —	— —
Girardville " "	— —		3 10@4 00	— —
Hill & Harris " "	— —		— —	— —
Shamokin " "	— —		— —	— —
Lykens Valley " "	— —		— —	— —
Broad Top " "	— —		3 25@4 25	— —
McMichael " "	— —		— —	— —
Henry Clay " "	— —		— —	— —

Company Coals.

January, 1873.

	L.	Str.	Gra.	Eg.	Sto.	Chest
*Scranton at E. Port	4 00	3 95	4 10	4 40	5 00	3 90
Pittston at Weehawken	4 40	4 40	4 40	4 40	4 80	4 40
*Lackawana at Weehawken	4 20	4 30	4 40	4 65	5 10	4 30
Wilk'b're at Hoboken	4 25	4 35	4 45	4 70	5 15	4 35
Old Co. Lehigh at Pt. John'n	5 25	—	4 85	4 90	5 15	4 15
Lehigh at Eliz. Port	5 00	—	4 75	4 75	5 10	4 15

For freights to different points see "Freights."
*To contractors only.

Prices at Baltimore—January, 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 35@5 60
Pittston and Plymouth, do	5 25@5 50
Shamokin Red or White Ash, do	5 50@5 75
Lykens Valley Red Ash, do	6 25@6 50
Zerba Valley	
Treverton	
By retail, all kinds per ton of 2,240 lbs	7 25@7 50
George'e Creek and Cumberland f. o. b. at Locust Point for cargoes	@4 75
Fairmont and Clarksburg gas f. o. b. at L. Point	6 00
BITUMINOUS COALS.	
Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	4 75
Consolidation Coal Co.'s on board at Baltimore	4 75
Maryland Coal Co "	4 75

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

January, 1873.

George's Creek and Cumberland f. o. b. for shipping [nominally.	$4 35@4 50

No coal before spring.

Prices at Havre de Grace, Md.

January, 1873.

Wilkesbarre and other White Ash for Cargoes	$ @4 75
Lykens Valley	@5 75
Shamokin Red or White Ash	5 00

Bituminous Coals (Cumberland).

Georgetown, F.o.b	$
Baltimore	4.75
New York	7.50

Prices of Foreign Coals.

January, 1873.

Duty 75 c. per ton.

Corrected weekly by ALFRED FARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Caking	Nominal.
" " Cannel	15 00@16 50
" House "	22 00@23 00
" Orrel	17 00@18 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$20 00@22 00
"Cannel, "	23 00@25 00

Per ton 2.000 lbs. delivered.

Prices of Gas Coals.

January, 1873.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y.

	Coarse	Slack.
Block House	$2 00	$1 00
Gowrie	1 75	— 80

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal,
Pictou nett	$2 25	1 25
Sydney	2 25	- 80
Lingan	1 75	- 80
Caledonia	1 75	- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm : 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.	Nominal quo. Currency.
Westmoreland	$7 10 @— —
Fairmount Gas Coal Co. of N. Y.	7 00 @— —
Despard Coal Co	7 00 @— —
Penn	7 10 @— —
Newburg Orrel Gas	— — @— —
West Fairmount Gas Coal	7 00 @— —
Redbank Cannel, Penn	— — @— —
AT PHILADELPHIA.	
Westmoreland	7 00 @— —

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven Lump and St., net, $1 60; Br., Egg and Ch., $1 65; Stove, $1 75 Shipping at Pt. R., 20c., for use at Phil., $2 18 from Pt. Carbon.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Manch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	1 06
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 23

MAUCH CHUNK TO PORT JOHNSTON.

L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g	$0 72
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 2

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	72
Morris & Essex R. R. Phillipsburgh to Hoboken	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23

TO SOUTH AMBOY.

L. V. R. R.	72
E. & D. R. R. / Cam. & Am. R. R.	1 06
Shipping Expenses	25
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	0 84
C. RR. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	15
Wharfage	20
Total	$2 25

Freights.—February, 1873.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore	Anthracite. From Philad'a.	Anthracite. From Port Johnston, and Hoboken.	Anthracite. From Elizabethport.	Anthracite. From Newburgh.	Anthracite. From Rondout.
Amesbury							
Bangor		5 00		3 00			
Bath							
Boston	3 10	4 75	3 00	3 00			
Bridgeport	2 75	3 75	1 00	1 00			
Bristol			2 00	1 50			
Cohasset Narrows	2 25		1 25				
Derby			ice	1 25			
Dighton	2 85		ice				
East Cambridge			3 10	3 20			
Fall River	2 75	4 00	2 00	1 50			
Hackensack			ice				
Hartford		3 25	ice	ice			
Hoboken	2 10		45	50			
Jersey City	2 10		45	50			
Lynn			1 35				
Middletown			ice	ice			
Mystic			ice	1 40			
New Bedford	3 00	4 00	2 00	1 50			
Newburyport	3 10	4 75	3 25	3 25			
New Haven	2 75	4 00	1 00	1 00			
New London	2 75	4 00	1 50	1 25			
Newport	2 30		2 00	1 50			
New York	2 25	3 50	45	50			
Norwalk	2 50	2 ½	1 00	1 00			
Norwich			1 60	ice			
Pawtucket			ice	ice			
Portland	3 25	4 75	2 95	2 75			
Portsmouth, N.H		4 75	3 10	3 15			
Providence	2 75	4 60	2 00	2 00			
Rockport			1 35				
Saco			3 00				
Sag Harbor			1 50	1 35			
Salem	2 70	4 85	3 00	3 00			
Stamford			1 00	1 00			
Stonington			1 45	1 35			
Taunton			ice	2 00			
Warren			3 00	1 50			
TO RIVER PORTS							
Albany							
Catskill							
Cocksackie							
Coeyman's							
Cold Spring	2 30						
Fishkill							
Haverstraw							
Hudson	3 25						
New York							
Nyack	2 25						
Poughkeepsie	2 50						
Rhinebeck							
Rondout							
Sangerties							
Sing Sing							
Stuyvesant							
Tarrytown							
Troy	3 00						
West Point							
Yonkers							

St. Thomas	$5 00 Gold.
Martinique	5 00
Demerara	6 00
New Orleans	6 00
Mobile	6 00

Foreign and Provincial Freight

January, 1873.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial

Sydney	$3 05
Lingan	3 50
Cow Bay	3 75
Port Caledonia	3 10
Little Glace Bay	3 00

TO BOSTON.

Sydney	3 00
Lingan	3 00
Cow Bay	3 00
Port Caledonia	3 00
Little Glace Bay	2 90

MARKET REVIEW.

NEW YORK, Jan. 29, 1873.

IRON—The market for Scotch Pig remains very quiet, but the tendency is upwards. Later advices received by cable quote Eglinton £7, Glengarnock £7 10s., Gartsherrie £8, and with light stocks here, holders look for still higher rates. About 300 tons Gartsherrie sold $56, which we understand is nearly all of this brand in market—now held above that figure ; 3@400 do. Glengarnock $55; and 100 do, Carnbroe, on private terms. American Pig is very firm and with light stocks in the market and little offering from producers, has a strong upward tendency. Most of the stocks have gone into consumption, but

some has been taken on speculation; we note sales of 200 tons No. 1 varions brands at $49, and 400 do. No. 1 Allentown on terms not made public. New English Rails are quiet, at $73a75 gold, but without bnsiness. American are very quiet at $80 currency at the works in Pennsylvania. Old English are nominally held at $52a$53 gold. 1000 tons D. H. and T. were sold on private terms. Scrap is irregular, bnt holders generally are asking about $55a $60 from yard, with sales recently of 200 tons wrought, ex ship at $45. The market for Bar is steady and firm at onr qnotations.

COPPER—New Sheathing is steady at 43 cents, and Bolts and Braziers 45. Bronze and Yellow Metal Sheathing 27, and Y. M. 32, net cash. Ingot is very quiet, and prices are rather easier; cash lots Lake may be quoted 34 cents; 50.000 lbs. sold for February delivery at 34½, and 20,000 lbs. spot on private terms. In English, we hear of no bnsiness; it is held at 30 cents, 30 days. 2500lb. Old Copper sold at a private price.

LEAD—Foreign has been quiet, bnt in price there is no change, and we qnote Ordinary $6,40a$6.62½ gold. Manufactnred is steady at onr quotations.

SPELTER—Since our last the market has been quiet, bnt the advanced prices are well sustained, and we quote Silesian firm at $7,12½a$7,25 gold. Domestic 9 cents currency.

TIN—The market for Pig is again quiet, and prices are in a great measure nominal. Straits is held at 30¾ cents for large parcels, and 31 for jobbing lots; English 31¼, and Banca 36¼, all gold. There is less demand for Plates' but the feeling is still very strong, Charcoal Tin being generally held above previons qnotations. We note sales of 2000 bxs. Charcoal Tin on terms not made public.

ZINC—Sheet is very steady at former qnotations—150 casks Mosselman, for importation, sold at 9½ cents, less 4 per cent. gold. Manganese black oxide 3½, gray peroxide 5½.

Ryland's Iron Trade Circular of Jan. 11, 1873, has the following:

SWEDISH IRON—The market is very firm for all descriptions, and buyers seem more disposed to listen to the qnotations from Sweden, where, owing to the usually mild winter, mnch fear exists amongst the ironmasters as to the possibility of collecting the needful supply of charcoal, which has to be conveyed by sledges from the forests to the works, and which it is impossible to do in the absence of snow on the gronnd and ice on the lakes. The exports from Sweden last year up to the end of November consists of:—

Pig Iron	77,000	tons	against	41,000	tons 1871
Bar Iron	118,000	"	"	136,000	"
Blooms	11,500	"	"	9,500	"
Rods and Hoops	25,000	"	"	18,000	"

Most of the Pig Iron has gone to Continental Bessemer makers, and the rods and hoops to Russia for home consumption.

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, Jan. 30, 1872.

Onr report from the San Francisco Stock Board is dated the 28th inst. Without exception the market has declined; Kentuck is out with a "*New Issue*," 15 for 1. It is quoted at $7 per share, a decline of $2⅔ as compared with the report of the 24th. We are not surprised at this new dilute-tory measure of Kentuck, it is only a matter of surprise that it did not happen before to this most capricious item of the list, however it partly makes up for the delay by the nnusual amount of its increase, which is more than 25 per cent. over any of its recent predecessors. We have also appended the report of the 24th inst.

		Jan. 24.	Jan. 28.
Savage	—	58	51
Crown Point	—	89	85
Yellow Jacket	—	61	52
Kentuck, "New Issue"	—	9⅓	7
Chollar Potosi	—	15	46
Gould & Curry "New Issue"	—	14⅓	12
Belcher "New Issue"	—	74	70
Imperial	—	7⅓	6
Raymond & Ely	—	79	82
Meadow Valley	—	16	16

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and A sociates.

I. The next meeting of the Institute will be held Tuesday, February 18, 1873, in Boston, Mass. Prof. T. STERRY HUNT, and Prof. W. H. PETTEE are the local Committee of Arrangements.

II. All members and Associates who pay their dnes ($10,) for each current year, strictly in advance, will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institnte and all notices of meetings. Back nnmbers cannot, as a general rnle, be sent.

Those members and associates who have not paid their dnes for the cnrrent year, are reqnested to do so at once. Money may be sent in postal orders, checks or bank bills, to the Secretary, THOMAS M. DROWN, 1123 Girard street, Philadelphia, Pa.

III. It is expected that the more important paper, read before the Institnte, and the debates thereon, will be pnblished in annual or occasional volnmes to which those Members and Associates will be entitled who have paid their dues.

IV. All anthors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

V. The ninth rnle has been amended, so that there will be hereafter three meetings a year, in February, May and October.

THOMAS M. DROWN, Secretary.
1123 Girard street, Philadelphia, Pa.

The Engineering of the Sutro Tunnel.

The Sutro Tunnel has passed the first stage—always tedious—of such works, that is, the establishment of the line, collection of machinery, construction of roads, and other preliminary labor, and we are now able to present a description of the work as it is to-day, together with an account of what is further to be accomplished. The triangulation lines are shown in the Supplement. The surveyor is Mr. SCHUSSLER, and the work was done with an excellent transit instrument originally made for the city of San Francisco. Mr. SCHUSSLER is an engineer of that city and a most competent man. The plan of the work includes a tunnel entrance at the town of Sutro, on the Carson river, and four shafts, which divide the work as follows:

From entrance to shaft No. 1	4,915 feet.
" Shaft No. 1 to No. 2	4,150 "
" Shaft No. 2 to No. 3	4,480 "
" Shaft No. 3 to No. 4	4,150 "
" Shaft No. 4 to Comstock lode	2,450 "

In addition to these there is an air shaft completed 2,252 feet from the mouth, and 500 feet deep. The total length of the tunnel will be 20,145 feet, and of the shafts 4,910 feet. The latter, omitting the air shaft, will have the following depths: No. 1, 523 ft.; No. 2, 1,041 ft.; No. 3, 1,361 ft.; No. 4, 1,485 ft. The present condition of the work is as follows: In the tunnel the header had reached, November 30, 1872, a distance of 3,451 feet, and the enlargement is completed for 1,100 feet. Shaft No. 1 had been sunk 454 feet, with only 69 feet remaining unfinished. Shaft No. 2 was 623 feet deep, with 418 feet to go. Shaft No. 3 was sunk 377 feet, and had 984 feet left. Shaft No. 4 was 421 feet deep, and had still 1,064 feet to pass through. It will be seen that these shafts are in themselves no inconsiderable works. Shafts of 900 and 1,000 feet deep collect a pretty heavy amount of water, and the engines and pumps which were at first put in, were intended merely for a commencement, and at length failed to keep down the water.

In expectation of this, sixteen pumps had been ordered of Messrs. Allison & Bannan, of Pottsville, Pa. Each has a steam cylinder of 22×72 inches, 10 inch water cylinder, weighs 20,000 pounds, and raises 300 feet. These are the first direct-acting pumps of this capacity which have been placed in the West. As the tunnel will, of course, be the drain of nearly five miles of mountain, it will be certain to collect a great amount of water, and in estimating the amount, the engineers thought that the Comstock lode itself offered the best criterion in forming an opinion. The quantity provided for at the shafts is, therefore, equal to the largest amount pumped from any one mine on that lode, namely, 20,000 gallons per hour. This is the capacity of the pumps at very moderate speed, and it can be increased by 50 per cent. It is not, however, thought that the water will ever amount to 720,000 gallons per day.

The amount of water actually pumped from the shafts during the past year was as follows:

	Shaft No. 1.	Shaft No. 2.	Shaft No. 3.	Shaft No. 4.
January	not measured.	not measured.	not measured.	not measured.
February	58,000	" "	" "	" "
March	1,860,000	" "	" "	620,000
April	3,000,000	210,000	330,000	1,140,000
May	4,000,000	62,000	217,000	3,800,000
June	3,000,000	300,000	300,000	2,100,000
July	2,500,000	558,000	403,000	2,480,000
August	4,800,000	not measured.	2,500,000	2,170,000
September	5,000,000	300,000	3,000,000	not measured.
October	3,500,000	350,000	5,000,000	" "
November	2,800,000	2,000,000	4,500,000	1,530,000
December	3,336,000	2,108,000	4,700,000	1,844,000
	33,854,000	5,888,000	20,950,000	15,684,000

Taking December as an average, we have 387,000 gallons a day. The cutting through of shaft No. 1 will, of course, remove the necessity of pumps at that station.

The quantity, however, is certain to be vast, and provision has been made for utilizing it in the operations of the tunnel. The water pumped from shaft No. 3, and probably also that from No. 4, (which latter, however, will have to be pumped an additional height of about 150 feet,) will be conveyed by its natural flow to the divide between shafts Nos. 1 and 2, which has an elevation above the tunnel level of 1,350 feet, from whence it will be conveyed in pipes to the face of the tunnel; the pressure obtained will be 675 pounds to the square inch, which will give a large power. The quantity of water will be largely increased by the construction of dams and reservoirs in the ravines adjacent to the flume which conveys the water from shaft No. 3 to the divide, and in which will be stored up the rain water accumulating during the winter months and that from melting snows, which falls to considerable depths in some of the deep gorges, and does not altogether disappear until the month of June. The completion of the tunnel will, of course, remove the supply from the pumps, while that obtained from the reservoirs will be permanent. To this will, at a future day, be added the water flowing from some remarkable springs, situated at an elevation of about 1,000 feet above the tunnel level, at a distance of about five miles to the northward, which are estimated to supply from nine to twelve miners' inches, equal to from 150,000 to 250,000 gallons for every twenty-four hours. One of the dams spoken of above has been completed, and a pipe carried to, and down, the air shaft, a distance altogether of about a mile, with a fall of 500 feet.

The whole work in the tunnel has so far been carried on by hand. One holder and two strikers are employed at each drill. Two holes are drilled from two to five feet deep, according to the nature of the rock, into each of which a cartridge of dynamite, or "giant powder," is inserted. The cartridges are then exploded simultaneously by means of fuses and caps. This explosion makes an opening of considerable size at the bottom of the drill hole, which is then filled with ordinary black powder. This is fired off with a water-proof fuse, the men in each case retreating from 200 to 300 feet distant from the header until the explosion takes place. Mules have lately been used to run the cars out, and mining locomotives will soon be put on.

The alternations of rock encountered were as follows: from the mouth of the tunnel a belt of conglomerate, consisting of bonlders of trachyte cemented together with volcanic tufa, extends for a distance of 650 feet; this is succeeded by a formation of coarse trachyte about 530 feet wide; then follows a seam of red clay 35 feet in width; following this is a belt of blue clay 150 feet, succeeded by porphyry, or greenstone, of varying hardness, 175 feet wide; a narrow seam of trachyte was then met, which was succeeded by propylite, extending to a distance of 3,000 feet from the month of the tunnel. Here trachyte was struck again, in which rock the work was, Nov. 30, 1872, 3,455 feet from the entrance. Shafts Nos. 1 and 2 are sunk in trachyte; Nos. 3 and 4 in propylite. The full size of the tunnel as far as completed is 12×16 outside of the timbers, which are 10×12 inches, except the inside posts, which are 10 inches square, This is divided into two compartments, each 5½ feet wide at the bottom, 4½ at the top, and 10 feet high, with a passageway between, and a drain underneath, as in Fig. 1 (Supplement). The top and sides are covered with "lagging," or sheathing, of two-inch plank. This timbering is to be permanent, but it is proposed to adopt a different style for the remainder of the tunnel, where the arch form, Fig. 2 (Supplement) will be used. In the clay ground a brick arch will be necessary.

The four shafts are of the same size, viz.: 5′×10′ feet, divived into two compartments, one 5′×5′—the other 4′ 2″×5′. One division is used for hoisting rock, which is raised by means of a large wrought iron tub, attached to a flat wire cable, operated by a large steam engine at the surface. The workmen also use this shaft. The other compartment is for pumps and air pipes. It also contains ladders, each 15′ long, and resting on a platform 5′×20″. It is proposed to replace the hoisting tubs by cages, on which cars can be run and hoisted to the surface. The shafts are timbered with sets of timbers placed 5 feet from centers, the outside pieces 10×12 inches; the posts 10×10 inches; the inside girths 10×14 inches. The "lagging," or sheathing around the outside of timbers, is of two-inch plank; the lining is one-inch boards. This timbering is shown both in plan and elevation in Fig. 3 (Supplement).

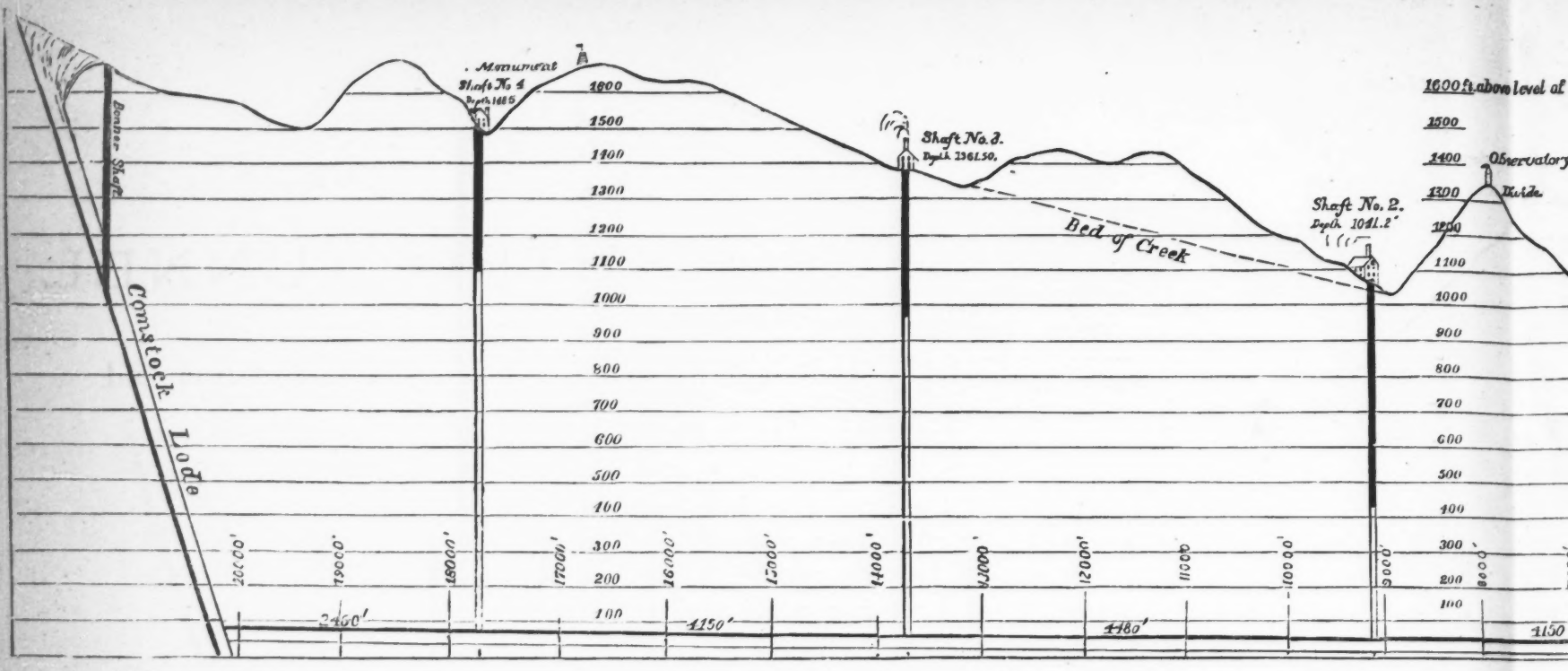
The tunnel water is to be used as a source of power and the plan of the town of Sutro contains some noticeable features, but these and other points not immediately connected with the work of the tunnel we must pass over.

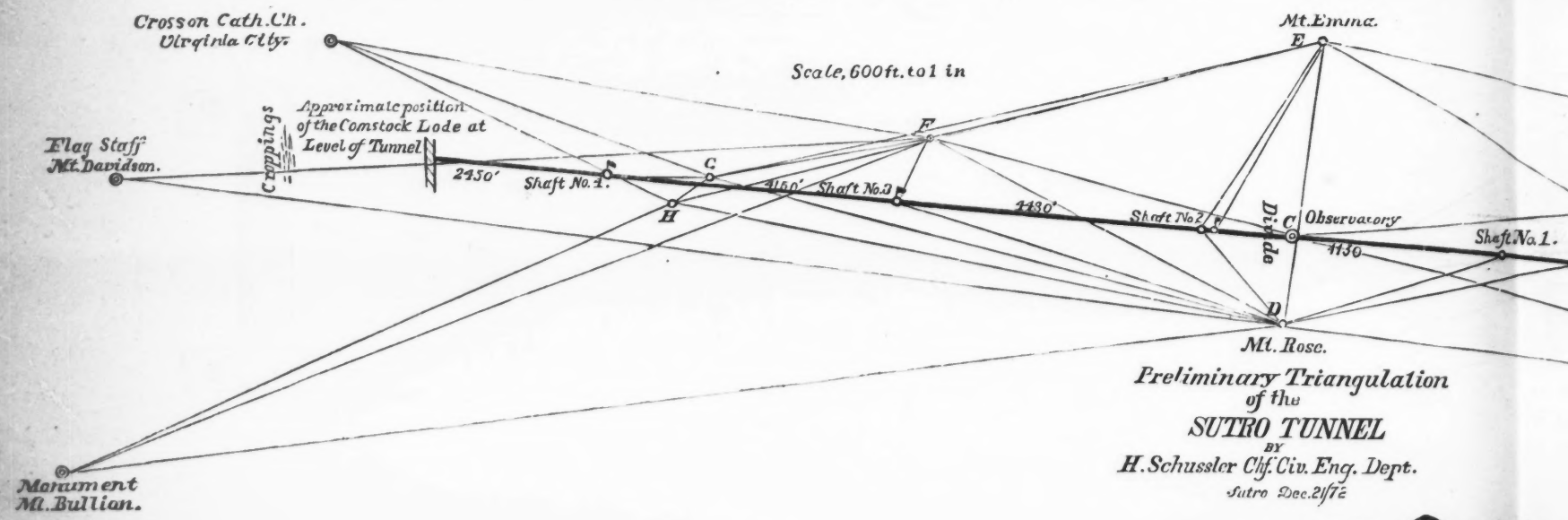
The great question in regard to this as to every engineering work of the kind, is, how soon will it be finished? The projector of the enterprise is happily able to give a favorable answer to this. Lying as it does under ranges of comparatively low hills, the work can be reached by shafts and its completion hastened with nine-fold rapidity. From the day the last shaft has reached the tunnel-level, there will remain the time necessary to penetrate 2,450 feet of rock, and then the work will be finished. The coming of that day is to be hastened by the use of diamond or Burleigh drills, whichever shall be found best suited to the hard rock in which the Comstock is embedded.

The shafts are to be sunk by the system of continuous drilling, which General PLEASANTS has introduced with such success in Pennsylvania. It is a question whether this method will succeed in a homogeneous, tough rock like propylite, as well as it does in the stratified deposits of the coal regions. It does not seem to us that the chance of failure is very great, and in any event the use of the diamond drill, in one way or another will certainly hasten the work. In the shafts, diamond drills alone are to be used, but in the tunnel, trial will be made of the Burleigh drill as before stated. The motive power of the drills will be the water brought, as above mentioned, from the auxiliary shafts. This will be conveyed to the heading, where hurdy-gurdy wheels will be placed. This system is preferred to the transmission of force by compressed air, on account of the loss of power by the latter.

It is expected that these improvements will permit a progress of three feet in twenty-four hours in the shafts, so that the deepest of them will be completed by midsummer of 1874. Mr. SUTRO calculates that if the diamond or percussion drills do as good work in propylite as the latter did on the less favorable rocks of Mont Cenis, the lode will be reached within thirty months from January 1, 1873.

The progress thus far made appears to be decidedly creditable to the projector and engineers of the work. The organization of the office seems efficient and the work has progressed so far with few delays. In fact the progress made is very flattering, and if the coming work answers the expectation formed of it, we shall have had in this country one example at least, of a well conducted great mining enterprise on the largest scale.





Preliminary Triangulation
of the
SUTRO TUNNEL
BY
H. Schussler Clf. Civ. Eng. Dept.
Sutro Dec. 21/72

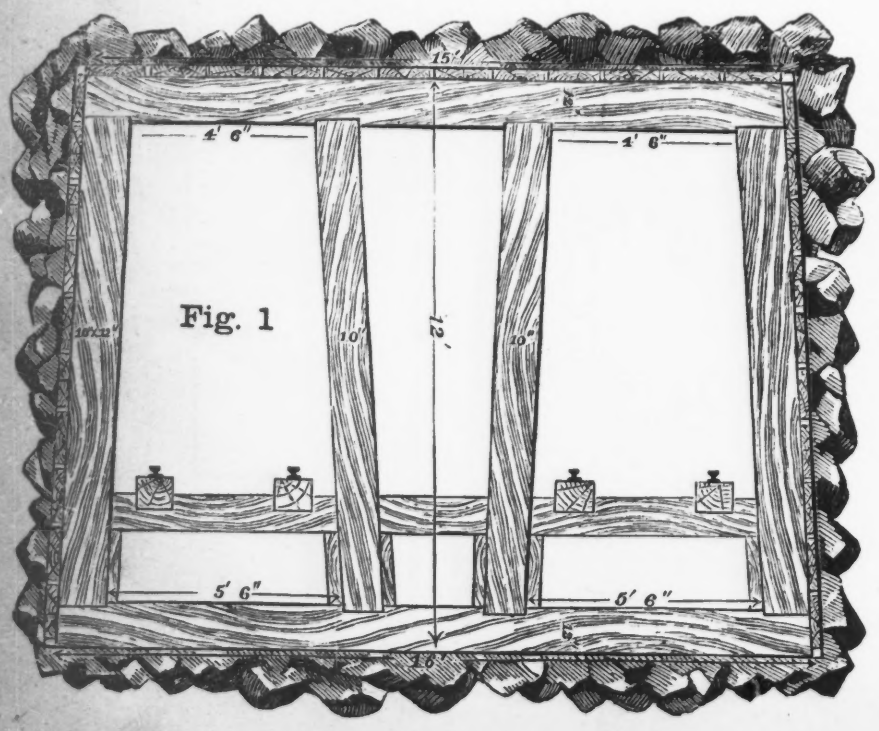


Fig. 1

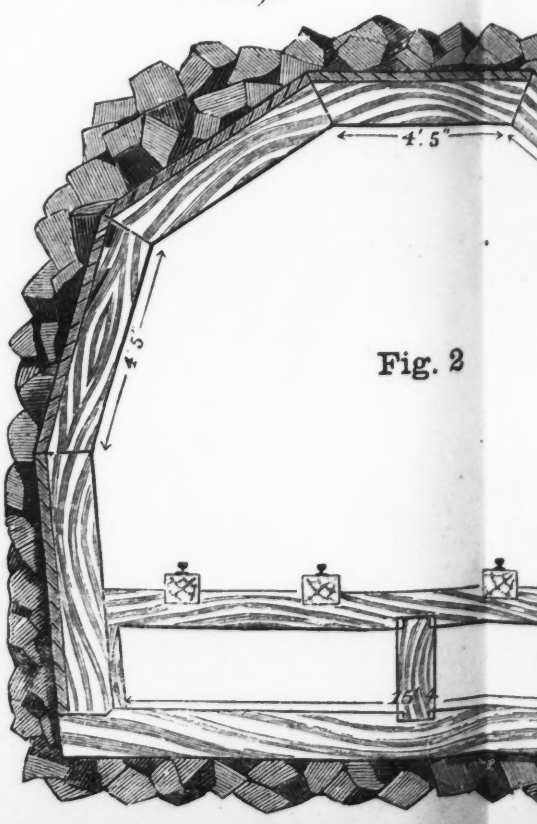
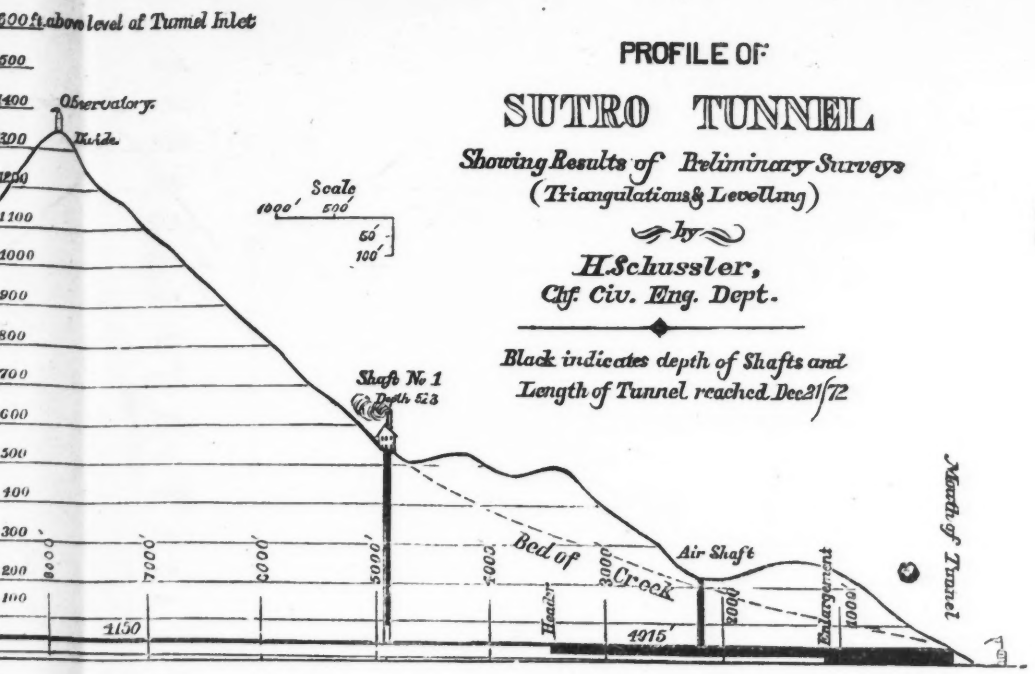


Fig. 2



PROFILE OF

SUTRO TUNNEL

Showing Results of Preliminary Surveys
(Triangulations & Levelling)

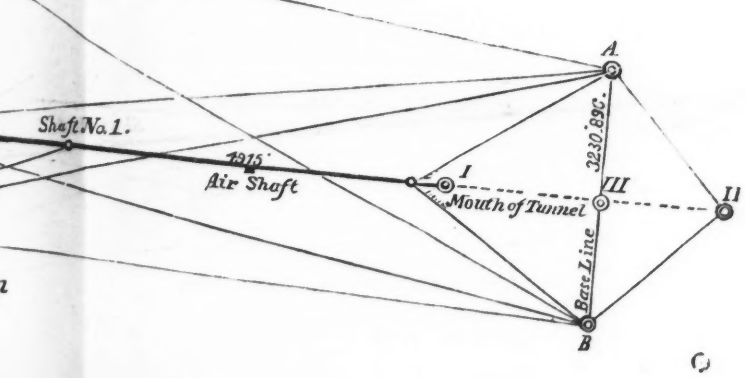
by

H. Schussler,
Chf. Civ. Eng. Dept.

Black indicates depth of Shafts and Length of Tunnel reached Dec 21/72

THE SUTRO TUNNEL,

Its Profile, Triangulation and Timbering.



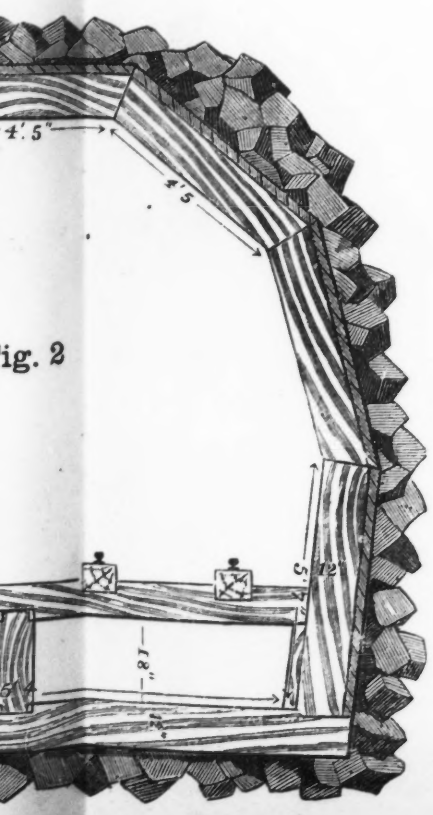
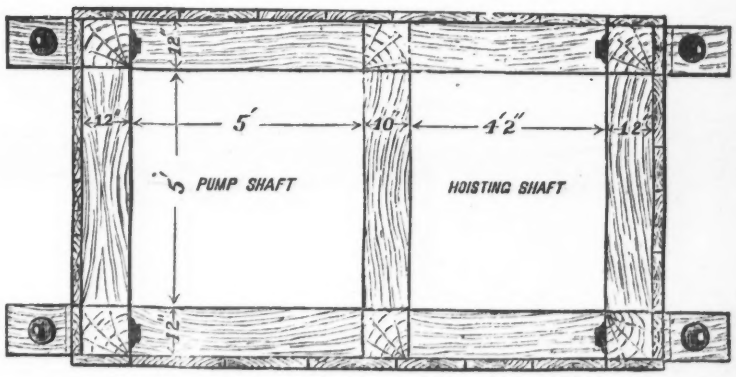
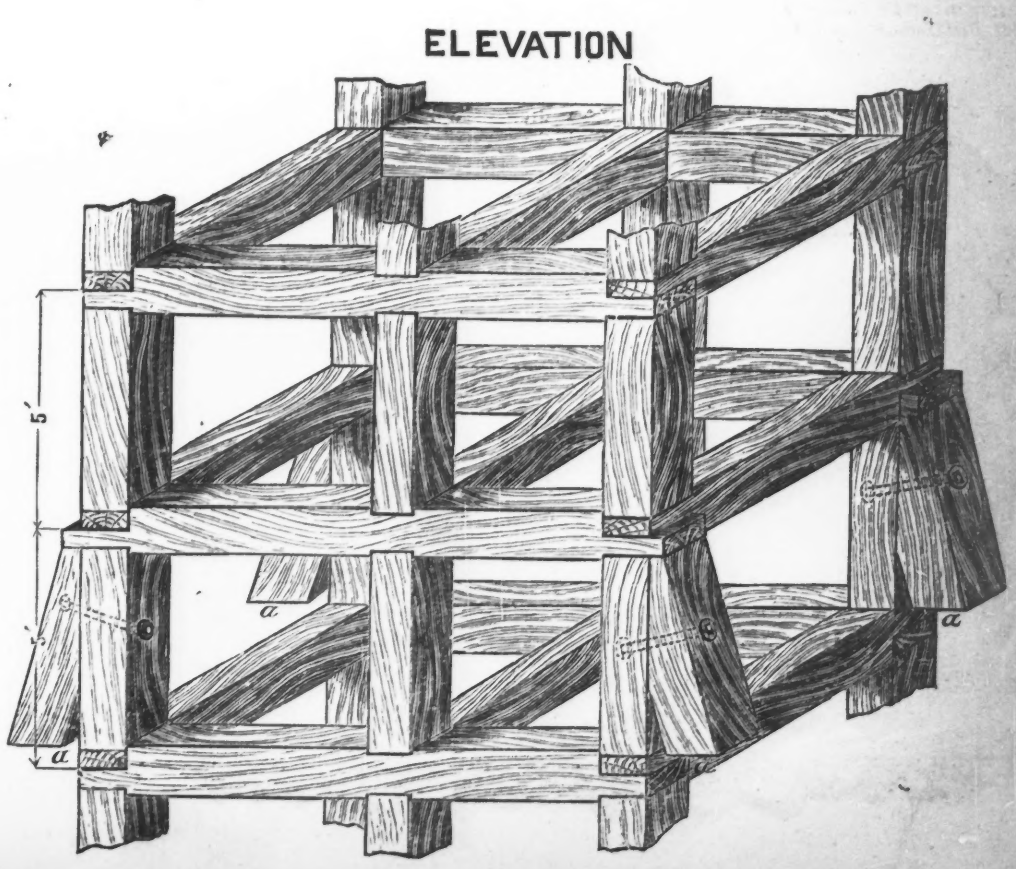


Fig. 2

PLAN



ELEVATION



THE ENGINEERING AND MINING JOURNAL.

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

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27 Park Place,
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P. O. Box 440

CONTENTS FOR THIS WEEK.

THE Local Committee in charge of the arrangements for receiving the members of the Institute of Mining Engineers, at the meeting in Boston, February 18th, announce that the meetings will be held in the building of the Boston Natural History Society, Berkeley street, corner of Boylston street. Members will make the Parker House, School street, their head-quarters. The committee has been in communication with the engineers and contractors of the Hoosac Tunnel, and have received the kindest assurances of welcome to the members. It is expected that the meeting will close with a visit to the tunnel, taking that great work on the return home. This, with the remarkable posture in which Boston is now placed, as a city undergoing general reconstruction—a reconstruction which is to be made as scientific and thorough as possible—will give members ample opportunity to employ all the time they can spare from the meetings. Interesting papers have been presented, and a full attendance is looked for.

PROFESSOR THURSTON very properly suggests that American machinery at Vienna should be run by an American engine. He also says: "We have the best stationary steam-engines in the world; our systems of transmission of power are exceedingly well devised; our mining machinery is, in many respects, superior to anything seen abroad; our apparatus for use in the manufacture of textile fabrics possesses many points of special value and interest; we have metal and wood-working machinery which excels in efficiency, and which is universally admired for the ingenuity displayed in making it at once simple in form, strong, and cheap of construction, and wonderfully effective. Our fire steam engines, steam pumps, and our railroad machinery; our household apparatus, and the whole wonderful variety of labor-saving and of small machinery for domestic purposes, which are observed in our market, should all be found at the coming International Exhibition at Vienna."

THE enterprise of Messrs. WHEATLEY & HARVEY, of the Schuylkill Copper-Works, Phœnixville, Pa., in endeavoring to utilize the Pennsylvania copper deposits is one worthy of all praise. It is a remarkable fact that the minor copper deposits of this country are almost entirely neglected. Leave out Lake Superior, and hardly anything remains of the copper industry. With the exception of the Ducktown mines, and the little that is doing in North Carolina, we do not recall at this moment any works for beneficiating the large number of poor deposits which are found in the chain of the Appalachians. In the West some rich ores are mined, and some medium ores are treated there. But the fact remains, that, as a rule, the production of the metal in this country is less vigorous than it should be. The determination of Messrs. WHEATLEY & HARVEY to build up a business upon Pennsylvania ores alone may therefore become a fact of great prospective importance to that branch of mining. As to their success we have not a doubt of it. We understand that their accounts thus far make a flattering showing. Last month they made $14,000 worth of best refined ingot, a beginning that can quickly be increased whenever desirable. In quality their brand is all that can be desired, a result which is especially satisfactory in view of the fact that only Pennsylvania ores were used.

We give this week a summary of the engineering operations of the Sutro Tunnel, taken from the report of the Company, just published; and we issue a supplement containing diagrams and sections to illustrate the work. We need not repeat what we have frequently had occasion to point out, that this is one of the greatest and most important mining enterprises ever undertaken in the world. As an engineering plan, we have always given it our hearty approbation; we think it ought to be carried out, as it would greatly benefit the mining industry. Of the struggle between Mr. SUTRO and his opponents over the franchise, etc., we know little or nothing. It would have pleased us better to see all parties working harmoniously in so beneficent a cause. But we cannot forbear to express our admiration at the wonderful zeal and perseverance with which Mr. SUTRO has adhered to his plan and pushed it to its present state of forwardness. The Committee on Mines and Mining of the House of Representatives has reported a bill for giving government aid, under certain restrictions, to this undertaking.

THE slight delay in completing the Chesapeake and Ohio Railroad has passed, and that route is now fully opened. Great things are expected of this route, and, looking at the importance of the iron and coal industry, it is more than probable that the hopes of its projectors will be answered. Now-a-days it is the fashion for railroads to look to a large mineral traffic, if they can get it, as a source of income as solid and more profitable than the transport of crops and casual freight which in former times was the main dependence of all lines. The Virginia line has undoubted advantages in this respect, and rests upon a solid foundation of ore and fuel that are already in great, and are certain to be in increasing, request. The report made in anticipation of the opening points out the fact that the coal traffic to the West is also destined to be of great importance and value to this road. "The common fuel of the Western prairies, and of the towns and cities of the Ohio and Mississippi valleys, is bituminous coal. The manufactories of the West, of course, depend almost wholly on coal for their operation. They, in common with the whole lower Mississippi valley, from the Ohio to the Gulf of Mexico, have hitherto been dependent upon coal shipped from the region near Pittsburgh, subject to the risks, uncertainties, and delays of the navigation above the terminus of the Chesapeake and Ohio Railroad. The quantity of coal from Pittsburgh passing Huntington, in a single year, was 60,000,000 bushels, equal to 2,143,000 tons. The amount of coal received at Cincinnati during the past year is stated at 36,894,000 bushels, or over 1,300,000 tons."

The Rothschilds as Mercury Merchants.

THE Spanish Government some time ago hypothecated to the London ROTHSCHILDS the production of the world-renowned mercury mines of Almaden, for thirty years, under conditions which are worthy of notice.

The Government receives a loan of 168 million reals—about twenty to the dollar, or $8,150,000 in gold—at 8 per cent. interest. It is to make a yearly payment of about $720,000 for interest and capital, in half-yearly installments. This payment will be made in mercury, but if for any reason the metal is not on hand in London by June 15 and December 15 of each year, or if the price obtained does not cover the amount, the sum is to be made up in cash. The Government further stipulates that the yearly product shall not be less than 24,000 cwt. (equal, we suppose, to 1,320 tons of 2,000 lbs. each), that the whole, with the exception of 150 cwts., shall pass to the control of the ROTHSCHILDS' that no change shall be made in the conduct of the works without the bankers' consent, and that they shall have what is called in America the "refusal" of the works, in the event of any negotiations for their sale. Finally, the works are mortgaged to them, and in case any one of the conditions is not fulfilled, they have the right to take possession of them.

These are the main conditions, but we have omitted many minor points which cannot be considered as otherwise than most exacting, and even degrading to the Spanish Government. They have excited the indignation of Don IGNACIO SALAZAR, one of the leading mining authorities of Spain, and he regards the convention as insulting to his country, as we certainly should were we born under the Spanish flag. He points out that the pecuniary conditions of the loan are in themselves exceedingly oppressive. His calculation is as follows:

		REALS.
Amount of the Loan		68,000,000
Payment, capital and interest	440,000,000	
Working expenses	250,000,000	
Office expenses	50,000,000	
Freight and transport	15,000,000	755,000,000
Excess of payment over Loan		587,000,000

But not only is the loan an excessively costly one, but Señor SALAZAR considers the conditions very dangerous. Hitherto the production has not exceeded 20,000 cwts. It is not certain that the extra 4,000 cwt. can be obtained, and even if it is obtained, the increased production will be gained only at the possible exhaustion of the most famous mine that remains to Spain. In any event, the day of its exhaustion will be hastened. The dates, too, at which the

interest is payable hardly allow the transport of the metal obtained in the usual spring and fall campaigns. They must be hastened, or commenced early, and there is always the hazard that the rigid conditions of the contract will not be met. The 150 cwt., which the Government may retain for sale on its own account, is not sufficient to supply the wants of the country, so that its people will have to buy back from ROTHSCHILD the mercury they have sold him, and of course with added costs and profits.

But we have no wish to go into the details of the error which, according to American ways of thinking, the Spanish Finance Minister has committed. That he does not look upon it as an error is apparent from the fact that he is reported to desire an extension of the contract for twenty years. Señor SALAZAR points out three methods by which the State could have secured the money on better conditions. They are: 1. Introduction of improved machinery, and consequent reduction of the cost of mercury. 2. Rent of the works with the certainty of obtaining 300,000,000 reals in thirty years for them. 3. Rent of the works for a gross sum to be paid down. He calculates that by the present contract the State loses 650 million reals, while the first of the alternatives he proposes would give a gain of 1,050 million, the second 870 million, and the third 450 million reals.

It is evident the treasury of Spain must be in a pretty low condition when the most important mining work of the kingdom is thus surrendered, without the slightest reference to the mining authorities of the country. People on this side of the Atlantic will not be slow to guess a reason for such depleted coffers. As to the ROTHSCHILDS, the venture cannot fail to be advantageous to them. They have already made large sums of money out of the folly and lack of business qualities of the Spaniards. They are now assured for thirty years in the control of the mercury market in Europe, and they can do much to control that of the world.

The Great Welsh Strike.

The ironmasters of South Wales are now facing the most formidable disagreement that has ever occurred between employer and employed.

Sixty thousand men are on strike. Of these, fifty thousand are said to be content with the reduction of wages which the masters demand. But they are ironworkers whose business is gone if coal is not to be had, and as the ten thousand who are determined to strike are coal miners; the workmen in iron decided to join them, in the hope that a positive action on their part might have some effect upon the masters. Of course, the effect upon trade is the same whether the ten thousand strike alone, or are joined by the others. Iron-making stops in either case.

There are some features about this affair which are worthy of note. The masters asked for negotiation, and a meeting took place in Cardiff. The great men of the Iron business were there—Mr. MENELAUS, Mr. FOTHERINGILL, Mr. CRAWSHAW, and ten or twelve more. About thirty workmen were at hand as representatives of 60,000 others.

The discussion was opened by the masters, who showed a hand that seemed to astonish the workmen's delegates. They acknowledged that iron had gone up 50 per cent., but their wages have advanced 50 to 100 per cent. Iron had fallen from the highest prices as much as $10 a ton, and for that reason the masters demanded a reduction of wages amounting to 10 per cent. They also criticised pretty severely the price lists of newspapers which reported rails at $60, when the highest price obtained by the Dowlais Company was $47. Finally, they offered to submit their books to examination.

The men were surprised, and acknowledged that they had been misled by the papers. But they did not care to look at the books which they could not understand, and called for arbitration. This the masters would not agree to, and the meeting failed of its object. The men are "out."

Perhaps the worst feature of the case is the declared willingness of both sides to do what is right. The masters will withdraw their demand if the workmen can show that it is unfounded in a lower price of iron. The colliers expressly said that they would submit to a deduction of 10 or 15 or even 20 per cent., if the masters can show that prices will not bear higher rates. Each side, therefore, goes into the struggle with unwillingness, knowing its own fairness, and feeling that it has done, and is ready to do, what it can to avoid disaster. And this is just the worst condition for all parties. If it were a battle for supremacy there would be a calculation of chances, and before long one side would feel its weakness. But when principle and conviction enter into the question, the prospect of a settlement is much more doubtful.

But while the cause of the quarrel presents little from which to expect relief, the condition of trade offers a good deal. Prices may go up and justify the men, or down, and the masters' argument will be strengthened. Either case will be fortunate for South Wales. For if the strike lasts long, that region will suffer severe and probably permanent injury, and our own business will reap a corresponding benefit. The American trade of the district is very large, and if work there stops just at the critical moment when United States producers are straining every nerve to increase their make, business in South Wales will receive a blow, the effects of which will not quickly pass away.

In many respect the strike is a remarkable one. It has so far done no or little injury, and if work is quickly resumed its effects will rapidly pass away. But its magnitude is so great that the foreign papers seem unable to express anything but awe in view of its possible effects, while all parties are puzzled to suggest a remedy, or pick a flaw in the argument of either contestant.

The Cost of a Fire.

Those who think that a fireproof system of building costs more than it comes to, and that a few dollars a year spent in insurance premiums are a sufficient safeguard against loss, will do well to read the report of the Massachusetts State Insurance Commissioner. The total loss in the Boston fire was 80 to 90 millions, of which 56,500,000 was covered by policies. Of the 187 insurance companies in Massachusetts, 147 suffered, and 26 failed, and 5 outside companies are also in the hands of the receivers. The policy holders will do well if they receive 70 per cent. of the amount of their policies. This will give them less than $40,000,000, so that the owners bear one-half and the insurance people one-half the loss.

It is quite certain that this forty millions would have sufficed to make the whole of the burnt district fireproof. In fact, that sum, added to the present cost of the buildings, would probably make the whole city of Boston so near fireproof as to render such an overpowering conflagration well nigh impossible. It has been our intention to describe the methods of building which give foreign cities such security from fire, but we are forestalled by Mr. ARTHUR GILMAN, architect, who gives in the *Tribune* a careful account of the light fireproof construction in vogue abroad. After describing the well-known ponderous iron and brick floors of our own fire-proof buildings, he says:

"The French architects, in the general run of their buildings, have come down in practice to a very different method. The style described above may, indeed, be in vogue among them for palaces, courts, halls, and other public structures, but in ordinary practice, as in the case of stores, offices, and dwelling houses, their usual methods might more nearly be imitated here, and with the material found in our markets, in something like the following manner: Take a span, for example, of 16 or 17 feet between the bearings—a length which would abundantly meet most of the requirements in our own buildings. The French architect would consider that a good fireproof floor might be constructed over this span as follows: Four-inch rolled iron beams, weighing 12½ pounds to the linear foot, or 37 pounds to the yard, would set on the walls at distances of 2½ feet apart. A beam 16 feet long of this size would weigh only 197 pounds. The *taquets*, or narrow bent strips of wrought iron which are laid down across the tops of the beams and binding them together, would next be put in at intervals of every 2 feet, transversely with these beams—these *taquets* being strips of iron ⅛ of an inch thick by 1⅛ inch wide. Lastly, the *sabots*, or straight, longitudinal strips between the beams, would be laid down, three of them in each interspace of 2⅛ feet between the beams, or a trifle over 7 inches apart—each *sabot* being a strip of iron 1-16th of an inch thick by 1 inch wide. All these sizes can readily be had of any iron house in the country. The result of the whole operation would be the production of a light and flexible, but strong network of wrought iron, capable of standing an immense tensile strain, and fitted to receive the gypsum flooring which is easily and rapidly put in all over the area required, and setting in one solid mass between each of the beams of the whole floor.

"A floor of this kind, at the present exceptionally high prices of iron and labor, could be put on, at a fair profit to the contractor, for 75 cents per square foot, $6 50 for each square yard of floor, the gypsum filling between the beams and the finishing on the under side, or ceiling line, with a thin coat of hard-finish plaster, costing $1 per square yard in addition."

It will be seen that he estimates the increase of cost at a much lower figure than we did in writing on this subject some months ago. He says, indeed, that "the conclusion of competent experts is that an increase of about 15 per cent. over and above the expense of our present highly dangerous mode of construction will very fully cover the additional cost of all the details described in this article."

Mr. GILMAN is building a floor of this kind in New York which he proposes to exhibit when finished, and it would be well for those who intend to put up houses to inspect this admirable, warm and safe mode of construction. Change the materials of our houses, and leave out some of the present dangerous features of arrangement, and there need be no fear of another Chicago or Boston fire, except where the old buildings are responsible for it.

Cornish Mining.

Mr. G. W. BAKER, of Colorado, who is now in Europe, and has contributed some letters to the London *Mining Journal*, makes an energetic criticism upon the condition of the mining industry in Cornwall. He says that the reputation of which Cornwall is so tenacious, is based upon that district as it was a century ago, but that it is now behind other mining regions in every respect. But we will let him speak for himself.

"The celebrity achieved by a locality may be, at a distance, attributed to a mistaken cause. Such appears to be the fact with Cornwall. Having a mention in history for so many years, because of the extent, endurance, and the almost exclusive character of the ore deposit, has led to the assumption that this celebrity is owing to an expert superiority of the Cornish miner, the superiority of Cornish machines and Cornish systems. Until I was undeceived, by a personal visit, I was of the opinion that Cornwall was celebrated for what was done by Cornish men in her mines, and on the surface. That delusion exists no longer, and, having so said in my first article, which has been the cause of much insolent personal abuse, it is now entirely proper to show that there is no greater fiction existing than that *there is any merit in the modern management of the tin*

mines of Cornwall. 1. All the hoisting rigs and stamping machinery I saw by rail, and after I arrived in St. Just, were standing in the open field, not housed. Many thousands of pounds invested in machinery were thus represented, in each case presenting a sight of primeval barbarity peculiar alone to abandoned property. No motive of economy can furnish an excuse with respect to the machinery alone, but when considered in the light of the attendance required by human beings in all weathers, in all seasons, by night and by day, the brutal inhumanity of the exhibition can only be palliated by men indurated to the extent that makes the level of the man the same as that of a beast.—2. None of this machinery has been affected by the wonderful progress made in the manufacture of such apparatus during the past twenty years. In this period the stamp-mill has been as much improved as was the steam-engine between 1698 and 1795. Vast improvements have also been made in hoisting gear. The former, constructed upon the rudest principles of lift and drop, cumbersome, clumsy, unsightly, and exposed to the elements for a quarter of a century, is the fittest representative of modern merit in Cornish mining.—3. The dump of the skip is upon unhoused ground. The workmen, engaged in sorting out copper-mundic, and in breaking the stone, are exposed to the storm, the sleet, hail, snow, rain, and when urged to hasten work complain—"How can you expect us to work, stiffened chilled, and wet all the day!"—4. Unimproved shafts, in deep, well proved mines, in preference to timbered passage and hoistways, are to be likened to the corduroy and mud roads of the country years ago, as preferable to the railway of the present for freight and passage. The difference in cost of bringing ore to grass, working through the Cornish shafts and through one of modern construction, is not less than ten per cent. on the daily expenditure—that is, where 100*l.* per day would be expended in mining and hoisting ore only 90*l.* would be required if the shaft was properly constructed, making a prodigious annual interest on the cost of such proper construction. The present system is indefensible in any sense, excepting a contemplated abandonment of the mine.—5. Whatever merit was once due to the system of tin washing in Cornwall no praise can now be accorded in that direction. In Germany, during the last twenty years, immense progress has been made in washing devices. Cornwall stands upon the rudiments and supplements, by tinkering devices, what should have been modified years ago. Slime is the recognized difficulty in washing, a cormorant of labor, and a thief of metal; yet, in Cornwall, the machine which makes the largest percentage of slime is the only one used for pounding the ore—the stamp mill. This is Cornish philosophy.

Engineering and Mechanical Notes.

Four wrought-iron beams for the pumping engines of the Milwaukee Water Works have been ordered in Sheffield, Eng., by the Reliance Works. The beams are 30 ft. 2 in. long, and 6 ft. 4 in. wide at the middle part, and decrease in width towards the end, each terminating in a semicircle of 12½ in. radius. Their thickness is each 1⅞ in., and their total weight something like 17 tons.

The increased attention to ventilation of collieries demanded by the English mining laws is bringing about the introduction of large ventilation engines in great numbers. The Guibal fan is a great favorite. One of them was lately started at the Manvers Colliery, Wath, where there are two shafts, each 275 yards in depth, and 13 ft. 6 in. in diameter. Hitherto the ventilation has been performed by means of furnaces, one 5 ft. 6 in., the other 7 ft., drawing at the rate of about 164,250 ft. per minute. The fan worked at 45 strokes per minute; averaged 172,720 ft., or 8,470 ft. more than the furnaces. This result must therefore be deemed satisfactory. The fan itself is 36 ft. in diameter and 12 ft. in breadth. The cylinders, of which there are two, are 30 in., with a 3 ft. stroke, and it is thought the fan can safely be run up to 60 revolutions. It was made by HATHORN, DAVIS & CAMPBELL, of Leeds, and this firm, which is a large maker of mining machinery, has several orders for large pumping engines on the *forcing upwards* principle, a newly-introduced method. One of these is being made for the Clay Cross Company, Derbyshire, to lift 1,000 ft., and another is in hand for a colliery at Newton Capp, Durham, which will be equal to raising 1,300 gallons per minute. The same firm has a large pair of winding engines, with 14 ft. drums, and another Guibal fan, 36 ft. diameter and 12 ft. wide, on hand.

Messrs. BELL BROTHERS, of which Mr. I. L. BELL, the well-known author, is a member, are about to lay the foundations of two new furnaces at their works at Port Clarence, and if trade remains satisfactory, it is intended before long to add one or more to that number. This firm had at one time under consideration the propriety of adopting the new furnace, patented by Mr. FERRIE, of the Monkland Iron and Steel Works, and now largely adopted in Scotland; but Mr. ISAAC LOWTHIAN BELL, who visited the Monkland Works specially with the view of seeing Mr. FERRIE's furnace in operation, was afraid that it would not suit the soft coal of South Durham, although it answered admirably the conditions of the splint coal used in the Scotch furnaces. The new furnaces at Port Clarence are, therefore, to be built in harmony with those already in existence, 80 ft. in height, and 25 ft. at the boshes.

Mr. WHITWELL writes to *Engineering* that 100 of his hot-blast stoves are in blast and building in continental iron-works; that 40 stoves have been ordered in Prussia alone since May 1st for seven companies, including such well-known names as KRUPP, BOCHUM, HOERDE, DRESLER, and FRIEDRICH-WILHELM HÜTTE; and that the Continent alone and America ordered 50 stoves since October 1st, 1872. He puts the cost of repairs at five per cent. a year, and says that excellent results have been obtained by using his stoves with open-topped furnaces at Esch-sur-l'Alzette, Luxembourg.

Visitors to the Vienna Exhibition will be able to reach one of the favorite points of interest near the city, Klosterneuburg, by means of an incline. Klosterneuburg is situated 850 feet above the Danube, and affords a fine view of the city and country about it, but hitherto was to be reached only by a steep and rough path. The tramway is somewhat over 800 yards long, and will be worked by a small steam-engine. The cars are besides provided with an extra catch-rope, and with safety catches or brakes similar to those used in mines.

The question whether Indium exists in American blendes is one that has received considerable attention. Mr. H. B. CORNWALL, of the New York School of Mines, publishes, in a note in the *American Chemist* for January, 1872, that a blende from Eaton, N. H., gave faint traces of it; another from West Ossippee, N. H., stronger indications; and one from Roxbury, Conn., contained so much that it could be detected in the raw powdered blende without the use of acids. The examination was entirely spectroscopic.

MINING SUMMARY.

Nevada.

The Gold Hill *News* of Jan. 11 has the following local Mining Summary, for the week ending Jan. 4, 1873:

BELCHER.—Daily yield 330 tons, from the 1000 and 1100-foot levels. These levels are now worked with the greatest facility through the incline and shaft of the company. The incline is still sinking at a good rate of progress, and is thirty-three feet below the 1200-foot level. The drift from this station north is in 42 feet, and the main drift south at the 1200-foot level to meet it is in 220 feet from the Crown Point line, with the face in splendid ore. The south winze to connect the 1100 and 1200-foot levels, 260 feet south of the Crown Point line, is probably about completed, as the connection between the winze and raise was expected to be made this afternoon. As soon as this is done, the old winze, 50 feet south of the Crown Point line, at the 1100-foot level, mentioned in our last report, will be proceeded with and sunk through to the 1200-foot level. The main drift east from this incline, at the 1000-foot level, is in 286 feet, and the north drift, at the 850-foot level, is in 393 feet. The framework for the north extension of the railroad ore-dump is going up to-day. A neat little engine of eight or ten horse-power has arrived and will be put in working position as soon as practicable, at the head of the south winze spoken of at the 1100-foot level. It is to be worked by compressed air.

SIERRA NEVADA.—Daily yield forty-five tons of good milling ore. This would appear to show a decrease in the yield of the mine, which is not the case, as the mill has not been able to crush the usual amount of ore, from the fact that one battery at a time has been suspended during the week, to put in new mortars, and it was not deemed necessary to extract more than sufficient ore to keep the other three batteries going. The different ore breasts are looking and yielding well, as usual. Prospecting the lower levels is making steady progress, with nothing new to report. The mill and hoisting works are receiving the addition of two new tubular boilers, fifty inches in diameter and sixteen feet long; also new cam-rods and other machinery; which will greatly facilitate the steady crushing of ore and prospecting on the lower levels.

SAVAGE.—Daily yield, 140 tons of ore, worth $28 per ton. The incline is making excellent progress, the rock in the bottom working much softer than at our last report; it is down 135 feet below the 1600-foot level. The main south drift, on the 1600-foot level, is pushed steadily ahead, good progress being made. The main drift north, on the 1600-foot level, to connect with the south drift of the Gould and Curry on the same level, is also making good progress. An assessment of $10 per share was levied January 6th, delinquent February 28, aggregating $160,000.

OVERMAN.—The water in the shaft has been at last drained; after sixteen days incessant application, during which time 40,000 gallons per hour was hoisted from the shaft, making the total amount of 15,360,000 gallons. The new pumping machinery works splendidly, and is amply sufficient to keep the shaft drained. Work has been resumed in the main drift, it being found necessary to clean it out and retimber it in places where the ground was soft. Sinking the shaft will be resumed in a day or two.

CROWN POINT.—The ore breasts all look well as usual; both ore and bullion yield highly satisfactory. The main incline is down 161 feet below the 1300-foot level, and good progress deeper is being made, the ground working well. The 1300-foot level is working better than ever, and the cross-cut east from the east winze, shows low grade ore in the face, with no sign of the east wall as yet. The assays from this level average over $150 to the ton.

YELLOW JACKET.—Nothing new in the drift or cross-cutting at the 1300-foot leve north. The 1400-foot level drift east is into the ledge about sixty-three feet. It has developed a fine body of quartz sixty feet wide, in which assays are obtained as high as $17 per ton. It is considered an importantly favorable development. Too much water at the 1500-foot level to allow of proceeding at present, but it will be pumped out next week and drifting east resumed for the ledge.

CHOLLAR POTOSI.—Daily yield 110 tons, the assay of which is $33 per ton. There nothing new to say of the ore producing sections of the mine or the quantity of the ore produced. The prospecting drift at the first station has made connection with the old Potosi shaft. The north drift at the third station is in 100 feet, having made excellent progress during the week.

INSURANCE.—The incline is down ninety-seven feet below the old tunnel level making a depth reached of about 250 feet from the surface. The upper side of the shaft is still in $20 to $25 ore, while the under side is cutting the east wall. The ledge at this depth pitches strongly to the west. Fair progress is being made, though the ground in the bottom is hard blasting.

CONSOLIDATED VIRGINIA.—Sinking the shaft is making excellent progress, the rock in the bottom working much better than heretofore. The main north drift on the 1167-foot level from the Gould & Curry shaft is pushed steadily and apidly ahead, the rock in the face being much softer, admitting of much better progress.

GOULD & CURRY.—The incline is down 110 feet below the 1,600 foot level, and maki

fair progress. The main south drift on the 1600-foot level is pushed steadily ahead to connect with the north drift on the same level from the Savage. Prospecting on the other levels still continues with no new developments to report.

HALE & NORCROSS.—Prospecting the lower levels, as usual, with nothing new to report. The north winze on the 1500 foot level to connect with the 1600 is down 146 feet, and, considering the extreme hardness of the rock, is making excellent progress. There is no change to report in the amount or quality of the ore produced

MINT.—Progress in the shaft is necessarily a little slow on account of the great inconvenience experienced from having to do the hoisting by hand at present. December 28th an assay of the ore gave $88 89 in gold and $271 50 in silver: January 4th, $140 57 in gold and $378 80 in silver, showing a decided increase in the value.

IMPERIAL EMPIRE.—The surface work for the new pumping machinery is completed. This machinery, when completed, will be amply sufficient to drain the mine to the depth of 3000 feet, and the hoisting engines now in use being of sufficient power to do all the hoisting to the depth of 2500 feet, will place the Imperial Empire in the front rank of our Comstock mines in capability for working purposes. Prospecting at the lower levels as usual, with nothing new to report.

SILVER HILL.—Both the north and south drifts at the first station are still driven energeticaly ahead, with but little change in either since our last report. It is expected to commence the extraction of ore as soon as the large ore house being now built is completed. Much delay is experienced from lack of the necessary timbers.

RED JACKET.—Machinery and pump being put in position for an active resumption of work in the mine. The incline will be sunk 500 feet deeper. It is now 75 feet deep, and shows a fine six-foot ledge.

JULIA.—Sinking the shaft is making good progress. Prospecting the 800 foot level continues without intermission and with no material change to note.

OCCIDENTAL.—Still drifting northward along the line of the ledge, with nothing new to report, if we except the steady and energetic progress of the work.

CALEDONIA.—The drift south, at the 700 foot level, is in 42 feet. Prospects favorable at all points of the mine. Nothing new.

JACOB LITTLE.—Lack of timber has interfered with the progress of the work some but it will go ahead as usual next week.

BUCKEYE.—The new ore body developed south of the incline is turning out finely and both mills kept steadily running.

KENTUCK.—still yielding the usual quantity of good ore from the old workings about the 500 and 600 foot levels.

UTAH.—All work in the mine suspended for the present on account of inability to obtain wood and timbers.

KNICKERBOCKER.—Main west drift in 487 feet. Face in clay, with some water, indicating ledge near by.

PICTOU.—Sinking the incline from the main drift still progressing well, in favorable indications.

NEW AND PROMISING MINING DISCOVERY.

From the Gold Hill *News* of Jan. 15:

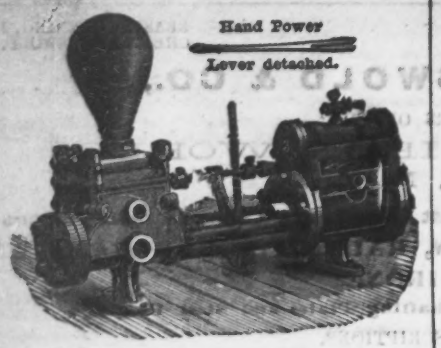
Fourteen miles in an easterly direction from Virginia City, in the eastern foothills of the Washoe range of mountains, near the eastern line of Storey County, is situated what is known as the Golden Eagle Mining Company's claim. Their claim consists of 1,400 feet on the line of the ledge and was located abont two months since, by J. P. Jones, Pat Gulfoil, Thomas Monahan, Neil McCloud, Al. McCausland, — Shellard and — McSwain. We visited the ground about four weeks ago, and found two men at work doing what they could do to develop their mine. They had erected a good, substantial board cabin, to protect them from the storms of winter, had stripped the ledge twelve feet in length, and had sunk a hole some five or six feet deep by the side, exposing the full face of the ledge to that depth, which, to all appearances, showed a fine deposit of good ore. The croppings of the ledge can be traced only about one hundred feet on the surface, and appear to partake of the nature of what is usually termed a "blind" ledge. From the hole sunk we took samples of ore that assayed from $23 to $162 per ton, mostly in silver.

Shortly after our visit an incline shaft was commenced on the ledge, which at this point appears to have a strong inclination to the north and west. The ledge is about three feet thick at the surface, with regular, well defined walls, and bears every appearance of being a true fissure vein. On the 1st of January the ledge in the shaft at a depth of thirty feet had increased to five feet in width, and three assays of the ore gave from $49 63 to $263 per ton, mostly silver, showing a decided improvement in the quality. Finding the labor of dragging a tub up the rongh incline too great, the men have abandoned sinking the incline for the present, and commenced sinking a perpendicular shaft at sufficient distance from the ledge to strike it at a depth of abont seventy feet. When this is accomplished they expect almost without a doubt to announce the fact of another paying mine outside of the Comstock. This mine is very cligibly situated on a spur or low hill of the main range of the mountain, is easy of access, about five miles from the Carson river, and can, if a sufficient body of ore is developed, be worked without any extraordinary expense, at a good profit to the owners. About 350 feet down the ravine, below the croppings, an old tunnel has been run directly into the hill to within 130 feet of the ledge. This tunnel furnishes a fine spring of several inches of water, is in good repair, and was run by some prospectors for a ledge lower down the hill during the exciting times of 1860, and by simply extending it 130 feet further in, it will tap the ledge of the Golden Eagle Company, and furnish an easy and favorable outlet for working their mine to that depth.

MISCELLANEOUS.

MISCELLANEOUS.

MACHINISTS' SUPPLIES.



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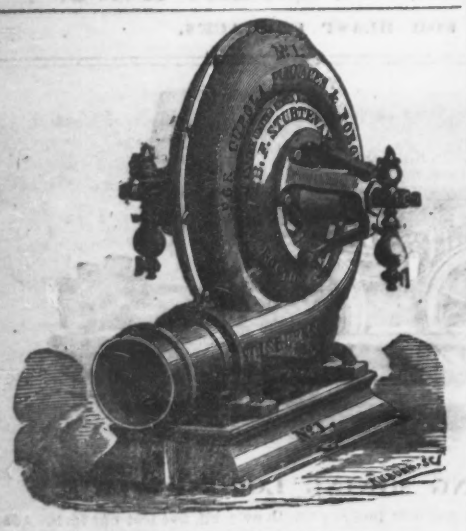

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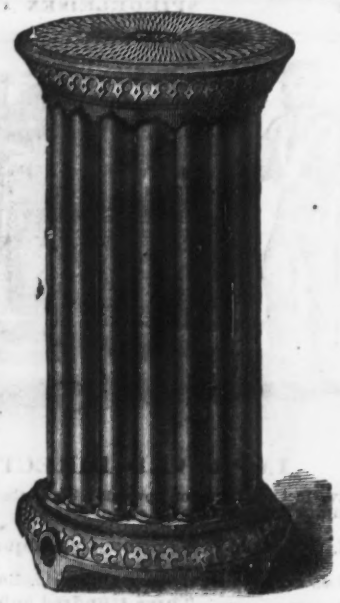

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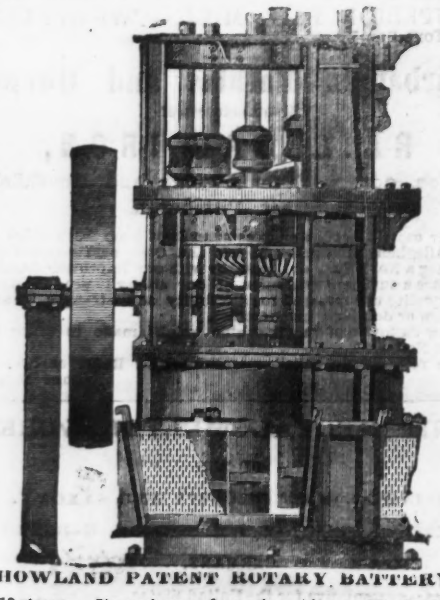

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