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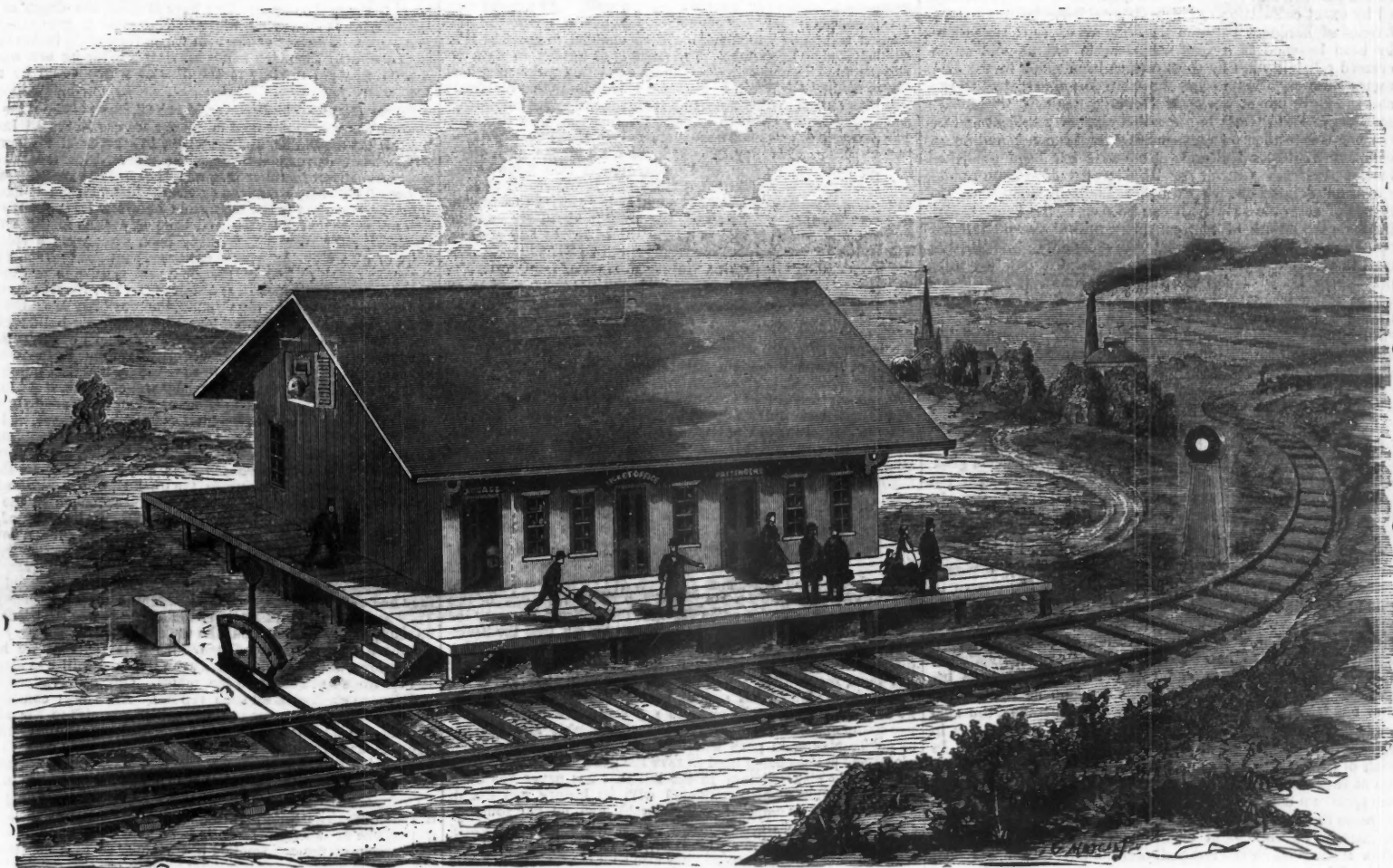
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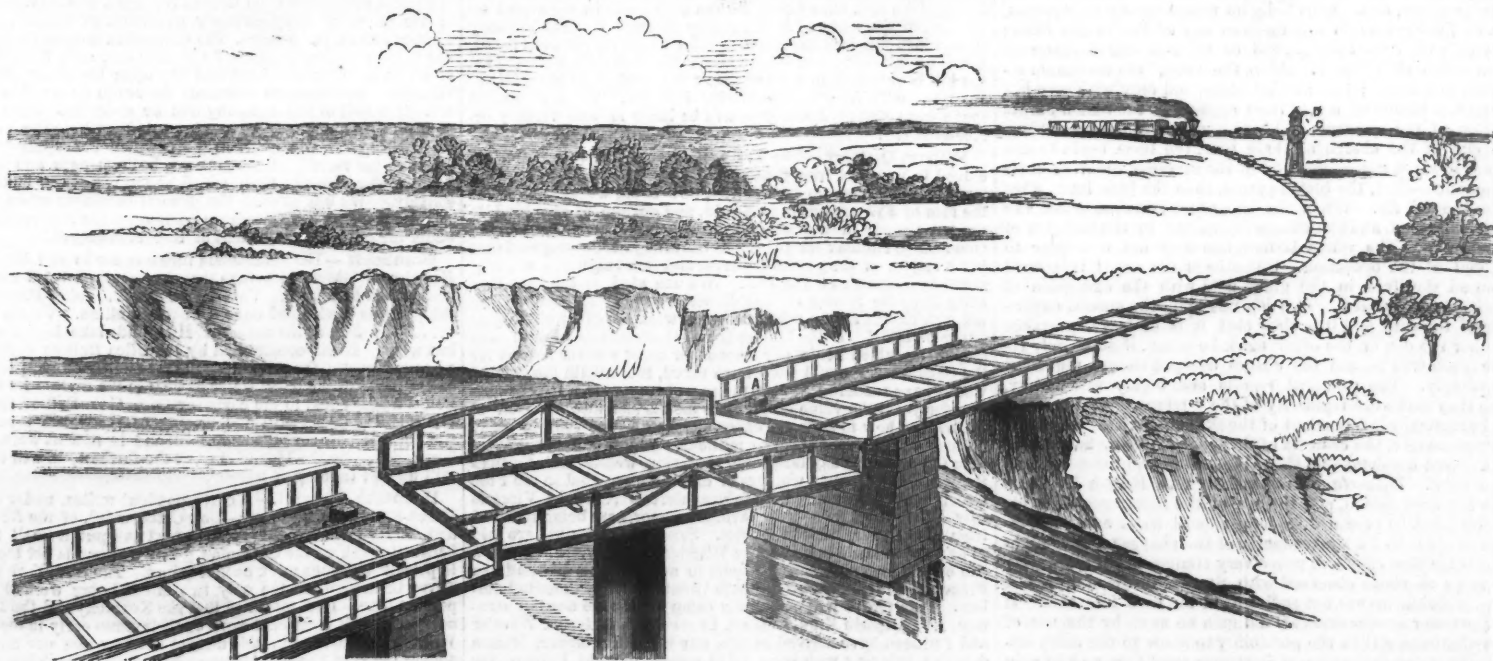
Since railways became a leading feature in social economy, security to life and property has been a source of the deepest anxiety to all entrusted with the safety of the travelling pub-

are attached, to be displaced, without the fact being known, not only to all in the immediate neighborhood of the switch or draw, but also to the engineer and employees of an approaching train. Nothing is left to chance. Nothing to carelessness or inattention. The slightest displacement of the

generating power is simply a battery, similar in all respects to the telegraphic and other batteries used in the arts. The mechanism and action of the Switch connection is illustrated by Fig. 1, in which A A represent sections of malleable or wrought-iron pipe or other suitable cylinders, in which are fit-



HALL'S ELECTRIC RAILWAY SWITCH.—THE RAILWAY STATION.



THE DRAW BRIDGE.

lic; and misplaced switches and drawbridges have been fearfully prolific of disaster. Against this class of accidents, it is claimed that "HALL'S Patent Electric Railway Switch and Drawbridge Signals" are the most perfect safeguards now in existence. The operation being wholly automatic, it is absolutely impossible for a switch or drawbridge, to which they

rail or switch or draw, whether caused by accident, criminal intent, or regular discharge of duty, is instantly and unerringly indicated, giving a warning which cannot be disregarded. That our readers may have all the details and operations of this new device, we this week present a number of engravings showing the whole thing in a very satisfactory manner. The

ted loosely pistons or plugs of wood, as seen on an enlarged scale in engraving (Fig. 2). In this, A is the tube, or cylinder, secured to the box in which it works by the ears or projections B. The plug C (Fig. 2), fits the upper portion of the tube having, passing through its body, the two strips of metal

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Spectral Analysis and the Bessemer Process.

The application of the spectroscope for conducting the charges in the Bessemer apparatus has become a practical reality. Professor Liellegg, of Gratz, of whose experimental researches with the spectroscope in the Bessemer steel-works of the Southern Railway Company of Austria we have only recently given an account, has succeeded in pointing out a sufficiency of marked changes in the spectrum for enabling the managers of these steel-works to watch and conduct the charges with the assistance of the spectroscope in preference to the routine previously adhered to at those works, a routine which, as a matter of course, was a strict copy of that existing in the Bessemer steel-works of this country. By the aid of the spectroscope the manufacture of Bessemer steel, in the Gretz steel-works, has been considerably improved with regard to that exact uniformity of hardness which formerly was more difficult to ensure under all circumstances. The great certainty with which the exact moment of complete decarburization can be fixed by spectral analysis has reacted upon the amount of care now bestowed upon keeping the percentage of carbon in the spiegelisen to a uniform or at least to a correctly ascertained amount, and regulating the quantity of spiegel employed by exact calculation. The accidental irregularities and difference of hardness between the different charges have thereby been lessened to a very considerable extent, and an increased reliability has by these means been given to the Bessemer process. Some other Austrian Bessemer steel-works, and the Government works of Neuberg amongst these, have sent engineers to Gratz in order that they may subject and introduce it into their own respective establishments, and on account of Professor Liellegg's discoveries has been published in the *Austrian Gazette for Mining and Metallurgy*. The spectrum pointed out by Professor Liellegg, belongs to the flames of carbonic oxide. It can be seen in the flame escaping from the mouth of the converter during the preliminary operation of heating this vessel with coke only; and in that case the lines referred to are very faint, and it requires some practice or knowledge of the precise spots in the spectrum where these bright lines should be looked for, to discover them. During the first period of the Bessemer process, the spectrum is very faint. The yellow portion is almost invisible, and even the sodium line is missing; the blue and purple portions are extremely faint. The absence of the sodium line can be accounted for only by the consideration that there is no real flame formed by incandescent gases escaping from the converter at that early stage, but only a mass of sparks carried by the nitrogen from the blast, the oxygen of which remains in the converter, combining with silicon. As the flame gradually appears in the centre of the volley of sparks, the spectrum widens and shows yellow light, until suddenly, the sodium line in the yellow field becomes visible, first only for moments as a flashing bright streak, and after less than one minute as a constant and clearly defined line. The appearance of the sodium line marks the commencement of the decarburization, although this line does not belong to the charge of iron at all, but rather to the accidental presence of sodium compounds in very minute quantities. It is therefore only indirectly connected with the combustion of carbon; i. e., the appearance of the sodium line is a signal of the completion of the continuous spectrum and this continuous spectrum belongs to the combustion of carbon. As soon as the sodium line has taken a steady and permanent appearance, the characteristic lines of the carbonic oxide may be looked for in the greenish-yellow, in the green, and in the purple field. In each of these three fields one bright line becomes clearly visible at that time. As the flame increases in size and brilliancy, the spectrum comes out more and more clearly. Bright lines increase in number in each of the first-named three fields, and ultimately, at the height of the process, some bright lines show themselves in the red and, occasionally, also in the blue field. The green field of the spectrum, however, is the real point of observation in practice, as in this the lines are most clearly visible, and in it they appear first and disappear last. The spectrum, as a whole, is by no means steady or constant, but its fluctuations do not displace any of the bright lines; they only alter the background or the continuous spectrum upon which they appear. After the "boil," the maximum intensity is reached; and at that stage, and only with very hot charges, a bundle of bright lines appear in the bluish-purple portion of the spectrum. About four or five minutes before the end of the charge of three tons, the lines begin to disappear in rapid succession, and in the inverted order of their appearance—first, the bluish-purple, then the blue lines, after these the red, &c. When the last green line disappears, the vessel is turned, and the charge completed by the addition of spiegelisen. The yellow sodium line does not disappear to the end of the operation. Sometimes the vessel is turned when all the lines in the green field with the exception of two have disappeared. This depends upon the special experience of the case, and it is clear that it is of less importance whether the one or the other mark be taken, if it is only regularly adhered to, and the charge of spiegelisen regulated accordingly. The practical results are highly satisfactory, since they make the regularity of the "temper" of Bessemer steel practically independent of the skill and experience of the charge-manager, the changes of the spectrum being made more marked and unmistakable than those of the appearance of the flame itself. Hitherto, no experience with British hematite irons has been gained, and the use of the spectroscope in this country must be preceded by some careful trials and observations in order to fix the character of the changes. It is highly probable that they will prove very similar, if not absolutely the same as those observed with Styrian charcoal iron, but mere probabilities are not sufficient in the case like this. If the Bessemer steel-makers should gain no more by the use of the spectroscope than the possibility to show to the noisy disbelievers in the uniformity of Bessemer steel that a child may conduct the charge without the least chance of error, just the same as a boy can now work the whole mechanical apparatus of the converters, the gain would be very great. But there is a greater gain immediately to be realised by the use of the spectroscope. The steel-masters will become less dependent upon the skill and attention of their charge-managers or foremen, and the percentage of waste or unsuitable material produced by carelessness or mistakes will be lessened in the general run of practice.—*Engineering*.

Mining Summary.

GOLD AND SILVER.

Nevada.

The Comstock.—From a review of the Mining Share Market of San Francisco, for the week ending April 6, given in the *Commercial Herald*, we take the following items of news:—All work upon the Imperial-Empire shaft and the progress of the drifts from the lower level are now watched with great interest by the speculator in stocks, that will be effected by the development through this large and well-constructed work. At latest dates the drift had been carried in upwards of forty feet from the 900 level, and on the evening of the 30th ult., the separate drift for the vein was commenced. From other portions of the mine the usual quantity of ore is obtained. The bullion receipts for March foot up \$39,761.15 with another clean-up to bear from At the Savage, during the week ending March 28th, 1,683 tons were extracted, valued at \$36.32 per ton, against 1,095 tons, valued at \$34.27, extracted in the previous week. During the month of March, 7,480 tons were sent to the mills. From March 14th to date (April 6), \$171,000 in bullion have been received at the office in San Francisco for March account, with another clean-up to bear from Telegraphic advices state that at the Crown Point the drift is in seventy-eight feet from the 800 station, and nineteen feet west of the winze from the 700 level, which is now ninety-five feet in depth. This winze is not running in as good ore at present as previously reported. The faces of all the flows going south on the 700 level are looking well. At present they are raising about 100 tons of ore per day, and so soon as the connection with the winze is made will be enabled to increase it to one hundred and fifty tons. The receipts of bullion to date aggregate \$44,264, and will reach about \$68,000 for the month of March against \$37,000 in February. It is thought that dividends will be resumed in May next, and from present appearances such disbursements are likely to continue for some time from that date. The Trustees have called a special meeting of the stockholders, to take place on Monday, May 11th, for the purpose of increasing the capital stock from \$2,400,000, divided into 2,400 shares of \$1,000 each, to \$3,000,000, divided into 3,000 shares of \$1,000 each. The Kentucky shaft is about being carried to a further depth of 400 feet. At present the yield is about seventy-five tons per day, which is said to average from \$45 to \$55 per ton. For March account the bullion receipts add up \$47,000. For the week ending March 26th, the ore product of the Chollar Postol amounted to 238 tons, against 249½ the previous week. In the Blue Wing stope a pay streak, is reported, six feet wide; one-third of it, however, is said to be waste. The Hale & Norcross company continue to extract the usual amount of ore, and has lately averaged about \$84 to the ton. The shaft is now upwards of fifty feet in depth toward a new level. From the Amador the receipts of bullion in March aggregate nearly \$53,000. A dividend of \$12 per share is reported for March. The Lady Bryan bullion product for March is about \$20,000, the ore yielding about \$25 to the ton. They intend to increase their milling facilities, and it is thought the yield will be doubled during the present month. Since our last report bullion amounting to \$14,670 has been received at the Overman office in this city. The Gold Hill Quartz company reduced for March account 426 tons of ore, showing a yield of \$8,166. Daney has levied an assessment of \$3 per share, or \$12 per foot.

Cedar Hill.—The *Enterprise* says:—Judging from present talk and indications, all the prominent leads on Cedar Hill will be worked during the coming summer, and even a few leads that are hardly known by name. We saw some ore a day or two since from a nameless lead on the hill, that showed by assay the handsome sum of \$36 per ton. It is well known that the Sacramento mine contains a vast amount of pay ore—gold bearing quartz—and parties have been at work in the mine all winter, or whenever the weather would permit. By working the ores of the hill for gold alone—they contain but little silver—there can be no doubt but they can be made to pay well, as a large amount per stamp can be crushed daily; then the trouble and expense of amalgamating in pans will be dispensed with, only copper plates and sluices being used to save the gold. That there is an exceedingly rich chimney in the hill that has never yet been found, no miner at all acquainted with its history can doubt. The dirt on all its slopes is rich in gold, and on the southern slope, near the old works of the Sierra Nevada company, a party of miners a few years since made big wages at washing the dirt with a hydraulic apparatus. They also sold the rock (which was nearly all quartz forked from their sluices) to the mills for a good price. While thus working they found many pieces of quartz that were literally covered with gold. We saw one piece found in the claim that after being broken could not be separated on account of the wires of gold running through it. The chimney from which this rich dirt and rock came has never yet been found, but is undoubtedly somewhere above the hydraulic works. That the hill is very rich in gold no miner can doubt, and we shall yet see many mills running upon Cedar Hill ore. We are satisfied that some valuable discoveries will be made in that vicinity before next fall.

Wilson District.—The *Trepassa* says:—A private letter, received in Virginia, from Pine Grove, states that the sulphuret ore from Wilson's mine, in that district, now being worked, yields at the rate of \$39 per ton in free gold, and enough of that kind of ore has already been developed in this mine to keep the mill (ten-stamp) running for years. It has always been supposed that but a moiety of the gold was saved, and this sulphuret working seems to demonstrate the fact. We are glad to see that thus early have the miners of that district resolved to save all the tailings, collect all the sulphurets, and work for every obtainable ounce of metal. If the hundreds and thousands of tons of rich sulphurets which lie in our canons, or make a silver bottom for the Carson river, could have been saved, the wealth thus added would have rendered Nevada thrice as prosperous. It is certain that for years the value of precious metals lost through lack of knowledge how to save, far exceeded the amount sent to assay offices—and that amounted to millions. Gold Hill and Seven-Mile Canon are to-day deep with glittering wealth, lost through the ignorance of early workers of ore. We are glad to see Pine Grove miners regarding their future interests. The Virginia City *Enterprise* says:—Very favorable reports are being received from Pine Grove, Wilson district. Several rich strikes are said to have been made lately. The Wheeler company are making a run of 600 tons of ore, and expect to astonish this city and San Francisco with a gold brick worth twenty or thirty thousand dollars. Pine Grove will be a lively camp during the coming summer. Captain Pray, Captain Cheever, and Messrs. Wheeler and Paddock have arrived in this city from Pine Grove, Wilson district, bringing with them 1,129 ounces of gold bullion, the product of 575 tons of unassorted ore, from the Wheeler mine, worked at the Pioneer mill. The ore was melted into a bar at the assay office of E. J. Rubling & Co., and weighs 80 pounds. The assay shows the bar to contain in gold (659.5 fine), \$15,394.38; silver (160 fine), \$233.63; total value, \$15,628.01. This is a very fine and valuable bar, but the assay shows that nearly one-fifth of its weight was base metal—copper, we judge, as we think there was little of iron or any other base metal in it. The redness of the bar is evidence that the base metal is copper. The Ophir company, on the second extension southeast from the Wilson mine,

have run a tunnel a distance of 180 feet and struck their lead at a depth of between 80 and 100 feet below the surface. The lead looks well where out, but as yet they have not got through it. The Wilson company have recently struck a rich deposit of sulphuret ore in their lower tunnel. Specimens shown us have the appearance of being very rich—quite as rich as the decomposed ore above. The people of Pine Grove are in high spirits, and are vigorously at work opening and developing their mines.

Pharanagat District.—P. Felsen, just in at Austin from this district, informs the *Reveille*, of 30th of March, that a considerable number of men were employed upon the claims of the Alameda company, as well as upon the Indiana and Illinois ledges, and that large amounts of ore would be ready for the mills. Ostrom's mill was not yet completed, the work being delayed for machinery which was upon the road. The mill of the Alameda company was being pushed forward by a good force of workmen, and it would be completed and running before the close of spring. Ore of good quality had been developed in several ledges outside of the principal ones of the district.

Ione District.—Mining affairs in Ione, one of the oldest districts in this section of the State, says the *Reveille*, March 31st, have taken a favorable turn at last, and the actual and great value of its mines has become established. The Knickerbocker mill, of twenty stamps, under the management of Mr. Langworthy, is now kept steadily employed on ores obtained from mines belonging to the company, as well as upon the Indiana and Illinois ledges, and its production of bullion is large and increasing. Although several mines in the district have been opened to considerable depths the water level has not yet been reached. In the Indianapolis mine, which belongs to the mill company, they have attained the depth of 240 feet without encountering water. This mine is producing excellent ore. The size of the vein varies from eight inches to two feet in width. Some ten mines are now producing ore, while it is believed there are fifty in the district which could be made productive.

Silver Bend.—The *Reporter*, March 28, says:—About the only company now here engaged in taking out ore is the El Dorado South. At the bottom of the incline, 130 feet from the surface, a level has been run south along the lode. This is now completed a distance of thirty feet, and disposes an excellent quality of ore all the way, but at the extremity just reached it exceeds anything yet found in the mine, and shows a large body of rich ore as has ever been raised from any mine in this section. Upon this mine there has recently been discovered a splendid body of chloride ore upon the surface, about 200 feet south from the main incline. The El Dorado South is as fine property as ever has been developed in the State. The *Reveille* says that the reduction works of the Combination company are a credit to the district in which they are located. The main building is of brick, three hundred feet long, and has a capacity of forty stamps, twenty for dry and twenty for wet crushing; but as the ores of the district are of such a nature as to render it almost impossible to save any great amount of silver by wet crushing, it is contemplated adapting the whole number of stamps for crushing them dry. The mill is furnished with sixteen Wheeler pans, and has ten roasting furnaces. The roasting and whey departments are in charge of J. M. Dawley and T. M. Luther, old citizens of Austin—both branches being in good hands. Owing to the inclement weather and bad roads, the quantity of salt received has been somewhat limited, which has at times compelled the furnaces to run on short allowance. This will soon be obviated, and when the forty stamps are all at work, we may expect a flow of silver bricks from that section such as will prove to our friends in other parts of the State that the "Great East" still lives. We also visited the mine of the company, and were satisfied that they had one which fully warranted them in erecting their mill. They are putting up immense steam hoisting works, which will be ready for operation about the 10th of April, when they will employ a large number of men. While in Belmont we heard that reports were circulated in Austin that the mill was stopped and all work had ceased on the mines. Our observations were sufficient to contradict all such reports. All things considered, the operations of the company are full of promise to the stockholders, and we saw nothing more discouraging than all new enterprises have to contend against. The company ship a large number of silver bricks each week, and have paid out nearly sixty thousand dollars since the mill commenced operations.

Cerro Gordo District.—Very good reports are received from this district. The *Enterprise* says:—Notwithstanding the severe winter, one or two furnaces have been kept constantly in operation. Some of the ore smelted has yielded as high as \$100 per ton. All interested in that district have the utmost confidence in the richness and permanence of the mines.

Newark District.—The *Austin Reveille* of March 28 says:—We had a call to-day from Robert Hanegan, the Superintendent of the mines of the Centenary company, in Newark district, whence he had just arrived. The Chihuahua mine of the company has developed large bodies of valuable ore, fully \$30,000 worth of which has been extracted and lies upon the dump ready for the mill. Mr. Hanegan estimates the ore to be worth \$100 per ton. The mill of the company will be re-opened about the 1st of May, with ample ore for uninterrupted work. The company is preparing to manufacture salt, of which the supply from the marsh in the vicinity of the mill was both meagre and inferior. Saline water abounds, from which superior salt can be obtained cheaply. We but express the general judgment when we say that the mines of the Centenary company have improved greatly under the skillful management of Robert Hanegan.

Humboldt.—The *Montezuma* furnaces are in full blast. The *Register* of March 14th says that they shipped 3,777 ounces of fine bullion last week. Value, \$4,800. Fall's Pioneer Mill shipped this week 1,000 ounces of fine bullion. Value, \$1,200. The dam at the outlet of Humboldt lake broke one day last week. It was constructed by the Utica Bullion company at a heavy expense, for propelling the machinery of its quartz mill, and was one of the finest water powers in the State. Its destruction is a heavy loss to the company. Gov. Fall of the Manitowoc and Arizona Mill and Mining company has located the site for his new twenty-stamp mill, and is now at work on the foundation. By the 15th of May, at the furthest, he will have his mill up and running.

Palmetto District.—A correspondent writes, under date of March 8th, in the *Reporter*:—Col. Catherwood, of the New York and Silver Peak company, has arrived and put a small force of hands at work on the Champion. The weather is yet too severe to permit vigorous work on our mines. The New York and the Silver Champion are the only two mines being worked at the present time. I am informed that the Kentucky and the Dickson companies will commence work on their mines early in the spring. Work is only needed in this district to show that our mines are among the very richest in Eastern Nevada. Enough has already been shown, even by the small amount of work that has been done, to warrant one in coming to such a conclusion. What we need is custom mills. There are many mills in different parts of the country that are idle and benefitting no one but the tax-gatherers, that could find plenty of profitable work to do if their owners would but seek it. The Kentucky mine presents a fine body of mineral of nearly six feet in width from the surface to the bottom of the incline. The ore from this mine, as well as from many others in the district, is of very rich quality and easily worked. The district is densely wooded, and water in abund-

ance can be had two and a-half miles distant. There will be a mill erected here during the coming summer, but not to do custom work. The New York and Red Mountain company, operating at Silver Peak, are progressing finely with their mill. The rumor circulating here and elsewhere, that rich placer diggings had been struck somewhere between Fort Independence and the Colorado river, I think, is without foundation.

Montana.

The *Montana Post*, which, by the way, comes to us this week from Virginia City instead of Helena City as heretofore, to which place it has permanently been removed by its new proprietor, Mr. Benjamin R. Ditts, has the following item of news: A number of men who have been wintering on the east side of the Missouri river, design organizing a prospecting party for the purpose of thoroughly exploring the Wind river mountains. Up to the present that region has obtained a sort of mythical celebrity, and a vague impression is abroad to the effect that it is fabulously rich in the precious metals—and probably precious stones—and as public attention has already been called to this region by the publication in the papers of glowing and extremely extraordinary accounts of the finding of caves of hidden wealth, the matter had better be settled as soon as practicable, and we hope the present party will be the successful one. We understand that the party is thoroughly organized, and are possessed of all the elements necessary to complete success. Mr. Fred. Cope, who has just returned from a trip through Gallatin valley and to the Crow creek mines informs us that there are a thousand or twelve hundred people in the Crow creek camps, and that they are from half to ounce diggings. Radersburg is a brisk and rapidly enlarging town, with busy business on every corner of it. Work will be generally commenced in the mines in a few days and from all indications it will be one of, if not, the largest gold producing camp in the Territory this season. The National Bank received from Phillipsburg last week four hundred and fifty-four pounds of silver bullion—the result of the late period of activity of the St. Louis & Montana company's mill. The mill has shut down again for want of quartz. From every indication a few more days of the present weather will set everything in the gulches alive with activity. In Hamshorn gulch three or four companies are already vigorously at work. The present promises to be a very successful season if there is sufficient water. The *Democrat* has the following items: Mr. Crelligh has deposited at the bank of Messrs. Nowlan & Weary, 145 oz. of retort from the Union mill, of the value of \$2,600 00 in currency, or \$2,300 00 in coin. This amount was obtained from seventy-five tons yielding about an average of \$35 00 per ton. Four tons of quartz taken from the Alameda lode, was a short time since crushed and the result assayed, which netted a fraction less than sixty ounces of silver and gold bullion. There is enough gold in this bullion to increase its value to about \$4 per ounce; one-fourth value in silver and three-fourths value in gold. The gold in value is \$60 to the ton. The Deer Lodge City *Independent*, of February 22, says: The Wm. Nolan mill started up at Cable City, on Tuesday last, under the most favorable auspices. The machinery worked well, and fully answered the expectations of the builders. A stampede broke out in this place on Wednesday night for some new diggings said to have been discovered about twelve or fifteen miles southwest of this place, in a gulch between two streams known as Lost and Modesty creeks. It is said to be dry diggings, and prospects about an ounce to the hand. A correspondent writes from Missoula, February 14: "Quite an excitement was created in town to-day by the display of some uncommon rich rock taken from the 'Poor Man's Joy' lode, at a depth of fifty feet. It was pronounced by the scientific and men of experience, to be the richest rock ever taken out of the camp, and estimated to contain all the way from sixty to ninety per cent. of silver. I dare not venture an opinion on its richness, but one thing is certain, it was nearly all black sulphure and ruby silver. Numerous companies are sinking and tunneling in this vicinity, and if capitalists can form any opinion by looking into a ledge from 100 to 150 feet, there will by spring be numerous opportunities for them to judge of the richness of our camp."

Arizona.

A correspondent of the San Francisco *Bulletin* writing from La Paz, Arizona, March 5th, says:

"Travelling from California to Prescott, the principal town in Arizona, there are three different routes, but all starting from Los Angeles. By the northern route, the first town in Arizona you pass through is Hardyville; by the central route, the first town is La Paz; by the southern, the first town is Fort Yuma. Our company took the central road by way of San Bernardino, in California, and La Paz, in Arizona. La Paz is situated on the southern bank of Colorado river, 186 miles from San Bernardino. The houses are all one-story high and built of bricks, the walls being nearly three feet thick. The first house built was in 1862, by a German named Charles Grosse, but in a short time afterwards many more houses were built. It is said that several thousand miners were engaged in placer mining from 1862 to 1864, all of whom were comparatively successful. They worked the mines, owing to having no water, by the dry process so generally used in Mexico. The mines are situated in the gulches and flats in the mountains near town. There are several hundred men still engaged in mining who are said to be doing remarkably well. I saw a piece of gold taken out by one of them which weighed over two ounces. There are within the vicinity of La Paz many gold ledges, and also some silver ledges. I visited none of them, but was shown some ore taken from some of the gold ledges, and found it quite rich, as in all the different pieces you can see a great deal of gold. A few of these gold ledges are being worked by their owners, and the rock reduced in arrastras. Nearly all the ledges are owned by Mexicans, who, owing to their poverty, are unable to erect proper works, and even unable, in most cases, to build arrastras. In La Paz I met C. W. Dent, the Indian Superintendent of this Territory. Mr. Dent has established an Indian reservation near La Paz. It embraces an extent of country nearly 40 miles long, with a varying width of from 3 to 15 miles, and occupies the bottom land from near this place to Corner Rocks, in the vicinity of Williams Fork. The ditch now being constructed for irrigation purposes is near 30 miles in length, 20 feet wide, with an average depth of 9 feet. The labor is performed wholly by Indians, and it is quite refreshing to pass along the line of work, and instead of meeting with 300 or 400 Indians armed and equipped with the 'implements of war' find them dexterously handling a long-handled shovel, and apparently working with a will. These Indians, I understand, are paid 50 cents per day for their services, and are bountifully fed with beef, flour, beans, etc., and also are properly clothed and cared for. The agency building, for the use of the agent and the employers, is now in course of construction. This building, when completed, will present a fine appearance, and probably be the largest and best in the Territory. It is modelled after the fashion of many of these old mansions built by the Californians in earlier days, with a court in the centre, and entrances to all the apartments from this court, there being but one entrance front and one back; so that when these principal portals are closed, the inmates are secure from attack of the Indians in case of insurrection or insubordination. I noticed 200 or 300 acres of wheat growing, which looks promising. Large fields have been prepared for spring planting of corn, etc., of which I understand it is the intention to plant some 3,000 or 4,000 acres. Colonel

Dent has succeeded in gathering together on this reservation over 1,700 of the degraded Apache Indians, and by his discreet conduct towards them succeeded in making them his warm friends. It is his intention, as fast as possible, to establish the Indians on other reservations established by Congress. La Paz is the main shipping-point for goods shipped to Central Arizona. The most of the goods come by sailing vessels from San Francisco to the mouth of the Colorado, and are there shipped on steamers plying on the river to this place. From here they are transported by teams inland. All the light goods come by teams from Los Angeles. There are two river steamers, their capacity being from forty to sixty tons. At Williams' Fork, about fifty miles from here, are a good many copper mines that are being worked very extensively. I was unable to go there. The next place on our road inland is Wickenburg, where is located the celebrated Vulture Mining company. Wickenburg contains about a dozen houses, all built of the same material and in the same manner as those in La Paz, except the mill-house of the Vulture company and also the mill-house of Messrs. Wickenburg & Smith. The last-named mill is situated in the town. It is only a five-stamp mill, but they intend putting in ten more stamps very soon. They crush about seven tons per day. The rock pays them remarkably well. The Vulture mill is about one mile out of town. The engine is one of the best I ever saw. They only run twenty stamps and four concentrators, but the engine is capable of running thirty stamps, together with all the appendages, such as pans, concentrators, settlers, etc. They crush about thirty-five tons of ore per day. It is the intention of the company to put in more machinery for the reduction of the ore. I went out to the ledge, situated in an easterly direction about fourteen miles from the mill. There are apparently two ledges separated by a strata of slate, through which is found more or less gold. These ledges are respectively called the blue and red leads. On the top the pay ore is sixty-five feet wide, running through both leads. The company have sunk one shaft down on the ledge. They started the shaft about sixty feet from the top of the ledge, in the direction the ledge was dipping. At the depth of about eighty-two feet they struck the ledge, and have, at the time I was there, gone in this ledge twenty-two feet, but had not reached the other side. You may take any piece of rock from anywhere in the ledge, and you could get a good prospect. Peter Taylor, who is foreman for the company, informed me that in extent and richness for a gold mine he has never seen anything like it. The company work about forty-five men at the ledge, and twenty at the mill. They employ twenty ten-mule teams for hauling quartz rock from the ledge to the mill; the teams make a trip from the ledge to the mill and back again in two days; the average load hauled by each team is five tons. Before the Vulture company got fairly to work they ran very heavily in debt, owing nearly \$100,000; but in a very short time they paid this off and now have a large surplus on hand. They only have been running about two months, so I was informed. Messrs. Wickenburg & Smith's lode is adjoining the Vulture, that is, it is on the same ledge, but an extension. What has been said of the Vulture can truthfully be said of Wickenburg & Smith's. There are about four more companies located on the same lead, but none are at work, owing to having no money to erect mills, etc. The ore from them is the same as the Vulture, and equally extensive. On the road to Wickenburg there is several ranges of mountains, in all of which extensive leads of copper, silver, and gold, have been found. The gold ledges are spoken very highly of.—[In next week's JOURNAL OF MINING, another very interesting letter from our contemporary's correspondent will be published, in which an account is given of the mines around Weaverville and Prescott.—Ed.]

Idaho.

We learn by the *Avalanche* of the 4th ult., that the Ida Elmore and Golden Chariot companies are removing their fortifications and putting their mines in proper shape for working again. Contracts are being let for sinking shafts, &c., on the Poorman. The ore is much richer in gold than formerly; the bullion being worth about \$5 per ounce. Charles Hilton, Assistant Revenue Assessor, furnishes the following, showing the amount of bullion assayed by the different assayers in Silver City for the month of March:

Blake & Co.—Gold.....	\$53,293 79
" Silver.....	14,195 23
	\$67,489 02
McDonald & Co.—Gold.....	\$45,694 94
" Silver.....	8,966 53
	\$54,661 47
Webb & Myrick—Gold.....	\$15,794 38
" Silver.....	4,561 00
	\$20,355 38

Total coin value..... \$142,515 87
Good quartz has been found at Red Mountain, and also placer diggings that will pay good wages. A ditch is being dug, and it is said a quartz-mill will be constructed there this spring. The Celestials at Boonville and vicinity are repairing sluice boxes, ditches, &c., and, if the present fine weather continues, placer mining will commence in good earnest in a few days. The product of the placers will be run into bullion and will considerably swell the monthly shipment of the precious metals.

Ohio.

GALION, Ohio, April 27, 1868.

EDITOR AMERICAN JOURNAL OF MINING:
I have noticed several articles in your paper in reference to gold being found near Belleville, Richland county, Ohio. Last fall some parties came to me to have me examine that locality; and, by so doing, I discovered indications of gold in the ground for some three or four miles around. In one place there was a good prospect, where water was plenty, and we tried to lease the farm, but not being successful, we bought it. It being late in December, we could not prove our property much, but last week Dr. Shoemaker, Mr. Colborn and Mr. Jackson visited the place, which is about 3 miles from Belleville, on the road leading to Newville, and on the George Rix farm, and by prospecting in various places, saved about \$8 worth of gold in the form of nuggets weighing over one pennyweight each. This locality promises to become a very profitable mining country. It has been known for some time that gold was to be found in and about Belleville, but never before has it been taken in such large particles as have lately been found. Parties working near the village, on a farm they purchased about one year ago, are said to be doing well. I think I can very safely say our diggings will pay one ounce to the hand per day. J. RIBLET.

COPPER.

Michigan.

"Good authority," says the *Gazette*, "states that the calumet stamps have, of late, broken from eighty to eighty-five tons per head when they have run a full day. The first level is opened a length of 1200 feet. Four shafts are down to that line, and three to that of the second level, on which alone, it is said, a fair mine is opened. Uren and Walker's new stamp has been in constant operation at the Pewabic mill during the past week. So far as we have been able to learn, the business has been quite satisfactory, the amount of rock stamped per day being 100 tons and upward, but whether the stamp will prove, in all respects,

so much superior to Ball's Improved as to warrant their adoption, is a question that must be settled by a longer trial than one week. There are many points of excellence in the new stamp, especially the steam cushions, the uniform length and weight of blow, and almost automatic feed arrangement, and there are two or three drawbacks, the main being the multiplicity and wear of parts. The product of the Franklin mine for the month of March was 92 tons, 678 lbs. The Cliff mine expects to weigh up for March not less than one hundred tons of copper. The mine is looking better, and the stopes in the back of the 150 are generally looking well. The "big mass," of which there has been so much said the past week, is about 50 tons. The 160 is being driven much faster, two winzes being down to the required depth. The Phoenix has a mass of copper at the bottom level going north on the Bay State vein, a great improvement on anything seen for a long time. The St. Clair has again taken on a few more men, and probably going to make a rush for spring shipment. The Eagle Harbor Mining Company have a vein two and a half feet wide, producing good stamp work, with pieces of heavier mineral; some pieces of twenty pounds each have been taken out. The Delaware is looking well in the 50 north. The mass first met with in the drift has been taken out, and is estimated to weigh from three to four tons. We are informed that another mass stands beside this, and two or three more stick out in the breast of the drift. One stope in the back of the level is looking very well. Stamps are working 48 heads by day and 24 by night, taking out two tons of copper daily. As summer advances the supply of rock will fall off. The Ontonagon *Miner* of the 11th ult. gives the product of the Ogima mine as follows: harrel work, 10,102 lbs.; stamp work, 19,546; masses, 3,710; or a total of 16 tons 1,358 pounds; and of the Evergreen Bluff mine for the same time as follows: harrel work, 19,820 lbs.; masses, 17,280 lbs., or a total of 18 tons 1,100 pounds. The *Gazette* reports the following products: Rockland mine: mass, 330 lbs.; harrel, 2 tons 1,789 lbs.; stamps, 6 tons 105 lbs., total 9 tons 230 pounds. Superior mine: masses, 1 ton 1,882 lbs.; harrel, 463 lbs., total 2 tons 345 pounds.

Pacific Coast Mining Review.

[From the San Francisco *Commercial Herald*, April 6, 1868.]

GENERAL ASPECT AND CONDITION OF THE GOLD FIELDS.

In remarking upon the mining interest of the Pacific coast in our last annual review, we were led to express a most favorable opinion as to its status and future prospects at that time. In taking a retrospect of the three months that have since elapsed we find these favorable opinions not only confirmed, but that the business in all its more important branches has meantime been marked by a very decided and substantial progress. Water, the element most essential to success in the placer mines, has been not only unusually plentiful, but in some localities superabundant; yet, viewed as a whole, these bountiful supplies have greatly facilitated as well as cheapened the process of earth washing, securing to the mining community during the most part of this season an uncommonly liberal reward for their labors. Not, perhaps, within the past ten years has any corresponding period given better average returns to those engaged in working the placers than the quarter now under inspection. The almost unprecedented amount of cold and stormy weather during a good portion of this time, by interfering with above-ground labor, has slightly diminished, what, with an equal rain-fall and a milder temperature, would have proved a yield beyond recent example. Throughout the northern tier of counties and along the more elevated portions of the gold-bearing belt, these interruptions have been most prolonged and frequent, curtailing to a proportionate extent the aggregate earnings of the miners operating in those localities. The snow in these semi-Alpine regions has fallen during the past winter to an unwonted depth; often greatly impeding travel, and in conjunction with the excessive cold, suspending work in the mines for weeks and even months at a time. Still, these vast accumulations of snow, though for the time being inconvenient and to some extent damaging, are generally regarded by the placer miner with favor; inasmuch as they become repositories of moisture, insuring ample supplies of water for the ensuing summer. By no other arrangement could nature have so well preserved this needed element as by this of converting it into snow and heaping it up in these realms of frost, to be gradually released by the growing power of the sun's rays, just as the aridity of the foothills and plains is increased by the fervid heat of summer. By this provision the superabundant moisture of winter is frugally stored away, to be afterwards dealt out with a steadiness and economy altogether admirable, and which could hardly have been so effectually accomplished in any other manner. Hence, while the early spring has already been attended with more than average good results, it may be expected that to the balance of this season and the entire coming summer there will be accorded a still more marked prosperity.

In glancing over the several mining counties of the State, it is found that they can be most conveniently considered in groups, because of a certain sameness in the character of their mineral deposits, and conformation of geological and climatic features or proximity of geographical position. Thus the counties of

ALPINE, MONO, AND INTO,

lying to the east of the Sierra Nevada mountains, may properly be reviewed together; since in all their natural peculiarities and products they bear a strong resemblance to each other. Owing to the great altitude of the district comprising these counties, the winter climate, even in the valleys, is quite severe, while in the more elevated localities it is extremely rigorous. As a consequence, but comparatively little is accomplished there during this season; leaving not much, concerning the mines and operations, to be added to what was said in our January review.

The ores in this district are mostly argenteriferous, and have thus far been found so exceedingly refractory as to require reduction by smelting or roasting; the latter process, though followed by careful after treatment, not always sufficing to a thorough extraction of the precious metals. With most of the ores in the Alpine county, roasting, with elaborate subsequent manipulation, has been found necessary—a circumstance that has tended greatly to retard the development of the many large and probably rich silver-bearing lodes that exist in that region. There are but three mills in the county, and even these, owing to a want of proper appliances for managing the ores, have accomplished but little. In 1867 a smelting establishment was erected, but it has failed thus far to meet the expectations of either the proprietor, or the public; nor has it been shown whether the fault lies with the works or mines, or whether it should be shared between them. The product of bullion during the last three months has been but trifling, neither the mills nor the smelting works having been in operation more than a small portion of the time. From the IXL lode, in the Silver Mountain district, a few tons of ore have been extracted monthly that sold to the mills in the neighborhood for \$100 per ton, it having been selected from a large amount of low grade ore taken out at the same time. The Tarshish mine, in the Monitor district, on which considerable work has been done, has also yielded a small quantity of very valuable but stubborn ores. Several other mines in the county have been worked with similar results; and, although a vast amount of labor has been expended here in the

aggregate, the bullion yield of Alpine has been small; and it can hardly be said of the mines, as a whole, that they present very strong inducements for the investment of capital, or that they promise large immediate returns. There has been but little work performed during the past quarter, only a small number of people having wintered in the country.

While so little has been accomplished during the last three months in Alpine still less has been done in Mono, the next county adjoining it on the south. In fact, labor here, except on two or three lodes, has been entirely suspended, not a mill of the four erected in the county having been running; though the smelting works in the Blind Spring district have turned out a small amount of bullion. There are no placer mines either in this or Alpine county.

In Inyo county, lying further south, and the greater portion of it much lower than the two counties just noticed, a greater amount of work has been done since the commencement of the year than in either of the latter; yet even here the long continued cold, with a considerable quantity of snow in most of the mining districts, has tended to check operations; the discovery last year of placer diggings in the Coso region, sixty miles east of Owen's lake, by diverting a portion of the population into that section, having further interfered with the working of the vein mines. The most valuable ledges in this county, so far as discovery has gone, are located in the Kearsarge and Cerro Gordo districts; the former situate on the eastern declivity of the Sierra Nevada, and the latter further south, at the base of that range. In the Kearsarge district the work of exploration has been in steady progress all winter on several of the leading claims, the mill of the principal company there having also been kept running a portion of the time, giving several thousand ounces of silver bullion as results.

In the Cerro Gordo district the ores, consisting chiefly of argentiferous galena, require to be reduced by smelting; for which purpose a number of small furnaces have been erected, and in most instances very large results obtained. The monthly product of these works has ranged from ten to twenty thousand dollars during the winter, but will no doubt be materially augmented the coming summer.

The placers mentioned lie east of the Coso range of mountains, quite out upon the desert. They are shallow and easily worked, but being in a dry and barren region, are without water for washing, except in the winter, and even then the supply is scant and of short duration. Very good wages have been made there this winter by such as had water, the average being about \$10 per day, though a few have made much more. The extent of these diggings has not yet been fully ascertained, though they are believed to cover a considerable area—much more than can be worked out with such supplies of water as can there be made available for a long time to come. The climate, like the country in that section, possesses but few points of attraction, being cold in winter and excessively hot in summer. At last accounts serious troubles were threatened between the whites and the Indians, growing out of disputes concerning possession of the mines.

KERN, TULARE, ANN FRESNO COUNTIES.

The difficulties attending the treatment of the sulphureted ores in this section of the country, alluded to in our last annual review, have since continued to be experienced, not more than one-half the mills and productive mines in Kern county having been operated thus far the present year. In the Clear Creek district, even a larger proportion of the mills have remained idle, reducing the aggregate yield of bullion to a comparatively small figure. The most of these establishments about Kernville and in Tulare county, however, have been running steadily, and with their usual good results; and there is no reason for doubting that effectual processes for reducing the sulphurets will in good time be introduced; thereby not only restoring the bullion product of this section to former rates, but insuring for it a very large and rapid increase. Many capitalists and experienced mill-men are now turning their attention to that portion of the State, some of them having already become largely interested in the mines. With the aids thus secured, the speedy and successful development of the latter may be regarded as certain.

Two new districts, Pi Uie and El Dorado, have been lately organized in the southeastern part of Kern county, in both of which there are reported to be numerous very promising gold bearing ledges, the work of exploration being in active progress upon many of them.

The placer diggings once found along and adjacent to the Kern river and its tributaries, are now so nearly exhausted that only a few score men any longer find profitable employment in them, even in winter, when water is most abundant.

Fresno county, though situate on the great auriferous range occupying the western slopes and foothills of the Sierra, contains so few placers or vein mines, that the operations carried on within its limits are quite unimportant.

MARIPOSA, TUOLUMNE AND CALAVERAS.

In entering the district comprising these three counties, we arrive upon a theatre of more active operations, both as regards quartz and placer mining.

A good deal of damage was done in Mariposa county by the storms and floods of December last; the expensive dam of the Benton mill, the shops and building covering the mill of the Crown company; the mill, outhouses, suspension bridge, and a large quantity of valuable tailings at Hite's Cove; together with many other buildings, bridges, etc., having been swept away. The loss at Hite's Cove amounted to \$75,000, and the aggregate damage done in the county to at least \$200,000.

Two new mills, however, have lately been put up in this county, and are now running with success. The great gains achieved last year by the introduction of an improved process in working the ores of the Pine Tree and Josephine mines have been well sustained, thereby fully establishing the value of the new method, which is to be introduced in other mills in the vicinity as soon as practicable. The placers, though now pretty well depleted in this county, have been worked to a greater extent, and with better results thus far this season than for several years past, hydraulic washing having recently been introduced at several places.

The remark concerning the placers of Mariposa will apply equally well to those of Tuolumne county, though the area of surface diggings is much greater in the latter than in the former. Hydraulic washing is now being practiced in the county at a good many points, and is found to pay well. Extensive preparations are also being made for working a number of claims in Table Mountain, some of which are already opened and give indications of great richness. A considerable area about Montezuma and Red Hill, which it is thought covers surface diggings that will pay well, awaits the introduction of water, when operations on a large scale will probably begin. A good deal of successful "pocket" mining, which consists of searching after small rich deposits in the crevices of rocks and similar places, is practiced in this county.

Vein mining in Tuolumne, after encountering a good many difficulties and partial failures, is now beginning to meet with better success, quite a number of mines and the most of the mills—some of them recently put up—being now operated with remunerative and frequently with largely profitable results, as the following examples, selected at random from many of similar purport, tend to establish: The Hesslep, ten-stamp mill, near Jamestown, running on a sort of gossan deposit, being the eastern ore channel of the great mother lode, produced \$2,000 in the

month of February last, at a monthly expense, including wear of machinery, etc., of \$450 32. The following statement of daily expenditure exhibits the cheapness and economy with which this class of ores can be reduced under a skillful and frugal management: 2 millmen, \$3 each; 2 Chinamen, who extract the ore and deliver it at the batteries, \$2 each; one superintendent, \$2; wear and tear, \$3; water for propelling the mill and other purposes, \$4—making a total daily outlay of \$17 32. This material pays from \$3 to \$4 to the ton, the mill being able to crush twelve tons daily. The labor of one man is saved at this establishment through the use of a self-feeding arrangement, whereby ore is supplied to the batteries much cheaper and better than could be done by hand.

From the old Soulsby claim there was taken out during the month of February last \$15,000 worth of gold bullion; from the App mine, \$5,000; from the Golden Rule, \$8,000; and from the Eagle, \$5,000—making a total of \$33,000 from these four claims for the month, more than half of which was clear profit. The Anthrax or Silver, formerly the Dutch claim, one of the best mines in the group above mentioned, is now being developed by means of a shaft, to be carried to a considerable depth, with a view to a more thorough exploration of the lode, a small quantity of excellent ore being extracted meanwhile. From the Rawhide mine about two hundred tons of very rich telluride ore have lately been raised, the most of which will be sent to Europe for reduction. The following shipments of gold dust and bullion made through the express of Wells, Fargo & Co., during the month of February, indicate for the more central portions of the county a fair yield of the precious metals: From their office at Sonora, \$50,000; Columbia, \$40,000; Jamestown, \$20,000; Chinese Camp, \$20,000, and from Big Oak Flat, \$10,000, making a total of \$140,000.

In Calaveras county, placer mining is being prosecuted very actively at Cat Camp, and a number of other localities. At the former place, there are about 300 whites and 200 Chinamen at work, their daily earnings ranging from \$3 to \$8 to the man, exclusive of water. The diggings here are shallow, and of sufficient extent to give employment to a much larger number than are at present engaged, if water could be had in sufficient supply. There are also some good hill and bank diggings in this vicinity. At West Point, where there are some heavy deposits of gravel, washing by the hydraulic method is in use, a large quantity of dirt having been washed out in that neighborhood within the past three months.

In the Washington district, some very promising discoveries of auriferous quartz have recently been made, causing no little excitement throughout that section of the country. Several crushings from lodes in this district have given extraordinary returns; in one instance, 13 tons of ore yielding \$882, while several other small lots, worked by mill process, gave from \$50 to \$100 to the ton. At Railroad Flat, a number of mines are turning out from \$10 to \$30 per ton. Angel's is, however, the most active quartz mining camp in the country, the Bovee mine at that place continuing to turn out, as formerly, large quantities of ore, yielding from \$10 to \$50 per ton, and averaging \$30. This claim is on the Veta Madre of the country, its great richness being due to the fact that the several veins of which the mother lode is composed, contracts at this point into a single ledge, concentrating the gold, elsewhere disseminated throughout a large mass of quartz, into a very narrow space.

Adjoining the Bovee mine, on the south, is the ground of the Angel Mill and Mining company, a property that is being developed with skill and energy, though not giving so large returns as the other. The ores from this mine paid but poorly at first, it supplying another of those numerous examples of increased product as depth is attained. There are mines in this and adjacent sections of Calaveras, that have, throughout the present quarter, yielded very handsome profits.

AMADOR, EL DORADO AND PLACER COUNTIES.

In no part of the State are the quartz mines looking better or yielding more satisfactorily than in Amador county. On the Hardenburg ledge a new mill has lately been erected, and is running with good results. The sulphurets in the Keystone ore treated by chlorination, yield from \$200 to \$300 per ton. The sulphurets from the ore of the Coney and Bigelow mines, worked by the same process, the expense being but trifling, turn out \$3,500 per month, the ore itself yielding only \$6 in free gold. Many quartz claims are being disposed of in this country to parties who intend proceeding at once with the work of their exploration. The Amador, formerly the Hayward mine, recently transferred to a new company, has, during the past quarter, continued to make its regular dividends of \$23,000 monthly.

Placer mining has been prosecuted with a good share of success at a number of points in Placer and El Dorado counties the past winter, the Cement and Iowa Hill, and the gravel diggings at Dutch Flat, and one or two other localities, having yielded particularly well. A vein of very peculiar but extremely rich quartz has been struck on the Bald Hills, Placer county, the surface of the lode being quite black, and so thoroughly decomposed that it is worked by washing and pounding up in hand mortars, a single person often taking out in this manner from \$100 to \$200 in a day; the gold is coarse and pure, being worth \$18 per ounce. It is surrounded by a field of quartz of considerable extent, much of which resembles it in character, rendering it probable that this will shortly become the theatre of profitable operations. The Green Emigrant lode, situate in the vicinity of the above deposits, though not exhibiting such evidences of extraordinary richness as when first opened, is still turning out a good deal of very rich quartz.

YUBA, NEVADA, SIERRA, BUTTE AND FLUMAS COUNTIES.

In these, which constitute the leading mining counties of this State, operations have been a good deal kept back the past winter by the severity of the weather, still the miners have earned more than average wages in the placers, having been able to wash in many localities where nothing could be done in ordinary winters for want of water. In Yuba county the hydraulic claims about Timbuctoo, Brownsville, Smartsville, etc., have turned out enormously, the Pierce Blue gravel claim having averaged over \$20,000 to every run of forty days.

Throughout nearly all sections of these counties, parties prospecting for gravel deposits have met with more or less success, indicating that work in the deep placers must last here for ages to come. With such abundant supplies of water ground, sluicing has been extensively practiced; thus, by getting rid of a vast amount of barren earth, greatly facilitating the work of washing hereafter. As the ditches are all running full, piping is kept up night and day, many claims working two and even three shifts of hands that in ordinary seasons work but one. In quartz mining equal activity is manifested throughout this district, and the returns from this branch of the business have been unusually large; a material part of the gain derived from this source being justly attributable to the improvements lately introduced in concentrating and working the sulphureted ores. Of the merits pertaining to the machines designed to secure the first of these objects, Hendy's Concentrator may equitably claim a very large share—the leading millmen of Grass Valley, where it is in extensive use, endorsing it in the strongest terms; it is found to save 95 per cent. of the sulphurets, a much larger proportion than has yet been effected by any other machine.

Of the more northern tier of counties sufficient has already been said to serve the purposes of the present review. Concerning the product of Coal, Copper, Quicksilver, Sulphur, Bo-

tax, etc., it may be stated that it has been about the same during the first quarter of the current year as for corresponding periods the past two years, the only difference being that while the production of Coal has been considerably increased, that of Copper has suffered a slight decline.

In glancing over the whole field of our mineral resources, and considering the progress made during the first quarter of 1868, much presents itself of a congratulatory and encouraging kind. New inventions and discoveries have been frequent, and in some instances of much practical importance; numerous rich strikes have been made, and an unprecedented number of valuable specimens picked up, having been unearthed by the copious rains; a considerable addition has been made to the list of our cement and quartz mills, while the facilities for conducting water to points where needed have been materially enlarged. If the winds have prostrated the flumes, and the rains have broken the ditches, swept away the mills, and filled up the mines, they have also supplied an abundance of water for washing, insuring to the miner a prosperous spring and summer season, and by carrying away the tailings that had covered up valuable claims, restored them to a condition to be worked once more with profit.

STATE OF NEVADA

Mining and milling operations, after suffering considerable interruptions during the winter months, in consequence of the bad condition of the roads and the inclement weather, have been generally resumed in the vicinity of the Comstock lode. Indeed, a very general activity prevails throughout the entire district—the work of exploration and extraction, while being pushed with considerable vigor on the mother lode, have also been extended to quite a number of outside mines, some of them lying several miles away from it. Thus we find the Sacramento mine, situate on Cedar Hill—a high eminence one and a half miles northwest of Virginia City—extensively developed and profitably worked some five or six years ago, having lately become the property of the California Bank, has been re-opened, and is to be worked systematically and vigorously hereafter, a contract having been let for the extraction of a large quantity of ore. Numerous other lodes in this hill, several of which have been sufficiently explored to demonstrate their value, will also be re-opened and worked the coming summer. The Occidental mine, lying more than a mile to the east of the main Comstock lode, has now been worked steadily for more than a year with results nearly as good as have been obtained from the average Comstock ores. The Lady Bryan mine, situate nearly four miles east of the Comstock, has also for several months past been turning out ore of about two-thirds the value of that from the Gould & Curry mine; while work is about to be resumed on many of the small but rich auriferous veins about Devil's Gate and at other points along the belt of country lying between Virginia and Carson rivers. Many of these mines were opened at an early day, attempts having been made to work their ores, but the great cost of reduction at that time absorbing all the product, caused them to be afterwards abandoned. At present rates, however, many of them can no doubt be made to pay well, thereby opening a new field for labor and adding materially to the bullion product of the district.

As the quartz in the lodes on Cedar Hill and in the Devil's Gate district contains but little silver, it is worked for the gold alone, the apparatus and methods employed in working it being those used in the quartz mills of California, the cost of which is much less than where pan amalgamation is resorted to.

In the mines along the Comstock lode proper there have been no important changes to note during the last quarter, other than such as have marked its development from the first, and as may be expected to occur in all masterly veins. The yield of bullion from the productive portion of this lode has for the quarter just ended been about equal to that of corresponding periods in other years, having been considerably curtailed, as is the case in all extremely inclement winters, in consequence of the bad condition of the roads and the stormy weather. It is found that as greater depths are attained, the quantity of water diminishes on this lode, rendering it probable that but little additional lifting power will be hereafter required, and encouraging the belief with some that the projected Suto Tunnel will not prove a work of such imperative or, at least, such immediate necessity, as was at one time believed. While, however, the yield of the various mines on the Comstock vein for the quarter has not fallen greatly below that of like periods in other years, the dividends declared have for this time been much less and the assessments much greater than they were in 1867, though comparing favorably with those of the preceding year, as appears from the following statement:

First quarter, 1868—Assessments.....	\$57,500
First quarter, 1868—Dividends.....	310,000
First quarter, 1867—Assessments.....	230,780
First quarter, 1867—Dividends.....	790,000
First quarter, 1866—Assessments.....	474,600
First quarter, 1866—Dividends.....	90,000

From many of the so-called "outside" districts in this State, the accounts are encouraging, several of them having made very respectable remittances of bullion during the first quarter of the current year. The narrow veins about Ansin, or at least such of them as have been opened to any considerable depth, continue to turn out small quantities of extremely rich ore, the yield varying by mill process from seventy-five to five and six hundred dollars per ton. These lodes invariably become more compact and regular at greater depths, some increasing slightly in volume at the same time. With roasting and the modes of treatment in vogue, from eighty to eighty-five per cent. of the silver contained in the ore, according to pulp assay, is saved. The shipments of bullion from Austin have varied during the quarter from \$150,000 to \$180,000 per month.

The mines at Silver Bend are opening with unexampled richness, the body of pay ore in the developed claims being large, compact, and of very high grade. The mills at Belmont have been obliged, however, to suspend operations until furnaces could be erected for roasting the ores, more than half the silver by the former treatment having passed off in the tailings. They have also substituted the dry for the wet plan of crushing. With these improvements, it is expected the yield of bullion will be very large at these mills hereafter, as the ore, of which there are immense bodies in these mines, turns out from sixty to ninety dollars per ton without any selection.

From Pine Grove, Humboldt, Red Mountain, Cortez, and the numerous districts lying in the southeastern part of the State, the most favorable reports come to hand, the work of development being prosecuted with vigor on a great many ledges, while the mills already built are running with success, and new ones are being erected in a number of these districts.

OTHER PACIFIC STATES AND TERRITORIES.

The placer mines about Althouse and Jacksonville, in southwestern Oregon, as well as those on Burnt and John Day rivers, and their tributaries, have been paying fair wages through the winter. A number of arrastras have been crushing quartz in the vicinity of Jacksonville with excellent results; and a renewed effort at operating the mill erected last year in the Santiam district, leads to the belief that the lodes in that section of country can be worked with profit.

The earnings of the quartz mills now running in Idaho have been satisfactory, the auriferous quartz in that territory yielding from \$20 to \$25 per ton. A number of new mills will be erected

the coming summer, several of which will be of large capacity. The Poorman, New York, Golden Chariot, Ida Elmore, Minear, War Eagle, and other well known lodes in the Owyhee country, continue to turn out astonishingly rich ore, the shipment of billion from that section having been about \$500,000 for the last three months, besides large quantities retained to serve the purposes of a currency. A considerable amount of gold has been taken from the placers during the winter, and extensive preparations are being made for hydraulic washing and sluicing the coming summer, which it is thought will prove a prosperous season for Idaho.

The placers in the Weaver district, and in the vicinity of Prescott, Arizona, have been working the past winter so far as there was water for washing, the daily yield having been about \$8 to the hand. No new diggings have been found in the territory, the hostility of the Indians preventing a thorough exploration of the interior. With the establishment of chlorination works, several of the quartz mills running in the district about Prescott are making handsome returns, and although the product of bullion has been small during the past three months, there is a good prospect of its undergoing a marked increase hereafter. But little has been done in the copper mines of Arizona, the low prices of this ore, and the difficulty of getting it transported to market, tending to discourage any extensive working at present.

Recent accounts from the Sweetwater mines, in Dacotah Territory, while they lead to the belief that the quartz veins in that region are numerous and rich, show the placer diggings to be of very narrow limits; while the cost of tools, provisions, and all other supplies is excessively high.

The Quick-Silver Mine of Santa Barbara, Peru.

This mine, which has been worked since 1570, is situated on a bold promontory of Farallon on the summit of the range about 1,200 feet above, and on the south side of the river Huancavelica. The strata containing the cinnabar rise almost vertically from the valley, being light colored sandstone, with occasional layers of bluish-gray limestone. The metalliferous stratum spreads out in places to a width of forty or fifty yards, running north and south, and dipping westerly. The mine, which is naturally a very safe one to work, has been so carelessly and ignorantly opened, as to have led, at various times, to extensive ruins and great loss. The present condition of the mine is deplorable, owing principally to the reckless system of the last lessee, who robbed the mine of every pillar, and like his predecessor made no new works to open fresh bodies of ore. In St. Domingo de Cochapata, in the bottom of the mine, over one hundred Indians were buried at one time.

In 1681 the ore which fell in the "labores" of the San Jacinto, and was afterwards extracted, produced four thousand flasks of quicksilver. The crush in 1786 from the falling in of the upper "labores" of Santa Rita, left a yawning chasm of 200 feet deep. The repairs of these damages during the working of the Santa Barbara mine have amounted probably to several millions of dollars. This has occurred in a mine safer and easier to work by far than the New Almaden in California. Extravagant sums have been expended on the great tunnels of this mine; that of Belen cost the Spanish Government nearly a million and a quarter of dollars.

Since the Peruvian Independence but little attention has been bestowed on this mine, which, after three hundred years is now abandoned to a few Indians who collect and reduce small quantities of ore from the superficial works. Most of the great works are closed by caving, or by the accumulation of carbonic acid gas. The grand tunnel is about 2,000 feet long, and from ten to twelve feet wide and high, running down at an angle of 15° to the ore. Omitting many details of the ancient workings now for the most part clogged or irreparable, it appears from the evidence of the explorations that the bodies of ore have not occurred in regular vein-like or continuous masses, as at Almaden in Spain. The ore of the "labor" of Santa Inez, fully twelve feet thick, and extending probably 150 feet to the "labor" of Santa Catalina, consists of a base of dark colored sandstone, spotted in places with bright red particles of cinnabar, and again containing cinnabar invisible to the naked eye. Large quantities of sulphuretted and sulphate of iron occur in connection with the ore, which rarely contains so much as two and a half per cent of mercury. Large bodies of iron pyrites are said to have been standing in the lowest depths of the mine, which, if worked, would probably yield more mercury than the average ore of the mine. The lowest point the author was able to reach was evidently the beginning of the large bodies of ore of the mine. Leaving the mine on the side of the grand tunnel he examined the bold promontory of sand-rock overlooking the city and river of Huancavelica, and marking the extreme north end of the workings of Santa Barbara. This is an immense body of stratified rocks of about fifty yards thickness, running north and south, and standing nearly vertical. A portion of it, averaging about one-third of the whole, is impregnated with cinnabar, and of the very poor quality. About two hundred yards south of its summit is the point called the Brocal, and to the south of the Brocal, a short distance, the strata bury themselves below the surface to re-appear again only at a distance of about fifteen hundred yards. The whole body of the mine at the Brocal is one vast ruin, and the percentage of the surface ore is too low to make it valuable. A deep tunnel, commenced during the past century, and extended about two hundred yards from the foot of the promontory, but still six hundred yards from the old workings of the Brocal, is the only mode of developing these beds in depths where tradition tells of rich and extensive bodies of ore. Extensive workings running to westward are approached by the Puerto de Santo Domingo, standing midway between the promontory and the Brocal. Here are numerous large chambers rapidly going to ruin, excavated in a light-colored sandstone containing cinnabar in minute quantities, amounting to less than half of 1 per cent. In the same strata with the Santa Barbara, and in close proximity, are six or eight other mines belonging to private individuals, formerly productive, but now abandoned.

In the vicinity of Huancavelica there are no less than forty-one well-recognized ranges of cinnabar, all within eighteen leagues of St. Barbara. Thus at Azulocha, one and a half leagues south of Santa Barbara, there is an extremely hard vein of cinnabar in limestone formerly mined, and where the ruins of old furnaces are still to be seen. The ore occurs in small branches and painted surfaces without regularity, and yields an average of not over one per cent. Near this is another vein of realgar containing also mercury, and about five feet in thickness. Immediately adjoining the realgar is a vein of a black sooty material of about eleven feet in thickness. It appears to be a decomposed sulphuretted, but its characters are obscure. This vein is remarkable from its containing selenium, associated with sulphur, mercury, arsenic, silver and lead.

The ores of Santa Barbara mine are all poor, not averaging, probably, over one-half of one per cent. The ore is frequently quite invisible and is disseminated through the rock at times in feebly-developed veins a few lines in thickness, but generally the appearance is that of common sandstone with very small particles of a bright red color scattered through its mass. Crossin, a French engineer, describes the same stone as intimately mixed with arsenical pyrites. Such ore contains more mercury than the simple sandstone. As much realgar is found in the St. Barbara as in all the other quicksilver formations of Peru. The arsenical mercury ores were rejected by the miners, because of

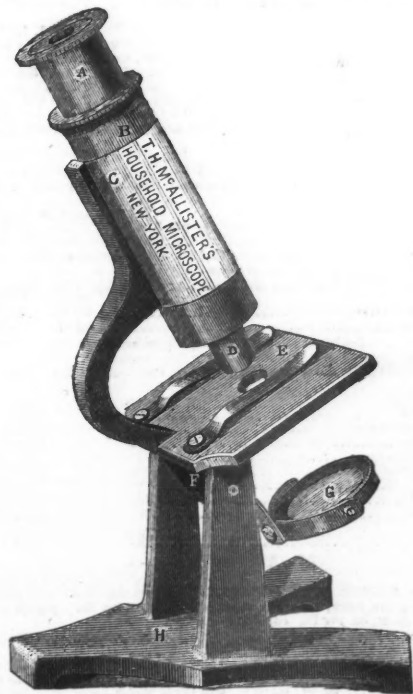
the effects of the arsenic in the furnaces. Sulphate of barytes, both in crystals and closely mingled with siliceous grains occurs in the mine. Large quantities of iron pyrites are also found, much of which might no doubt be profitably worked.

The deposit of cinnabar at St. Barbara is not in a vein, as at New Almaden, but is disseminated through the strata, and intimately mingled with the sandstone. No walls exist, and the limits of the ore are irregular and undefined. Like all other similar formations the quantity of ore is very great and the quality very poor.

The furnaces used in reducing the ores were of stone and brick, poorly constructed, and the vapors were conducted through aludels or earthen jars joined end to end and leading from the upper part of the furnace, a distance of from eight to ten yards, where the smoke and vapor escape into the open air. These aludels are about two feet long, by a middle diameter of eight inches, and four inches at the ends. Four lines from each furnace, lying side by side upon the ground. The furnaces and condensers are of poor materials, the openings imperfectly closed, and the firing badly conducted, so that great losses of quicksilver occur and the workmen suffer from the poisonous vapors. The fuel is of dried grass and the dry dung of the Llama, both scarce and almost valueless as fuel, the quantity consumed to produce a feeble effect being very great. The country is completely without wood, except in a few deep ravines where some stunted bushes grow, worth about twenty dollars a cord, equal to 145 Llama loads. None of it exceeds three-fourths of an inch in diameter. There is some turf better in quality than the other fuels, but insufficient to maintain a large metallurgical operation. The author searched the country for ten leagues about Sta. Barbara for coal, but in vain. A very poor quality of bituminous slate exists in considerable quantity about nine leagues from Sta. Barbara, but aside from its locality, the distance of mountain roads precludes its use. The history of this mine shows extreme difficulty from the want of fuel, and even stoppages for several months at a time. In conclusion, it appears that the Sta. Barbara district in Peru is extensive, the mercurialized sandstone being practically inexhaustible in quantity, but the grade of ore very low, not over one-half of one per cent, and the richest portions not averaging over 1½ per cent. The records of the mines have been very loosely kept, and offer no reliable data. The furnaces are remarkable for their worthlessness, which is still more true of the fuel. A system of concentration of the poor ores by machinery and water, which is in unlimited quantity, was proposed by Baron Nordenflycht, which deserves serious attention. The labor at Sta. Barbara is necessarily Indian, and very inefficient, the extreme rarity of the air at an elevation of 14,975 feet above the sea, (according to Ulloa) adding to the natural inefficiency of the race. Great numbers of Indians formerly were employed in these mines. In 1621, there were two thousands of Indians, who were required by government edict to produce three quintals (four flasks) of quicksilver for each Indian per annum. "His majesty pays for the same, \$47 per quintal." In 1681, the cost of quicksilver to the government, including transportation to Potosi, was \$79 per quintal, and in 1678, its value at Potosi was \$97 per quintal. In 1789 the cost rose to \$195 per quintal, so that the king lost that year \$197,758, and in five years, \$693,624. In 1681, and for some years about that time, the average product was 7,500 flasks per annum, with 4,249 Indians at work. At New Almaden nearly six and a half times that quantity of quicksilver has been extracted in a single year by less than a thousand men.

SOMETHING MORE ABOUT MICROSCOPES.

The name Microscope is derived from two Greek words *micro*, small, and *skopos* to see; hence we understand the microscope to be an optical instrument, designed to aid the eye in the inspection of minute objects. Telescopes, on the other hand, assist the eye in the examination of distant bodies. These two instruments have, probably more than any other, extended the boundaries of human thought, and no small part of the labor which has been bestowed upon the science of optics, has had for its ultimate aim their improvement and perfection. The microscope is now considered an instrument of much importance, as it opens a new world to man, and thousands of curious objects, invisible to the naked eye, are



now seen and studied under its lenses, by every naturalist and lover of nature. The simplest microscope is a double convex lens. This, it is well known, when applied to small objects, as the letters of a book, renders them larger and more distinct. What is commonly called a pocket microscope, is the most usual form of simple microscope; it is found useful in preliminary examination of objects, before submitting them to the higher powers obtained by the compound microscope. In the latter an enlarged image of the object is formed by a lens termed the Object Glass, (or objective), and this image is viewed and again magnified by means of two lenses mounted together and forming an "Eye Piece;" various forms of Eye Pieces have been from time to time constructed; but experience has led to the general adoption of what is known as the

"Huygenian Eye Piece," consisting of two Plano Convex Lenses, the Plano side of each lens being to the eye. The further (within certain limits,) the Eye Piece is removed from the objective, the greater will be the magnifying power of the combination. In all the first class Compound Microscopes made at the present day, the Eye Piece is mounted in an "Extension Draw Tube" moving easily within the body of the instrument, by extending which the magnifying power can be increased without any change of lenses. The engraving is an accurate representation of a compound microscope invented and manufactured by T. H. McAllister, who has termed it the HOUSEHOLD MICROSCOPE. The following is a description of the various parts.

A. The Huygenian Eye Piece; attached to the Extension Draw Tube. B. The body of the Instrument. C. The Brass Collar; in which the body (B) moves easily, for adjustment of the focus. D. The Objective. E. The Stage; on which the object is placed, with springs to hold the object. F. The Axis of Inclination; by which the instrument can be readily brought to any convenient angle for observation. G. The Mirror; with universal motion, for the illumination of transparent objects. H. The Base; firmly supporting the instrument. Two objectives accompany the instrument; No. 1, being the Low Power, and No. 2, the High Power. The Microscope is also furnished with 2 slips, one of which has a recess ground on one side; by placing a small insect, or other small object in this recess, and covering it with the other glass slip, it can be placed on the stage of the instrument and examined at leisure.

This microscope is a miniature model of the most approved and modern pattern, with a range of magnifying powers going as high as can be obtained with not-achromatic lenses, and afford an opportunity for investigating all the minutiae of animal and vegetable life, by which we are surrounded, and which are to so many an unknown world. The magnifying powers are as follows:

OBJECTIVE No. 1.—With the extension draw tube closed in, gives a magnifying power of 20 times the diameter or 400 times the area.

OBJECTIVE No. 1.—With the extension draw tube drawn out 3 inches, gives a magnifying power of 40 times the diameter, or 1,600 times the area.

OBJECTIVE No. 2.—With the extension draw tube closed in, gives a magnifying power of 50 times the diameter, or 2,500 times the area.

OBJECTIVE No. 2.—With the extension draw tube drawn out 3 inches, gives a magnifying power of 100 times the diameter, or 10,000 times the area.

All further information respecting these useful instruments may be obtained on application to T. H. McAllister, 49 Nassau Street, New York City.

Opinion about Minerals, &c.

We learn that Captain C. O. Boutelle, of the United States Coast Survey, whilst making explorations in the neighborhood of St. Helena Island, S. C., recently unearthed a huge Mastodon, lying in a bed of marl. When discovered the huge monster was fixed precisely in the position it is believed to have been when it laid down to die before the flood. The skeleton was perfect, but a portion of the bones very soft, while other parts are petrified. The bones are of enormous size. Prof. C. U. Sheppard, of the South Carolina Medical College, and his son, the Professor, who recently returned from Europe, will exhume the monster and bring it to this city. It is the first Mastodon yet discovered on the Atlantic Coast, though it has heretofore been met with in the West.—*Charleston Courier*, April 6.

A geological curiosity lately found at Galesburg, Ill., is thus described by the *Free Press*: "Imagine the foot of a giant enclosed in a moccasin, the leather partially torn away, and all turned to solid stone, and the reader has an idea of the curiosity. The length of this gigantic pedal extremity is sixteen and one-half inches; breadth across the ball of the foot six and one quarter inches; and it weighs twenty-two and one-half pounds." The petrification was discovered in a bed of soap-stone. But whether it once formed the foot of some antediluvian gigantic specimen of humanity, or whether it is one of those curiously shaped accidental formations of rock, in which this country abounds, we leave the skilled geologist to explain."

About a fortnight ago, Captain Boutelle, of the United States Coast Survey, discovered on the beach of St. Helena Island, near low water mark, and not far from where the City of Port Royal has been laid out, the remains of a mastodon, buried in the sand, with the bones partially exposed to view. Captain Boutelle at once communicated the discovery to Prof. C. U. Sheppard, Sr., of the South Carolina Medical College, and that gentleman, with the assistance of Captain Boutelle recovered the greater portion of the skeleton. Professor C. U. Sheppard, Jr., son of Professor C. U. Sheppard, Sr., will go down to-day, and it is hoped that the remainder of the skeleton will be secured.

At Denver, Col., a company has been organized to build a train-road into the mountains of South Pass, as a means for bringing into the city lumber and all kinds of building material. The plan of construction is as follows: The ties are designed to be seven feet long, round timber; the rail 8x3 wide, sawed spruce timber, 16½ feet long, let into the ties and securely keyed; track four feet wide; car wheels 18 inches in diameter; four inch tread, with square flange. These rails can be turned and used eight times, or can be strapped with iron when desired by the company. Small but powerful locomotives are to furnish the motive power. The calculated cost per mile is \$1,738.

A Paris correspondent writes as follows: "Rapidity of printing has just been carried out in France to a degree far exceeding anything which has been accomplished in machine work, and outstripping the famous American machines, which were supposed to have realized everything attainable in the way of speed. M. Marinoni has put up in the new printing office of the *Petit Journal* (a one cent daily paper), a marvellous machine of his invention, which prints 600 copies a minute. Four of these powerful machines turn out 144,000 copies an hour, the whole impression being 416,000 daily.

In the foundry of the Port Richmond Iron Works, of Philadelphia, are three cupola furnaces, the largest of which will melt twelve tons of iron per hour. In the machine shop of the same establishment there is a planing machine capable of planing casting eight feet wide, six feet high, and thirty-two feet long; a lathe that will swing six foot long, and turn a length of thirty-four feet; and a boring-mill, believed to be the largest in America or Europe, that will bore a cylinder sixteen feet in diameter and eighteen feet long.

Mr. E. B. Eddy informs the Sweetwater Mines that in the year 1864 he discovered and located on the little Po-po-agio river, a large flowing oil spring that discharges at least fifty barrels of oil per day. He says that the spring is about twenty miles northeast of California Mining District, and easily accessible to the mines. That being the case, the "Sweetwaterites" will not want for oil at reasonable rates to burn.

The Directors of the Philadelphia Academy of the Natural Sciences have purchased a site for a new building for their institution, a lot which measures 288 feet on Nineteenth street, 183 feet on Race street, and 139 feet on Cherry street. The cost of the ground was \$60,000, and the institution has now on hand a fund of about \$112,000 with which to erect the new building.

Iron curbing is now being laid in Pittsburg. The curb consists of an inch plate, eighteen inches broad, pierced with holes, and having a corrugated flange at the top. The plate is imbedded perpendicularly beside the pavement, and the flange extends on the surface several inches to meet the bricks.

Mr. J. Lamey, of Astoria, Oregon, has discovered a cement bed near that place. It is said to equal in quality the celebrated Maine cement, so extensively used for building purposes in the United States.

Chicago proposes to have the largest depot in the West, for the Pittsburg & Fort Wayne, Northwestern, and Chicago & St. Louis Railroads—of stone, 1,300 feet long, and to cost \$2,000,000.

Coal was shipped from Pittsburg recently to Helena, Montana Territory. It will cost the purchaser \$10 a bushel delivered. It is wanted for blacksmithing purposes.

A complete Scientific Dictionary in the English and Spanish languages, is in course of preparation in this city, and will probably be published in 1869.

The artesian well on the Colt estate at Hartford has reached a depth of 1,400 feet, and is to be bored 200 feet deeper.

It is said that the Piscataquis quarries, in Maine, annually ship to Boston 20,000 tons of slate.

MARKET REVIEW.

FRIDAY EVENING, May 1, 1868.

Gold and Silver Stocks.—Nevada stocks are stronger, and some show an advance in price. Twin River is held again at \$70. and holders of Combination stock ask \$45. The selling price of Manhattan is reported at \$110. Colorado stocks command better prices, and the improvement noticed last week continues. Smith & Parmelee is now quiet strong at \$220. and Rocky Mountain at \$140. Consolidated Gregory is working up towards its old figures, \$290 is bid for it at the board, and holders are asking \$295. Last week the quotation was printed in our report \$157, when it should have been \$237. Montana has recovered from its recent decline, and now commands 40c.; Owyhee, \$15. Prices are thus quoted at the board:

Table of stock prices including Alameda Silver, American Flag, Atlantic and Pacific, Eatos & Baxter Gold, Benton Gold, Black Hawk Gold, Bohlall Gold, Bullion Consolidated, Columbian G. & S., Combination Silver, Consolidated Gregory, Corydon Gold, Edgehill Mining, Gold Hill, Gunnell Gold, Gunnell Union, H. G. & S. Co., Harmon G. & S. Co., Holman, Hope Gold, Klipp & Buell Gold, Keystone Silver, etc.

Copper Stocks.—Davidson is not quite so strong as last week, 80c. is given as the selling price. The market for this kind of stock exhibits more life and is thus quoted: The market for this kind of stock exhibits more life and is thus quoted: Caledonia Co., Canada, Davidson, Gardiner Hill, Hilton, etc.

Petroleum Stocks.—United States has advanced, and sold yesterday at \$1.60. Prices range: Besshoof Run, Brevoort, Buchanan Farm, Central, Clinton Oil, Columbus, Manhattan, National, etc.

Miscellaneous Stocks.—Del. & Hudson Canal is quoted at 158; Quicksilver Mining, 27 1/2; New York Central, 129 1/2; Erie, 71 1/2; Reading, 90 1/2; Michigan Southern, 90 1/2; Pittsburgh, 82 1/2; Northwestern Freighter, 76 1/2; Fort Wayne, 104 1/2; Adams' Express, 61 1/2; American, 60 1/2; United States, 61 1/2; Wells, Fargo & Co., 26 1/2; Merchants' Union, 35 per cent., 31 1/2.

Government Stocks are in fair demand. Quotations ranged to-day: U. S. 5-20, 1862, coupon, 113 1/2; U. S. 5-20, 1864, coupon, 108 1/2; U. S. 5-20, 1865, coupon, 106 1/2; U. S. 5-20, July, 1865, coupon, 109; U. S. 5-20, July, 1867, coupon, 109 1/2; U. S. 10-40s, coupon, 108 1/2; U. S. 7-30s, June, large, 107 1/2; U. S. 7-30s, July, large, 107 1/2.

Foreign Exchange is dull, but rates are steady and were thus quoted to-day: London, (prime bankers) 60 days, 110 @ 110 1/2; London, (prime bankers) sight, 110 @ 110 1/2; London, prime commercial, 110 @ 110 1/2; Paris, (bankers) long, 5.13 1/2 @ 5.12 1/2; Paris, (bankers) short, 5.11 1/2 @ 5.10; Antwerp, 5.15 @ 5.13 1/2; Swiss, 5.15 @ 5.13 1/2; Hamburg (bankers), 36 @ 36 1/2; Amsterdam (bankers), 41 @ 41 1/2; Frankfurt (bankers), 41 @ 41 1/2; Bremen (bankers), 79 @ 79; Berlin (bankers), 71 1/2 @ 72.

Gold is steady at 139 1/2 @ 139 3/4. As has often happened before, the heavy Government disbursements of gold have failed to depress the price. The aggregate payments are of 27,000,000, of which about 21,000,000 will probably be paid here. Five millions of this sum were actually paid yesterday. The payments this morning are also large. The carrying rate is 4 @ 6 per cent. The loan market is easy at 6 @ 7 per cent. The demand for call loans is rather more active, and discounts are quiet at 7 @ 9.

Table of gold and silver deposits, including Foreign gold, United States bullion, Deposits of silver, Gold bars stamped, etc.

The San Francisco Commercial Herald of April 6, says: "The receipts of treasure from all sources, through regular public channels, during the past three months, as compared with the same period in 1867, have been as follows: 1867. 1868. From California, Northern Mines, \$1,845,903 \$5,123,388; From California, Southern Mines, 950,268 1,060,674; From Nevada, 4,199,949 2,750,000; From Coastwise Ports, Oregon, etc., 642,286 706,404; Imports, Foreign, British Columbia, etc., 607,286 734,258.

Totals, \$11,245,797 \$10,391,724. From the foregoing we find that the yield from the California mines, for the first quarter of 1868, is \$467,786 in excess of that for the first quarter of 1867, while the decrease in the results from the Nevada mines is \$1,449,979. This is owing to the non-productiveness of the mines which have been sunk to lower levels for richer and greater quantities of ore. In returns from Nevada, credit should be given to Owyhee, Idaho, for very nearly half a million, which have been contributed from that place, and the credit heretofore given exclusively to Nevada. Coastwise, and from Oregon, our receipts have been increased \$53,118 for the first quarter of the present year, over the same period of the year previous, and \$124,974 from Foreign and British Columbia, over the receipts of the first quarter in 1867.

Our treasure export during the first three months of the past three years has been as follows: 1866. 1867. 1868. To New York, \$6,441,256 92 \$5,851,501 66 \$6,959,936 76; To England, 696,489 28 1,444,830 45 976,210 31; To France, 420,047 27 294,411 47 141,408 66; To China, 1,757,139 56 1,292,925 31 1,039,722 40; To Japan, 14,592 00 31,885 46 205,359 46; To Panama, 92,354 86 90,000 00 133,000 00; To other countries, 104,635 00 519,950 97 160,000 00.

Totals, \$9,525,514 89 \$9,825,305 31 \$9,616,707 59. The above table does not include the amounts turtilly shipped by the Sub-Treasurer, which were probably large, judging from the fact that from the 28th of February, 1867, to the 10th of September of the same year, it amounted to \$5,000,000. We have certain intelligence that a large amount of bullion, the product of the Boise mines, finds its way directly East, instead of coming to this place.

Messrs. Platt & Newton's San Francisco circular, of April 6, makes the following allusion to financial affairs at that point: "Our money market shows an increased activity and improved rates. The demand is legitimate, and indicates a healthier financial and business condition. Call loans are obtainable at 1 1/2 @ 1 3/4 per cent. per month, and loans for long terms, on good real estate collateral, are negotiated for 10 @ 12 per cent. per annum. First class commercial paper is done at 1 per cent.; good do. at 1 1/2 per cent. per month. Gold and silver bars are in better supply, although the bullion market for the outgoing steamer has not yet settled down to a determined figure. We quote gold bars at 90 @ 91 1/2, with considerable demand; silver bars are selling from par to 1/4 per cent. premium; currency bills on Atlantic cities 36 @ 38 1/2 per cent. premium on gold; sight drafts, payable in gold, 1/4 @ 1 per cent. premium; telegraphic transfers, 1 @ 1 1/4 per cent. premium; sterling exchange, 48 @ 49 1/2; commercial exchange, 49 1/2 @ 49 3/4. Mexican dollars are nominal at 4 1/2 @ 5 1/4. Copper has been quiet but on the whole quite firm. The sales are six to 700,000 lbs. at 23 1/2 c. for Baltimore, and 23 1/4 @ 23 1/2 c. for Detroit. For June delivery 23 1/4 @ 23 1/2 c. more is paid.

The English market is unchanged. The last quotation was 27 1/2 for Chili pig. Best selected and fine foreign have not advanced in proportion to Chili. Best selected is good at 28 1/2. Tin is quiet. Five to six hundred slabs Straits in lots were sold at 23 1/4 @ 24 c.; Banca, 27 1/2 c.; English, 24 1/4 @ 24 1/2 c. The English market is unchanged. Lead.—A steady business at 6 1/2 @ 6 1/4 c. gold for ordinary foreign. Spelter.—6 1/2 c. gold for Silesian on short wholesale transactions. Pig Iron.—Scotch is dull and is quoted at £40 for Glengarnock. American No. 1 is held at \$38 @ 40, with little doing.

Zinc.—The wholesale price of \$5 ton lots of French oxide zinc in lbs., 13c. currency. American XX extra, 9 1/2 c. currency. XX, 9 c. Spelter, 10 1/2 c. Sheet zinc is scarce at 12 1/2 c. Antimony.—16c. currency. Bismuth.—\$5 @ \$6 50 currency. Nickel.—\$2 @ \$2 50 currency. Quicksilver.—90 to 90c. currency.

Oil.—Crude fish oils are in good demand and firm at 75 @ 76 c. for whale and \$2 for sperm; manufactured oils are dull and nominal; lard oil is firm and in fair demand at \$1 35 @ 1 45 fair, prime and choice. Petroleum.—There is a fair demand for both crude and refined in bond. Prices are steady. We quote the former at 17 1/2 c. in bbls. and the latter at 27 1/2 c. for standard white. Naphtha is selling at 13 c.

Table showing quantity exported from other ports, Jan. 1 to April 25, 1868. From Boston, 624,465 galls.; Philadelphia, 7,430,109; Baltimore, 557,965; Portland, 19,072. Total, 8,618,611 galls. Total Exports from the United States, 21,311,483. Same time 1866, 14,996,920. Same time 1865, 3,440,297.

THE IRON TRADE.

New York, May 1, 1868. The sale in both Scotch and American pig iron, is very dull. We note the market of Thomaston, No. 2, amounting to 2,000 tons, and of No. 1, 700 tons on terms not made public; of No. 1, Allentown, at \$40; of Crane, 500 tons from second hands, private; 500 tons Masconsetcong also on private terms. In Scotch, we notice sales of 200 tons Glengarnock, from dock, at \$40. 400 tons comprise the transactions for the week. No. 1, wrought scrap, is held at \$50; 400 tons old rails brought \$45; nothing in new rails. The market in bar iron shows a little more life.

PITTSBURGH, April 29, 1868. Pig iron is dull, with sales of Anthracite at \$38 @ 39 for No. 1; \$36 for No. 2; and \$33 @ 34 per ton for bar; manufactured iron is firmly held at full prices. BOSTON, April 29, 1868. There is a steady but moderate demand for pig iron, with sales at \$42 @ 44 per ton for Castlesherrie and other brands. No. 1; and in bar iron there is no change, with sales of common and refined English and American at full prices. Russian sheet iron is quiet and prices are nominally 12c. per lb., gold. BOSTON IMPORTS OF PIG IRON FROM JANUARY 1 TO APRIL 25, 1868. From Great Britain, tons, 1,673; Coastwise Ports, 3,583. LEHIGH VALLEY IRON TRADE. The following table shows the amount of Pig Iron transported over the Lehigh Valley Railroad for the week ending April 25, 1868, and for the season to that date.

Table of Lehigh Valley Iron Trade showing tons transported for Carbon Iron Co., Lehigh Valley Iron Co., Thomas Iron Co., Lehigh Crane Iron Co., Allentown Iron Co., Robert Iron Co., Glendon Iron Co., and other shippers.

Table of Market Prices for various iron products including DUTY, Anthracite, Grey Forge, Scotch Pig, Charcoal, Old Wrought, English rails, American Bar Iron, Refined, Old Railroad, Hoops, and Scroll Iron.

Table of prices for various iron products including 1/2 x 1/4, 1/2 x 3/4, 1/2 x 1, 1/2 x 1 1/4, 1/2 x 1 1/2, 1/2 x 1 3/4, 1/2 x 2, 1/2 x 2 1/4, 1/2 x 2 1/2, 1/2 x 3, 1/2 x 3 1/4, 1/2 x 3 1/2, 1/2 x 4, 1/2 x 4 1/4, 1/2 x 4 1/2, 1/2 x 5, 1/2 x 5 1/4, 1/2 x 5 1/2, 1/2 x 6, 1/2 x 6 1/4, 1/2 x 6 1/2, 1/2 x 7, 1/2 x 7 1/4, 1/2 x 7 1/2, 1/2 x 8, 1/2 x 8 1/4, 1/2 x 8 1/2, 1/2 x 9, 1/2 x 9 1/4, 1/2 x 9 1/2, 1/2 x 10, 1/2 x 10 1/4, 1/2 x 10 1/2, 1/2 x 11, 1/2 x 11 1/4, 1/2 x 11 1/2, 1/2 x 12, 1/2 x 12 1/4, 1/2 x 12 1/2, 1/2 x 13, 1/2 x 13 1/4, 1/2 x 13 1/2, 1/2 x 14, 1/2 x 14 1/4, 1/2 x 14 1/2, 1/2 x 15, 1/2 x 15 1/4, 1/2 x 15 1/2, 1/2 x 16, 1/2 x 16 1/4, 1/2 x 16 1/2, 1/2 x 17, 1/2 x 17 1/4, 1/2 x 17 1/2, 1/2 x 18, 1/2 x 18 1/4, 1/2 x 18 1/2, 1/2 x 19, 1/2 x 19 1/4, 1/2 x 19 1/2, 1/2 x 20, 1/2 x 20 1/4, 1/2 x 20 1/2, 1/2 x 21, 1/2 x 21 1/4, 1/2 x 21 1/2, 1/2 x 22, 1/2 x 22 1/4, 1/2 x 22 1/2, 1/2 x 23, 1/2 x 23 1/4, 1/2 x 23 1/2, 1/2 x 24, 1/2 x 24 1/4, 1/2 x 24 1/2, 1/2 x 25, 1/2 x 25 1/4, 1/2 x 25 1/2, 1/2 x 26, 1/2 x 26 1/4, 1/2 x 26 1/2, 1/2 x 27, 1/2 x 27 1/4, 1/2 x 27 1/2, 1/2 x 28, 1/2 x 28 1/4, 1/2 x 28 1/2, 1/2 x 29, 1/2 x 29 1/4, 1/2 x 29 1/2, 1/2 x 30, 1/2 x 30 1/4, 1/2 x 30 1/2, 1/2 x 31, 1/2 x 31 1/4, 1/2 x 31 1/2, 1/2 x 32, 1/2 x 32 1/4, 1/2 x 32 1/2, 1/2 x 33, 1/2 x 33 1/4, 1/2 x 33 1/2, 1/2 x 34, 1/2 x 34 1/4, 1/2 x 34 1/2, 1/2 x 35, 1/2 x 35 1/4, 1/2 x 35 1/2, 1/2 x 36, 1/2 x 36 1/4, 1/2 x 36 1/2, 1/2 x 37, 1/2 x 37 1/4, 1/2 x 37 1/2, 1/2 x 38, 1/2 x 38 1/4, 1/2 x 38 1/2, 1/2 x 39, 1/2 x 39 1/4, 1/2 x 39 1/2, 1/2 x 40, 1/2 x 40 1/4, 1/2 x 40 1/2, 1/2 x 41, 1/2 x 41 1/4, 1/2 x 41 1/2, 1/2 x 42, 1/2 x 42 1/4, 1/2 x 42 1/2, 1/2 x 43, 1/2 x 43 1/4, 1/2 x 43 1/2, 1/2 x 44, 1/2 x 44 1/4, 1/2 x 44 1/2, 1/2 x 45, 1/2 x 45 1/4, 1/2 x 45 1/2, 1/2 x 46, 1/2 x 46 1/4, 1/2 x 46 1/2, 1/2 x 47, 1/2 x 47 1/4, 1/2 x 47 1/2, 1/2 x 48, 1/2 x 48 1/4, 1/2 x 48 1/2, 1/2 x 49, 1/2 x 49 1/4, 1/2 x 49 1/2, 1/2 x 50, 1/2 x 50 1/4, 1/2 x 50 1/2, 1/2 x 51, 1/2 x 51 1/4, 1/2 x 51 1/2, 1/2 x 52, 1/2 x 52 1/4, 1/2 x 52 1/2, 1/2 x 53, 1/2 x 53 1/4, 1/2 x 53 1/2, 1/2 x 54, 1/2 x 54 1/4, 1/2 x 54 1/2, 1/2 x 55, 1/2 x 55 1/4, 1/2 x 55 1/2, 1/2 x 56, 1/2 x 56 1/4, 1/2 x 56 1/2, 1/2 x 57, 1/2 x 57 1/4, 1/2 x 57 1/2, 1/2 x 58, 1/2 x 58 1/4, 1/2 x 58 1/2, 1/2 x 59, 1/2 x 59 1/4, 1/2 x 59 1/2, 1/2 x 60, 1/2 x 60 1/4, 1/2 x 60 1/2, 1/2 x 61, 1/2 x 61 1/4, 1/2 x 61 1/2, 1/2 x 62, 1/2 x 62 1/4, 1/2 x 62 1/2, 1/2 x 63, 1/2 x 63 1/4, 1/2 x 63 1/2, 1/2 x 64, 1/2 x 64 1/4, 1/2 x 64 1/2, 1/2 x 65, 1/2 x 65 1/4, 1/2 x 65 1/2, 1/2 x 66, 1/2 x 66 1/4, 1/2 x 66 1/2, 1/2 x 67, 1/2 x 67 1/4, 1/2 x 67 1/2, 1/2 x 68, 1/2 x 68 1/4, 1/2 x 68 1/2, 1/2 x 69, 1/2 x 69 1/4, 1/2 x 69 1/2, 1/2 x 70, 1/2 x 70 1/4, 1/2 x 70 1/2, 1/2 x 71, 1/2 x 71 1/4, 1/2 x 71 1/2, 1/2 x 72, 1/2 x 72 1/4, 1/2 x 72 1/2, 1/2 x 73, 1/2 x 73 1/4, 1/2 x 73 1/2, 1/2 x 74, 1/2 x 74 1/4, 1/2 x 74 1/2, 1/2 x 75, 1/2 x 75 1/4, 1/2 x 75 1/2, 1/2 x 76, 1/2 x 76 1/4, 1/2 x 76 1/2, 1/2 x 77, 1/2 x 77 1/4, 1/2 x 77 1/2, 1/2 x 78, 1/2 x 78 1/4, 1/2 x 78 1/2, 1/2 x 79, 1/2 x 79 1/4, 1/2 x 79 1/2, 1/2 x 80, 1/2 x 80 1/4, 1/2 x 80 1/2, 1/2 x 81, 1/2 x 81 1/4, 1/2 x 81 1/2, 1/2 x 82, 1/2 x 82 1/4, 1/2 x 82 1/2, 1/2 x 83, 1/2 x 83 1/4, 1/2 x 83 1/2, 1/2 x 84, 1/2 x 84 1/4, 1/2 x 84 1/2, 1/2 x 85, 1/2 x 85 1/4, 1/2 x 85 1/2, 1/2 x 86, 1/2 x 86 1/4, 1/2 x 86 1/2, 1/2 x 87, 1/2 x 87 1/4, 1/2 x 87 1/2, 1/2 x 88, 1/2 x 88 1/4, 1/2 x 88 1/2, 1/2 x 89, 1/2 x 89 1/4, 1/2 x 89 1/2, 1/2 x 90, 1/2 x 90 1/4, 1/2 x 90 1/2, 1/2 x 91, 1/2 x 91 1/4, 1/2 x 91 1/2, 1/2 x 92, 1/2 x 92 1/4, 1/2 x 92 1/2, 1/2 x 93, 1/2 x 93 1/4, 1/2 x 93 1/2, 1/2 x 94, 1/2 x 94 1/4, 1/2 x 94 1/2, 1/2 x 95, 1/2 x 95 1/4, 1/2 x 95 1/2, 1/2 x 96, 1/2 x 96 1/4, 1/2 x 96 1/2, 1/2 x 97, 1/2 x 97 1/4, 1/2 x 97 1/2, 1/2 x 98, 1/2 x 98 1/4, 1/2 x 98 1/2, 1/2 x 99, 1/2 x 99 1/4, 1/2 x 99 1/2, 1/2 x 100, 1/2 x 100 1/4, 1/2 x 100 1/2.

English, cast (2d and 1st quality) per lb., 18 @ 23; English Spring (2d and 1st quality), 10 @ 12 1/2; English Blister (2d and 1st quality), 11 1/2 @ 20; English Machinery, 13 1/2 @ 16; English German (2d and 1st quality), 14 @ 17; American Blister, "Black Diamond," 11 1/2 @ 16; American, Cast, Tool, 21 @ 22; American, Spring, 10 @ 13; American, Machinery, 10 @ 14; American German, 10 @ 13.

The market for pig-iron is not active. Bars are firm. Anthracite Pig No. 1, \$38 @ \$39 00; No. 2, 36 00 @ 37 00; Gray Forge, 34 00 @ 36 00; Charcoal Wheel, 42 00 @ 44 00; Blooms, 42 00 @ 44 00; Scotch Pig, 42 00 @ 44 00; Refined Bars (American), 50 00 @ 50 00; Refined Bar, 50 00 @ 50 00; Common Bar, 75 00 @ 90 00; Band Iron, 1 1/2 to 6, 110 00 @ 120 00; 12 to 3-16, 110 00 @ 120 00; Hoop Iron, 1 and upwards, 135 00 @ 140 00; 1/2, 140 00 @ 150 00; 3/4, 150 00 @ 175 00; 1, 200 00 @ 200 00; Nails and Spikes, 5 @ 25; 4d, 5 @ 7 1/2; 3d, 6 @ 7 1/2; 3d, fine, 8 @ 25; Boiler Rivets, 7 1/2 pr. lb; Railroad Spikes, 6 @ 6c.

PITTSBURGH, April 25, 1868. Pig Iron and Bloom Market.—There is, says the Commercial, but little animation in the market for crude iron. A fair amount of business, however, is doing, with continued moderate receipts. Prices, especially for cast iron, are fairly maintained. Foundry irons are in excess of the demand, and concessions are offering to effect sales. We are quoted the following sales:

Table of Bituminous Coal Emelted from Lake Superior Ore, including 50 tons Open Gray Forge, 100 tons Medium Gray, 200 tons, 50 tons, 60 tons, 50 tons Favorite Brand White, 500 tons, 158 tons Mixture with Native Ore, 2,000 tons Low Grade, 100 tons Inferior Mahoning.

ANTHRACITE. 80 tons Neutral Forge, 100 tons Red Short, 30 tons No. 2 Foundry, 200 tons Red Short Forge, 100 tons. CHARCOAL. 200 tons A Fancy Forge Iron, 100 tons, 400 tons, 200 tons, 40 tons Hanging Rock, 50 tons, 50 tons, 400 tons. BLOOMS. 30 tons Charcoal No. 1, 90 00 @ 4 mos. Iron and Nails.—The demand for iron is light—not sufficient to carry off the product of the mills as they are now running, which is much short of their capacity. Nails are in fair demand; the mills, however, find no difficulty in promptly supplying orders.

IRONTON, Ohio, April 23, 1868. Owing probably to the general cessation of operations among the rolling mills all through the country, says the Register, metal has been unusually quiet during the past week. Orders have been exceedingly slim, and the market has shown no indications of business. Rates have met with no change, and may be quoted as follows: Mill, hot blast, \$38 00 @ \$40 00; Foundry, hot blast, 40 00 @ 42 00; Cold blast, 55 00 @ 60 00; Receipts for the week, 375 tons. Shipments very light. Manufactured Iron continues dull, except in hoop, for which an excellent demand continues. It is probable that the Lawrence Mill will stop for a short time in a few days. The Ironton Mill continues in statu quo. Prices 3 1/4 @ 4 1/4 c. Nails are very active at \$5 for 10d.

BOSTON, April 22, 1868. Scotch Pig No. 1, English-com, 55 90; Castlesherrie, dc refined, 95 100; No. 1, other brands, 42 45; Russo sheet, per lb., 6 1/2 @ 10c; American, No. 1, 40 45; Russia, sheet, 16 00 @ 17c; Swedish—common as'd., \$150 @ 155. SAN FRANCISCO, April 6, 1868. Stocks of most kinds of Iron, Steel, etc., are liberal, and the trade as heretofore controlled by three or four wealthy houses, who are ever ready to freeze out all outsiders, "new-comers," or others disposed to import or traffic in the business. Scotch & Eng. Pig, ton, 4x 50 @ 45; Boiler, 1 to 4, 3 1/2; American White, Pig, 42 50 @ 45; Plate, No. 5 to 10, 3 1/2; Refined Bar, bad assortment, per lb., 2; Sheet, 10 to 13, 3 1/2; Refined Bar, good assortment, per lb., 2; Sheet, 14 to 20, 4; Sheet, 24 to 27, 4 1/2.

LONDON, April 9, 1868. Iron.—In Staffordshire, a slight improvement in the market appears to have taken place, which it is hoped, as the season becomes more advanced, will be more fully developed. In Welsh, the tendency to improvement is making some slow progress, but so far as actual operations at the works are concerned, it can be said to be as yet hardly perceptible. Preparations are being made for a considerable increase in the exports, principally to the United States and Russia, the demand from both countries being expected to increase. Already there are several vessels in port chartered, to carry rails to the American markets, and others are expected to follow. Additional contracts on bonds account are being offered, which is considered a proof that the general trade of the country is recovering from its long prostration. In Swedish iron the demand is not at present very active, and holders are not quite so firm in their prices. In Scotch pig iron, the tendency throughout the week has been to lower prices, but towards the close a little better feeling has been manifested, the last price received from Glasgow being 62s. 4d. cash. Bars, Welsh in Lond., 5 0 @ 5 0; Do. railway, Wales, 25 10 @ 25 15 0; Ditto to arrive, 6 2 @ 6 5 0; Do. Swd. in London, 10 0 @ 10 5 0; Nail rods, 6 15 @ 7 0; To arrive, 10 0 @ 10 5 0; Stafford in Lond., 7 7 @ 8 10 0; Pig, No. 1, in Clyde, 2 12 @ 2 17 0; Bars, 7 7 @ 8 10 0; Do. f.o.b. Tyne, Tees, 2 6 @ 2 6 1/2; Hoop, 8 5 @ 9 15 0; Do. Nos 3, 4, f.o.b. do, 2 6 @ 2 7 0; Sheets, single, 9 0 @ 11 0 0; Railway chairs, 5 10 @ 5 15 0; Pig, No. 1, in Wales, 3 15 @ 4 0 0; "spikes, 11 00 @ 12 0 0; Refined metal, ditto, 4 0 @ 5 0 0; Indian Charcoal Pigs, common, ditto, 5 10 @ 5 15 0; In London, pr. ton, 7 0 @ 7 10 0; Do. merch. Tyne or 6 10 0.

STEEEL. Swed., kegs (rolled), 14 5 0 @ 15 0 0; Swed., in faggots, 16 0 0 @ 17 0 0; (hammered), 14 15 0 @ 15 0 0; English, spring, 17 0 0 @ 23 0 0.

THE COAL TRADE. New York, May 1, 1868. We understand that the Lehigh Valley Railroad has purchased or formed a co-partnership with the Hazleton railroad, securing the valuable traffic from that region. We congratulate the miners and shippers in Hazleton district on this change. One influential firm heretofore held the control of the road leading from that district, and at times there has been a little partiality shown in the distribution of cars and other accommodations. This will be avoided under the new management. The principal event of the week was the Scranton sale, 75,000 tons were sold. There was an average advance of 15c. per ton. This was totally unexpected by the trade generally, most parties believing the sale would sympathize with a depressed market, and show a decline. The following is a list of prices obtained compared with those of last month: April 29. March 25. Lump, \$3 70 @ \$3 80, \$3 65 @ \$3 80; Steamboat, 3 72 1/2 @ 3 90, 3 65 @ 3 70; Grate, 3 92 1/2 @ 3 97 1/2, 3 87 1/2 @ 3 90; Egg, 4 05 @ 4 20, 3 95 @ 4 00.

Stove... 4 62 1/2 @ 4 72 1/2... 4 75 @ 4 95... Chestnut... 3 77 1/2 @ 3 90... Messrs. Rathbone, Norton & Co., a new firm, have opened an office at No. 41 Pine street.

There is little or no variation in prices this week, and freights remain unchanged. PHILADELPHIA, April 29, 1868.

The market continues dull. We quote Locust Mountain, lump and steamboat, at \$3 50; do. broken, \$3 50 @ 3 65; Egg, \$3 90 @ 4 10; Skove, \$4 @ 4 25; Red Ash, Egg and Skove, \$4 10 @ 4 50; Lehigh, lump, steamboat and broken, \$5; do. prepared, \$5; do. chestnut, \$4 25.

There is no change to notice in English Canal, and very little has been done. Prices are nominally \$20 per ton. In Sydney, no change; prices range from \$8 \$3 25 per ton, and Pictou from \$7 50 @ 7 75 per ton; Cumberland coal has been selling at \$8 @ 50; and cargoes continue to be taken at Baltimore at \$4 75, and at Georgetown, \$4 35 per ton; Anthracite continues unsettled, with sales at \$5 50 @ 50 per cargo, with sales; \$6 @ 7 50 per ton in retail lots, as to quality and size.

The amount of Coal exported from the port of New York for the week ending April 25 was... Exports for the week... from January 1st... same time last year...

For the week ending April 21 there was no Coal exported. The following table exhibits the quantity of Coal passed over the following routes of transportation for the week ending April 25 1868:

Table with columns: WEEK, YEAR, 1867, 1868, INC. OR DEC. Rows include Phil. & Reading R. R., Schuylkill Canal, Lehigh Valley R. R., Lehigh Canal, Scranton North, etc.

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Table with columns: WEEK, YEAR, 1867, 1868, INC. OR DEC. Rows include Phil. & Reading R. R., Schuylkill Canal, Lehigh Valley R. R., Lehigh Canal, Scranton North, etc.

Table with columns: REGION, COAL, PRICE. Rows include HAZLETON REGION, CENTRAL COAL CO., ASHBURTON COAL CO., etc.

Table with columns: REGION, COAL, PRICE. Rows include U. LEHIGH REGION, U. LEHIGH COAL CO., OTHER SHIPPERS, etc.

Table with columns: REGION, COAL, PRICE. Rows include MAHANOT REGION, MT. ROSE COAL CO., MOUNT ETNA COAL CO., etc.

Table with columns: REGION, COAL, PRICE. Rows include GRAND TOTAL, SAME TIME LAST YEAR, INCREASE, DECREASE.

Table with columns: REGION, COAL, PRICE. Rows include GRAND TOTAL, SAME TIME LAST YEAR, INCREASE, DECREASE.

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Yonkers... 55... Boston... 1 90... The Coal must be discharged with all reasonable dispatch, at the expense of the consignee, who shall also pay wharfage on the boat. Boatmen will tend guy while unloading.

Table with columns: REGION, COAL, PRICE. Rows include FROM ELIZABETHPORT AND PORT JOHNSON, ALBANY, BOSTON, etc.

Table with columns: REGION, COAL, PRICE. Rows include FROM ELIZABETHPORT AND PORT JOHNSON, ALBANY, BOSTON, etc.

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Prices of Coal by the Cargo.

Table with columns: REGION, COAL, PRICE. Rows include At New York, May 1, 1868, Schuylkill R. A., choice, \$6 00 @ \$6 00, etc.

Table with columns: REGION, COAL, PRICE. Rows include SPECIAL COALS - DEALERS' QUOTATIONS, DIAMOND VEIN R. A., SCHUYLKILL CO., etc.

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Rates of Transportation to Tide Water.

To Port Richmond - (Philadelphia) Philadelphia and Reading R. R. from Schuylkill Haven... \$2 00

Table with columns: REGION, COAL, PRICE. Rows include LUMP, STEAMBOAT, BROKEN, EGG, etc.

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Prices of Gas Coals.

Table with columns: REGION, COAL, PRICE. Rows include PROVINCIAL, AMERICAN, BLOCK HOUSE, GORVILLE, etc.

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San Francisco Coal Trade.

There is no movement worthy of record. The store supply is liberal, with no special inquiry; prices, therefore, are both low and nominal. We note a sale of 104 hhd's of Cumberland at \$22 per ton; the same in bulk, \$19 @ 20.

Table with columns: REGION, COAL, PRICE. Rows include AUSTRALIAN, DO WALLSEND, BELLINGHAM BAY, etc.

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San Francisco Stock Market.

A Telegram from San Francisco, dated April 27, to Messrs. LEES & WALLER, Bankers, 33 Pine street, this city, quotes stocks as follows:

Table with columns: REGION, COAL, PRICE. Rows include GOLD & CURRY, SAVAGE (PER SHARE), CHOLLAR FOTOS, etc.

Table with columns: REGION, COAL, PRICE. Rows include GOLD & CURRY, SAVAGE (PER SHARE), CHOLLAR FOTOS, etc.

Table with columns: REGION, COAL, PRICE. Rows include GOLD & CURRY, SAVAGE (PER SHARE), CHOLLAR FOTOS, etc.

Liverpool Copper Ore Circular.

Messrs. J. Pitcairn, Campbell & Co., Liverpool, March 31, write: During the early part of the fortnight, and up to the last few days, the copper market continued quiet; but a decidedly favorable reaction then set in, with a good general demand, and we close strong at our extreme quotations.

Table with columns: REGION, COAL, PRICE. Rows include LIVERPOOL, SWANSEA, etc.

AMERICAN Journal of Mining.

WESTERN & COMPANY, PROPRIETORS.

ROSSITER W. RAYMOND, EDITOR.

OFFICE, 37 PARK ROW, NEW YORK.

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DESIGNING. WOOD ENGRAVING, and JOB PRINTING
LITHOGRAPHING Executed in elegant style, on reasonable terms.

Correspondents, exchanges and others addressing us should be extremely careful to write "JOURNAL OF MINING," instead of "MINING JOURNAL," to ensure safe carriage. Communications intended for publication should be plainly written, and on one side of the paper only.

NEW YORK, SATURDAY, MAY 2.

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OF-SET ABOUT MINERALS.
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NOTICE TO SUBSCRIBERS.

Subscribers receiving their paper in a blue wrapper will accept the same as a notification that their subscriptions have expired, and that the JOURNAL will be discontinued unless we are otherwise authorized.

PROFESSOR WHITNEY AND THE CALIFORNIA SURVEY.

The address of Prof. J. D. Whitney to the California legislature, on the propriety of continuing the State Geological Survey, contains much that is admirable, and, we think could not have failed to be convincing in its effect upon minds capable of comprehending the bearings of the question. But as a plea before a somewhat hostile tribunal, it might be improved. There is an undertone running through it, of curiously blended contempt and despair. It is evident that the State Geologist did not expect to change the final result by his arguments, and felt himself to be rather (in his own words) "preaching the funeral sermon" of the Survey, than attempting to prolong its life. The meagre accounts thus far received do not indicate to us the nature of the arguments by which the opponents of the work sought to justify their cause; and it is difficult to imagine what could have been considered, under the circumstances, even plausible, not to say conclusive. We cannot believe that any body of citizens in California seriously deny the utility of such an undertaking, or could have the boldness to abolish it on mere general grounds. It is more likely that objection was made to the cost of the work compared with the results thus far attained, or that the survey as hitherto organized was done away, with the intention of continuing it on a new plan.

In fact, we gather from a passage in Prof. Whitney's speech, and from private information, that the plan of the new State University was the occasion of the stoppage of the Survey. It was supposed that an appropriation to the geological corps would defeat the appropriation for the University; and some members of the legislature expressed the opinion that the University, once established, could successfully carry on the work of scientific exploration, at a great saving to the State. In the language of Prof. Whitney, "there are some who would pull the survey up by the roots in order that the University may be planted in the same hole." This plan, if carried out, would give to California either no University or no Survey worthy of the name. One or the other institution must certainly suffer by the attempt to place both in new hands. If the University were an old and well-established one, with numerous professors and graduates, perhaps an enterprise of this kind might be organized in connection with it, and prosecuted without detriment to the special work of instruction; but under present circumstances, such an arrangement would be impracticable.

The whole question is narrowed down to two or three points. If a scientific survey is desirable, who shall direct it? Having lost Prof. Whitney by their recent action, the wise men of California will not be likely to find his equal elsewhere. If there are men in America equally competent to carry on the work, they will not be very eager to take service under masters so ignorant and whimsical. And any new man, no matter how able and willing, would hesitate to attempt to gather up and reunite the broken threads left by his predecessor. It is sad enough, when relentless Death interferes in some great scientific work, and, striking down its architect, leaves the fair fabric

that was growing to perfect beauty beneath his hands a mass of fragmentary columns and arches, magnificent in ruin. But to see the same confusion wrought by the hand of stupidity or malice, is sadder yet.

In the examination of the old forsaken mines of Germany, great care is taken to determine whether their abandonment was caused by their exhaustion or worthlessness, or by such unusual events as pestilence, invasion, or other disaster. When the deserted workings are found to contain tools and heaps of ore, mined but not hoisted to the surface, the inevitable deduction is, that the proprietors did not voluntarily depart, since otherwise they would certainly have turned into money whatever was left of value.

But these brilliant California economists have changed all that. They will not even put in the market the ore that is already mined and ready for sale. They are so economical that they cannot afford to print and sell at a profit the material they have spent \$125,000 to collect. The only parallel we can find is the case of a respectable but penurious Pennsylvania Dutchman, who let his sheep go unshorn rather than buy a pair of shears.

A LESSON FOR THE HOUR.

About a century before the time of the Trojan war, as the story runs, Jason, with his band of Argonauts, set out upon his journey for the land of Colchis, in search of the golden fleece. Although beset with despair and intrigue, his passage of the Euxine was effected in safety, and at last his difficult adventure was crowned with success. The golden fleece, though concealed in the forest and guarded by the dragon, finally became his hard-earned prize. In a certain sense we have in the present, as it were, a counterpart of this legend of the olden time. The adventurous Jasons of our day, who would win the golden prize from the veins of ore that are threaded through, and interlaced in the matrix-rock of our western mountains, seem to be met with dangers, intrigues, and hardships equally difficult to be overcome. It should be to us a lesson of patience. It will not be long before the dragon that guards the golden fleece, that we would gain possession of, will be shorn of his strength. Before long the journey can be made quickly, and safely. Very soon, lines of railway will trace the valleys, cut the spurs and wind along the slopes and passes of the mountain chains of our great mining region. With the influx of the tide of emigration, labor will be cheapened, and mines of moderately yielding ores, can then be worked to advantage.

The Schools of Mines in our own country, and in Europe, will very soon give us a body of scientific experts, who will work with economy our most difficult mines, and smelt with success our most refractory ores. The old adage, that "everything comes in time," cannot fail us in this instance. Though tens of millions of dollars of capital have been spent in vain in the endeavor to extract the gold and silver from the pyrites of Colorado, the time is, in our estimation, very near at hand when those obstinate ores will be reduced easily, and profitably. The metallurgist of the Lower Hartz Mining District has to-day no difficulty in extracting the gold from pyritical ore, although the amount contained therein is only about one three and a half millionths of one per cent. The capitalist, who has his tens or hundreds of thousands invested in our western mines, and that, too, apparently to no purpose, can take heart. The triumph of mind over matter is, in this case, as in many another, near at hand. The key that will unlock the door of this great treasure-house of the west is already in the grasp of science. The times of fraudulent enterprise, and fool-hardy speculation, have already passed away. Mining operations must now be entered upon carefully, and carried out intelligently. The capitalist, who invests his property in mines or metallurgical works that are managed in a legitimate, careful, intelligent manner, need have no fear. The chances of failure, under such circumstances, would, perhaps, be no greater than in mercantile operations; while, in case of success, the chances of munificent returns would be very much increased. As in the transit of human life, "the coffin and the cradle often stand side by side," so, often in business enterprises, success lies the next door to defeat.

GEOLOGY AND HISTORY.

VON COTTA, one of the most eminent geologists of the present day, and a follower of Werner as Professor in the celebrated mining school of Freiberg, Saxony, at the close of the chapter on "Geology and History" in his work entitled the *Geology of the Present*, after having given a summary of the oldest human relics that have thus far been found in the upper geological strata or formations of the earth's crust closes with the following beautiful comparisons.

He remarks substantially as follows:

"I have shown in this chapter, how closely Geology and History are united together, as well through the object as through the methods of investigation. In both, the general progress of events and conditions are found to be the result of continuous causes. Sudden transformations are only of local or passing significance. As in human history, single individuals do not determine the common progress, or in general the transformations, but rather the gradual development of the whole which comes to its special maturity and clearest expression, only in individual, prominent men; who, controlling the mass, can then, of course, wield a dominating influence; so also, is the process of the formation of the Earth, the product of countless individual effects, traces of which can be recognized only here and there with marked distinctness. If it were possible for a man to advance some centuries

ahead of the knowledge of his time, his fellow-men would not comprehend him. He would be isolated and powerless; he would be like a leader who has gone so far in advance of his band that they can no longer see him. But that is, indeed, quite as impossible as the existence of a species before its time has come; that is, before it is necessitated by the conditions upon which it depends."

When we consider the fact that only a very small fraction of the earth's surface has been explored by the geologist, and that there is yet much to learn in regard to those parts that have been investigated, we may, with the eminent geologist, well believe that, could any one of us, in respect to the science of geology, look a century or two into the future, he would indeed be isolated and powerless. The science, though it has made wonderful progress in the course of the last three-fourths of a century, cannot be other than in its infancy. Problems that baffle the skill and far-sightedness of the best scientific minds of the age, are yet to be solved; apparent contradictions remain to be reconciled; new problems must come up for solution, and other apparent contradictions for reconciliation.

As regards the phase that the science of Geology will assume, a century or two hence, who will venture to conjecture? With the impetus that it has at the present time and the great field that lies open for research, it must advance with rapid strides. We can, however, rely up this; though theories fall, facts will remain.

EXPERIMENTS IN THE GROWING OF PLANTS.

In the infancy, and we are almost justified in saying, the inchoate state of the agricultural schools of this country, our people are not given generally to a discussion of questions relating to agriculture. Our territorial domain is, indeed, altogether too great, in proportion to the number of its inhabitants, for the question, what is the maximum amount of produce that might under certain conditions be raised upon a given quantity of land, to arouse universal attention. The following quotation from a pamphlet, entitled "*Sterility is Laid*," from the pen of John A. Riddle, Esq., and giving the results of experiments in the raising of plants under very anomalous conditions, seems to have a peculiar interest.

"Prof. Ville, a scientific Frenchman, after fifteen years' experimenting, substituted for soil an artificial mixture, all the elements of which were clearly defined. In this way he succeeded in producing vegetation in pots of china with burnt sand and perfectly pure chemicals. Under these circumstances he carried on the four following experiments, viz.:

- "1. Burnt sand alone.
 - "2. Sand with a nitrogenous substance.
 - "3. Sand with minerals only. (Phosphate of lime, potash and lime.)
 - "4. Sand with nitrogenous substance and minerals.
- "He sowed on the same day, in each pot, 20 grains of the same wheat, of the same weight, and kept them moist with distilled water during the entire period of vegetation. At the harvest the following facts were observed, viz.:

"No. 1. The plant was very feeble, the crop dried, weighed 93 grains.

"No. 2. The crop, still very poor, was, however, better than No. 1,—it weighed 140 grains.

"No. 3. It was a little inferior to the preceding,—it weighed 123 grains.

"No. 4. It weighed 370 grains.

"From these experiments we conclude that each of the agents fulfills a separate and a combined action, as the effect in combination was much better than that produced separately."

This, to say the least, is a curious bit of research in the line of agricultural science, and may perhaps form the groundwork of very important results in the cultivation of the soil. Anything that shall give the husbandman a greater reward for his toil, we hail with pleasure. For the practical conclusions drawn from these experiments, we refer to the pamphlet mentioned above.

MARIOTTE'S LAW IN MINES.

Any information that has a tendency to diminish the danger of explosions in the working of coal mines, is well worthy our attention, more especially when, as in the present case, it is susceptible of direct application in the management of our own extensive mines of coal.

Mr. SMYTH, of the Royal School of Mines, London, in speaking of the difficulties that one has to struggle with in passing through the workings of mines, makes the following application, which we quote from the London *Mining Journal*. Applying the rules of MARIOTTE'S law, he said that it would be obvious—

"1. That the pressure to be overcome varied according to the length of the gallery, so that if it be so much in one mile of workings it would in a second mile have twice as much resistance as in the first.

"2. The resistance varied according to the square of the velocity of the current. This was an important point, because it was often said that if the current would blow out a candle, the ventilation was good, but this proved that, while at one place the current might be three feet per second, and at another six feet per second, the difference did not arise from any increase in the quantity of air, but in the variation of resistance, the difference being in that case as that of nine to thirty-six, so that, increasing with this rapid ratio, there was an enormous loss of power.

"3. If the volume of air remained the same, the resistance varied inversely with the sectional area of the air-way, so that the larger the air-way the less resistance was offered, and the larger the volume of air obtained."

From these rules, Mr. Smyth deduces one or two very simple but important rules that may be directly applied in the ventilation of mines. The first rule is that the air currents should be as short as possible, and the velocity as low as possible. The second rule deduced is, that, at the same time, by enlarging

the air-way, the resistance should be diminished as much as possible. These rules are certainly of very great moment, and should be kept in mind by our mining engineers.

Brimstone Victorious

We heard the other day that a prominent manufacturer of sulphuric acid, having tried pyrites, had abandoned it, and gone back to Sicilian sulphur, somewhat astonished, we inquired how he had constructed his kilns, and were informed that he had merely dumped the pyrites into the old sulphur-burners and waited for the result! When beefsteak is broiled in the oven and soup eaten with a fork, such an adaptation of means to ends may be successful; but not under the present order of things. The gentleman alluded to forgot a most important, though not imported, ingredient in the manufacture—namely, not sulphur only, but sense.

Scientific Meetings.

LYCEUM OF NATURAL HISTORY.

On Wednesday evening the organization of the Lyceum of Natural History celebrated its semi-centennial anniversary at the hall of the Cooper Institute. Owing to the inclement state of the weather, the audience was very small; it was, however, very intelligent and appreciative. The organization is one of the oldest in the country, and embraces among its many members numerous distinguished names. Dr. I. S. Newberry presided at the meeting. The following eminent scientific gentlemen were upon the platform:—Major I. Delafield, for nearly forty years President of the Society, Prof. Benj. Silliman, Prof. Theo. W. Dwight, Baron Osten-Sacken, L. Fenchwanger, Mr. McCormick, Andrew H. Green, Comptroller of Central Park, Thomas Bland, B. Waterhouse Hawkins, of London, R. Ogden Doremus, Thomas McElrath, Thomas Ewbank, and others. Grafulla's band was in attendance, and gave a pleasing variety to the exercises by playing some fine selections from Rossini, Haydn, &c. The divine blessing was invoked in a fervent prayer by Prof. Martin. Prof. John Torrey, the only surviving member of the Board of Corporators, was the first speaker. He said that before giving a history of the Society he ought properly to speak of the state of science at the time of its foundation. He then went on to remark, that a century and a-half, or two centuries ago, the population was sparse, and that the energies of the people were for the most part employed in overcoming the physical obstacles of the time; that the first works upon the science of Botany were written upon the plants of Virginia and sent to Europe for publication; that in 1803 the first work upon the general flora of this country was published. The speaker then gave a very interesting account of the origin and early history of the Society. He said, that the first meeting was held in Barclay street, in the year 1816; that in 1817 the organization was completed; that Hon. Samuel Mitchell, Maj. Delafield, and Prof. C. A. Joy were successively the Presidents of the Society; the presiding officer at the present time being Dr. I. S. Newberry, of the Columbia College School of Mines. He said that the Society was provided with rooms in the Almshouse in the year 1818; that it afterwards moved to a building at the corner of White and Centre streets; that, at a later date, they put up a building on Broadway, but having become involved in financial difficulties, they were obliged to sell at auction; that after other removals, and after having been at one time burnt out, they eventually secured the use of rooms in the Cooper Institute buildings. The membership of the Lyceum is now 250.

Rev. Dr. Barnard was the next speaker. He gave an able and eloquent address upon the relation of science to the advancement of civilization, and upon the expediency of a public provision for its support. With all deference to classical literature, he presented the claims of science upon the student. He then went on to give an accurate and exhaustive definition of science; after which he spoke in eloquent language of the advantages, the necessities of mental culture. He said that man, though allied to the animal, is yet gifted with endowments that lift him up somewhere between the earth and the heavens—that raise him near to superior intelligence; that he must not allow his powers to slumber, if he would not sink in his high purposes and aspirations. He ably refuted the statement often made, that high mental culture blunts the moral sensibilities. He remarked, that while the studies of Archaeology, Literature, &c., were more or less conversant with humanity, the study of science taught us of God. He then went on to show how the achievements of science have been practically a great blessing to mankind; as instances of which, he mentioned at length the process of bleaching, the application of steam to purposes of navigation, the invention of the telescope, &c. He then presented the claims of science upon the public, for encouragement and support, in a very felicitous and forcible manner.

Rev. Dr. I. P. Thompson then made, in fitting terms, a few closing remarks, after which, the benediction having been pronounced, the audience dispersed.

POLYTECHNIC BRANCH OF THE AMERICAN INSTITUTE.

NOVEL TIME PIECE—VALVE REFITTING MACHINE—FOSSIL BONE FROM THE EAST RIVER—INGENUOUS APPLICATION OF THE TELEGRAPH—NATIONAL SCHOOL OF MINES.

The regular meeting of this association was held at Cooper Institute last Thursday evening. The audience was large and very attentive—a fact that would naturally be supposed from the interesting character of the proceedings. Professor S. D. TILLMAN occupied the chair. The meeting was opened with the reading of the usual summary of scientific news by the chairman. It was of an interesting nature. Dr. VAN DER WEYDE remarked, in reference to one of the items read, to the effect that scales of the oxide of iron are now added to carbonized iron, until it comes to the requisite degree of toughness to constitute good wrought iron. The more important features of the proceedings of the evening, were the following:

An exhibition of Timby's library globe time-piece, which seems to be an interesting piece of mechanism. It is a miniature world, so to speak, put in motion by a superior time movement. A dial representing twenty-four hours, encircles

and revolves with it once a day; it gives true and equatorial time, and also illustrates the method of measuring time.

Mr. HALL exhibited a valve refitting machine. The proprietors claim that it repairs the valve without detachment from the connecting pipes; that there is a saving of time, money and fuel; that it is simple, portable, etc.

The chairman read a letter from CORNELIUS REYNOLDS, giving an account of a fossil bone found in dredging the East River. It was found thirteen feet below the surface, and within cannon shot of City Hall. In the letter, the following questions were proposed. What is the bone physically speaking? Does it belong to the drift period? Is it probable that there are any more? What was the size of the animal when living? Dr. VAN DER WEYDE remarked that it was a femur either of an Elephant or a Mastodon. A call was then made for the distinguished Naturalist, Mr. HAWKINS, of London, but the gentlemen were not present.

Mr. BRADLEY then brought forward a telegraphic machine for the use of the Broker. It is so arranged that the manipulator at the gold board can telegraph at will the rise or fall of gold. The Broker at his desk has the price of gold at any moment before his eye.

Mr. R. W. RAYMOND, United States Commissioner of Mining Statistics, then addressed the audience upon the subject of a National School of Mines. An abstract of the address will be given in our next issue.

Original Papers.

[PREPARED FOR THE AMERICAN JOURNAL OF MINING.]

SMOKE OF SMELTING WORKS—No. I.

The source of the following paper upon the injurious influence of the smoke of metallurgical works upon the immediate neighborhood, is found in the report of F. Reich, one of the chief mining counsellors of Freiberg, Saxony, upon its effects, as observed by him at various smelting works in other parts of Europe, and also upon the measures by means of which such deleterious influence is sought to be counteracted. This report of mining counsellor Reich, appears in full in the Freiberg Jahrbuch, (Year-Book) of 1867.

The blighting effects of the smoke from metallurgical works was observed in many of the various places that were visited, though in a very different degree. At Swansea, and St. Helens, these influences are so considerable that, even in case of a flying visit, they could not be mistaken; while at many Lead and Zinc smelting works, they have to be sought after, and found out by inquiry.

If, according to STOCKHARDT, we should separate these injurious influences into two classes—the one chronic, the other acute—the first would, by way of preference, consist in a poisoning of the ground, through the agency of substances containing the oxide of lead. A case of this sort has been spoken of only in connection with the *Frankensharn* Silver smelting works, as also in the neighborhood of the works that formerly existed at *Schulenberg*, in the region of the upper Harz. At the latter place the blighting effects of the furnace smoke upon the forest-trees was admitted by RETTSTADT, in his article upon that subject.

The investigations of PAPPENHEIM at other points, speak to the contrary. He also shows that the oxide or salts of zinc, mixed with the soil, does not injure the growth of plants at all, and that these plants take up, at the most, only a very insignificant quantity of zinc.

It is, indeed, as yet a matter of doubt, whether plants that grow in soil containing arsenic are injured thereby. It has been shown that plants placed in water that contains arsenious acid in solution, die out; but on the contrary, plants grow exceedingly well in soil that contains a mixture of this acid; and, if it were possible to find arsenic in them, it would indeed be only in so small a quantity, that it would require a chemical reaction of the greatest delicacy to detect its presence.

The influences, injurious to vegetation, that have been denominated acute, are effected almost wholly through the instrumentality of sulphurous or sulphuric acid, and hydrochloric acid; the latter is, however, in this place, less interesting to us, since it is a product only of chemical manufactories. Outside of these there would be only arsenious acid, oxide of zinc, salts of zinc, and, of course, hydrofluoric acid to consider.

It is, indeed, unquestionable that sulphurous, and likewise hydrochloric acid have an injurious influence upon plants with which they come in contact, through the medium of the air, even when thereby greatly rarefied. This fact is established partly by means of observations upon a large scale, and partly by means of experiment.

The effect of air, containing sulphurous acid, upon plants, consists in a bleaching and withering of the leaves. This process of decay is wont to commence at the points, and upon the edges of the leaves, and then spread out gradually over their surfaces. In case of trees, the tops suffer the most, and the first of all. Different kinds of vegetation indicate different degrees of sensibility. If the smoke strike upon grain-fields in time of bloom, it blights the heads. Evergreen are more exposed to its noxious influence, than leaved growths of timber. Among the latter, plum trees appear to be very sensitive; oaks, tolerably so; while pear trees, on the contrary, are the least sensitive of all. However plainly it may have been remarked that plants, which have been protected by means of houses, walls, and high trees, from the action of sulphurous acid, remain uninjured; and also that noxious influences, in the direction in which the gases have been driven by the winds, are pre-eminently observable, and that, too, at great distances; it still remains a matter of great surprise, that frequently injured fields and trees border upon, and in-

terchange with those of the same kind that are wholly uninjured.

It is generally acknowledged that the condition of the atmosphere has great influence in regard to the effect of these gases. In moist, foggy weather, the blighting effect is greater than at any other time. It shows itself also, in case of a thaw, when the smoke descends to the surface of the ground. On the contrary, it is not perceptible, either in clear, dry weather, or in time of heavy rains. The fact that places that lie to the eastward of the spot from whence the smoke comes, suffer far more than those that lie upon the west side, stands in perfect harmony with this atmospheric influence; since the west winds that bear the smoke to the former localities are more frequent, and generally moister than the east winds.

It is indeed not yet decided, whether the plants are injured by the sulphurous acid, as such; or whether it is first converted into sulphuric acid by the action of the air and moisture. Certainly the smoke of works, containing, relatively speaking, a good deal of sulphurous acid, contain also sulphuric acid; which renders it opaque and holds it together, even at a great distance from its place of origin.

Arsenious acid is, to be sure, in general very much feared; it is, however, on the one hand, for the most part condensed; on the other hand, it has been shown by means of observation and experiment, that it does not injure the vegetation of the neighborhood.

It has been shown by some French experiments, that oxide of zinc, scattered upon plants, does not injure them at all. This has been authentically established since then, by German investigations. On the other hand it has been demonstrated by a number of writers, that zinc salts have a deleterious influence; and especially by PAPPENHEIM, who showed that plants that are wet with a concentrated solution of zinc-vitriol, or that have dry zinc-vitriol scattered upon them, and are then moistened, very quickly suffer from the effects of it.

Salts of copper in the smoke, appear to be still more destructive in their effects.

Hydrofluoric acid needs only to be mentioned here, since the noxious influence of the furnace smoke at Swansea has been, only in part, charged against it; and even such fractional influence has not been well enough established, as to render it necessary to give it any further attention.

The injurious effect of the smoke from furnaces upon animals, appears to be only an indirect one, and is brought about through the eating of the blighted vegetation.

Two eminent authorities look upon a greater quantity of sulphuric acid as almost the only cause of the evil effects of furnace smoke upon animals, especially cattle; such evil effects having been indirectly effected by a previous blighting of the vegetable matter afterward consumed by them as food.

Near the zinc works at Moresnet (Altenberg), experiments have been made by mixing zinc oxide in considerable quantity with the fodder of cows. Thereupon they grew poor, lost their appetite, and in the end their tongues became white; but after having been fed awhile upon their usual fodder, in a short time they recovered from their diseased state.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

ATOMMECHANICS PROVED BY TYNDALL'S EXPERIMENTS.

BY GUSTAVUS HINRICHS,

Professor of Physics, Chemistry and Mineralogy, Iowa State University.

The readers of this journal are probably familiar with the great experimental discovery of the celebrated physicist, JOHN TYNDALL, described in the tenth lecture of his work on "*Heat as a mode of motion*." I refer to his discovery of the marvelous absorptive power for radiant heat possessed by the various gases.

While TYNDALL's predecessors limited themselves to the investigation of the absorptive power of the different solids, usually of a very complex chemical composition. TYNDALL struck out in an entirely new field. Knowing that all bodies in the gaseous condition exhibit the simplest laws, he endeavored to measure the absorption of radiant heat by gases, rather than by solids and liquids; and, like a truly great philosopher, firmly relying on the principle, that the *properties of bodies are but the expression of their chemical composition*, he confined himself to the investigation of gases of simple and well-known composition. Having a distinct aim, he succeeded in devising a new method of experimentation, alike marvelous for its qualitative delicacy and its quantitative accuracy. Referring for the details to the works of TYNDALL, we shall here only give a few of his results, together with some of his theoretical suggestions; thereafter we intend to show how all of these remarkable phenomena form a most valuable proof of the correctness of the constitution of matter as propounded in my *Atommechanics* (See JOURNAL OF MINING, August, 1867). For we have been able to calculate the very values observed by TYNDALL in his famous experiments, from the known chemical constitution of the gases experimented upon, just as chemists are in the habit of calculating the specific gravity of gases from the same chemical constitution of the gas.

TYNDALL finds that if the absorption of hydrogen be called one, the absorption of chlorine, produced by the same volume and the same pressure of one inch of mercury, will be 60; that of sulphurous acid almost 9000! After stating these results, TYNDALL exclaims:

"What extraordinary differences in the constitution and charac-

ter of the ultimate particles of various gases or the above results reveal! For every individual ray struck down by the air, oxygen, hydrogen or nitrogen,—the ammonia strikes down a brigade of 7260 rays; the olefant gas a brigade of 7950; while the sulphurous acid destroys 8800. With these results before us, we can hardly help attempting to visualize the atoms themselves, trying to discern, with the eye of intellect, the actual physical qualities on which these vast differences depend. These atoms are particles of marble, plunged in an elastic medium, accepting its motions and imparting their motions to it. Is the hope unwarranted, that we may be able finally to make radiant heat such a feeler of atomic constitution, that we shall be able to infer from their action upon it, the mechanism of the ultimate particles of matter themselves?"

From this quotation it will be seen, that Professor TYNDALL does not belong to that school, which, accepting all traditional notions, never intends to go beyond the surface of the facts. On the contrary, TYNDALL works out his great facts; he achieves his experimental discovery with the distinct aim of reaching beyond the mere facts to their cause: the chemical or atomic constitution of matter. Yet, these remarkable facts of TYNDALL remain but facts even to day; the inductive method, of which we hear so much, has as yet not deduced the atomic constitution of matter from the facts of the great philosopher of the Royal Institution of England. May we therefore be permitted to show that these facts can be deduced from the atomic constitution as set forth in the "Atomechanics?"

Having given a solution of the mechanism of the ultimate particles of matter in my Atomechanics, I naturally tried to deduce the absorptive power of bodies from this atomic constitution. But, unfortunately, physicists have not yet discovered the relation between matter and heat; so that the problem was not at all merely to apply the atomic constitution to the radiant heat, but also the further problem of discovering the relation between radiant heat and matter itself!

In the present short synopsis we may conveniently adopt the view of TYNDALL himself, considering the atoms as particles in an elastic medium. But in order to base any calculations upon it, we must give this general view a more precise and definite form.

Now the hindering, resisting, or as it is commonly called, the absorptive influence of a number *g* of equal particles in a given space, is evidently proportional to this very number; but the ultimate atoms are the panatoms, so that $g=2A$, if *A* the modern atomic weight of the body (Atomechanics §18; AM. J. OF MINING, 1867, Vol. IV., p. 82, Aug. 10).

If now space was evenly filled with panatoms, always according to the same law, then the absorption would simply be proportional to *g*, for equal volumes (or atoms) of gaseous bodies. But a mere glance at the results of TYNDALL shows that this is not the case; hence that, in accordance with Atomechanics, the distribution of the panatoms is different in different substances.

A great many elementary atoms consist, according to Atomechanics, of a series of net-like plates (many hexagonal ones resembling snow-flakes) placed vertically above one another. The number of panatoms in each plate is called the atomare, *a*; the number of such atomares placed vertically above one another in each element-atom, is called the atometer, *m*, of the element. The prismatic body thus formed is the atobar, which in virtue of its vibratory motion or in virtue of the elastic medium occupies a comparatively very large space, the atobare or atomic volume of the element.

Now each atomare will oppose an equal resistance to TYNDALL's elastic medium, or the absorption is also directly proportional to the atometer, *m*; that is, the number *m* of atomares in the atom of the element.

By continuing this reasoning, or by starting from a few principles of theoretical optics, I have obtained a general formula, giving the absorptive power of any gas as a very simple function of its composition as determined in my Atomechanics. But reserving all detail for other occasions I propose here to prove by means of TYNDALL's experiments, the correctness of the two theoretical laws just stated.

Let the absorption for one inch pressure, as determined by Professor TYNDALL, be called *B*; then the absorption of each single panatom will be

$$p = \frac{B}{g} = \frac{B}{2A}$$

since the gases in TYNDALL's experiments occupied the same volume under equal pressures and at the same temperature, that is, his values correspond to an equal number of atoms of the compounds or (separately) the elements.

According to my second law, this value *p* must furthermore be proportional to the atometer *m* of the element, when this is uncombined, or combined with the same other atomic group. That is, $p = K m$, *K* being a constant.

The values of *B*, as observed by TYNDALL, are given in the following table, together with the chemical formula, the abogramme *g*, and the value of *p*, obtained by dividing *B* by *g*.

Formula	<i>B</i>	<i>g</i>	<i>p</i>
Elements, type A.			
Hydrogen.....H	1	2	0.5
Chlorine.....Cl	60	71	0.85
Bromine.....Br	160	160	1.00
Binaries, type AB.			
Hydric bromide....HBr	1005	162	6.1
Carbonic oxide....CO	750	56	13.2
Nitric oxide.....NO	1590	60	26.5
Type AB ₂ .			
Nitrous oxide.....N ₂ O	1860	88	21.1
Hydric sulphide....SH ₂	2100	68	30.9
Sulphur dioxide....SO ₂	8800	128	68.7
Type AB ₃ .			
Ammonia.....NH ₃	7260	34	213.5
Type A ₂ B ₄ .			
Olefant gas.....C ₂ H ₄	7950	56	142.0

The values of *m* we transcribe from the Atomechanics, viz.:

- m*=2 for hydrogen, carbon;
- m*=4 " oxygen, nitrogen;
- m*=8 " sulphur;
- m*=10 " chlorine;
- m*=12 " bromine;
- m*=11 " iodine, etc.

We may now proceed to the text, whether the values of *p*, given by TYNDALL's experiments, actually are proportional to the values *m* from our Atomechanics; if so, we may conclude, that the atomic constitution, as given in the Atomechanics, is correct, and that the influence of matter on radiant heat is quantitatively as here accepted.—

I. ELEMENTS.

We find in the preceding tables of *p* and *m*:

$$p \text{ for Cl:Br} = 0.85 : 1.00 \text{ or } 1 : 1.18$$

$$m \text{ " Cl:Br} = 10 : 12 \text{ " } 1 : 1.20$$

or *p* is actually very nearly proportional to *m*! Indeed we find for Chlorine $K=0.085$, for Bromine almost the same, $K=0.083$. Taking the mean value $K=0.084$ we may calculate the absorption *p* for any chloroid (Fl, Cl, Br, I) by

$$p = 0.084 m$$

which gives

	Cl.	Br.
calculated value, $p=0.84$	1.008	
observed value, $p=0.85$	1.00	

The coincidence is complete. Thus TYNDALL's admirable experiments prove that the Chlorine-atom indeed does consist of 10 atomares, while the Bromine-atom contains 12 similar atomares. For Iodine the formula gives $p=0.924$; hence $B=235$; as yet, Tyndall has not determined the absorption of iodine vapors.

Hydrogen is not quite comparable; but if it were, it would give $p=2$ $K=0.17$ instead of $p=0.5$ which latter results from the value given by TYNDALL; but it must be observed, that this figure in the table of TYNDALL is not the result of direct measurement, and he thinks himself that it probably is too high.

II. COMPOUNDS.

The type AB.—The two compounds CO and NO of this type admit of simple and direct comparison, since both have O in common and are of the same constitution. Hence we must have the absorption *p* proportional to the atometer *m* of the elements C and N. The actual values are:

$$\text{of } p \text{ CO : NO} = 13.2 : 26.5 = 1 : 2.007$$

$$\text{of } m \text{ C : N} = 2 : 4 = 1 : 2.000$$

or again almost identical!

Of the type AB₂ the compounds SH₂ and SO₂ admit of direct comparison; but since the atomare of H is the smallest of all (only 1 single panatom), while that of O is $8=2.4$, we may expect the absorption of O to slightly exceed that corresponding to the atometer. We have

$$\text{for } p \text{ SH}_2 : \text{SO}_2 = 30.9 : 68.7 = 1 : 2.22$$

$$\text{for } m \text{ H : O} = 2 : 4 = 1 : 2.00$$

The observed absorption of the oxide is indeed 0.22 greater, than that of the corresponding hydrate, as anticipated on account of the great disparity of the atomares.

Of the other types we may yet compare C₂H₄ and NH₃; both containing H. According to Atomechanics, the atom C₂H₄ is composed of two atoms CH₂ placed in a straight line; so that the absorption for CH₂ is one half of that of C₂H₄; or *p* for CH₂ is 71.

The two compounds CH₂ and NH₃ may now be compared; the absorption *p* is directly as the atometer of C and N or for *m* CH₂ : NH₃ = 2 : 3;

but at the same time, there are two atoms H in the hydrogen-plane of CH₂; but three in that of NH₃—hence on this account also absorption

$$\text{CH}_2 : \text{NH}_3 = 2 : 3.$$

Combining both proportions we obtain the theoretical absorption

$$\text{CH}_2 : \text{NH}_3 = 2 \times 2 : 4 \times 3 = 1 : 3$$

which according to TYNDALL's observations we have

$$\text{for } p \text{ CH}_2 : \text{NH}_3 = 71 : 213 = 1 : 3$$

exactly!

The other compounds experimented upon by TYNDALL do not permit so simple comparisons as here given; but, as stated before, my more complete investigation of this subject has led me to one general formula, which permits me to calculate the absorptive power of any gas from its chemical constitution alone, just as chemists are in the habit of calculating the specific gravity of a gas from the chemical constitution of the same. But the details of this investigation will be too extended for publication here.

Only one further result may here be stated. Most chemists are in the habit of using molecular formulae; they write the elements as occupying two volumes, like the compounds. So long as this is done without meaning thereby to imply anything in regard to the real constitution of the elements, it may be well enough. But many think that the atoms of elements are indeed two and two, combined like hydrogen and chlorine in hydric chloride; and for such it may be well to remember that this supposition has not the basis of a single fact, for nothing proves that hydrogen is hydric hydride, HH, or chlorine is chloric chloride, ClCl. The heat developed by chemical combinations is rather opposed to such a view. But I find in the absorption of radiant heat by chlorine and bromine a final proof that the atoms of these elements are perfectly free, not forming molecules two and two. For if they did, then my formula would give for ClCl or BrBr an absorption

much greater even than that observed by TYNDALL in ammonia and olefant gas; while in fact the absorption of chlorine and bromine is but very small, as compared to that of the compounds just mentioned. Since now my formula renders the absorption of the compounds with considerable accuracy, it may be relied upon also for the elementary molecules; and would then unmistakably prove, that the chlorine and bromine experimented upon by JOHN TYNDALL in his absorption tube, had no such molecular constitution as many chemists seem to think; in one word, that the atoms are perfectly independent of one another, not forming molecules ClCl, but merely free atoms Cl or Br.

Is not the beautiful discovery of TYNDALL as much a feeler of the true atomic constitution of matter when applied deductively, as here has been done, and as we are accustomed to do in Physics and Astronomy—as if it had been done inductively? Is it really a crime to work down from the general principle to the facts observed, particularly when the clamorings for induction have failed to lift us up from the facts to the general principle?

Indeed, it is a singular fact, that those who so loudly clamor for induction in science have usually done nothing themselves in the more recondite parts of modern science. They may indeed have prepared a new compound or even discovered a new element; but they may, nevertheless, show a most astonishing ignorance in regard to the questions of molecular physics, which now occupy many an earnest investigator. These chemists think, that the domain of chemistry does not reach beyond the immediate vicinity of the crucible and the test-tube; if their way had led them to astronomy, they would scorn everything but the hunting up of new comets, planets or meteors. But while Astronomy has long been beyond the very important work here referred to (see LEVERRIER's remarks in the meeting of the French Acad. of Sc., Dec. 30, 1867), it is a deplorable fact that in chemistry these same workers rule the day; and by their stubborn opposition to theoretical investigation, which they profess not to understand, hinder the progress of the science more than their own labors will compensate for. So much the more cheering is the fact, that there yet are men like TYNDALL, who have used experiment, not like the Dutch inventors of the telescope for merely making their own living, but, like GALILEO, in order to disclose the harmonies of the material universe.

If my present paper does prove the correctness of the prophetic word of the great philosopher of the Royal Institution—*if I have succeeded in showing, that his beautiful discoveries indeed constitute a delicate feeler of the atomic constitution of matter*, I need not mind the scorn of those who consider it a duty to deride all that is in advance of the text-book by which they swear.

Patent Claims.

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

- 76,417, patented in England, October 28, 1863.—COAL MINING MACHINE.—George Edmund Donisthorpe, Leeds, England. I claim, 1. The application of wedges to secure or hold the carriage to the rails, substantially as herein described; and 2. The application of clearers or clearing-instruments to the picks or cutting-tools, substantially as herein described.
- 76,418, patent in England, March 8, 1866.—COAL MINING MACHINE.—George Edmund Donisthorpe, Leeds, England. I claim the holding in position the rails (upon which machines used in getting coal and other minerals run,) by posts or pillars wedged or held between the floor and roof of the mine, substantially as herein described.
- 76,419, patented in England, March 8, 1866.—COAL MINING MACHINE.—George Edmund Donisthorpe, Leeds, England. I claim the so mounting of the cutting-apparatus of machinery employed in getting coal or other mineral, that the cutting-apparatus may, whilst at work, rise or fall independently of the truck or carriage of the machine, substantially as herein described. Also the carrying the cutting-apparatus on the top of the plunger of an air-cylinder, carried by the truck of the machine, so that the cutting-apparatus may cut a groove close up to the roof of the mine, substantially as herein described.
- 76,461.—ORE-CRUSHER AND GRINDER.—Seymour Hughes, San Francisco, Cal. I claim, 1. An ore-crusher, having the spiral inclined planes BB, together with the stamps N and dies E, the whole constructed and operating substantially as and for the purpose herein described. 2. In a circular crusher and grinder, the inclined planes, consisting of the removable grinding plates *b* and the adjusting-plates *a a*, substantially as and for the purpose described.
- 76,499.—MANUFACTURE OF NITRO-GLYCERINE.—George M. Mowbray, Titusville, Pa. I claim the process of manufacturing nitro-glycerine by the use of compressed air, artificially dried and cooled, nitric acid, sulphuric acid, and glycerine, substantially as described.
- 76,538.—AMALGAMATOR.—Robert Smith and William T. Smith, Carondelet, Mo. We claim, 1. The amalgamating-troughs BB', when their bottoms are serrated, and acute angles *b'*, formed at the back end of each serration, as described and set forth. 2. The combination of two or more sets of amalgamating-troughs, BB', with the delivery-flume C, and distributing-apron D E, substantially in the manner and for the purpose herein shown and described. 3. The swivel-guide blocks *c* and *d*, when applied to the flume C and apron D, as described and set forth. 4. The arrangement of the shafts I, with their handles *i*, and levers or arms *i'*, when employed as herein described and shown.

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- "Are they going to take a bath?" asked Mrs. Persimmon, at one of our theatres, as the dancers made their appearance to execute a well-known figure. Mr. Persimmon guessed not, because they wear more than at Cape May when they bathe.
- The most delicious fruits are composed of hydrogen, oxygen, carbon, and nitrogen; and the most deadly poisons are composed of the same ingredients, differing only in the proportions of their combinations.
- Does the razor take hold well? Inquired a darkey, who was shaving a gentleman from the country. "Yes," replied the customer, with tears in his eyes, "It takes hold first rate, but don't let go worth a cent."
- The Alaska Herald is published in San Francisco in Russian and English, and its editor is Agapins H. Baranok.
- We see it stated that eighty per cent. of the Atlantic cable receipts come from the American side.

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The New York Evening Mail recommends young men of wealth, who are making up plans for summer tours, to choose the mining regions of the West, rather than "lounging about watering places."

Princeton College received recently two gifts—one of \$100,000, the other of \$125,000, raising the fund to \$375,000.

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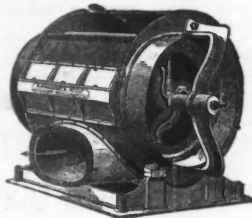
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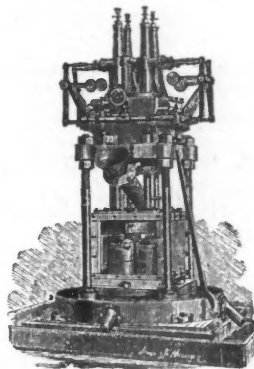
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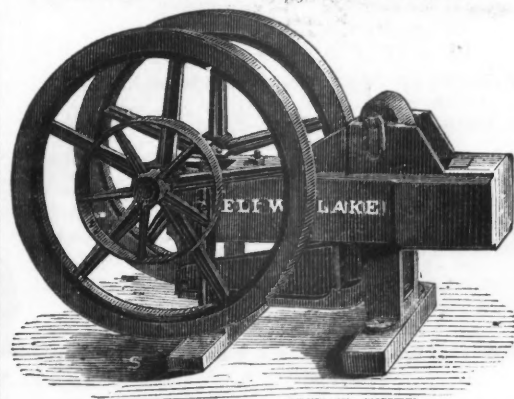
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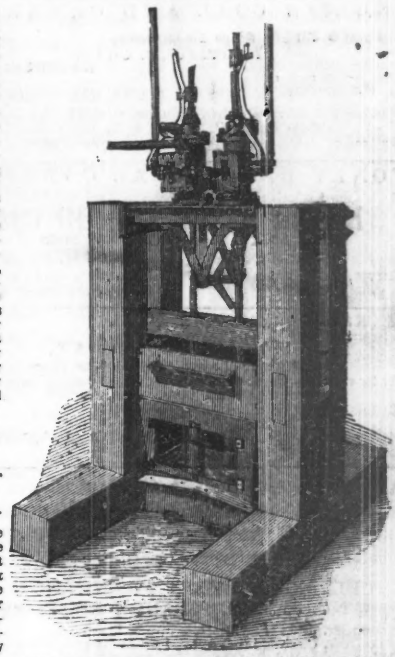
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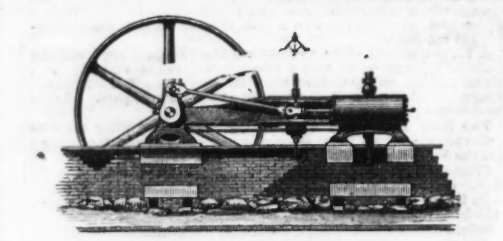
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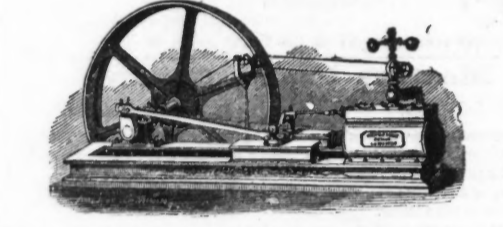
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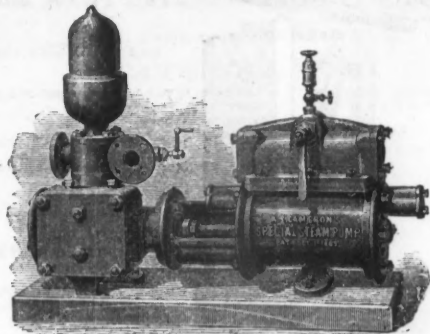
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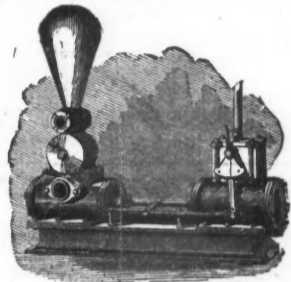


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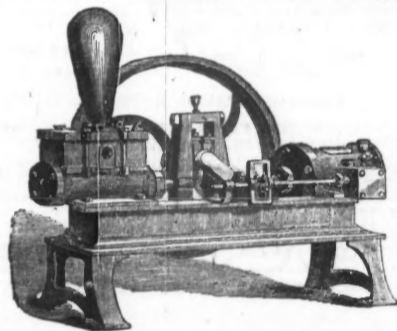
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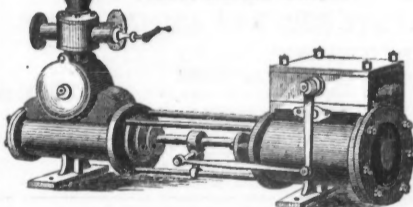
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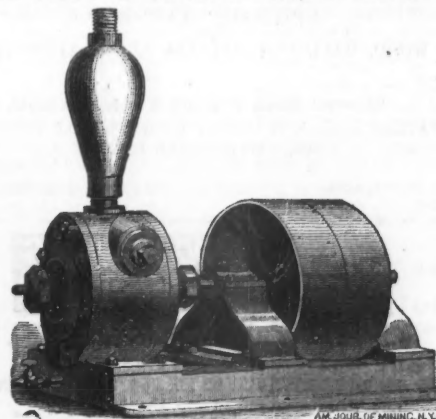
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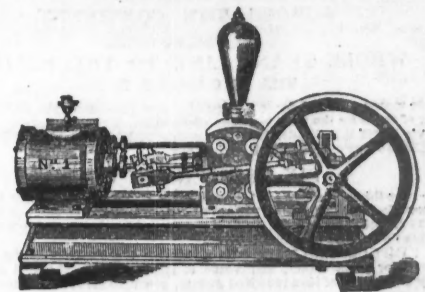


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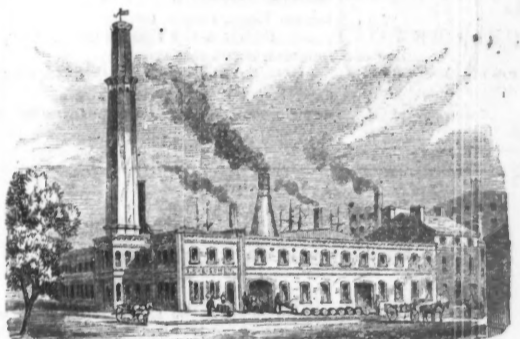
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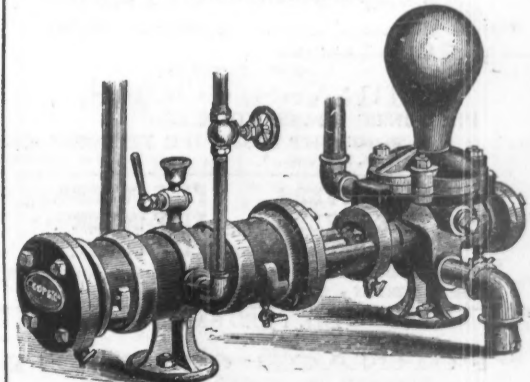
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D, which project nearly to the bottom of the tube. The screws E secure the wooden plug C to place. A horizontal lever, marked C in Fig. 1, and G in Fig. 2, has a longitudinal

plate, F, of metal, which, by a movement of the lever G, will have its edges in contact with the plates, thus completing the circuit from the battery by means of the wires I I, Fig. 2. This arrangement is confined in a strong box, F, Fig. 1, of cast

in the earth. In the Signal House H is the mechanism seen in Fig. 3. A is the electro-magnet, B being the armature having a projecting arm or lever to which the rod C is attached, D is the signal, a rim or hoop of wire covered with red cloth, balanced on a pivoted bar, having a small wheel on the periphery of which is secured the end of a chronometer chain, the other end fastened to a lever the weight of which is balanced by the tension of the spiral spring F. To another shorter lever on the same spindle the rod C is attached, making connection between the electro-magnet and the disk signal. The whole is secured to a metallic plate, G. The wires, H H, lead from the battery to the electro-magnet. It will be seen that with the completion of the circuit by the displacement of the switch the armature will act instantly, elevating the signal, which remain as a warning to the engineer of an approaching train, at a distance amply sufficient to enable him to brake up and stop his train before reaching the point of danger. In the night a reflector or lantern is attached to the Signal House, so that a bright red light is displayed so long as the train is in danger, but as soon as the rail is in place a white light of safety is shown. The signals are thus unerringly given to the engineer both by night and day, and at the same time the gong or bell signal is rung to prevent the switchman from neglecting his duty. The second large engraving on the first page shows the good adaptation of this device to the draws of bridges over navigable streams. This engraving shows the draw of the bridge partially opened. An approaching train is seen in the distance coming around a curve; just in front of the train can be seen the Signal House which is of the form used for switch signals with the exception that a bell or gong sufficiently large to be heard by the engineer when running at a speed of forty miles per hour, is placed, as shown by the letter D, directly above the red signal C. The object of this double mode of signals for the engineer in connection with drawbridges is that in case he should, from any cause, neglect to look at the red signal, in passing the Signal House, the sound of the gong would be sure to attract his attention. Fig. 4, is an enlarged view of the working parts of the drawbridge signal. In this the box A—shown at A A, in the large cut—contains four brass posts, B B, secured to the bottom of the box, which bottom is lined with vulcanized rubber as an insulator. These posts support the circuit breakers or spindles C, one end, D, of which passes through the side of the box and comes in contact with the key or wedge F, which locks the rail H. E are the wires leading to the battery. G is a guide chair for securing the rail and holding the wedge. H is the break in the rails or the joint between the connecting rails, and I the lock to prevent displacement by malice or accident. The recess, F, when the key or wedge is driven back to open the draw, allows the brakes D, (by means of the powerful spiral springs) to be forced forward toward the rail and complete the circuit, thus giving the alarm and showing the signal when the key only is partially removed. From the foregoing descriptions all the details and operations of this excellent device will be sufficiently plain. Any information relative to its application and use may be obtained from the manufacturer and patentee, at Stamford, Conn.

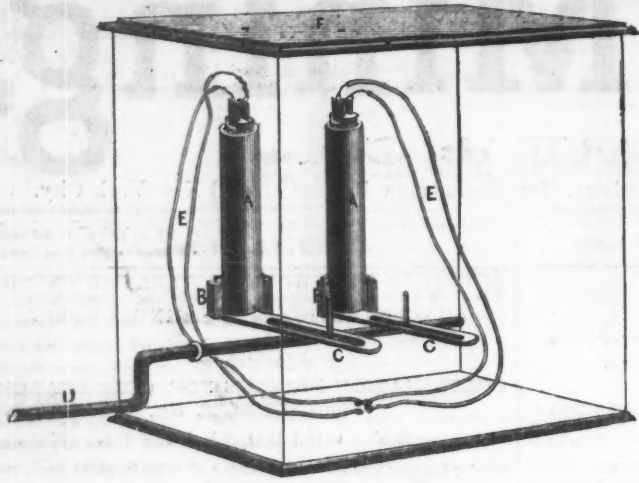


FIG. 1.

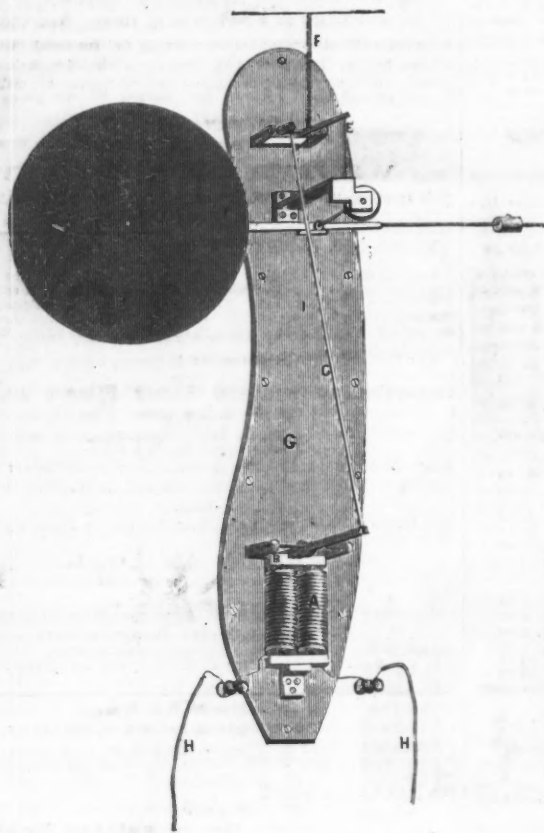


FIG. 2.

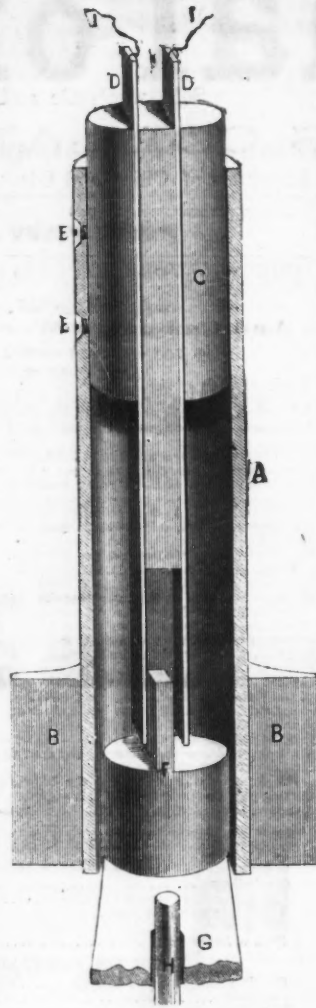


FIG. 3.

iron preferably, to protect it from the weather and from the officious meddling of the over-curious. It will be seen that a very slight movement of the lever G, Fig. 2, will suffice to bring the plates, D D and F, into contact, so that if the rail to which the switch-bar is attached is moved from place never so little, it will form a circuit, so that the electro-magnetic fluid can act, as will be presently described. An ordinary telegraphic alarm is affixed to the station or the switch-tender's box, so that somebody, either himself, another employe, or a stranger, will have his attention attracted; since the bell is so arranged that it will continue to sound as long as the electric current is closed, which will be as long as the switch is misplaced. The action of the electro magnetic current keeps a hammer in rapid vibration while as the connection

between the two poles is perfect, or, in other words, while the switch is misplaced. Thus far we have merely described the "alarm" and its mode of operation, which has been, in a modified form, used repeatedly for other purposes. We now propose to show how the same agent, electro-magnetism—known throughout the world in telegraphic operations, as well as in the arts and sciences, can be made to give a signal, either of danger or safety, to an approaching train on a railroad. Our large engraving on the first page shows a railroad station with ordinary switch, with an alarm-gong on the end of the building next to the switch, and a signal situated at a distance from the station. The switch-rail being on a line with the main track, a white light is shown in the Signal House H; when the switch is misplaced, a red signal, being the disk D, Fig. 3, appears instead. The circuit-box, connected by a lever with the switch-rail as explained in Figs. 1 and 2, is also shown. The

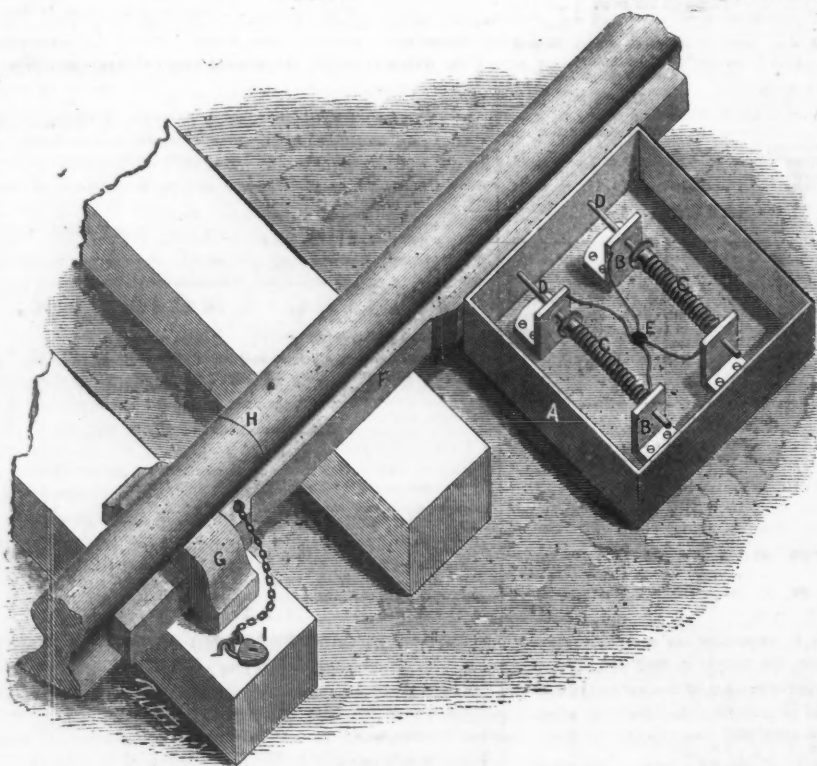


FIG. 4.

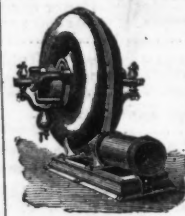
slot in its arm, through which pass studs of pins, H, in Fig. 2, connected with the switch bar D, as in Fig. 1. A metallic plug secured to the lever at its inner end, and entering the lower end of the tube, serves as a fulcrum of the lever. Projecting from the centre of this plug, and standing between the depending plates of metal belonging to the upper plug, is a

amount of distance does not affect the usefulness of the device, as it can operate as readily at the distance of miles, rods or yards. The proper distance, however, for the position of the signal, is from 1,000 to 2,000 feet, or more, from the point of danger. The connection between the switch and the gong and the signal is by means of insulated and indestructible wire buried

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