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THE announcement that an electrical training school is to be established at Frankfort, Germany, suggests the practicability of similar institutions in this country. At present some of the general technical schools have special courses in electricity, more or less thorough; but it is probable that with the rapid growth of the various electrical industries, special schools, as for mining, civil engineering, agriculture, etc., will in time spring up, in which scientific training in electricity will be the leading feature, and not made subsidiary to the other branches of technology.

THE open air calcination of sulphureted copper ores, which is at present carried on to such a great extent at the Rio Tinto mines, in the province of Huelva, Spain, is to be done away with. The complaints as to the vitiation of the air and destruction of vegetation have at last had the effect of obtaining a royal decree which orders that at given dates, covering the next two years, the amount of ore so treated shall be reduced in stated proportions of the present output. The cementation process is also to be suppressed, or at least checked, as the acid leachings discharged into the rivers have had a serious effect on the fishing industry. It is not yet known what additional expense will be borne by the mining companies in changing the present system of working, as the government proposes to partly reimburse them for the added cost; but there is no

doubt that the companies will have to stand the greater part of the outlay.

NOT long ago, the San Francisco Stock Exchange appointed a committee to investigate the manner in which the Comstock mines were being worked. We do not learn that the investigation has given any results, but it certainly looks very queer to see to what the scrupulous San Francisco brokers have come. For ten or fifteen years, the stock of any Nevada or Idaho wildcat could have been listed on that exchange without scrutiny, on payment of the fee, and the members' consciences were not then too tender to prevent their handling such stocks. We believe that every exchange, whether a mining board or dealing in general "securities," should look closely into enterprises sought to be listed. Strict rules can not keep out all the wildcats, but will at least exclude some of them, and are therefore beneficial so far as they are effective. The San Francisco Exchange was a little late in its investigation of the Comstock mines, and, after all, its only power in the matter would have been to exclude the stocks. As a matter of fact, it is the general impression, in which we share, that these mines, as well as most others on the Pacific coast, are operated more squarely on their merits, and less for stock deals, than ever before. Speculation in mining stocks in the San Francisco market is at such a low ebb that there is little inducement for any other policy than legitimate mining, at least until the times are ripe for another harvest of small speculators.

### USES OF COPPER AND BRASS.

When the price of copper was so low as to starve out most of the weaker mines, disinterested outsiders as well as the copper producers were puzzling themselves to suggest new uses for the metal which would extend the field of consumption and by absorbing the increasing production admit of living rates for the mines. Some relief was given by the growing demand for electrical purposes, for copper roofing, by the greater use of brass for fittings, household utensils and ornamental work, in which fashion lent assistance, and by the new bronzes. Now that the price is higher a reaction has set in. For example, the London Statist recently contained an article in which it questions whether it is not possible to curtail the use of copper and brass, and in what directions and on what scale substitutes could be employed. It points out a few cases in which a cheaper metal, such as iron or steel, could be substituted for brass, as in certain parts of locomotive engines, and concludes that a large reduction might be made in brass furniture and the fittings of houses, ships, etc. It is hardly likely, however, that there will be any recession from the present consumption. People use copper and brass because of their adaptability to particular circumstances, and while a temporary freak of fashion in limited directions may seem to be an unsafe reliance, it certainly has had the effect of making permanently popular many of the new applications of brass work by simply introducing them.

### SELLING MINES IN LONDON.

IT is a matter of common remark that mining properties which can not be sold in San Francisco, New York, or other places in this country, are often placed abroad; and it not infrequently happens that the selling price increases in direct ratio with the distance from the mine. An instance of this has lately come to our notice. A California gold mine—an old one, and one, by the way, which bears the reputation of being a good little mine—has been offered here in New York for over a year at \$300,000, including commissions, etc., reducing the gross amount by perhaps one third. Whether the gentleman who went over to London recently in charge of negotiations has succeeded in obtaining the million which is reported as the present asking price, we are not yet informed. It is equally a matter of conjecture whether this property has been enhanced threefold in value by the purchase of a return steamer ticket, and whether, if it is sold, our English friends expect to work it three times as economically and get out three times as much product and dividends as were in prospect two months ago. The chances for a sale in London at \$300,000 nominal would of course have been nil; at \$1,000,000 they should be better; but to make a sure thing of it \$3,000,000 should have been asked. This hint is probably too late to be of service in the present case, but it may be useful to future negotiators, notwithstanding that £1 per £1000 tax which the Chancellor of the Exchequer proposes to levy on the capital.

### THE BROOKLYN BRIDGE PROBLEM.

Messrs. WALTER KATTÉ, JULIUS W. ADAMS, and JOSEPH CRAWFORD, a board of consulting experts, recently recommended to the Trustees of the New York and Brooklyn Bridge a plan for the enlargement of its capacity for traffic, prepared by Mr. A. M. WELLINGTON. This plan has been described in a pamphlet, with abundant illustrations and interesting statistical as well as engineering matter, which has received from the

newspapers much approving notice. But the Trustees have rejected the plan, and adopted another instead; and as a consequence, most of the New York newspapers are engaged in denouncing their stupidity and short-sightedness.

Such denunciations assume that a body of men who know nothing about the subject are overruling the completely matured conclusions of those who understand it thoroughly. In truth, it is rather a case of theorists, overruled by practical experts. The mistake committed by the Board of Trustees seems to have been that, in a good-natured desire to avoid public exposure of the engineering mistakes and oversights of the consulting board, they have put forward the estimated cost of the proposed plan as a sufficient reason for rejecting it, whatever its merits; whereas their true position should have been, that the plan is impracticable and dangerous, whatever its cost. Mr. T. C. CLARKE, of the committee of the Board on Terminal Facilities, is too good an engineer not to appreciate this fact, and ought not to have compromised himself by the polite ambiguity of his complimentary declaration that the report of the consulting experts is "a very careful and exhaustive one, worthy of the reputation of its authors, and one which clears the way toward arriving at definite conclusions."

The first result of this timidity or good-nature on the part of the Board is that Mr. WELLINGTON, assuming that no fault could be found from an engineering standpoint with his plan, and that it has been rejected on financial grounds alone, loudly complains that its cost has been unfairly estimated at more than three times what it would really be, as he is prepared to prove by figures. This charge conveys a covert intimation that Messrs. MARTIN and LEVERICH, the Bridge engineers, have been guilty of intentionally misleading the Board, from motives of professional jealousy. As such, it is entirely unworthy of its author, as a member of the same society, perfectly aware of the honorable character of the men thus impugned. But we take no further interest in this question of expense than to express our belief that the estimates presented to the Board are perfectly sincere, and that, coming as they do from men who are thoroughly familiar with the work required, and have before them the full details of the cost of similar work in the same locality, on a smaller scale, they are far more likely to be accurate than anybody's specifications and calculations on paper.

Our main point, however, is, that Mr. WELLINGTON'S plan is a bad one; that it involves certain inherent difficulties and dangers, greater than any which it seeks to remove; and that it omits to provide for some of the most simple and likely interruptions and disturbances. We shall prove this proposition sufficiently, though not exhaustively, referring our readers for more detailed discussion to the able reports submitted to the trustees by Messrs. MARTIN and LEVERICH. But first we must pay our respects to the "consulting" board which transmitted, with a general approval, the plan of Mr. WELLINGTON, adding, as it had been requested to do, its own statement of the safety-appliances "necessary" in connection with the system recommended. The specific and positive recommendations of these experts are:

1. That if the existing cable plant and motive power is not adequate, steps should be taken to increase it. This is easily said; but a calculation of the work required to pull the 18-car trains of Mr. WELLINGTON'S system, distributed on the bridge grades as they would sometimes be, shows, as to the cable alone, that it would need to be 2½ inches in diameter. Did these gentlemen ever hear of a 2½ inch cable running round sheaves at 10 miles per hour? Or did they ever hear of any cable starting a train of eighteen loaded cars on a curve of 90 feet radius?

2. That all grips and brakes for the whole train of 18 cars be operated by one man, stationed in a cab at the head of the train, with an assistant to relieve him in case of sudden disability. This, they say, is perfectly practicable on railway trains running 60 miles per hour, and therefore would be practicable for the Bridge trains, running at only 10 miles. They propose that this system of brakes and grips shall be operated by "air pressure or electricity," without specifying how either is to be got. If the railway experience of these gentlemen had been either wider or more carefully recalled to mind, they would have realized that no engineer in his senses would trust to such contrivances the safety of a train of eighteen cars, carrying over a thousand passengers, and running by gravity down a grade of 150 feet to the mile, with another similar train standing on the same track 352 feet in front of it. They speak with edifying horror of the danger of switches; but it strikes us that the situation they calmly propose to substitute is one in which a switch would be a godsend. From the time their man in the cab found that his "air-pressure or electricity" was out of order and wouldn't work, it might be only 20 seconds to the final crash. By way of making the result sure, "three trainmen only, one at the head, one at the rear, and another merely ornamental and precautionary, will operate each train," says Mr. WELLINGTON.

3. "That a complete system of block signals should be provided over the entire length of both tracks with signal targets or semaphores," etc. Could any thing be more absurd? In clear weather it is as easy to see the rear of the preceding train as to see a target; in foggy weather, both

would be invisible. The introduction of this superfluous piece of railroad engineering, copied from practice under totally different conditions, would simply, by giving the train hands something more to watch, diminish their effective vigilance.

4. That all trains be equipped throughout with the Westinghouse continuous automatic train brakes. This is "strongly" recommended. But there are to be no locomotives furnishing the compressed air. Hence it will be necessary to carry a storage-tank, which must be replenished from some stationary plant. Are these gentlemen aware how long it would take to fill such a tank? Are they aware that the Westinghouse brakes were tried on the Bridge, and that it was found impossible to replenish a tank for the supply of 3 cars only (not 18) in the time permitted by the traffic; that, moreover, the frequent failure of pressure, through leaks in tanks and couplings, made the whole system unreliable; and that for these reasons it was abandoned? The present system of a separate vacuum-brake to each car, with an air-pump connected to one of the car-axles, and, above all, a separate brakeman, always on the lookout for any change of speed, is in all respects better.

5. "That an immediate modification in the present cable plant and grips should be made, that will provide the ability in any car to slacken speeds, release, and again pick up the cable at any and all points of its passage on the railway." This opinion is expressed "decidedly;" and the change is called for "immediately," that is to say, even while the present system of running trains continues. Unfortunately one half of the improvement demanded is unnecessary, and the other half is, in the present state of the art, impossible. A car which has let go the cable, and has been stopped by the brakes beyond the middle of the bridge, does not need to pick up the cable again in order to proceed. When the brakes are released, it will start by gravity. So much for the unnecessary half of the improvement. But a train held by the brakes before it has reached the middle of the bridge is on a heavy grade in the other direction. Now, as the experts take pains to say (and they are quite right), the brakes must be released before the grip is put on. But the instant the brakes are released, the train begins to move backward with gathering momentum, and there is no earthly way to overcome this movement except by the instant application of the grip with force enough to overcome the total inertia of the train. Every fraction of a second between the release of the brake and the application of the grip increases the force required of the latter. Until the experts shall produce a grip or set of grips, warranted to make comfortable connection between a cable traveling ten miles an hour in one direction, and a train of eighteen cars moving in the other direction, we must be excused from accepting their decided opinion on this subject. But we freely confess that the application of such a grip would cause "an immediate modification in the present cable plant"—of a somewhat startling character.

If the foregoing devices were really "necessary in connection with the system" recommended, as the experts say they are, they would be enough to condemn it at the outset. But we will not judge it by the weakness of these collateral propositions—though it should be said that all, or nearly all, of them are embodied in Mr. WELLINGTON'S own description.

The great merit claimed for this system is that it is a "circulating" system; that is, the tracks are continuous, and the incoming trains pass round a horseshoe curve, of 90 feet radius, to go out on the other track. Stopping when they completely occupy this horseshoe, they discharge and receive passengers. Entrance to the train is from the inside platform only; exit from the outside platform only. The curved form of these platforms makes each car a tangent to the inner platform, and a chord to the outer. Hence entrance is through a door in the middle of the side, and exit through two doors at the end of the side; and there are no end-doors. The trains will consist (for maximum traffic) of 18 cars each, and run at intervals of 140 seconds. They will remain at the platform discharging and receiving passengers 50 seconds, and Mr. WELLINGTON assumes that they will start and acquire the full cable-speed in 10 seconds. This is doubtful. The question of starting such trains at all, on such a curve, by means of a cable running round it, is full of difficulty. But accepting the figures, there will be a time when the outgoing and incoming trains will be only 352 feet, or 24 seconds, apart on the same track.

Now we consider this plan, of receiving passengers on the same track on which heavily loaded trains are rapidly approaching, to be the most dangerous that could be devised. It is worse than all switching systems. Did Mr. WELLINGTON ever see a cable-car "run away?" It is not always a merely amusing sight, even at the comparatively low speed of street-cars. It happens, for instance, when some injury to the cable, breaking and bending up a wire, prevents the grip from letting go. The brakes are worse than useless in such a case; and there is nothing to be done, except to clear the track ahead until the cable can be stopped. But a clear track ahead is what Mr. WELLINGTON specially prides himself on not having. "Switches are so dangerous."

In the peculiar conditions of grade and traffic on the Bridge, a still greater danger arises from the possible failure of the brakes; and with singular lack of perception of this danger, Mr. WELLINGTON proposes a



brake-system which if it fails at all, will fail throughout, and leave a train entirely helpless.

The experience of our elevated railroads, which are necessarily obliged to discharge and receive passengers on the main track, shows the constant danger from this source. Yet they have no such grades as the Bridge; they have much greater intervals between trains; and their trains are not pulled by a blind cable, which goes right on, whatever may be the impending disaster.

While it is thus, from the standpoint of safety, bad engineering to employ a "circulating system" where it is not absolutely necessary, the system is also bad from the standpoint of capacity and economy. For it fixes the minimum possible headway between trains by the time required for the double operation of discharging and receiving passengers; whereas, a system by which the incoming trains are removed from the main track, and only returned to it when this double operation is over, will permit the headway to be reduced to the minimum required by engineering considerations only, quite independent of the time it takes for lame people and old people and people with heavy bundles and babies, to get safely in or out of a car. Leisurely entrance and exit, coupled with rapid transit—that is the desideratum which Mr. WELLINGTON has quite unnecessarily sacrificed.

Passing over the argument which might be made, to show that this system of long trains would necessitate (to provide against its maximum demands) an unprecedented, and perhaps entirely impracticable cable plant, with an enormous motive power, and that this machinery would be liable to such violent irregularities and unbalanced strains as prudent engineers most earnestly avoid, we may notice one or two of the small but vital oversights which, unless they can be remedied by some modification of the plan, are well-nigh fatal to it.

Mr. WELLINGTON lays stress upon the claim that by his system of doors on opposite sides for entrance and exit, the crowds of incoming and outgoing passengers would not hinder each other, and that every passenger could find a seat. But he forgets that if more people rush into a car than it will accommodate—an inevitable occurrence in the crowded hours of the day, they can not get out again against the current; and his abolition of the doors at the ends makes it impossible for the surplus to step into the next car. This inconvenience becomes still greater in case of such delays as will inevitably occur under any system. A car is disabled or a man falls in a fit and has to be lifted out, or some other trifling cause hinders the train from moving. Meanwhile, the next train arrives, and is stopped, touching its predecessor. On the present system, the passengers simply walk through the standing train and so reach the platform. On Mr. WELLINGTON'S system, they would be bottled up until their own train could be pulled to its regular place.

But the worst practical oversight is in the provision made for the removal of disabled cars. The necessity of taking from the train a car with a heated box or some trifling breakage or disability, to say nothing of serious damages, is one which frequently occurs. To deal with it, Mr. WELLINGTON reluctantly permits a switch. (To tell the truth, his system really requires more switches to be passed by loaded trains at full speed than does the present method: but we will not discuss that here.) And this is what he does, to get rid of the disabled car, which is assumed to be standing in the train on the horseshoe, and not derailed, or otherwise so crippled that it can not travel. The car is first uncoupled from those behind it; then the head of the train grips the cable and pulls out a sufficient distance; then the car is uncoupled and runs back by gravity to and upon the switch. Then the switch is replaced, and the rest of the train runs back by gravity to couple to the rear portion on the horseshoe. All this must be done in 90 seconds, or else the next train will have arrived at the station, and be waiting with all its passengers imprisoned in it, looking out through the end windows and wishing they were doors. But the worst result would be the strain on the cable and machinery caused by the weight of the loaded trains thus thrown out of their proper distribution on the two tracks and on the different grades.

We might go on with this criticism, did space permit. The truth is, that together with many interesting observations, equally applicable to better devices, Mr. WELLINGTON'S plan exhibits unfamiliarity with the practical requirements, and a lack of wise discrimination and just perspective as to the engineering requirements, of the problem it undertakes to solve. If it would cost no more than he says, and if the money were on hand to construct it, we should still condemn it. To adopt Mr. CLARKE'S phrase, it "clears the way towards arriving at definite conclusions"; but it performs that useful office by clearly setting forth one thing that ought not to be done.

The plan actually adopted by the Trustees, while it has the immediate recommendation of being sufficient for present needs at small cost, is perfectly capable of further enlargement and development to the full capacity of Mr. WELLINGTON'S. It will be far more convenient to passengers; and it will be safer, switches, locomotives and all. The public need not be scared from a system which has conveyed 90,000,000 people without injury, into one which promises, if any thing does happen, to smash 2000 at one blow.

## THE BRITISH MINING SHARE MARKET.

From Our London Correspondent.

The city is decidedly displeased with the Chancellor of the Exchequer on account of his proposal to put a tax of sixpence on each contract. This means that if a man buys, say 5 mining shares at half-a-crown each—which, unfortunately, he can do only too often—he is now mulcted in sixpence for his contract instead of one penny. This petty impost is being met by the strongest opposition. Another proposal of Mr. Goschen's will hit your countrymen hard when they come over here with new mines and other undertakings. The almost nominal fees for registration he proposes to replace by a tax of £1 per £1000 of capital in which any company may be registered. Thus, a man registering a company with a capital of £300,000 will have to pay £300 for the luxury. This will not matter much if he succeed in floating the concern, but if he fail he may bid adieu to his £300. To avoid this impost, there has, within the past few days, been quite a rush to the registration office to put new enterprises on the file which are now in the final stages of incubation.

### AMERICAN MINES.

There has been some movement in American mines, and it was commenced by the announcement in the *Mining World* of March 31st, that a letter had been received from a gentleman of position and influence in Utah, to the effect that the New Emma Company was on the eve of striking a bonanza. Am I right in inferring that the writer of that letter was Judge Bennett, of Salt Lake City, who holds 30,000 of the Emma shares? At all events, those shares, which had sunk to the marketless point of 3s., began to move and advance to 5s., but have remained stationary chiefly owing to the intervention of the Easter holidays. I must confess that I am one of those who have always felt that at some time or other a bonanza would be struck in this old mine, and I repeat, that should there be any thing in the nature of a success in this concern, in the Flagstaff, in the Last Chance, or in the Richmond, an impetus would be given to American mining in this country such as it has not known since the palmy days of 1872-73, and when any thing in the way of American mines went down with the public like oysters at a feast. Captain Eddy, the new manager of Alturas, has arrived on the spot, and his report on the state of the mines is awaited with some anxiety on this side. The returns for the first half of March were poor; for the second half they showed an improvement. The Montana Company held a really brilliant meeting a few days after my last letter was dispatched. I have already given the salient facts about this property from the report of the directors, and have only to add that the speeches at the meeting fully confirmed all that had previously been printed. It is a singular fact that in this country, whenever a meeting is held, however satisfactory may be the statements made and the facts adduced, the shares are sure to fall, and I do not think the explanation is quite sufficient that they rise in anticipation of it. The shares of the Montana Company in this way declined, but are again recovering tone. I may mention that Mr. Bratnaber has left the service of the company because his health will not allow him to pass another winter in the district. Mr. Rawlinson T. Bayliss still retains his position as managing director, and has the absolute confidence of the shareholders. They owe more to this gentleman, to his father, and to the present directors than they can ever repay. The former management brought the concern to a lee shore, and it was only by the lavish application of new capital that the enterprise was brought into smooth water and into a position to easily pay dividends that during the past few years have averaged more than 20 per cent per annum.

After the fall in Empires, caused mainly by the retirement of Mr. Sizer, the manager, the shares are gradually rising once more. The decline has been almost as much caused by the state of the markets, which are terribly depressed. As regards North Carolina, I have to tell you that the Russell gold-mill has been started. The Stanly Freehold Company has made its first remittance of gold of 74 ounces, but the telegram does not say the number of tons from which this was recovered. This return is not bad, considering that the company has only been registered nine months.

I am glad to be able to announce that the Consolidated Esmeralda has made a most satisfactory return, which quite puts into the shade any of those that have been published within the past few days from mines in any other part of the world. Two hundred and twenty tons yielded 1375 ounces of fine gold and 2497 ounces of silver—in other words, at the rate of 6½ ounces for gold and 11½ ounces for silver.

### INDIAN MINES.

The crushings from Mysore and Nundydroog for March are rather disappointing. Mysore put through the mill 1851 tons, which yielded 1610 ounces; Nundydroog, 280 tons, producing 432 ounces. In the one case the money declension is about £600, and in the other about £450. Since the commencement of crushings in 1884 Mysore has crushed 27,152 tons, which yielded 40,994 ounces of gold, and Nundydroog, since January, 1887, 1630 tons, producing 2960 ounces. The capital of Mysore being £150,000, it has already given back that amount in gold, but the shareholders have had precious little of it in dividends.

### MINES GENERALLY.

The feature of the mining market during the last few days has undoubtedly been the big rise in Cape copper shares. In the first week of October last, when these shares began to move, they were £25; as I write they close at £71—a rise of nearly 200 per cent. The price of copper in the first period was £40; in the second, £80. The company has joined the Paris syndicate and sold its produce for the next three years. It is not proposed to "let well alone," but to increase the capital from £160,000 as it at present stands, to £600,000; but I am of opinion that this is a most impolitic measure, particularly as there seems to be no occasion for it. The shares at present number 20,000 of £8 each, and the subdivision will multiply this number by 15 of £2 each. I know that when the Montana Company changed its share capital from £2 per share to £1, the shares dropped to almost half the price they then were—that is, the £2 share was worth in the market about £8, and now the £1 share is not worth much more than £2. All copper shares are rising, but the bloom has decidedly worn off the diamond speculation and the shares have receded as every one expected they would despite the declaration by the De

Beer's Company of a dividend of 40 per cent for the year and a dividend of 36 per cent for the year by Kimberley Central. Home mines call for no special comment, except in relation to tin, the high prices of which show some signs of giving way. There has been an improvement in Van—a famous Welsh lead mine—the £4 shares of which at one time were dealt in at over £80.

LONDON, April 9, 1888.

#### THE DEVELOPMENT OF THE AMERICAN CHEMICAL INDUSTRY.\*

By Dr. Francis Wyatt.

(Continued from Page 288.)

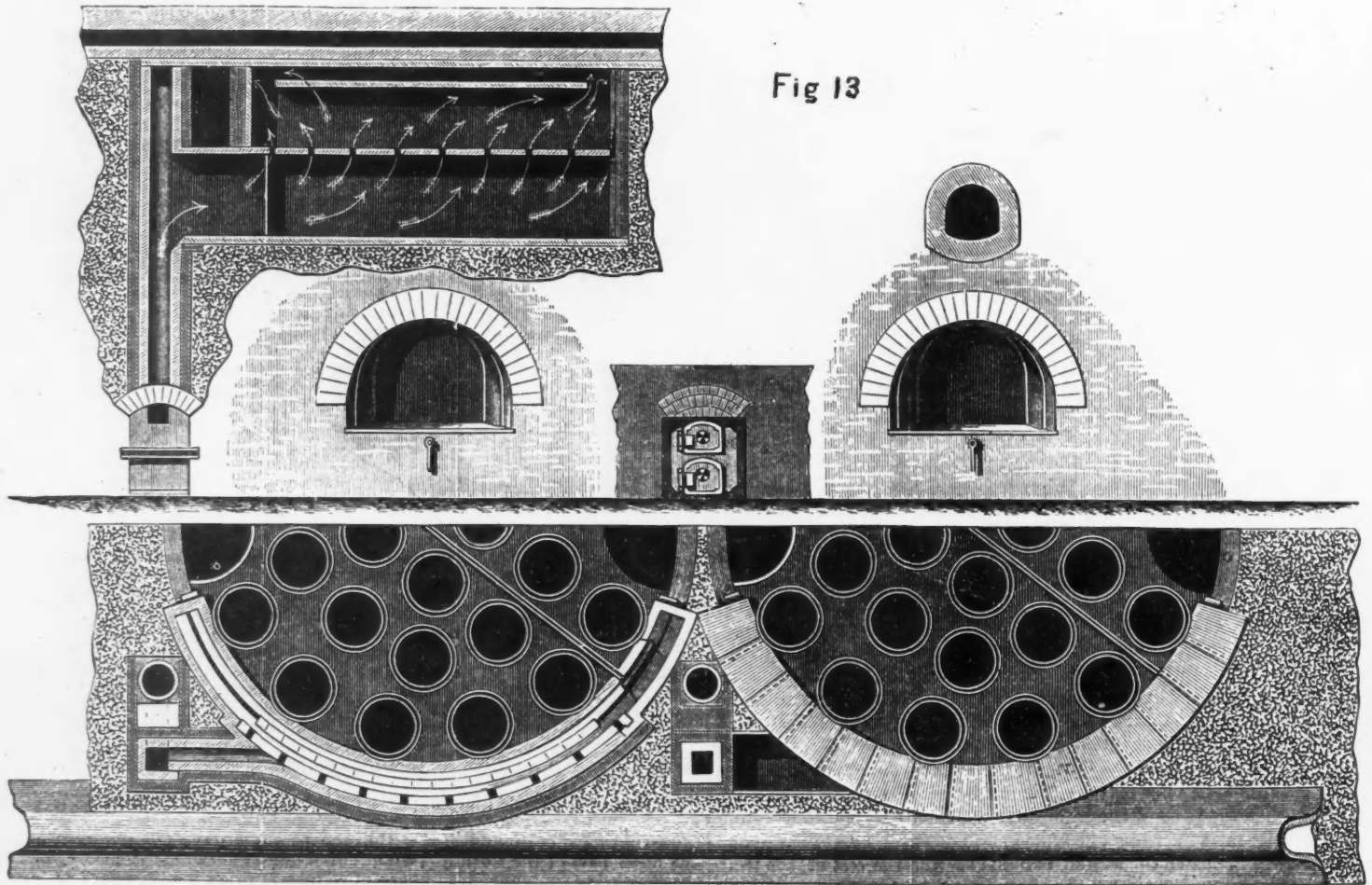
##### THE HARGREAVES PROCESS (SALT CAKE).

The inclined flue, illustrated in our last issue, is maintained at a regular temperature of about 900 degrees Fahr.; the salt bricks have therefore the time to become perfectly dry during their course from the bottom to the top, and when they finally fall over the drum on to the grates, they are easily broken into small and regular fragments.

To prevent any choking or possible obstruction by sticking or caking, the revolving plates themselves receive a thin coating of tar at every return to the lower end, and thus, from the moment the salt enters the

parts the greatest imaginable simplicity to the working of the process. All of them having been filled with salt they are heated up to about 900 degrees F., when the burner gases, with air and steam, are allowed to enter. These pass up and down and traverse the whole range of cylinders until they have been absorbed. The draught is created and regulated by a blower, and, as sufficient heat is soon developed by the chemical action going on within, the heating of the cylinders from without may be discontinued directly the necessary indications are given by the pyrometer.

When the contents of the first vessel have been completely decomposed and converted, it is detached from the series. This is done by severing the connection as shown in Fig. 16. The burner gas being next directly connected with the second cylinder, the bottom door of the finished one is removed, the dogs sustaining the grids and bars are knocked away, and the salt cake falling upon the bottom is drawn out into trams or wagons and wheeled off to the storehouse. The cylinder is now recharged with NaCl, and, instead of the first, has become the last of the series and the recipient of the weakest gas. Thus the operations continuously proceed. Once properly started, the apparatus may almost be said to look after itself, and it certainly demands less expenditure of manual labor than any other equally important plant with which we are acquainted. Forethought, care, and skillful management or supervision; the ever watchful eye of a director in short, are of course, essential; but



HARGREAVE'S CYLINDER FIRE FLUES.

mixing box, until it is broken up as described, ready for use, no manipulation of any kind is required. The next step in the process is to convey the prepared salt to a series of cast-iron cylinders, 20 feet high by some 15 feet in diameter, arranged in double row, in sets of 12 or more. These enormous recipients are ordinarily cast in two halves, the upper half fitting into a groove cast upon the top rim of the lower half, and the latter, in its turn, fitting into the bottom, cast in segments. In order to allow free passage to the smoke, a six-inch space is left between each cylinder and its ring wall of nine-inch bricks. The ring wall itself is sustained by concrete filling up to the outside retaining wall encircling the entire series. The arrangement of the fire-flues is illustrated in Fig. 13, while Figs. 14 and 15 show the cylinders in transverse section, and the passage of the smoke flue and all pipes and connections. These connections, it will be noticed, cause the gases which enter at the top of the first, to make their exit at the bottom of the last cylinder, and in their passage to traverse the whole series from summit to base. In principle therefore the device is a realization of rational lixiviation, applied to the exhaustion of a gaseous instead of to a liquid current. On the top of each cylinder is an opening to receive the charge, while at its other extremity is a door for discharging purposes, and a false bottom beneath which the gases are free to circulate. Both these openings are made to close hermetically while the reactions are actually progressing.

The disposition of the apparatus in such a manner as to insure that each and every cylinder becomes in its turn the first and the last, im-

granting these, no mishaps are to be feared. The main points to be considered are:

*First.*—Correct construction and due allowance for contraction and expansion.

*Second.*—Efficient preparation of the salt, with exclusion from it of all dust.

*Third.*—Watchful regulation of both the heat and the draught.

That none of these are of difficult achievement is proved not only by Mr. Hargreaves himself, but by several other firms who now use his invention and who decompose some 40,000 tons of salt per annum with far better economical results than with pans and furnaces. The analysis of the sulphate prove it to be much purer than Leblanc's, free from all those contaminations inherent to chamber vitriol, and containing but little free salt and mere traces of free acid. It is therefore much preferred by manufacturers of glass and is particularly adapted for the production of very fine alkali and caustic soda.

Why this process has not become more popular; why it has not even altogether displaced Leblanc's it is difficult to explain, unless we turn to the facts we have so often before alluded to. No intelligent manufacturers in Great Britain or elsewhere have expressed disappointment with its working or have failed to recognize its merits, and we must therefore attribute their hesitation, to feelings of disquietude and uncertainty as to what is coming next, or as to how soon an entirely new departure may so change the aspect of the chemical trade, as to force the Leblanc makers completely out of existence. Every one is on the *qui vive!* each one is striving to reduce cost and increase production, new pro-



jects are constantly being discussed, tried, and (generally speaking) rejected. We have seen what gigantic improvements have taken place in chamber construction and what vast economy has been realized in the use of nitrate of soda! Those who have already incurred the heavy expenditure necessary for the erection of chambers, furnaces, pans and condensers are looking for still further ameliorations and economies, and we can not wonder if they are disinclined to abandon their original outlay only to recommence constructions of almost equal cost. Admitting, for example, that a complete Leblanc plant for turning out 200 tons of sulphate per week has been erected at a cost of say \$75,000; and that the regular and total cost of production, including all incidentals, has been brought down to \$7 per ton of the finished product! Admitting also that a complete Hargreaves apparatus would cost but \$50,000, and—as is usually claimed—that its salt cake costs no more than \$5 per ton! What are we to conclude? Does it not appear that old established European manufacturers, in their present state of uncertainty have not in these figures sufficient grounds to warrant them in making any merely partial change? Is it not equally evident that where the

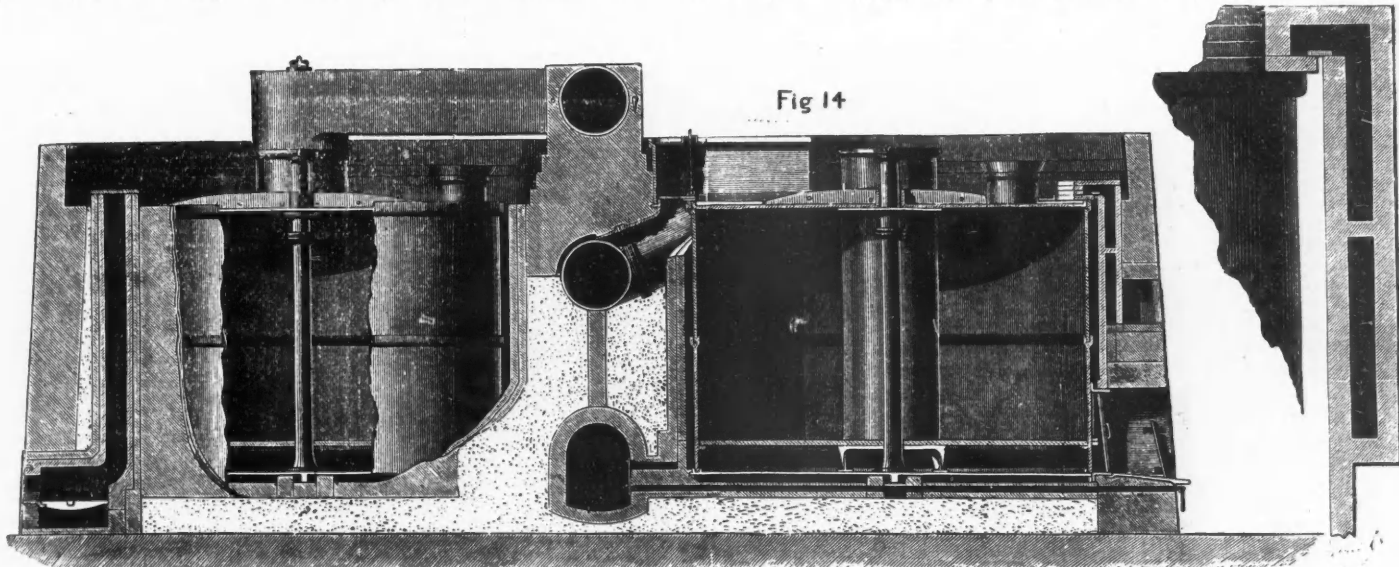
realize as much profit from their acid, as they might derive from the manufacture of salt cake and bleaching powder directly from their sulphurous gases, we are not well enough informed to determine. However that may be, the question is well worthy of consideration, not only from all those who, like them, are engaged in the treatment of pyritiferous ores, but from the owners of pyrites mines, all over the United States. Let every one concerned pause only to reflect upon the daily increasing magnitude of the demand for sodas, and upon the present high value of bleaching powder, and they will soon be convinced that there is in this direction a large and fruitful field for the investment of capital, the exercise of intelligence, and the employment of labor.

(TO BE CONTINUED.)

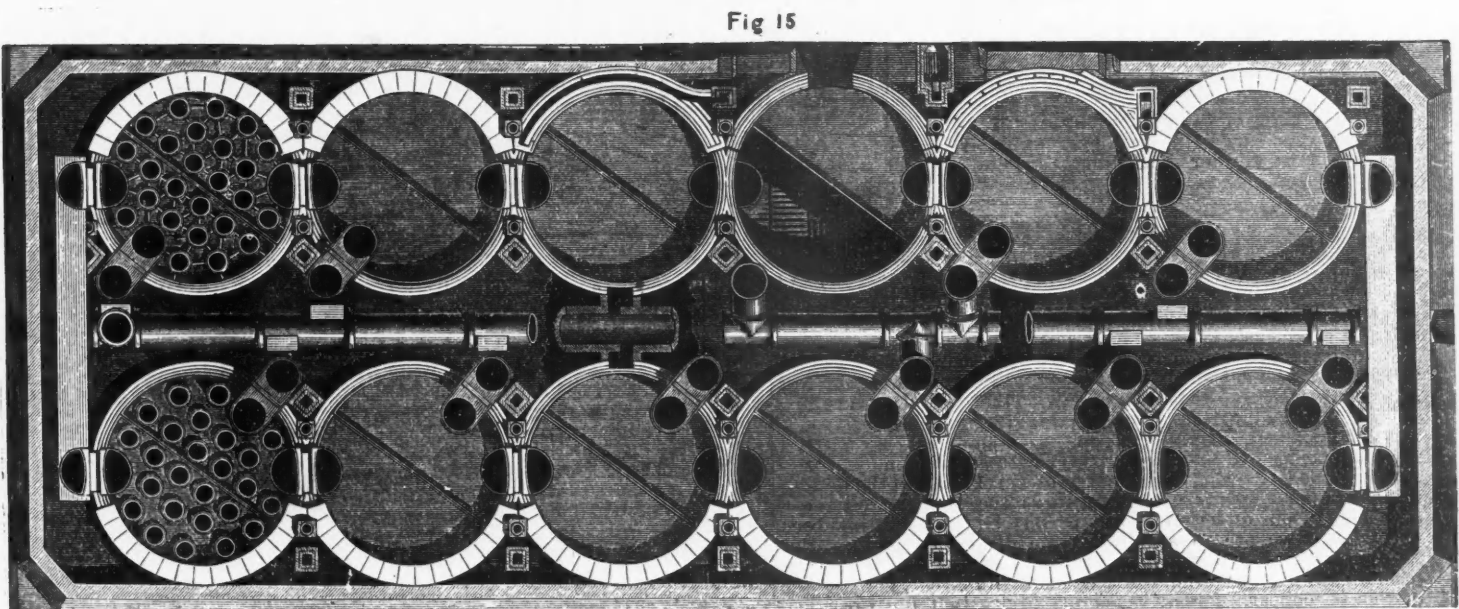
OFFICIAL REPORTS.

Ridge Copper Mining Company, Mich.

The product of the mine for the year has been: Barrel copper, 86,470 pounds; mass copper, 25,236 pounds, a total of 111,706 pounds, or 55,853



HARGREAVE'S CYLINDERS IN TRANSVERSE SECTION.



PLAN OF TWELVE HARGREAVE'S CYLINDERS WITH PIPES AND CONNECTIONS.

industry has no existence at all; where, as in our own country for instance, it has yet to be created; everything points to a preference for Hargreaves plant? Is it not cheaper in itself, less cumbersome, less complicated, and generally speaking far more economical?

In the opening chapters of this work, we dwelt at sufficient length upon our enormous, our super-abundant supplies, of all varieties of those pyrites in any way calculated to be of value for manufacturing purposes. No nation could possibly be more favored in this respect than ourselves, and yet, as it is extremely humiliating to reflect, despite the admitted intelligence and growing knowledge of our industrial community, we fail to make use of our advantages. Some very rare and exceptional cases, where great experience and business acumen prevail, can, of course, be pointed out; but impartial investigation will show that they merely serve to prove the rule. The Mathiessen & Hegeler Zinc Company, of La Salle, Ill., is an example to which we have already referred. Its managers were led by the vast quantities of sulphur with which they were called upon to deal, and which they found it impracticable to discharge into the air, to erect a series of acid chambers! Whether they

tons; yield 76.09 per cent, or 84,902 pounds fine, which has realized \$8789.49. The expenditures of the year have been: Mine expenses, \$7137.17; other expenses, \$3297.45; total, \$10,434.62, leaving a loss on the business of the year of \$1645.13.

The statement of assets and liabilities in last report showed a balance of \$15,145.93, leaving balance on January 1st, 1888, \$13,500.80.

BALANCE SHEET.

Expenditures: Real estate, cost of property, \$203,541; expenditures to January 1st, 1887, \$1142,034.64; in 1887, mining account, \$7110.96; smelting, \$813.44; expenses, taxes and copper charges, \$1930.75; transportation, \$553.26; total, \$10,408.41; dividends paid in 1873-80, \$99,784.50; company's stock costing \$304.40; treasurer's account, cash on hand \$13,841.08; total, \$1,469,914.03.

Receipts: Capital stock, paid in for property, \$200,000; assessments, \$219,938.50; copper sales to January 1st, 1888, \$1033,339.61; interest collected to January 1st, 1887, \$16,835.92; total, \$1,469,914.03.

Liabilities: Unpaid dividends, \$215.50; drafts outstanding, \$1442.25; balance, \$13,500.80; total, \$15,158.55.

Assets: Treasurer's account, \$13,841.08; cash on hand at mine, \$2.30; supplies at mine, \$1315.17; total, \$15,158.55.

REPORT OF SUPERINTENDENT ALFRED MEADS.

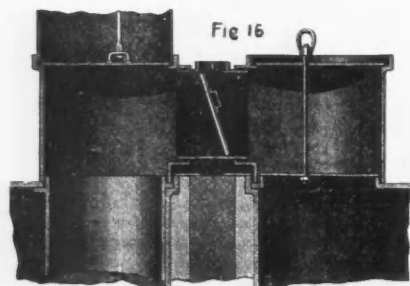
Tribute work has been continued through the year on a limited scale with satisfactory results, when we consider the small force employed and the limited amount of ground available in which tributors can work, for it must be remembered that this system of tributing has been carried on now for four years in ground many years ago abandoned as too poor to work, and confined almost entirely to the upper levels of the mine. The results, however, have shown different, and proven that the ground opened in the Ridge mine is capable of producing more copper per fathom of ground than any mine opened on the lake.

The production for the year has been 83 barrels of copper weighing 86,470 pounds, and 34 masses of copper weighing 25,236 pounds, a total of 111,706 pounds, or 55 tons and 853 pounds. Of this 106,468 pounds were purchased of the tributors at  $4\frac{1}{2}$  cents per pound, \$4791.05, and 5912 pounds, taken from the mine on company account, at a cost for labor, powder, fuse, etc., of \$100.

The total cost of the copper, including the labor, teaming, barrels, etc., was \$5255.76, and all has been shipped to the smelting-works at Detroit as heretofore.

The limited amount of ground now available for tributing, and the great demand for miners at remunerative wages in the iron mines in the south part of the county (just set off as the County of Gogebic), has caused such an exodus from the copper range as to amount to almost a desertion; for this reason all our houses are vacant (except two), causing quite a decrease in our revenue. All the houses have been boarded up and taken care of, and all other property is being well watched and taken care of. As copper has ruled so low through the year (until the past few weeks), no development work of any consequence has been done, and my aim has been to keep all expenses down to the lowest point consistent with true economy in taking care of the property.

Underground in the mine every thing is watched and kept in good condition; decaying timbers have been replaced by sound ones, falling and caving ground removed and supported by timbers and all dangers or obstructions to the free drainage or access to the mine removed. The



Section of Circulating Siphon Connection between Hargreaves Cylinders. (See page 304.)

mine is unwatered to below the fifty fathom level, and as it can be kept there at small expense, it will be advisable to do so, for the purpose of keeping the mine open and making any repairs to keep the shafts and drifts in good condition.

It would seem that the price of copper has been permanently advanced to a point at which there can be no doubt the Ridge mine can be worked at a profit. I therefore renew my advice that the mine be equipped and worked for the production of copper at a reasonable outlay. I believe this can be done without calling on the stockholders for money, without it should be decided to make our real estate holdings more extensive and work on a larger scale. The sinking of No. 1 shaft to the bottom of the mine through the low ground towards the Evergreen mine and the extension of our drifts westward to our boundary line, is becoming a necessity, if we are to keep the mine open on tribute; owing to the nature of the ground it can be done very rapidly and cheaply, and would open up ground that would yield us many hundreds, perhaps thousands of tons of copper. I again renew my advice that the work be done, in full confidence that the company will be richly repaid for the investment.

I have no hesitation in advising the company to start operations, as I believe the record of the mine proves it to be one of the richest copper producing properties on Lake Superior. Mines and mining can no longer be judged in the light of twenty or thirty years ago. Vast improvements have been made in the modes of working, improvements in machinery, the use of high explosives, and better knowledge and more intelligence on the part of the managers of mines; better roads, cheaper means of communication and transportation, all have made it possible to produce copper much cheaper, and at a profit.

The promised completion this coming summer of the Ontonagon & Brule River Railroad to a connection with the Duluth, South Shore & Atlantic Railroad, will place the mine within two miles and a half of railroad connections with the Atlantic or Pacific coast, and afford us ready and cheap transportation.

There are now sixteen miners at work in the mine in fairly productive ground, and I estimate they have taken out about 10 tons of copper up to the commencement of the year.

The gold output of Victoria for the last quarter of 1887 was 166,412 oz., a slight increase over the production during the preceding quarter

THE BERTENSHAW CONCENTRATOR.

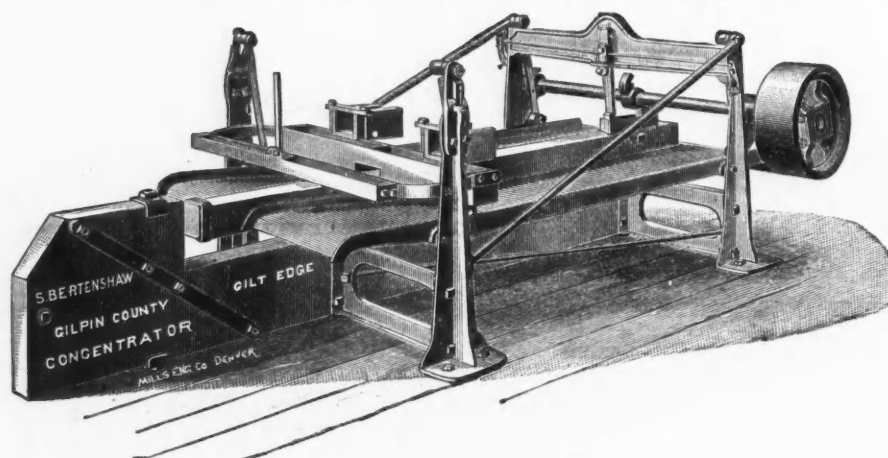
This new concentrating machine, which is also known as the "Gilpin County Gilt-Edge Concentrator," belongs to the class of shaking tables. The design of the inventor has been to secure strength and rigidity of frame with the least possible friction. The tables are suspended on knife-edge bearings, both upper and lower. This device reduces the friction to a minimum. The guide pieces on the tables correspond to adjustable pieces on the standards, so that any wear on the guides can be remedied when in operation, and the same can be done in respect to elevating or lowering the head end of the table by the bolts and set screws on the front standards. The cam works in a box which can be filled with tallow or other grease, thus insuring constant lubrication at every revolution of the shaft. In this box is placed a steel shoe with a bolt through its center for the cam to wear upon, which can be changed end for end as the wear may require. The spring is of torsional character and easily adjusted without stopping the machine, by the set screw and clamp at each end. There is also a clamp bar attached to the center of the spring, which works in the cam box to give the bumping blow when the cam point leaves the shoe. All the wearing parts are in sight and easy of access. Each division is intended for the capacity of five stamps, yet the product of twenty-stamps has been run over two divisions, the capacity being governed in a measure by the quantity of water carrying the pulp. These machines have been on trial for the last four months, and many of them are now in daily operation in three of the largest mills in Gilpin County, viz., Gregory-Bobtail, New York and Hidden Treasure mills. These machines require not less than 65 revolutions of the shaft, or 130 shocks per minute. They are made by the Hendrie & Bolthoff Manufacturing Company, Denver, Colorado.

MICA MINING IN NORTH CAROLINA.—II.

By Wm. B. Phillips.

(Continued from page 286.)

The success that attended the operations of Heap & Clapp in 1869 in Mitchell County soon induced others to enter the field. The profit was



THE BERTENSHAW CONCENTRATOR.

large, the work comparatively easy and the mica abundant. The Indians (I use the term for lack of a better) had shown that good mica was to be had with very little expense or trouble. The whites were indeed for some time in doubt as to the purpose of the old works, but as on following the trenches and re-excavating the old diggings they found only mica, they soon came to understand this mystery. Had it not been for the pre-historic operations much time and money would have been expended on searching for the true veins. But, as it was, the miners of 1869 took their cue from the miners of 1500-1600, and with their modern appliances—rude, indeed it may be, but far superior to those of their predecessors—they carried on the business vigorously. It was not long before Mitchell and Yancey counties were dotted with prospect holes of more or less promise. The Ray mine, Westall, Joe Gibbs, Young, Baily Mountain and others in Yancey County, the Pizzle (now Cloudland), Deake, Flat Rock, Mart Wiseman (famous for rare minerals) and others in Mitchell County were opened and worked. The fever spread, and in the counties of Buncombe, Haywood, Jackson, and Macon, other mines were added to those already in operation. Strange stories were told of the curious minerals found in some of the mines. J. G. Heap, the pioneer of regular mica mining, and one of the shrewdest of men, told me that he has seen masses of "uranium ore" as large as his head imbedded in perfectly white kaolin. Not being then apprised of its value (in 1869 some parts of Mitchell County were on the confines of mineralogical knowledge), he paid no especial attention to it, and it was thrown on the dump and lost. He knew better before long, as did the others, and now uraninite and gummite, etc., are saved. A few years ago, watching the emptying of the water bucket at the Flat Rock mine, I was able to secure some very handsome specimens of uraninite and gummite. Several old miners standing near remarked that when the mine was first opened those minerals were much more common and in much larger pieces. The first miners mined for mica and paid but little attention to other minerals, and they very likely threw on the dump many interesting and valuable minerals as not being their *point d'appui*.

Mitchell County has been the scene of the most extensive operations, the deepest mines are located here, and by far the greater amount of mica sent to market from North Carolina has been obtained here. The county lies between the Blue Ridge on the east and the Smoky Mountains on the west, being a part of the great western plateau between



these two ranges. Its average elevation is not far from 3500 feet, and it slopes gradually from east to west, the highest point, Roan Mountain, lying on the Tennessee boundary. The eastern boundary, the Blue Ridge, attains a height of 5228 feet in the Sugar Mountain, while Roan Mountain on the west rises to a height of about 6400 feet. There is on the whole, therefore, an upward slope towards the west. Some intermediate points, however, are much lower than the Blue Ridge. Thus, for instance, Bakersville, the county seat and the mining town for the district, is 2550 feet, while the Watauga River, at the State line, is 2131 feet. The most productive mines in Mitchell County lie within ten miles of Bakersville, on the east, northeast, south and southeast, at an elevation from 3000 to 4000 feet.

The geology of Mitchell County has been described as follows:

Another considerable area of Laurentian rocks is found beyond the Blue Ridge,\* occupying most of the mountain plateau between that and the Smoky Mountains, and in places constituting the materials of these chains. The rocks are foliated for the most part and consist of indefinite alternations of metamorphic strata, gneiss, hornblende, feldspathic and micaceous schists, and occasionally chloritic and talcose slates."

According to the same authority† the roughly shaped hills that occur through Mitchell County, scattered irregularly, and in close connection with the greatest dislocations of the strata, are to be referred to a very low horizon. He identified them as chrysolite ledges (dunite). Though they occur very frequently in close association with the mica-bearing rocks proper, the connection between the two has not yet been made out. These chrysolite or dunite ledges occupy the middle portion of the plateau, and are sometimes "nearly a mile long and several hundred yards wide."

It is still, I believe, an unsettled question whether this plateau is Laurentian or Lower Silurian, Cambrian. The absence of all traces of animal or vegetable remains (unless, indeed, graphite be considered vegetable remains), the well-nigh exclusive occurrence of the older crystalline rocks, such as hornblende and actinolitic rocks, schists, syenites, and more or less porphyroidal granites, and the extreme dislocation of all the members of the series, would seem to indicate an age beyond the Silurian. It would require patient and long continued observation, based chiefly on stratigraphical and petrographical relations, to settle this obscure problem. It is known, however, that the mica-bearing rocks of the plateau between the Blue Ridge and the Smoky Mountains do not cross the Smoky Mountains, except sporadically, and then only for a short distance. On the western side of the Smoky Mountains, in Tennessee, we meet with the Silurian, but as it does not here carry mica, though only a few miles from the North Carolina mica zone, the assumption that the "mica zone" occurs in rocks older than the Silurian is somewhat strengthened, be that age Huronian or Laurentian.

Assuming, therefore, for the present that the mica occurs in the very oldest rocks, we may inquire as to its immediate congeners.

A mica vein is only a vein of very coarse granite, in which the feldspar, quartz and mica have crystallized on a large scale. It differs from ordinary granite chiefly in this respect, that while in granite the crystallizing forces have, in a measure, interfered with each other in a mica vein, each has had, so to speak, free play. The difference between the two can best be conceived by imagining the ingredients of granite magnified several hundred, indeed, several thousand times. The crystals of mica in granite seldom attain a greater size than one sixteenth or one fourth inch across; a single mica "block" from Mitchell County made two two-horse wagon loads and could not have weighed less than 2000 pounds! A single block of "A" mica from the Mart Wiseman mine in Mitchell County was 6 feet long and 3 feet wide. The crystals of feldspar in granite are seldom larger than one sixteenth or one-fourth inch across. A single feldspar crystal from the Balsam Gap mica mine, Buncombe County, weighs 800 pounds, and is now in the State Museum at Raleigh. A piece of a feldspar crystal, now in the possession of the writer, obtained from the Deake mica mine, Mitchell County, weighs 30 pounds. It originally weighed 500 pounds, but was unfortunately broken by careless handling in the mine. Although no large quartz crystals have been obtained from these mines, large masses of crystallized quartz (generally the darker colored sorts), are constantly met with. The accompanying small red garnets are generally sprinkled through the quartz, and not through the mica or feldspar.

The origin of the mica veins will be discussed in the next article.

(TO BE CONTINUED.)

**Prize Essay on Electro-Magnets.**—A gold medal, worth about \$30, is offered by the Italian Society for the Advancement of Electrical Science for the best paper on electro-magnets, considered more particularly with a view to their application to dynamos. The paper must be written in either French or Italian, and should reach the executive committee before the 30th of October of the present year, accompanied by a device or motto, and a sealed envelope bearing the same device, and containing the name and address of the author.

**Quicksilver in Cuba.**—It is thought, says the *Chemist and Druggist*, that the unsatisfactory condition of sugar-growing will cause greater attention to be paid to the development of the immense mineral resources of Cuba. Among the mines for which titles have been granted by the Government are two quicksilver mines, covering an area of 27 hectares, and one for antimony, covering 60 hectares. The Government is willing to offer all the advantages possible with a view to developing the country; but there would be a difficulty from insufficiency of labor for working on a large scale—a difficulty which, however, could easily be surmounted by importing miners from Spain or elsewhere.

**No Authority to Grant a Natural Gas Company Exclusive Right.**—The Supreme Court of Indiana lately decided in the case of the Citizens' Gas and Mining Company vs. the town of Ellwood, that the trustees of a town incorporated under the laws of that State have no authority to grant a natural gas company the exclusive right to use the streets of the town for the purpose of supplying citizens with gas, and that a town can not maintain injunction against another company which

is threatening to use the streets for the same purpose upon the ground that it has by agreement granted the exclusive privilege to a different company, but that it may enjoin a gas company from using its streets until such company has procured a license so to do.

#### BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in another part of the Journal.]

*The Design and Construction of Masonry Dams, Giving the Method Employed in the Profile of the Quaker City Dam.* By Edward Wegmann, Jr., C. E., Division Engineer, New Croton Aqueduct, New York. Published by John Wiley & Sons, New York, 1888. Pages 106 and Index. Illustrated. Price, \$5.

*Three Kingdoms. A Hand-Book of the Agassiz Association.* By Harlan H. Ballard, President of the Association, Pittsfield, Mass. Published by the Writers Publishing Company, New York, 1888. Pages 166. Illustrated.

*Notes on the Compressive Resistance of Freestone, Brick Piers, Hydraulic Cements, Mortars and Concretes.* By Gen. Q. A. Gillmore, Ph.D. Published by John Wiley & Sons, New York, 1888. Pages 198 and Index. Price, \$3.50.

*Twelfth Annual Report of the State Inspector of Mines of Ohio for 1887.* By Thos. B. Bancroft, Chief Inspector of Mines. Published by the State, Columbus, Ohio, 1888. Pages 181. No Index. No table of contents.

*Seventh Annual Report of the State Mineralogist of California (for the year ending October 1st, 1887).* By Wm. Ireland, Jr., State mineralogist, with contribution from W. A. Goodyear. Sacramento. Published by the State. 308 pp. and Index.

#### PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent-Office.

- PATENTS GRANTED APRIL 24TH, 1888.
- 381,527. Method of Making Compound Ingots. Levi L. Burdon, Providence, R. I.  
381,555 and 381,556. Electric Railway. Rudolph M. Hunter, Philadelphia, Pa., Assignor to the Electric Car Company of America, same place.
- 381,568. Steam Dynamo-Electric Machine. Richard H. Mather, Windsor, Conn.  
381,575. Apparatus for Tempering Steel Bands. Joshua Oldham, Brooklyn, N. Y.  
381,582. Guide for Wire-Rod Mills. Henry Roberts, Pittsburg, Pa., Assignor to himself, George T. Oliver and Andrew J. Day, same place.
- 381,583. Tube-Expander. Charles H. Robinson, St. Paul, Minn.  
381,585. Trap for Electric-Railway Conduits. William M. Schlesinger, Philadelphia, Pa.  
381,586. Lubricator. Max Schneider, Doos, near Nuremberg, Bavaria, Germany.  
381,595. Boiler and Furnace. Allan Stirling, Yonkers, N. Y.  
381,596. Valve-Gear. Joseph W. Thompson, Salem, Ohio, Assignor to the Buckeye Engine Company, same place.
- 381,597. Governor. Joseph W. Thompson, Salem, Ohio, Assignor to the Buckeye Engine Company, same place.
- 381,599. Nail-Plate Feeder. Asahel H. Tyrrell, Tyrrell Hill, Ohio.  
381,609. Valve for Water-Gauges. William H. Bray, Boston, and Cornelius Nickerson, Chelsea, Mass.
- 381,619. Device for Regulating the Quality of Carbureted Vapor or Gas. Edward J. Frost, Philadelphia, Pa.
- 381,629. Ore-Roasting Furnace. James L. Lovell, Austin, Nev.  
381,632. Sectional Hood for Gas and Air Fuel Mixing Chambers. Charles H. Miller, Erie, Pa.
- 381,636. Armature for Dynamos. Moritz A. Müller, Newark, N. J., Assignor to the United States Electric Lighting Company, New York, N. Y.
- 381,639. Dust-Collector. Henry N. Pomeroy, Sparta, Wis., Assignor to J. A. Warner, same place.
- 381,640. Belt-Fastener. Wilson L. Potter, Hartford, Conn., Assignor to the Jewell Belting Company, same place.
- 381,645. Core-Arbor for Casting Curved Ipe. Peter Rieth, Chicago, Ill., Assignor to the L. Wolff Manufacturing Company, same place.
- 381,650. Electric Motor for Railways. Sidney H. Short, Denver, Colo., Assignor to the United States Electric Company, same place.
- 381,655. Process of Casting Metal. Daniel C. Stover, Freeport, Ill., Assignor of one half to the Washburn & Moen Manufacturing Company, Worcester, Mass.
- 381,685. Apparatus for Obtaining Phosphorus Trichloride. Constantin Fahlberg, Selbke-Westerhüsen, Prussia, Germany, Assignor to Fahlberg, List & Company, same place.
- 381,689. Rolling Mill Plant. William Garrett and Samuel T. Wellman, Cleveland, Ohio.
- 381,718. Metallic Alloy. Heinrich Ostermann and Axel Prip, Geneva, Switzerland.  
381,719. Metallic Alloy. Heinrich Ostermann and Charles Lacroix, Geneva, Switzerland, Assignors to the Usine Genevoise de Degrossissage d'Or, same place.
- 381,720. Whip-roll for Looms. Anthony F. Parker, Charleston, S. C.  
381,746. Method of Rolling Sheet Metal. Franklin H. Wright, Lake View, Ill.  
381,747. Valve-Gear. John Young, Newark, N. J., Assignor to the Watts-Campbell Company, same place.
- 381,753. Dust Collector. Gustav Behrens, Lubeck, Germany.  
381,756. Cap and Anchor for Metallic Roofing. Benjamin F. Caldwell, Wheeling, W. Va.
- 381,757. Machine for Painting Metallic Roofing. Benjamin F. Caldwell and William F. Peterson, Wheeling, W. Va.
- 381,768. Regulation of Electric Motors. Stephen D. Field, Yonkers, N. Y.  
381,789. Dynamo-Electric Machine and Motor. Moritz Immisch, London, County of Middlesex, England.
- 381,791. Steam-Boiler. Jonathan Johnson, Lowell, Mass.  
381,794. Transformation and Distribution of Electric Energy. Rankin Kennedy, Glasgow, County of Lanark, Scotland, Assignor of one-half to Robert Dick, same place.
- 381,797. Portable Caisson. Henry P. Kirkham, Brooklyn, N. Y.  
381,803. Sliding Joint for Gas Mains. Daniel M. Marquis, Kokomo, Ind.  
381,809. Treatment of Ores and Materials containing Sulphur for the Extraction of Metals and other Constituents. Robert Oxland, Plymouth, County of Devon, and Charles Oxland, Sydenham, County of Surrey, England.
- 381,815. Heating by Electricity. Elias E. Ries, Baltimore, Md., Assignor of one half to Albert H. Henderson, same place.
- 381,818. Method of Electro-Chemical Heating. Elias E. Ries, Baltimore, Md., Assignor of one half to Albert H. Henderson, same place.
- 381,825. Expandible Joint for Pipes. Henry W. Brinkhoff, Brooklyn, N. Y.  
381,832. Process of Obtaining Ammonia and Bone-Black. Frederick Egner, St. Louis, Mo.
- 381,837. Apparatus for Applying Sand to the Driving-Wheels of Locomotives. James Gresham, Stratford, near Manchester, England.
- 381,838. Rock-Drill. Simon Ingersoll, Glenbrook, Conn.  
381,849 and 381,850. Treating Ores and Metallurgical Products. Edward H. Russell, Park City, Utah.
- 381,866. Electrical Method of Automatically Controlling the Supply of Water or Gas. Leopold Weil, New York, N. Y.
- 381,869. Tube-Coupling. Frank A. Williams, Albrighton, County of Salep, England.  
381,870. Boiler. Amasa Worthington, Brooklyn, N. Y.  
381,872. Nur-Making Machine. Frank Brüser, Pittsburg, Pa., Assignor of one half to William Charles, same place.
- 381,876. Compressing or Blowing Engine. William E. Good, Reading, Assignor to the Southwark Foundry and Machine Company, Philadelphia, Pa.  
381,894. Die for Making Draw-Bars. John T. Wilson, Pittsburg, Pa., Assignor of one half to the Pittsburg Forge and Iron Company, same place.
- 381,895. Method of Making Draw-Bars. John T. Wilson, Pittsburg, Pa., Assignor of one half to the Pittsburg Forge and Iron Company, same place.

\* W. C. Kerr, Geol. of N. C., Vol. I. (1875), p. 128.

† Idem, pp. 129.

## THE METALLURGY OF STEEL.\*

By Henry M. Howe.

(Continued from page 291.)

The fact that molten iron often evolves gas in the ladle and moulds in spite of its constantly growing cooler, at first suggests that the solubility of the escaping gas is diminishing instead of rising with the falling temperature. When agitation, due to pouring, and local solidification do not suffice to explain this escape of gas it may, I think, be reasonably ascribed to the slowness with which supersaturated metal expels its excess of gas, and occasionally to a slowly terminating reaction between the carbon of the metal and the oxygen of the moulds, of the atmosphere, or of the metal itself. The agitation due to the escape of such nascent carbonic oxide might well liberate the nitrogen and hydrogen which accompany it.

*B. Protracted and Deferred Escape of Gas.*—Were we ignorant of the composition of the gases, we might refer the protracted escape of gas, continuing from the time of the spiegel reaction up to and during solidification, either on the one hand to gradually diminishing solubility, or protracted escape from a supersaturated solution, or on the other to a persistent and slowly perfected reaction between carbon and oxygen. Such a protracted reaction may be due either to imperfect mixing, or to the inability of the carbon and oxygen to unite immediately, so that, though perfectly mixed and brought into contact molecule with molecule, their union is not perfected for hours. It seems very improbable that the phenomena are due to imperfect mixing.<sup>a</sup> The metal is twice poured, from converter to ladle, from ladle to moulds: the ebullition which occurs both before and after teeming should greatly aid mixing. But, passing this by as inconclusive, we have the fact that if a charge of steel, from which this protracted escape of gas would naturally occur, be thoroughly mixed by raising the converter and blowing air through it after the spiegel reaction, the same protracted escape of gas occurs.<sup>b</sup>

There must be a cause other than imperfect mixing to explain protracted escape of gas when mixing is perfect. Is it tardiness in reacting, or slow escape from solution? It may be the former, though no one has pointed out a chemical phenomenon which is known to be strictly analogous. The slow parting of precipitates,<sup>c</sup> the slow growth of crystals, have been suggested: but in both cases purely physical and mechanical reasons suffice to

\* Copyright by the Scientific Publishing Company, 1887.

<sup>a</sup> The heterogeneousness of steel ingots is often adduced as evidence of imperfect mixing. There can be little doubt that is in large part the result of segregation during cooling and solidification, though under certain conditions, as when cold additions are made to molten metal, it may be exaggerated by imperfect mixing. Others have pointed to the protracted stirring needed to uniformly mix black and white paint, and to the veins and striæ in imperfect glass as evidence that steel can be rendered homogeneous only by long stirring. But it is manifestly unfair to liken the mixing of seething highly fluid steel, whose fluidity is attested by the sharp outlines of its stream, by the tiny gas bubbles which are able to part it and travel up through it when it effervesces, by the minute and quickly propagated waves which stirring produces,—it is most unfair to liken it to the mixing of different colored paints, which consist of finely divided solids mechanically suspended in an initially viscous liquid: their coloring matter is solid. Mark rather what brief stirring suffices to mix a drop of ink with a tumbler of water so thoroughly that the eye can detect no sign of heterogeneousness. Does glass on the punty seethe and splash and foam? Does the blower's breath pass through in fine bubbles? Shall we gauge the action of water on the hurly-gurdy, of ether in the atomizer, by that of cold molasses? (Journ. Iron and St. Inst., 1881, II., p. 373.)

<sup>b</sup> Müller, Stahl und Eisen, IV., p. 77, 1884; Iron, Feb. 22, 1884, p. 161. In treating a basic charge he "had the converter raised for several seconds after the spiegel reaction, when the steel did not behave differently in the least in the ladle and mould."

<sup>c</sup> Ledebur, Iron, Nov. 11th, 1883, p. 463.

explain the tardiness. The fine precipitate, if instantaneously formed, may be held to part slowly because fine, because its particles are of such form and texture that they adhere to and hook into each other, slowly coalesce, and long remain too small to settle rapidly: friction opposes gravitation. Our protracted gas escape cannot be of this nature, a gradual rising of mechanically suspended gas bubbles, too minute to coalesce and rise rapidly, because their collective volume (from 7 to 23 times that of the containing metal, § 211, VI.) is far greater than could be thus suspended. The crystal grows slowly because the weak crystal-forming forces, but feebly overcoming friction and inertia, can but slowly move the molecules from distant regions across the solution to the crystal's growing apex. In both cases, then, force has to impel matter over considerable distances: in neither do we know that the reaction is not instantaneous. Reaction whose immediate effects are of a nature which renders them visible as soon as produced and without waiting for subsequent motion or coalescing of their products, often appear to be well-nigh instantaneous. Thus when a drop of sulphocyanide is added to a dilute ferric solution, the full intensity of coloring is very quickly reached.<sup>d</sup>

Metal, which has been perfectly quiet after the end of the spiegel reaction, remains still for a time in the mould, neither froths nor scatters; yet it is said that after solidification has reached a certain point it may begin to rise, and, if unopposed, may double its length,<sup>e</sup> owing to the formation of gas within it.

It seems far more probable that the renewed escape of gas is here due to a fall of solvent power owing to solidification, than that reaction, having once totally ceased, recommences during solidification, especially as the fall of temperature should oppose the oxidation of carbon.

*C. That the shape and position of the blowholes in ice and in iron respectively are governed by similar causes we infer from their remarkable similarity.* As the ice bubbles are doubtless due to the escape of gas (in this case air) during solidification, and as they owe their contour and place to the manner in which the ice grows during the emission of this air, so with the blowholes in iron. The fact that the air in ice escapes from solution does not, however, prove that the blowhole-forming gas in iron also escapes from solution. It is clearly gasified under similar outward conditions, but not necessarily from the same previous state. It is conceivable that the very act of solidification might cause previously uncombined carbon and oxygen to unite in such a manner that their escape would closely simulate that of a previously dissolved gas. But it is certainly far more natural to refer the phenomena to an escape from solution.

§ 215. RATIONALE OF THE ACTION OF SILICON.—Our study of the analogy between the behavior of iron and that of other solvents towards gases would be most incomplete if it did not embrace the action of silicon on the escape of gas and on the formation of blowholes.

The addition of 0.1% of lead to molten copper and of 0.12 of magnesium to nickel is said to prevent these metals from evolving gas and from acquiring blowholes while solidifying. These additions appear to act by increasing the metal's solvent power, so that it is able to retain in solution while setting the gas which it holds

<sup>d</sup> This is an elaboration and extension of Müller's argument, Stahl und Eisen, IV., pp. 76 et seq: Iron, Feb. 22d, 1884, p. 161.

<sup>e</sup> I have never seen such a case, but Müller states that rising steel may act thus. Iron, Jan. 5th, 1883, p. 17.



while molten, and which it would have evolved but for these additions. On uncorking a bottle of soda water it evolves gas violently. The escape of gas soon diminishes, but it continues at a much reduced rate for hours: yet the addition of freshly boiled cold water arrests it at once and completely. Now do silicon and manganese, as Müller contends, act through the iron's solvent power; or do they, as Pourcel maintains, simply prevent the formation of carbonic oxide by being preferentially oxidized? I will endeavor to show (I) that the quieting action of additions of silicon harmonizes better with the former than with the latter view: (II) that the effervescence following the removal of silicon accords with either: but (III) that, while the escape of gas from iron rich in silicon is in perfect harmony with the former view, it seems directly opposed to the latter.

A. In many cases the quieting action of silicon appears to harmonize with either view. Doubtless if added to metal in which the oxidation of carbon was actually occurring it might check that action. But I can recall no case in which it is clear that silicon checks the *blowhole-forming* escape of gas, *i. e.* the escape during solidification, by preventing the oxidation of carbon: on the other hand in those important and striking cases which have actually been investigated, silicon certainly seems to act through the solvent power.

Müller found in three cases (numbers 2, 4 and 6, Table 70 A) that on adding ferro-silicon or ferro-silico-manganese to molten basic oxygenated or ingot iron, contained in iron moulds and with the action of the slag and of the containing vessel thus nearly eliminated, the protracted escape of gas (carbonic oxide, hydrogen and nitrogen) which had been occurring either immediately diminished or stopped, though part of the carbon present simultaneously disappeared. In number 2 the volume of gas was diminished by about 80%<sup>a</sup>: in number 4 gasification stopped so completely that Müller was unable to collect enough gas for analysis, though the 0.02% of carbon which disappeared should generate carbonic oxide equal in volume to twenty times that of the metal. These results are summarized in Table 76.

TABLE 76.—RECARBURIZING ADDITIONS WHICH IMMEDIATELY CHECK THE ESCAPE OF GAS, THOUGH APPARENTLY CAUSING THE OXIDATION OF CARBON.

Number in Table 70 A	2.			4.			6.		
	C.	Si.	Mn.	C.	Si.	Mn.	C.	Si.	Mn.
Present in the metal before recarburizing	.083	.008	.144	.083	.021	.181	.075	.007	.480
Added in the recarburizer	.059	.855	.073	.162	.818	1.487	.054	.339	.069
Total	.092	.858	.217	.195	.839	1.668	.129	.346	.549
Present in the recarburized steel	.062	.238	.186	.175	.846	1.604	.127	.314	.585
Loss	.030	.120	.031	.020	.007	.064	.002	.032	-.06

Here the quieting effect of silicon and manganese certainly does not seem to be due to their preventing the formation of carbonic oxide by being oxidized in preference to carbon, 1, because though in some cases part of the carbon added with them appears to be immediately oxidized, or at least disappears, so that more carbonic oxide appears to be present after than before their addition, yet no gas escapes, neither the carbonic oxide thus formed, nor that carbonic oxide, hydrogen and nitrogen which would have continued to escape had the silicon and manganese not been added. Unfortunately, the quantity of carbon which disappears is so small that it is possible to attribute its disappearance to experimental error. 2, Because the escape of gas was wholly arrested when no silicon and but a trifling quantity of manganese (.06%) appeared

<sup>a</sup> Stahl und Eisen, IV., p. 75, 1884.

to be oxidized, and only by being oxidized should these elements prevent the oxidation of carbon. (No. 4.) But this little manganese may suffice to arrest the oxidation of carbon: and, moreover, more manganese and silicon may be oxidized than is recorded: for, should part of their oxides remain suspended or dissolved in the metal, they would appear on analysis as if unoxidized.

3, Because, on a priori grounds, one would hardly expect that carbonic oxide would be formed in this practically carbonless metal, even before the silicon and manganese were added (§ 216).

4, Because, if it were being formed, one would hardly expect, on a priori grounds, that silicon and manganese could thus totally arrest its formation. For at this exalted temperature the affinity of carbon for oxygen probably greatly outweighs that of silicon and manganese: hence, while under especially favorable conditions (*e. g.* in the presence of a basic slag, or when a very large proportion of silicon is added to metal containing very little carbon), silicon might totally arrest the oxidation of carbon, yet one would not expect it to when, as in the case under consideration, a very considerable proportion of carbon is added along with it. In each of the ten cases in Table 70 A in which the behavior of carbon on recarburizing is recorded, a considerable quantity of it is oxidized, while in certain cases no silicon and but little manganese is. Indeed in number 9, Table 70 A, no less than 0.075% of silicon appears to be reduced from the slag by the recarburizing additions. This reduction of silicon from the slag also occurs in another spiegel reaction, which will appear later.

5th, Because when oxygenated metal receives a recarburizing addition the resulting tranquillity and freedom from blowholes should, on the reaction theory, be proportional to the quantity of oxygen removed by the silicon and manganese (the more they remove the less remains to react on carbon), but, on the solution theory, proportional to the quantity of these elements which remain in the recarburized steel. Yet in the examples in Table 70 A, the latter is in the main true, while the most solid and tranquil steel of all, 4, is the very one from which the least oxygen is removed, the one which on the reaction theory should become the most porous because retaining the most oxygen to react on carbon. It is but fair to say, however, that it may have lost less oxygen in the reaction than the others because, though apparently produced under like conditions, it may have held less initially.

In brief, while it is possible that silicon and manganese act in these cases by arresting the oxidation of carbon, the phenomena harmonize much better with the view that these additions act through the solvent power.

B. Just as the addition of silicon stops the evolution of gas, so there are reasons for believing that its sudden removal induces violent ebullition. This is not so well seen in the Bessemer process, for, owing to the violent agitation caused by the blast, as the removal of silicon lowers the solvent power of the metal a large portion of the excess of gas is expelled almost as fast as it becomes an excess, and the metal does not become greatly supersaturated. Still, both half-blown and fully-blown Bessemer metal froth, scatter and sparkle much.

(TO BE CONTINUED.)

NOTE.—The publishers of the ENGINEERING AND MINING JOURNAL will thank the readers of this article if they will promptly call attention to any inaccuracies they may observe in it.

## PERSONAL.

The summer meeting of the Ohio Institute of Mining Engineers will be held at Logan, Ohio, on July 11th, 12th, and 13th.

Mr. M. A. Preston has been elected President of the St. Clair Coal and Coke Company, and Mr. P. J. Slevin, formerly mine boss, has been appointed superintendent.

Mr. J. E. Clayton, Mining Engineer, of Portland, Oregon, has been engaged to make an examination of the property of the Montana Company, Limited, Marysville, Montana.

Mr. Edward Roberts, for many years connected with the firm of P. L. Kimberley, Sharon, Pa., has accepted the management of the Youngstown Rolling-Mill Company's works at Youngstown, O.

Dr. S. H. Emmens, whose record here, and in England before he came here, was not altogether satisfactory, appears to be making quite a sensation in Dakota. Before investing in his schemes a little prospecting of his antecedents might pay.

Capt Ned B. Roscoria has been appointed mining captain at the Allouez copper mine, Michigan. Captain Roscoria has been associated with Lake Superior copper mines for over twenty years, about fifteen of which have been spent at the Allouez mine.

Messrs. Wartenweiler, late of the Lexington mine, at Butte, and Bratnaber, of the Montana Company, Limited, at Marysville, Mont., have taken an option on the Guadalupe de los Reyes mine, in Mexico, and are about to offer it in England, where, indeed, it has been offered before without takers.

Mr. Thomas Couch, superintendent of the Boston-Montana Consolidated Copper and Silver Mining Company, has proposed the establishment of a miners' union hospital, at Butte, Montana. An excellent idea and one which appears to receive the unqualified commendation of the citizens and generally of the local papers.

Mr. Charles Hamill, Mine Inspector of Maryland, will accompany ex-State Senator R. T. Browning, who becomes mine inspector on the 1st of May, upon a tour of inspection of the mines of Garrett and Allegany counties. It is understood that after this trip through the region Mr. Hamill will turn over his charge to his successor.

Mr. G. W. Thompson, of Brooklyn, chemist, has been engaged for laboratory work by Messrs. Ledoux & Co., of this city. Mr. Thompson is one of the many professional gentlemen who have received his appointment through the services of the ENGINEERING AND MINING JOURNAL, which publishes free every week the list of positions vacant.

Mr. Robert W. Hunt, late general superintendent of the Troy Steel and Iron Company, has established the Robert W. Hunt & Co. Bureau of Inspection, Tests and Consultation. The general office of the bureau will be in Chicago, with branch offices in Pittsburgh and New York. Mr Hunt's associates are: Messrs. John J. Cone, G. W. G. Ferris, Frank C. Osborn and James C. Hallsted. The speciality of the bureau will be the inspection of rails.

Mr. Harrington Blauvelt, the able and conscientious mining engineer who, in his letters to the ENGINEERING AND MINING JOURNAL, pricked, as they deserved, certain Arizona bubbles, has since then been the best abused man in that part of the Territory. This, of course, he must have expected, and the abuse of the inflators and floaters of "bubbles" is so complimentary that he must feel the satisfaction of having touched a very sensitive place. Those who wish to invest capital or who have capital invested in Arizona will respect and appreciate the honesty of the engineer who at the risk of local abuse and defamation still denounces dishonest mining schemes.

Mr. S. B. Whiting, general superintendent of the Philadelphia & Reading Coal and Iron Company, of Pennsylvania, for many years, has resigned to become general manager of the Calumet & Hecla Mining Company, of Michigan.

Mr. Whiting is one of the most experienced and able mechanical engineers in this country, and his experience as manager of the vast coal interests of the Reading Coal and Iron Company, when the very strictest economy had to be practiced, will make him an invaluable manager for the Calumet & Hecla. This company is apparently preparing for such a reduction in its cost sheets as will allow the directors to publish its reports without producing too great a shock to its stockholders. We congratulate the company on having secured the services of so able an engineer as Mr. Whiting.

## FURNACE, MILL, AND FACTORY.

The Midway Machine Company has been organized at Anniston, Ala., with a capital of \$8,500, to make tram engines, etc. Operations will begin June 1.

The Cherokee Iron and Land Company, Rusk, Texas, intends to put up one 50-ton charcoal furnace, and immediately thereafter another coke furnace of 50 tons capacity.

The Atlantic Machine Works, Boston, Mass., were burned on the 26th inst., causing a loss of \$150,000. The supposition is that the fire was started by the wires of an arc electric light.

The Illinois Rolling Mill Company has been organized at Chicago, Ill., with a capital stock of \$300,000, for the manufacture of iron and steel. The incorporators are J. L. Pfau, Jr., Warren F. Pitney, and Edward Starr.

The new coke-ovens which are being built by the Sloss Iron and Steel Company, at Coalburg, Ala., are almost completed. Twelve of the ovens have just been finished, and are now ready for operation. The remaining fifty will be finished by May.

The converter at the Bessemer steel-works of the Colorado Coal and Iron Company, Pueblo, Colo., commenced running at full capacity on the 21st inst. The rail-mill started at its full capacity on the 23d making steel rails.

The Round Mountain furnace, at Round Mountain, Ala., controlled by the Elliott Pig Iron Company, which blew out about middle of December, preparatory to being remodeled, will shortly go in blast. This furnace formerly made from 12 to 15 tons of iron per day. It is now expected to make from 25 to 30 tons per day.

At a meeting of the creditors of the Elba Iron and Bolt Company and the Continental Tuce Company, held in Pittsburg, Pa., on April 21st, the requests for extensions of two, three and four years were unanimously granted. To the failure of these companies we referred in our issue of April 14th.

Paris now stands some chance of having a system of underground electric tramways, the municipal authorities having just reported favorably upon the scheme proposed. Surface electrical railroads are increasing in number, but all means of rapid transit in crowded cities, whether in actual operation or proposed, are of interest in these busy times.

An old acquaintance turns up in the shape of a recently patented "disintegrator" for ores, which is to accomplish wonders by means of a spindle driven at high speed provided with steel arms or beaters revolving between steel plates in a casing which is nearly all screen. Before this phoenix goes to work on tough quartz, let us pause to speculate as to which will get the worst of it—the ore or the beaters.

Messrs. Chas. A. Schieren & Co., of New York, have purchased the right and title of the Gabel Belting Company, of Chicago, and will continue the business under the name of the firm, Chas. A. Schieren & Co., and under the direction and management of Mr. Emil Gabel, the former president of the company. The American Leather Link Belt Company being under the control of this firm, will also be under the control of Mr. Emil Gabel.

The Delanater Iron-Works, New York City, which occupy nearly an entire block, were partially destroyed by fire on the evening of the 26th inst. The most valuable part of the works, including the machine shop, pattern shop and foundry, were totally wrecked. It is estimated that the loss will amount to \$100,000. The property was fully insured. The business has been carried on at this place for the last 35 years, and this is the first serious loss by fire. The works will be rebuilt. Some special machines were destroyed that will be hard to replace.

The American Wheel Association, composed of the leading wheel companies of the United States, have purchased the machinery, etc., of the Lexington Wheel Company, Lexington, Ky. The spoke department will still continue in operation, and with increased facilities will supply the association with raw material for the manufacture of spokes. The city appropriated ground for the wheel company to establish a factory, and the sale is strongly condemned by the citizens. The hands, it is said, were notified that their services would no longer be needed, without a moment's notice.

The Julien Electric Company Limited has been organized in London with a capital stock of £100,000, shares £10 each, to purchase the British patents, viz.: 1885, No. 8881, improvements in secondary batteries, part of which is applicable to primary batteries; 1886, No. 2470, for improvements in electrical locomotion, propulsion or traction, and the apparatus therefor; and also the benefit of an application for letters patent 1887, No. 8855, for improvements in and appertaining to electric piles and plates therefor; to carry on the business of manufacturing or dealing in engines, machinery, and other things which are manufactured or used in accordance with the inventions.

The new Swedish glass which, according to the glowing accounts given at the time of its first appearance, was to revolutionize the optical instrument industry, does not seem to be making much progress as yet. It is claimed that, owing to its high refracting power, microscopes made with Swedish glass lenses can distinguish the 304,000th part of an inch, as against the 300,000th obtained with common lenses. Among the fourteen elements which are said to enter into its composition, the most striking ones are phosphorus and boron. If all that has been claimed for it is true, it is strange that its practical introduction has been so long delayed.

The old firm of Morris, Tasker & Co., Limited, have been succeeded by a chartered company under the title of Morris, Tasker & Co. The officers are: Andrew Wheeler, President; Johnathan Rowland, Vice-President; T. Wistar Brown, Treasurer, and H. C. Van Sant, Secretary, and Stephen P. M. Tasker will, as heretofore, act as general consulting engineer. The company will operate both the Pascal Iron-Works, Philadelphia, Pa., and the Delaware Iron-Works, at

New Castle, Del. The Pascal Iron-Works' products include pipe-fittings, valves, gas machinery and many other specialties. The Delaware Iron-Works have unexcelled facilities for the manufacture of boiler tubes and wrought-iron pipe of large diameters.

The British Sodium and Aluminium Company, Limited, has been organized in London with a capital of £1,050,000, divided into 105,000 shares of £10 each, of which 5000 shall be preference shares, and 100,000 ordinary shares, to acquire the sole right to certain inventions of Albert Bervick Cunningham for the manufacture of sodium and aluminium, and all improvements therein, and all British and colonial or foreign patents and patent rights in respect of the same in all countries in the world; to acquire the right to an exclusive supply of artificial cryolite; to manufacture and sell sodium and potassium, or utilize the same for the purpose of reducing any metal from its compounds, and chiefly aluminium.

It is stated that the Knights of Labor formerly employed at the Edgar Thomson Steel-Works, in Braddock, Pa., are preparing a new proposition to submit to Mr. Carnegie. They will agree to an average reduction of 15 per cent in the event of Mr. Carnegie's willingness to withdraw the sliding scale iron-clad. Mr. Carnegie has come to the conclusion that inside of two years wages will be down to \$1 a day for laborers, but in the face of this he is willing to make a contract with his men for three years, in which he offers them 20 per cent more than they can hope to receive elsewhere, but the offer is refused. Should work in the converting mill be resumed the latter part of this week, an attempt will be made to start the new continuous rail mill next week or the week after. This mill has never yet been operated, having been completed last year at a cost of over \$1,000,000. It is the only one of the kind in the world, and will increase the output 33 per cent above the best record.

## CONTRACTING NOTES.

Machinery and supplies wanted. See page xiv. Contracts open will be found on page xix. New contracts this week: No. 869, Sewers; No. 870, Water-Works; No. 871, Iron Bridges.

Contracts have been awarded for furnishing machine tools for the Norfolk Navy Yard as follows: Niles Tool-Works, of Hamilton, Ohio, \$20,800; William Sellers & Co., of Philadelphia, \$11,391; Morgan Engineering Company, of Alliance, Ohio, \$4560; Bement, Miles & Co., of Philadelphia, \$8375; Manning, Maxwell & Moore, New York, \$2450.

## GENERAL MINING NEWS.

## ALABAMA.

## COLBERT COUNTY.

SHEFFIELD LAND, IRON AND COAL COMPANY.—The following officers were elected at a meeting of this company held at Decatur, recently: A. H. Moses, President; W. L. Chambers, Vice-President and General Manager; Capt. Joseph F. Burke, Secretary; J. V. Allen, Treasurer. The following constitute the Executive Committee: A. H. Moses, W. L. Chambers and W. A. Johnston. Col. E. W. Cole and Eugene Gordon, among the largest stockholders of the company, were not re-elected.

## ARIZONA.

## COCHISE COUNTY.

COPPER QUEEN MINING COMPANY.—Mr. James Douglass, General Manager, recently made a speech to the miners, in which he stated that wages would be \$3.50 per day, that no work would be done in the mine on Sunday, and that there would be no regular pay-day. The men could draw their money when they wanted it, or could let it remain with the company, as they pleased. This was done to discourage gambling.

## ARKANSAS.

It is reported that the employment of convict labor in the coal mines of Arkansas is to be prohibited.

## OUACHITA COUNTY.

OUACHITA COAL COMPANY.—This company has been organized with a capital stock of \$75,000, to develop coal mines in Ouachita County, by A. S. Garnett and E. Hogaboom, of Hot Springs, and R. C. Tunstall, of St. Louis, Mo.

## CALIFORNIA.

CALIFORNIA WATER AND LAND COMPANY, LIMITED.—This company has been organized in London with a capital of £150,000, shares £5 each, to acquire and carry out a concession or monopoly already granted by the United States government of the entire or principal water supply over about 600 square miles in the counties of Sacramento and El Dorado, and the mining property situated in El Dorado County, known as the Dry Gulch mine.

## AMADOR COUNTY.

The case of the French Savings Bank vs. Amador Canal and Mining Company, Blue Lakes Mining Company, Thomas Mitchell and others, have been dismissed at the request of plaintiffs.

AMADOR GOLD MINE.—Local papers state the grading for the 60-stamp mill of this mine is about to commence.

NEWTON.—This copper mine has been purchased by H. D. Ranlett. A number of men have been put to work preparing pits to roast the piles of ore now awaiting treatment.

## CALAVERAS COUNTY.

UNION GOLD COMPANY.—The transcripts in two suits against this company have been filed in the United



States Circuit Court at San Francisco. The San Francisco *News Letter* says that in the first suit the Rathjeks seek to recover the mining property in Calaveras County, covering 27 acres, and \$26,000 alleged to be the value of rents and profits of which the plaintiffs have been deprived by the respondents. The second suit is to recover lots 3 and 7 in the east half of section 33, township 4 N., range 12 E., Mount Diablo meridian, Calaveras County, and \$12,000 damages for the unlawful retention of the same. The company was organized in England and the stock placed there.

#### INYO COUNTY.

**INYO MARBLE COMPANY.**—This company is making arrangements to make its marble better known. Mr. Israel Luce, superintendent of the company, has been in the East to secure machinery to increase the present plant. He has also been in Washington, and had a conference with the Supervising Architect, who has decided that when the specifications are sent out for public buildings on the Pacific Coast he will include bids on Inyo County marble.

#### NEVADA COUNTY.

**SPANISH GOLD MINING COMPANY.**—It is reported that the Spanish mine is now looking better than it has for a long time. A recent upraise of three hundred feet has developed better paying ground than has been found for years. This development affords fully a three years' run without further dead work.

#### TUOLUMNE COUNTY.

A correspondent writes us that at the Patterson mine, near Tuttle town, referred to in our last issue, there is a 10-stamp mill, with silvered copper plates to save the free gold, and four concentrators, also a plant of canvas concentrators, to save the sulphurets, of which the quantity is large. Judging from the looks of the mine at present, it cannot fail to give good results to the stockholders. The mine, the hoisting works and the mill are at present run by steam power, but I have been informed by Mr. Patterson, one of the directors, who is at present at the mine, that he has made arrangements to bring in the water at an elevation of 450 feet above the mine, and is now putting up new hoisting works of larger capacity to be run by water, and intends also to run the mill by water power.

#### COLORADO.

**MARSHALL CONSOLIDATED COAL MINING COMPANY.**—This company has commenced sinking a new shaft at Louisville. The engines and machinery of the old Welch mine will be moved to the new site, and by the time the shaft is completed the mechanical part of the new mine will be in readiness to hoist coal.

#### BOULDER COUNTY.

**POORMAN MINING COMPANY.**—This company has been organized, with a capital stock of \$500,000, to carry on operations in Grand Island mining district. The principal office will be at Denver. The incorporators are H. A. W. Tabor, Jacob Hooper, T. L. Wiswall, Peter McCourt, and Theo. H. Lowe.

#### CLEAR CREEK COUNTY.

The Lebanon and Republican Mountain mining companies will probably be consolidated. For several years past these companies have been in litigation.

**PIONEER GOLD MINING COMPANY.**—This company has been organized, with a capital stock of \$1,000,000, by E. P. Cowan, C. F. Collins, John Scudder, John N. Dumont, and James Trevillion. The principal office will be at Idaho Springs.

#### COSTILLA COUNTY.

**TRINCHERA CANAL COMPANY.**—This company has been organized with a capital stock of \$50,000, shares \$100 each. The purpose is to be the acquisition by purchase as well as the operation of ditches in Costilla County. The company proposes to take water from the Rio Trinchera, Sangre de Christo and Ute creeks. The directors are William H. Geselbracht, A. R. Bevan and W. A. Bell. The office of the company will be at Colorado Springs.

#### GILPIN COUNTY.

**CASHIER MINING COMPANY.**—This company has purchased the plant of machinery formerly in use on the Post Hole lode, and has removed it to the main shaft of the Cashier mine. The work of sinking will be inaugurated at once.

#### LA PLATA COUNTY.

**MONTEZUMA VALLEY WATER SUPPLY COMPANY.**—The Montezuma irrigating tunnel has been completed. This tunnel is over one mile long, and runs under one of the range of mountains composing the "Rockies," and with the fifty miles of canal, it is said, will convey the water of the Dolores River over the richest agricultural valley in Colorado. Over 200,000 acres of land will be irrigated by this enterprise.

**SAN JUAN SMELTING AND MINING COMPANY.**—This company, just organized, is a consolidation of the Durango and Hazelton Mountain companies of Durango. The capital stock is placed at \$2,000,000; one of which is preferred stock and the remainder common. The incorporators are H. Amy, J. A. Davidson, Theodore P. H. Meyer, Spencer Musk, Theodore Knick and Robert Peabody.

#### PITKIN COUNTY.

The great apex-side-line suit takes place on May 15th, before Judge Brewer of the United States Circuit Court. This is the first suit against the Aspen mine.

The ore shipments from Aspen during the week ended the 20th ult. amounted to 1522 tons; 1237 tons to Denver, 225 tons to Leadville and 60 tons to Pueblo.

#### PUEBLO COUNTY.

The Pueblo Board of Trade and Messrs. Holden and Guggenheim, on the 20th ult., closed the contract regarding the building of the new smelter at Pueblo, to which we referred in our issue of April 7th. The

\$25,000 bonus was placed in escrow in one of the Pueblo banks to the credit of the Messrs. Holden and Guggenheim, together with a copy of their proposition, and as soon as they comply with the terms of said proposition the money will be turned over to them and work upon the new smelter will be commenced at once.

#### DAKOTA.

##### CUSTER COUNTY.

The *Custer Chronicle* reports that the property consisting of twelve tin claims, known as the Lord-Thurlo group, situated near the northern limit of Custer, have been bonded by S. H. Emmens and Hugh Henry for \$69,000, the bond to run six months. The property was owned by Capt. C. A. Hazerodt, Charles Harbach, and A. Wilcox. The same parties also took a bond to run until December 31st upon five gold claims adjoining the Penobscot gold lode, seven miles west of Custer, the property of C. A. Hazerodt and Charles Harbach, for \$95,000, and a bond upon 120 acres of placer ground, situated on Laughingwater Creek, near Custer, the property of A. Wilcox, for \$6000, the bond to run six months. Development work has already begun upon the respective properties.

##### LAWRENCE COUNTY.

Dispatches from Deadwood dated to-day state that Central City, two miles above Deadwood, was totally destroyed by fire on the 26th inst. The fire originated in a bakery. The town was in ashes within two hours after the commencement of the fire. All necessary relief is being sent by adjoining towns. There are numerous mines in the vicinity of this place and undoubtedly the different companies are also to be classed among the sufferers.

**IRON HILL MINING COMPANY.**—The company has leased the smelter at Galena for one year. Operations will begin shortly. It is estimated that at present there is available sufficient ore to keep the plant in operation for two months. However, as the market thus created will stimulate mine owners to more extensive operations, it is probable the plant will be enabled to run a much longer time.

#### ENGLAND.

A correspondent writes under date of April 4th, in reference to the Welsh gold-fields, England, that during the last two weeks, at the mines near Dolgelly, in Merionethshire, 460 ounces gold had been obtained from 250 tons quartz. One of the owners had prosecuted two workmen for having in their possession a piece of gold quartz valued at \$50.

#### ILLINOIS.

##### COLES COUNTY.

According to reports another strong flow of natural gas has been discovered near Mattoon. While boring a four-inch hole for water on a farm near Lerna natural gas was struck at a depth of 75 feet. Eight holes were bored on this farm for water, and in seven of them gas was found. In this vicinity the Cunningham gas-well struck last year, on the ridge east of the Champion well, which has supplied gas for light and fuel since 1871.

#### KENTUCKY.

**BIG CREEK GAP COAL AND IRON COMPANY.**—This company has been organized, with a capital stock of \$2,500,000, to develop coal and iron lands in Campbell and Claiborne counties, engage in manufacturing, etc., by B. R. Hutcheff, Hiram Berry, W. E. Bradley, G. F. Berry and J. W. Pruett.

##### BELL COUNTY.

**PINE MOUNTAIN COAL AND IRON COMPANY.**—The company has begun work on its iron ore lands near Pineville.

#### MARYLAND.

##### ALLEGHANY COUNTY.

**CUMBERLAND OIL AND NATURAL GAS COMPANY.**—The work of clearing out the gas well in the "Narrows," near Cumberland, has been completed and every thing is now ready for boring to re-commence. J. W. Humbird & Co., who have undertaken to continue the well to a depth of 600 feet more, referred to in our issue of March 24th, have concluded a contract with Gibson & Giles, of Washington, Pa., to do the boring.

#### MICHIGAN.

The Lake Superior iron ore mines make the prices of the ore market throughout the country, and the opening of the lake contracts is consequently a matter of great consequence. Last year prices were abnormally high, owing to the Lake vessel freights, which were from Ashland to Cleveland \$2.50, where a normal rate, and one which has been paid for this year, is \$1.25 per ton. Last year the vessel owners absorbed all the profits of the trade and left many of the mines to work at a loss, only the largest and most economical mines making any profit. This year the prospect for the mines is far brighter. Contracts have been made at \$6 per ton at Cleveland for Republic ore, \$5.75 for Vermilion, Minn., ore, \$5.25 for Gogebic Bessemer ore, from the Iron King ore, probably the highest grade Bessemer ore produced on the range, and \$5 is named for Chapin Menominee ore, which is higher in phosphorus. Non-Bessemer ores will sell at \$4.50@4.75.

The railroad freights from the Gogebic to Ashland have been reduced to 70 cents (and some hope it will go to 60 cents), with Lake freights \$1.25 and 15 cents for insurance and commissions, such great mines as the Iron King, Norrie, Aurora and Ashland should have a full \$1 per ton net profit, after paying the high royalties ruling in the Gogebic. No doubt the output of the range will increase under this stimulus, but there appears to be some doubt as to whether present prices for ore can be maintained through the season.

In detail the ore rates for the season of 1888 are as follows:

Chicago & Northwestern—Negaunee and Ishpeming and Cascade branch, Menominee Range, Florence and east and Felch Mountain range, to Escanaba, 70 cents; Menominee Range, west of Florence, 75 cents; Republic, Champion and Michigamme to Escanaba, 85 cents.

Duluth, South Shore & Atlantic—Ishpeming to Marquette, 54 cents; Ishpeming to St. Ignace, 85 cents; Republic and Champion to Marquette, 60 cents; Republic and Champion to St. Ignace, 85 cents.

Chicago & Northwestern and Milwaukee, Lake Shore & Western—Gogebic Range to Escanaba, \$1.50; reduction of 25 cents.

Milwaukee, Lake Shore & Western and Wisconsin Central—Gogebic Range to Ashland, 80 cents; reduction of 10 cents.

All-rail rates from Lake Superior mines to Milwaukee, Chicago, Joliet, Appleton and Fond du Lac remain unchanged.

**ISLE ROYALE MINING COMPANY.**—According to local papers a deed executed by H. D. Nelson and wife to this company for an undivided half of lot 2, section 24, town 53, range 33, dated January 19th, 1859, has been recently presented for record to registrar of deeds. The above-named document has been lost for nearly thirty years and was the missing link to the title of a valuable piece of property. The deed was found by a business man in Houghton while looking over some old papers in his office.

#### COPPER MINES.

**CALUMET & HECLA MINING COMPANY.**—It is believed that the statement that No. 1 shaft has been reopened is premature, but it is thought that it will be opened in a few days.

**OSCEOLA COPPER MINING COMPANY.**—It is reported that great improvement is shown south of No. 4 shaft, which is the part of the mine where the company was particularly desirous of finding improvement. The mine is producing a little above the average at present.

**FEWABIC MINING COMPANY.**—An adjourned meeting of this company was held in Boston on the 25th inst. It was voted to change the by-laws and make and sign duplicate certificates of association, and file the same according to the laws of Michigan. The meeting then adjourned to May 15.

**TAMARACK, JUNIOR, MINING COMPANY.**—The weather has interfered with rapid progress at this mine. The engine, compressor and boiler are in place, the shaft house is up, and before the end of this week the miners will be started in No. 1 shaft, which it is estimated will be struck at about 2600 feet, or a little less than half a mile. No. 2 shaft is down in the rock its full size, and sinking has been begun for the cribbing of the shaft.

#### IRON MINES.

W. J. Turner, a receiver of the mining firm of Moore, Benjamin & Co., to-day secured judgment in the Circuit Court against the Atlantic Mining Company for \$9145.34, and the Bourne Iron Mining Company for \$6105.26. Executions were issued to the sheriff of Ashland County to levy on the property of the defendant companies.

**AURORA MINING COMPANY.**—Some 2905 shares of this company's stock, which had been given by John E. Burton to H. M. Mygatt as security for a promissory note for \$20,000, dated November 15th, at 6 per cent interest, was sold at public sale at Milwaukee to Mr. H. M. Mygatt at \$3.47 per share. The company has about 326 men at work and developments are being pushed. The mine has about 55,000 tons of ore in stock and is adding to the amount continuously. Small shipments are being made to the Appleton furnace on an old contract.

**LAKE SUPERIOR IRON COMPANY.**—The explorations in progress on section 16, west of the Lake Angeline mine, now look very promising. Some slate ore of fine quality, carrying some 66 per cent of metallic iron, is now being taken out.

#### MINNESOTA.

##### ST. LOUIS COUNTY.

**MINNESOTA IRON COMPANY.**—The company has applied to the New York Stock Exchange to list \$14,000,000 of its stock.

#### MISSOURI.

##### LACLEDE COUNTY.

The piping of an artesian well at Lebanon, according to press dispatches, is so heavily charged with electricity that small bits of steel adhere to it wherever they touch it. The well is 1,200 feet deep, the water rising in it nearly 1,000 feet, and the pipe extends down some 300 feet.

#### MONTANA.

##### DEER LODGE COUNTY.

**CABLE MINING COMPANY.**—In the damage suit of John Kelly vs. the Cable Mining Company, asking \$30,000 for injuries received in the Cable mine on the 18th of July, 1884, tried in the District Court at Deer Lodge, the jury brought in a verdict of \$10,000 in favor of plaintiff. The case was tried once before, two years ago, at which time Kelly was beaten. He appealed to the Supreme Court and the case was sent back for a new trial.

**HOPE MINING COMPANY.**—Official advices to us show that the bullion production for March amounted to \$25,681.32, and for the first three months of 1888 to \$64,494.84.

#### SILVER BOW COUNTY.

The Harris & Lloyd tunnel property, south of the Mountain View, is under bond to Thomas Couch for six months, the consideration being \$100,000, half of which amount will be paid in the time stated, and the

balance within ninety days afterward. It is thought that Mr. Couch is acting for the Boston & Montana Consolidated Copper and Silver Mining Company.

NEVADA.

CHICAGO MINING AND REDUCTION COMPANY.—The amount of the liens and the cost of suit to cancel the indebtedness of this company at Ophir has been paid over. It is stated that the miners are now certain of getting the money due them for wages.

LINCOLN COUNTY.

YUBA MINING AND REDUCTION COMPANY.—This company has been organized in Salt Lake City, where the principal office will be, with a capital stock of \$2,500,000, shares \$10 each. The company owns the Yuba mine, situated in Ely Mining District. The officers are: W. S. Godbe, President; Benjamin Hampton, Vice-President; H. W. Lawrence, Treasurer; O. J. Hollister, Secretary.

STOREY COUNTY—COMSTOCK LODGE.

We take the following from the Virginia City Chronicle:

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—During the week ended the 14th ult., 1247 tons of ore were shipped to the Morgan mill and 2111 tons to the Eureka mill. The average assay value of all the ore worked at the above mills during the week, according to battery samples, was \$36.43. Bullion valued at \$100,000 was made to the Carson mint.

HALE & NORCROSS MINING COMPANY.—The weekly ore shipments average 1600 tons, showing an average value of \$35 per ton by pulp assays. It is stated that the directors have set May 10th as the date upon which to pay the dividend.

OPHIR MINING COMPANY.—This company will be added to the list of bullion producers as soon as crushing power is available.

OVERMAN MINING COMPANY.—Ore shipments from this mine to the Vivian mill began April 12th. Every other day ten car loads of eight tons each are shipped, making a daily average of 40 tons.

POTOSI MINING COMPANY.—During the month of March there was worked at the mill for account of this company, 1550 tons of ore, yielding bullion of the gross value of \$33,232.91. The cost of reduction was \$10,850, and the net proceeds in bullion amounted to \$22,382.91. The assay value of the ore per ton was \$23.86. The gross average yield in bullion per ton was \$21.45, and the net average per ton was \$14.45.

SUTRO TUNNEL COMPANY.—The company has begun to drive a branch drift from the main line leading to the Foran shaft to connect with the Crown Point 1400 level east drift. The work will be pushed as rapidly as practicable and connection will be made in about four months from date. When the connection is accomplished the draining of the Crown Point and Belcher lower levels will begin at once, as it is said there are known to be extensive reserves of ore above the milling grade below the 1700 level, on which the water is now encroaching.

WHITE PINE COUNTY.

The concentrating mill and works at Seligman are rapidly approaching completion, and will probably be ready to start up in a few weeks.

NEW MEXICO.

SILVER CITY AND PINOS ALTOS RAILROAD.—This company has been incorporated by Lorenzo S. Lapham, Daniel C. Hobart, John Boyle, Jr., George Gordon Posey, and John Boyle, with a capital stock of \$100,000, for the purpose of building a road within or near the city limits of Silver City to a point near the town of Pinos Altos, of about ten miles in length. The increased activity of the mines at Pinos Altos makes the building of this road a great necessity, as there is not water enough in the camp to warrant the construction of larger mills there. Silver City is a more convenient point to crush the ores. Water enough can be easily obtained, and the cost of transporting the ore will be small.

NORTH CAROLINA.

ROWAN COUNTY.

NEW GOLD HILL COMPANY, LIMITED.—This company has been organized in London with a capital stock of \$350,000 in £1 shares. The object is to acquire from the Gold Hill Mining Company, Limited, the mines and all the other property and assets of the company, and to enter into any agreement or agreements for the purpose.

OHIO.

It is stated that the Standard Oil Company has completed all its arrangements for building a pipe line from Lima, O., to Chicago, for the cheap and rapid transportation of the crude oil. The total length of the pipe will be about 210 miles, and the entire investment will aggregate, it is said, about \$2,250,000.

OREGON.

PORTLAND SMELTING WORKS.—The smelting works at Portland will sample and assay free of charge any ores purchased in lots of five tons and upward.

PENNSYLVANIA.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to April 21st.

	1888.	1887.
	Gallons.	Gallons.
From Boston	606,238	1,690,360
Philadelphia	33,281,073	35,040,804
Baltimore	905,514	1,894,689
Perth Amboy	6,639,259	4,730,342
New York	102,330,382	101,990,950
Total exports	143,872,466	145,356,145

UTAH.

BEAVER COUNTY.

HORN-SILVER MINING COMPANY.—The Salt Lake Tribune says that the Horn-Silver is understood to be

making shipments of ore with some regularity, but no returns of amounts and values are available.

BEAVER AND MILLARD COUNTIES.

DICKERT & MYERS SULPHUR COMPANY.—The company is pushing work vigorously at its sulphur mines and making large shipments.

SALT LAKE COUNTY.

NEW FLAGSTAFF MINING COMPANY, LIMITED.—This company has been organized in London with a capital stock of £300,000; shares £1 each. The object is to acquire from the Flagstaff Mines, Limited, the mines and mining property of that company at Salt Lake City, and all other property and assets of the said company, whatsoever and wherever, and to enter into any agreement or agreements for that purpose.

VIRGINIA.

DINWIDDIE COUNTY.

D'ALTON GRANITE QUARRY COMPANY.—This company has purchased 170 acres of stone land, formerly known as Booth's quarries, situated on the line of the Norfolk & Western Railroad, three miles from Petersburg. The quarries opened are only a half mile from the main line.

WASHINGTON TERRITORY.

CLARKE COUNTY.

It is stated that the City Council at Vancouver has received a notification of the acceptance of the proposition of the city by London capitalists for the erection of a smelter at Vancouver, the city giving a bonus of \$25,000. The smelter is to have a daily capacity of fifty tons, and is to be built immediately at a cost of \$75,000 or \$100,000. The company building it is said to have secured mines sufficient to supply the smelter without buying any ores, and will enlarge the works as the ore offered for sale increases. Reports state that an American company is also considering the location of a similar works at Vancouver.

COWLITZ COUNTY.

TURTLE RIVER COAL MINING COMPANY.—This company has let a contract to run a 200-foot tunnel in its mine on the Turtle River. The coal from this mine is of the cannel variety, and will be marketed principally in Portland. It is said that for domestic purposes this coal is excellent. The tunnel will be finished in about 30 days. The officers of the company are: R. C. Smith, President; John Drew, Vice-President; and E. W. Pagett, Secretary.

Continued from page 294

A special correspondent writes us as follows:

COAL-FIELD DEVELOPMENTS IN PIERCE COUNTY. Of these we more particularly note—1st. The Carbonado Hill mines, which shipped 176,000 tons of coal to San Francisco in the year 1886, for the use of the Southern Pacific Railroad Company, and their steamships from Tacoma, per steamer San Pedro, which vessel carries 4000 tons at each trip. The mines are owned and worked by the Southern Pacific Railroad Company and are capable of turning out nearly 2000 tons daily. Three beds, 3½ feet, 4½ feet and 10 feet thick, respectively.

II. The South Prairie coal mines are situated 26 miles from Tacoma. This company shipped 55,000 tons of coal in 1886, four-fifths of which was exported to San Francisco, and the remainder to ports on Puget Sound. Last year the output was enlarged slightly, and for the present, owing to the strike of the miners, the proprietors have closed them rather than pay the advance in wages demanded. The vein worked is good coal, about 4 feet thick, with a dip from 45 to 80 degrees.

III. Bucoda coal mine on N. P. R.R., 38 miles from Tacoma, has been operated for about one year, and has an average output of about 200 tons daily, which is shipped to inland towns in Oregon and Washington Territory on the O. R. & N. Co.'s lines, and elsewhere. It is a soft coal, and like Cedar Mountain mines coal of King County, makes a great deal of small, and much ash.

IV. The Tacoma mine [situated on the N. P. R.R., 32 miles from Tacoma, was opened in 1876 and abandoned and re-opened in 1884. The shipments for the half year of 1885 only amounted to 5431 tons of coal. The coal is mined chiefly for coke making and is previously well washed with water, than coked in 30 coking-ovens near the railway at the mines. The coal is well adapted for blacksmith purposes, and it makes a close grained, hard, bright compact coke, which can be handled freely without making much small, and is worth \$17 per ton at San Francisco, to which place it is shipped in quantity. It is almost equal in quality to the best English foundry coke, containing very little sulphur, and not so much ash as many bituminous lignite coals. It is very similar to the excellent lignite coke of Livingston, Mont.

UNDEVELOPED MINES.

Several in Pierce and adjacent counties are being incorporated and are likely soon to be developed on the N. P. R.R. lines, or on branches in the proximity thereto.

OREGON TERRITORY COAL-FIELDS.

The adjoining territory hitherto has not shown any development of much importance. Coos Bay mines have been long worked, but the output has increased but little. With a view of more economical export of this coal to California a vessel of 1000 tons is under construction which will be better able to ascend the River Coquille, and be better adapted for the shipment to San Francisco. The quality of the coal is not so good as that from other West Coast coal-fields, cargo lots selling, on an average, at 50 cents per ton lower in price than the coal shipped from Puget Sound. The export trade averages about 44,000 tons yearly and remains nearly stationary.

For the last 16 years some fairly good bituminous lignite coal has been known to exist near St. Helens and Columbia cities, on the range of hills running

parallel with and near the Columbia River. The bed has a slight dip, is 12 feet thick, and contains much shale and clay; not more than one third of the bed is coal, the thickest seam being only two feet. A lower bed is known to exist, and a third and fourth seam may be found, as the indications and formations are the same as at Coos Bay and elsewhere in Oregon and Washington Territories. The dense timber lands make it difficult to explore this and other ranges in Oregon, so that the coal area is not known in this territory. It is not improbable that the proposed railway from Portland to Astoria will soon be constructed and will open up some fairly good paying coal-fields. The owners are willing to sell at a reasonable price and await development by others. The timber is well worth \$20 per acre, with economical facilities for shipment. Whatever energy is brought to bear in the development, it is not ever likely to be a serious competitor to Washington Territory.

BRITISH COLUMBIA COAL FIELDS.

These are being developed on the island of Vancouver by Messrs. Dunsmuir & Sons, in a new section, at Comox, 60 miles further north than Nanaimo, and only 10 miles from the coast, where the coal can be sent by sea, and very soon by rail, to the coast towns. The extension of the railroad, by ferry, across the Straits of Fuca, in connection with lines in the United States, being in the hands of enterprising railroad capitalists, will soon be accomplished.

WEST VIRGINIA.

MARION COUNTY.

MONTANA COAL AND COKE COMPANY.—This is one of the many companies which has decided to adopt the use of electricity for lighting its mines, and will also put in electric motors for hauling the coal to the coke-ovens.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 27.

Production Anthracite Coal for week ended April 21st, and year from January 1st:

Tons of 2240 LBS.	Week.	Year.	1887.
P. & Read RR. Co.	1,179,354	2,235,796	
Cent. R. R. of N. J.	1,405,706	1,372,190	
L. V. RR. Co.	166,921	1,538,924	2,125,483
D. L. & W. RR. Co.	105,305	2,073,322	1,612,670
D. & H. Canal Co.	65,979	1,386,510	1,218,905
Penna. RR.	69,172	1,285,638	927,795
Penna. Coal Co.	17,705	435,054	408,746
Total	534,984	9,304,508	9,901,585
Increase			
Decrease	106,896	597,065	

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

Production for corresponding period:

1883	8,794,071	1885	7,517,982
1884	7,801,179	1886	9,256,177

Production Bituminous Coal for week ended April 21st, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.	Week.	Year.	1887.
Phila. & Erie RR.	5,303	22,174	
*Cumberland, Md.	81,295	1,018,921	860,522
Barclay, Pa.	4,193	58,215	73,435
Broad Top, Pa.			
H. & Broad Top, RR.	5,992	130,610	134,017
Cleaveland Region, Pa.			
Snow Shoe	3,066	47,664	57,630
Karthus (Keating)	768	58,468	64,492
Tyrone & Clearfield	65,555	1,110,444	980,150
Tipton	1,673	16,173	
Allegheny Region, Pa.			
Galtzitz & Mountain	15,752	297,705	261,825
*Pocahontas Flat Top Coal.			
Norfolk & West, RR.	34,512	490,428	359,967
Kanawha Region, W. Va.			
Ches. & Ohio RR.	41,489	578,680	466,247
Total	259,598	3,823,482	3,198,255

Tons of 2240 lbs.	Week.	Year.	1887.
WESTERN SHIPMENTS.			
Pittsburg Region, Pa.			
West Penn RR.	8,252	125,644	102,595
Southwest Penn. RR.	1,344	33,474	52,937
Pennsylvania RR.	4,917	89,635	74,939
Westmoreland Region, Pa.			
Pennsylvania RR.	39,286	527,467	493,254
Monongahela Region, Pa.			
Pennsylvania RR.	6,613	95,448	109,258
Total	63,412	871,668	832,983

Grand total 320,010 3,701,150 4,031,238  
Production of Coke on line of Pennsylvania RR. for week ending April 21st, and year from January 1st, in tons of 2,000 pounds: Week, 68,850 tons; year, 1,180,194 tons; to corresponding date in 1887, 1,376,525 tons.

Anthracite.

We have had many opportunities during the week to learn that our assurance that the companies would amicably arrange the proportions of the output has had an excellent effect upon the trade generally. The fear that disagreement would culminate in a break in the market naturally led purchasers to hold off and to discredit the companies' circulars. This was especially apparent among the representatives of the independent operators, and there was consequently very heavy cutting in prices. As recorded in our last issue and in that preceding it, our announcement that the quota for the current month is about 2,600,000 tons and for next month will probably not exceed 2,500,000 tons, followed by the actual curtailment of production by nearly all of the companies and the scarcity of cars to individual operators, which obliged them to curtail, has carried conviction to a good many in the trade that the old arrangement and



good feeling between the companies will be maintained for the present at least.

Companies' circulars remain unchanged, and though the market has not yet come up to them, there is a decidedly better tone prevailing, and prices actually obtained are perhaps ten cents a ton better than they were a week ago. If the restriction in output is strictly maintained, there can be little question that in a short time prices obtained will be so near the circular rates that the companies will be enabled to handle a much larger tonnage than they have recently been marketing. The stocking places are all full, or nearly so, and the railroads are filled with loaded cars. One company is said to have 6000 loaded cars standing on its tracks and others are in almost the same condition. It is, therefore, very easy to excuse a refusal to give cars to individual operators. Some of the Lehigh operators are complaining of the dullness in the fine sizes, pea coal and buckwheat, but this is not the case with the free burning coals, though the inroads of bituminous are likely to continue; and even perhaps to be increased under the lower prices which some bituminous producers are offering their coal at.

The stoppage of a number of the Lehigh furnaces is likely to be a serious matter to the anthracite trade and to the railroads if it should be continued for any length of time. The furnaces very properly demand a reduction in the price of coal in order to enable them to compete with Southern iron, and with iron made from Lake Superior ores and Connellsville coke, which have been reduced in cost.

At the present price of anthracite lump the mines receive but little over \$2 a ton, which practically leaves no profit after paying the usual royalties. The railroad companies, on the contrary, charge enormous freight rates, as much as two and a half to three cents a ton-mile for lateral rates, and they can well afford to reduce these rates by fully 25 cents a ton. This is what the furnace companies ask, and what we understand the railroad companies refuse to accord.

Nominally prices remain as follows: Broken, \$3.75; Egg, \$4; Stove and Chestnut, \$4.25; Pea, \$3 to \$3.80 for free burning coals, f. o. b. Actual prices obtained by individual operators or their agents may be quoted as follows: Broken and Egg, \$3.50 and upward; Stove and Chestnut, \$3.75 and upward; Pea, \$2.70 to \$2.90 and upward, f. o. b. for free burning coals.

We have the pleasure of extending the hand of fellowship and welcoming to the ranks of the coal trade Mr. Frank M. Kelley, who has been placed in charge of the New York office of the Philadelphia & Reading Coal & Iron Company.

Although Mr. Kelley is new to the trade, he comes equipped with the experience and judgment of many years connection with railroad and transportation interests, which will enable him soon to become familiar with the details of the new position to which he has been called. We feel confident that in Mr. Kelley the trade will find a pleasant associate and the Reading Company an efficient officer.

After May 1st the New York offices of the Reading Company will be in the Washington building, No. 1 Broadway.

**Bituminous.**

The bituminous coal trade is in a critical condition. The only large contract that has been made here during the week is that of the New York & New Haven Railroad, which was at about the prices paid last year. This is a little off color, but it is not as serious, perhaps, as the cutting that has been done in the East. Our Boston correspondent's letter in another column gives some particulars of this, and the trade here generally is a good deal exercised over it. It appears that the Pocahontas Company has been the chief sinner. It is pushing out to capture the trade of others where it can.

Naturally where a new coal is to be introduced, some advantage has to be given to the consumer to take him away from his old trade, and that advantage has been given rather freely; to such an extent in fact as to produce the impression pretty generally that Pocahontas coal is not quite as good as those interested in it would like to have believed. We can see no benefit to come from this policy, for it is certain that where the Pocahontas reduces prices the other companies will meet them, and so the down grade having been reached there is no telling where it will stop. The Cumberland and Clearfield coals could probably allow the Pocahontas something on quality, but if they are going to work together, the prices which have been established should be lived up to on all sides. We quote \$2.50 to \$2.60 f. o. b. at the shipping ports, otherwise quotations are nominally unchanged.

**Boston.** April 26.

[From our Special Correspondent.]

The market for anthracite coal has seemed to be somewhat stronger of late, but there is not enough doing to thoroughly establish a market. The companies show more firmness in holding to their prices than was expected, but individual operators are hustling all the coal possible to tide-water. It is lately reported that the companies have begun to curtail the supply of cars afforded individual shippers. This lessens the amount of individual coal offering, which until now has been quite large. The small sizes of coal are in light supply, comparatively speaking. There is a fair supply of stove coal offered to the Eastern trade and more broken coal, while egg coal is quite abundant and lower in price. About the scarcest thing on the list is Lykens Valley coal. There is a much larger demand for it from this market than can be supplied, and fancy figures are being asked, say as high as \$5.25 to \$5.50 f. o. b.

The movement in bituminous coal is small unless transactions are kept covered up. There is great activity among salesmen, and every order has been

solicited almost to the last degree. Contract prices do not get out as yet, and the pretense of holding strictly to \$2.60 f. o. b. is still maintained. There continues to be more or less coal openly offered at a lower price, however, by parties who do not consider themselves bound by the pool. While the Cumberland coal companies have the reputation of holding better to the pool price than the Clearfield people, still there is Cumberland coal to be had at cut prices beyond a question. I met a party the other day who sells coal outside the pool, and who bid away down to get a contract, and found that he was still the highest bidder, although several pool shippers were in competition. It was an eye-opener for him, he said, for he thought he was sure of that contract.

It is generally conceded that all contracts contain the protection clause so-called, whereby the buyer has the privilege of taking the unfilled portion of his contract from other parties if at any time his shippers refuse to meet the lowest figures in the market for the same kind coal. On this account great pains are taken to have no open rupture of the pool and consequent demoralization of the market. The outlook is not a very hopeful one, however. Among recently reported contracts is that of S. D. Warren & Co., paper manufacturers, for 30,000 tons. The East Boston Ferry contract for 7000 tons drew out bids of from \$3.84 to \$4.13 delivered.

The freight situation has been a little stronger. We quote, exclusive of discharging: New York, 70 to 80c.; Philadelphia, 90c. to \$1.00; Baltimore, \$1.05 to \$1.10; Newport News and Norfolk, 90c. to \$1.05; Richmond, \$1.15 to \$1.25.

There is a slight movement at retail.

**Buffalo.** April 26.

[From our Special Correspondent.]

On and after May 1st the wholesale prices for anthracite coal will be as follows:

On cars at Buffalo, at the Niagara River Bridge, for shipment West, \$4.25 for Grate and Egg, \$4.50 for Stove and Chestnut per gross ton.

Free on board vessels Buffalo, \$4.55 for Grate and Egg, \$4.80 for Stove and Chestnut per gross ton.

The retail prices will be announced on Monday next, to go into effect on May 1st.

The Buffalo Water Commission will try natural gas as fuel at the main pumping station, and arrangements are being made to place it under one boiler. If the gas answers the purpose, a large sum can be saved. It is estimated 10 per cent less than coal. The coal bill for 1887 was \$64,000. The wages question is also a factor in the experiment, as the labor of many workmen would be saved.

The situation of the ice embargo at the Straits of Mackinaw is practically unchanged, although the latest news received is more encouraging. Yesterday "thermometer 56 degrees, with warm wind, ice rotting," was the substance of a telegram. Another dispatch confirmed this account, with this added: "A few days more warm weather will make an opening in the ice above, which is piled up and remains solid. It is probable now that a break up will occur within ten days."

The following items may prove interesting: A propeller and three schooners have been chartered to carry coal from Ogdensburg to Milwaukee at \$1.30 per net ton. A season contract for about 25,000 tons of ore has been closed at \$1 per ton from Escanaba to Lake Erie ports, and also for 75,000 tons from Marquette to Ohio ports at \$1.25 per ton. Another contract is being prepared for 25,000 tons from Ashland for Lake Erie ports at \$1.25 per ton, to be delivered before October 15th.

A Western newspaper item says that the Chicago coal dealers are preparing to make a stand against paying more than 50c. per net ton for coal freights from Buffalo to that port. A deadlock is predicted after the sailing of the first fleet of the season by many, but our vessel men are determined to hold to present rates.

Latest freight engagements to Buffalo for coal are: To Toledo and Sandusky, 50c.; and Chicago 75c. per net ton. A shipper offers 65c. for a vessel to Duluth.

Line boats for western ports have commenced taking package freight at their warehouses here.

A vessel from Toledo arrived at Port Colborne, on April 23d, bound to Ogdensburg with corn. She met with little obstruction from ice. On the same day the Welland Canal was opened.

It is informally announced that the New York state canals will be opened about May 10th, unless the Straits are navigable sooner than at present expected. The boatmen wish the canal opened about the time the western fleet arrives and not before.

From the roof of our Board of Trade building Lake Erie can be seen, with solid ice extending from break-water for about five miles, then a wide strip of blue water, then as far as eye can reach rough ice. Down Niagara River and inside Erie Basin are large masses of ice, those in the river very slowly passing down. Weather a shade milder. "The rays from the sun are honeycombing the ice," says a grain inspector who has just come from the docks and has been conversing with vessel men.

**Montreal.**

The following gentlemen have been elected officers of the Montreal Coal Exchange for the ensuing year: President, Robert Evans; Vice-President, J. F. Hott; Secretary, Robt. Bell; Treasurer, W. S. Patterson; Directors, James E. Kelly, Peter McCroly and W. S. Patterson.

**Pittsburg.**

[From our Special Correspondent.]

The coal market continues steady, with a fair trade demand. The river shipments for 1888 were large, and prices have been fairly maintained. The price-

pal boats that went out on the last rise have returned empty. They have been forwarded to the pools and are being loaded for the next rise. The rates are:

PRICE OF COAL PER 100 BUSHELS = 7600 LBS.

First pool.....	\$4.75	Fourth pool.....	\$3.25
Second pool.....	4.25	Railroad coal.....	5.00
Third pool.....	3.75		

In Connellsville coke we have to report a very unsettled market. Prices nominal to all points—below the actual cost of production. Of course this condition of affairs must have an end, and that before long. Blast furnace f. o. b., \$1—to dealers, \$1.10. Foundry, \$1.25.

Freights.—New rates to Pittsburg, 80 cents per ton; Chicago, \$3; Springfield and Urbana, Ohio, \$2.75; Toledo, \$2.90; Cincinnati, \$2; Indianapolis, \$2; all valley points, \$1.50; East St. Louis, \$3.50; St. Louis, \$3.65. Other points same proportion.

**FREIGHTS.**

The latest actual charters to April 26th, per ton of 2240 pounds:

**From Baltimore to:**—Banzor, Me., 1.05; Bath, 1.10 to 1.15; Boston, 1.05 to 1.10; Bridgeport, Conn., .95 to 1.00; Charleston, .80 to 1.00; Fall River, .95 to 1.00; Galveston, 3.00 to 3.10; New Bedford, .95 to 1.00; Newburyport, 1.30; New Haven, .95 to 1.00; New London, .95 to 1.00; New York, .90; Pawtucket, 1.10; Portland, 1.05 to 1.10; Portsmouth, N. H., 1.10 to 1.15; Providence, .95 to 1.00; Salem, Mass., 1.05; Savannah, .75 to .90; Williamsburgh, N. Y., .90; Wilmington, N. C., 1.00 to 1.10.

**From New York to:**—Bath, Me., .75; Beverly, .80; Boston, .70; Bridgeport, Conn., .55; Cambridge, Mass., .70 to .75; Cambridgeport, .70 to .75; Charlestown, .70; Chelsea, .70; Com. Pt., Mass., .75; F. Boston, .70; E. Cambridge, .70 to .75; E. Greenwich, R. I., .75; Fall River, .75; New Bedford, .80 to .85; Newburyport, .90; New Haven, .55; New London, .70 to .75; Norwich, .75; Portsmouth, N. H., .85; Providence, .75; Salem, .70.

**From Philadelphia to:**—Beverly, \$1.00; Boston, .90 to 1.00; Cambridge, 1.05 to 1.10; Charleston, .80; Charlestown, .90; Chelsea, .90 to 1.00; Com. Pt., Mass., .95 to 1.00; East Cambridge, .95; Falls River, .80 to .90; Gloucester, 1.05; Lynn, 1.25; Marblehead, 1.05; Milton, 1.10; New York, .90; New Bedford, .80 to .90; Newburyport, 1.15; Norfolk, .60; Portsmouth, N. H., 1.15; Richmond, Va., .70; Salem, Mass., .90; Savannah, .80; Washington, .85; Wilmington, N. C., .80.

\* And discharging, 3c. per bridge extra. † Alongside.

**MARKETS.**

NEW YORK, Friday Evening, April 27.  
Prices of Silver per ounce troy.

Apl.	Sterling exchange	Lond'n Pence.	N. Y. Cents.	Apl.	Sterling exchange	Lond'n Pence.	N. Y. Cts.
21	4.87½	42½	33	25	4.87½	42½	92¾
23	4.87½	42½	33½	26	4.87½	42½	93½
24	4.87½	42½	33½	27	4.87½	42½	93½

The market has been quiet, but with the announcement of a reduction in the rupee offerings for next Wednesday there is a prospect of some improvement in silver.

The British bi-metallic league recently held a meeting at Manchester, at which a number of papers protesting against the present English monetary system were read. It is not apparent that the spasmodic agitation of the silver question in Great Britain goes much further than the reading of papers. British conservatism is always slow to move, and in regard to bi-metallicism there seems to be no motion whatever.

**Foreign Bank Statements.**—The governors of the bank of England at their weekly meeting made no change in its rate for discount, and it remains at 2 per cent. During the week the bank gained £256,000, and the proportion of its reserve to its liabilities was raised from 40.82 to 40.84 per cent, against a decline from 50.90 to 50.09 per cent in the same week of last year, when its rate of discount was the same as now. Thursday the bank lost £100,000 bullion on balance. The weekly statement of the Bank of France shows a gain of 4,900,000 francs gold and a gain of 1,275,000 francs silver.

**Copper.**—The tone of the market has been very strong throughout the whole of the past week, and in addition to very satisfactory orders from consumers, several parcels have also changed hands at full prices for account of speculators. More disposition can now also be observed to make contracts for delivery during the later months of the year. European advices report a fair trade, and prices of Chili Bars remain firm at £80 5s. to £80 10s. for Spot, while three months futures are quoted £77 10s. to £78.

Manufacturers are now well booked with orders, and the complaints which were rife early in the year that consumption had seriously fallen off are not now often heard. As far as we have been able to ascertain, however, the orders in hand do not extend beyond the next 2 or 3 months.

We quote to-day Lake Copper, spot, \$16.70; May, \$16.70; June, \$16.70; July, \$16.70.

The supply of outside brands is now rather more plentiful, and a good trade has been done at about 1c. below the Lake copper quotations.

The Boston Transcript says: The Boston & Montana copper people had figured the April product at from 600 to 700 tons of matte, but in a letter just received from the superintendent, the estimate is made at between 800 and 900 tons of matte, of which 60 per cent, or between 960,000 and 1,080,000 pounds is refined copper. This compares with 1,470,641 pounds in March, 979,179 pounds in February and 634,039 pounds in January. An accident to the machinery caused a loss of a number of days, and lessened the

product. From May 15th, the mine will produce at least 1000 tons, or 2,000,000 pounds of refined copper per month.

The company is shipping from one to three car-loads of matte, each car containing about 38,000 pounds daily. This matte assays over sixty per cent of refined copper. Shipments were begun October 3d, 1887, and the total from that date to April 17th was 8,347,148 pounds of matte, or fully 5,000,000 pounds of refined copper.

All of the Lake Superior copper companies have signed the contracts with La Société Industrielle des Metaux calling for the sale of their products for the next three years. The final agreement was reached with the Franklin and Huron companies on the 25th inst., and the great copper "deal" is now complete.

The Calumet & Hecla is about to open the mine where the fire occurred. In fact, its opening has been announced, though we understand a little prematurely. The fire is supposed to be extinguished.

The success of the copper syndicate and the deal in tin lend some encouragement for a new lead combination, which, it is rumored, is contemplated.

The profit of the Wallaroo copper mines, Australia, for the year 1887, was about \$200,000.

The exports of copper from New York during the week were as follows:

Table with columns: To, Copper matte, Lbs., and value. Includes entries for Liverpool, S. S. City of Rome, Egypt, Baitic, Chester, Antwerp, and La Bourgoyne.

Tin.—The past week has witnessed very heavy fluctuations in this article, and the inflated prices lately ruling have had another important decline. The difference between the quotation for spot delivery, and near futures is still very great, however, and we have to-day to quote spot 29; April, 28 1/2; May, 24 7/8.

According to cable advices from London these differences between spot and future prices are even more marked in that market than here, as whilst spot tin is still quoted £166, 1st May delivery is quoted £140, and three months forward has been sold down to £110.

The deliveries for this month will be heavier than for some months past, as consumers have been unable to delay any longer making purchases to supply their urgent wants, and as prices have been more tempting they have purchased more freely than for some months past.

At the moment it is very difficult to predict the course of this market during the next few days or months, as it must not be forgotten that the article and the market operations therein are still more or less controlled by the speculators, who could at any time bring about an important change.

Lead.—Quotations are again a little lower, but it would appear that the market is now assuming a more healthy condition, as the prices now ruling allow of manufacturers buying their supplies at figures enabling them to make a fair profit on their manufactured goods. Under these circumstances pretty large quantities have lately been taken up by the trade. Still it must not be forgotten that the stocks which have accumulated in New York are rather considerable, whilst on the other hand the stocks held by Western smelters are not great. Some sales have taken place during the week as low as 4'60, but a rather better tone is now observable, and we have to-day to quote from 4'62 1/2 to 4'67 1/2 for May and June delivery.

Messrs. John Wahl & Co., of St. Louis, telegraph to-day as follows: Our market has declined slowly since our last report. Buyers expecting a decline are holding off, and buy only for immediate wants. Sales will not aggregate over 500 tons at prices ranging from 4'47 1/2 down to 4'37 1/2.

Messrs. Everett & Post, of Chicago, telegraph to-day as follows:

The market is a little easier but the demand is only moderate, and the absence of buyers is effecting a decline. There is very little doing and prices are nominally 4'50. Sales will not aggregate 300 tons.

Spelter continues rather dull and transactions have been insignificant. We have to quote to-day Domestic at 4'65c. to 4'70c., while foreign is held for 5 1/2c. to 5 3/4c., which entirely prohibits business in the latter.

Antimony.—We quote Cookson's, 13c. to 13 1/2c.; Hallett's, 10 1/2c. to 10 3/4c. The English quotations continue somewhat above the parity of these prices.

Chemicals.—The general lack of animation which has characterized the chemical trade for the past few months continues in all its glory. There is scarcely a notable feature in the market, beyond the very slight increase caused by higher freight rates from Europe.

Carbonated soda ash 48 per cent is quite firm, owing to very limited supplies to arrive; 1'22 1/2 @ 1'25c. is quoted, but buyers are not taking these figures very readily. High test is without animation, the better feeling that has prevailed lately having apparently all died out. The nominal quotations are 1'12 1/2 @ 1'15.

Caustic soda ash 48 per cent is very in limited demand, but the market has a firm tone, owing to difficulty in obtaining ocean freight rates at reasonable figures. Goods for future delivery are in limited offering at 1'22 1/2 @ 1'25 while small lots on the spot bring 1'27 1/2 @ 1'30.

Caustic soda is without much change. Advices from abroad show the English market to be improving, and the change in some degree affects us, though there is hardly a quotable change in prices. In 70 and 74 per cent goods a fair business is done, but 60 per cent is without much animation. We quote prices as follows: 74 per cent, 2'20c.; 70 per cent, 2'22 1/2 @ 2'25, and 60 percent, 2'40 @ 2'50c., as to quantity, seller, etc.

English sal soda continues firm but dull. We hear of no business since our last, except in a jobbing way, to supply the immediate wants of consumers. Small lots on the spot are quoted at 1.05 @ 1.15, according to quantity, seller, etc. Future arrivals at 95c. to \$1.

American sal soda is in good demand, contract orders keeping manufacturers from accumulating heavy stocks. The prices vary according to combination figures from \$1 to \$1.15, as to quantity, etc.

Bleaching powder is without much animation, and though the stock on the spot is light, the lack of inquiry prevents any rise in prices. The quotations range from 1'85 @ 1'92 1/2, according to quantity, seller, etc.

Refined alkali, 36 per cent, is in the same position as last week, entirely without animation. The quotations of 1'10 @ 1'12 1/2 are merely nominal; 48 per cent is only wanted to a limited extent, and that in a jobbing way. High test is not inquired for at all, and it is impossible to give fair quotations in the absence of business.

Acetic acid continues quiet outside the contract business. The demand may only be called fair, though sufficient to prevent accumulation of stocks or closing down of works. The long continued competition seems no nearer a settlement, and prices rule as for some months heretofore.

Sulphuric acid 66° is in moderate demand, though business is mostly of a jobbing character. Prices rule as hitherto, 90 @ 95c. for large lots, \$1 @ \$1.10 for smaller quantities.

Oxalic acid continues in a rather unsettled position. The business of the past week may be called fair, prices ruling from 6 1/2 @ 6 3/4c. for large quantities, 7c. for smaller lots.

The market on fertilizing chemicals has improved slightly during the past week, though there are in most cases no quotable changes in prices. We continue to quote: Dried blood, high grade, 2'25 @ 2'50; low grade, 2'15 @ 2'20. Tankage, high grade, 21 @ 21 1/2; low grade, 18 1/2 @ 19 1/2. Refuse, bone black, \$16.50 @ \$17.00 per ton. Ground steamed bones, 25 @ 27 per ton. Fish scrap, f.o.b. factory, \$25.00. Azotin, \$2 20 @ \$2 25 per unit; Sulphate of ammonia, \$3.20 @ \$3.25 per cwt.

Muriate of potash is firm and the demand continues brisk. There is no change in quotations, which are steady at 1'77 1/2 @ 1'80 on the spot, 1'72 1/2 for future sail shipments, and 1'77 1/2 prompt steamer.

Kainit is very scarce and the demand continues good; \$11.50 per ton is demanded for small lots ex store futures at \$8.50 @ \$8.75 per ton.

Double manure salt is not in very good demand, and we note no change in quotations since our last.

Nitrate of soda continues dull and depressed, the large offerings of spot supplies attracting no buyers; 1'95 @ 2c. is the price asked for goods afloat in port or ex store. Futures are a little firmer, but we hear of no important transactions.

The brimstone market is recovering somewhat from the depression of the past few weeks, and a better feeling prevails on futures, owing to the advance in freights noted in our last. The spot market is without much

IMPORTATIONS AT NEW YORK DURING WEEK ENDING APRIL 24, AND FROM JAN. 1 TO SAME DATE.

Large table with multiple columns for different metal categories: Spelter, Pig-Iron, Steel and Iron Rods, Old Rails, Bar-Iron, Scrap-Iron, Sheet Iron, and Iron Ore. Each category lists various companies and their respective import quantities and values.



WEEKLY REGISTER OF CURRENT QUOTATIONS.

CHEMICALS.

Table of chemical prices including Acid-Acetic, Ammonia, Alum, Aqua Ammonia, Arsenic, Barytes, Bleach, Borax, Bromine, Cement, Chalk, China Clay, Chrome Yellow, Cobalt, Copper, Cream of Tartar, Emery, Feldspar, Fuller's Earth, Gypsum, Iodine, Kainit, Lead, Lime Acetate, Litharge, Magnesite, Manganese, Mercuric Chloride, Mineral Wool, Mica, Phosphate Rock, Phosphorus, Plumbago, Potassium, Pyrites, Quartz, Rotten Stone, Soda Ash, Sulphur, Tannin, Vermillion, Vitriol, Zinc Oxide.

Table of building materials including Bricks, Haverstraw, Front bricks, Building Stone, Brownstone, Granite, Slate, Red roofing, Black roofing.

BUILDING MATERIAL.

Table of building materials including Bricks, Haverstraw, Front bricks, Building Stone, Brownstone, Granite, Slate, Red roofing, Black roofing.

THE RARE METALS.

Table of rare metals including Aluminum, Arsenic, Bismuth, Cadmium, Calcium, Cesium, Cerium, Chromium, Cobalt, Didymium, Erbium, Gallium, Glucium, Indium, Iridium, Lanthanum, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Niobium, Osmium, Palladium, Platinum, Potassium, Rhodium, Ruthenium, Rubidium, Selenium, Sodium, Strontium, Tantalum, Tellurium, Thallium, Titanium, Thorium, Tungsten, Vanadium, Yttrium, Zirconium.

METALS.

Table of metals including Aluminum, Copper, Lead, Tin, Zinc, Antimony, Quicksilver.

IRON AND STEEL.

Table of iron and steel products including American Pig-Iron, Scotch Pig, Dalmellington, Summerlee, Shots, Cable to day to the Metal Exchange, Scotch Warrants, Coltness, Langloan, Sumnerrie, Gartsherrie, Glengarnock, at Ardrossan.

Table of iron and steel products including Dalmellington, Eglinton, Bessemer Pig, Foreign, Domestic, Spiegeleisen, German, English, Ferro Manganese, Steel Blooms, Steel Billets, Steel Nail Slabs, Steel Wire Rods, Steel Rails.

IRON AND STEEL.

Table of iron and steel products including Structural Iron and Steel, Bridge Plate, Angles, Steel Angles, Beams and Channels, Steel Plates, Tank and Ship, Boiler shell, Flange, Fire-Box, Iron Pipes, Merchant Steel, Crucible machinery, Bessemer machinery, Cast-Iron Pipe, Wrought Iron Pipe, Lap-Welded, Boiler Tubes, Rail Fastenings, Wrought Scrap, Cast Scrap, Old Car Wheels, Old Rails, Nails.

LOUISVILLE PRICES.

Table of Louisville prices including Hot Blast Irons, Missouri Charcoal, Large Irons, Car Wheel and Malleable Irons.

PITTSBURG PRICES.

Table of Pittsburgh prices including Coke or Bituminous Pig, Charcoal Pig, Warm-Blast, Muck-Bar, Steel Blooms, Steel Slabs, Steel Crop Ends, Steel Bloom Ends, Steel Billets, Old Iron Rails, Old Steel Rails, No. 1 W. Scrap, No. 2 W. Scrap, Steel Rails, Bar Iron, Nails, Steel Nails.

PHILADELPHIA PRICES.

Table of Philadelphia prices including Foundry No. 1, Foundry No. 2, Gray Forge, Bessemer Pig, Steel Rail Blooms, Foreign Bessemer, Spiegeleisen, Scrap, Selected, No. 1, Carro Scrap, Muck-Bars, Merchant Iron, Plate Iron.

Table of stock market quotations including Tank Iron, Steel Iron, Angles, Beams and Channels, Nails, Steel Rails, Old Rails.

STOCK MARKET QUOTATIONS.

Baltimore, Md.

Table of Baltimore stock market quotations including Atlantic Coal, Balt. & N. C., Big Vein Coal, Conrad Hill, Diamond Tunnel, George's Crk. C., Lak-Chrome, N. State, Balto., Ore Knob, Silver Valley.

Birmingham, Ala.

Table of Birmingham stock market quotations including Ala. Cond. C., Bir. Min. & Mfg., Decatur L. Imp. & Fur., Decatur Min. L., Eaterprise Mfg. Co., Sloss I. & S., Sheffield C. I., Woodstock S&I.

Pittsburg, Pa.

Table of Pittsburg stock market quotations including Allegheny Gas, Bridgewater Gas, Charlotte Mg. Co., Charters Val. Gas, Columbia Oil Co., Consigneer Mg. Co., Forest Oil Co., Geobetic L. Syn., Kittanning Gas, La Noria Mining, Lustre Mining, M'Inturers' Gas, Nat. Gas Co. of W. Va., N. Y. & C. Gas Coal, Ohio Valley Gas, Pennsylvania Gas, People's Nat. Gas, Philadelphia Gas, Pine Run Gas, Silverton Mining, South Side Gas, Tuna Oil Co., Washington Oil, W'h'se Air-Brake, West House Brake, Westmoreland & Cambria Gas, Wheeling Nat. Gas, Yankee Girl Min.

Foreign Quotations.

Table of foreign quotations including London, April 14, and Paris, April 12, listing various commodities and their prices.



DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS, DIVIDENDS, NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS. Lists 150+ mines with their respective financial details.

G. Gold, S. Silver, L. Lead, C. Copper. \* Non-assessable. † This company, as the Western, up to Dec. 10th, 1881, paid \$1,400,000. Non-assessable for three years. ‡ The Deadwood previously paid \$275,000 in eleven dividends, and the Terra \$75,000. Previous to the consolidation in Aug., 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia, \$42,300,000. Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1875, the Copper Queen had paid \$1,350,000 in dividends.



NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table of New York Mining Stocks Quotations, divided into Dividend-paying and Non-dividend-paying mines. Columns include Name and Location of Company, dates from April 21 to April 27, and Sales. Lists companies like Adams, Alice, Amador, etc.

\*Dealt in at the New York Stock Ex. Unlisted Securities. †Dealt in at the Metal Ex. ‡Assessment unpaid. Dividend shares sold, 23,645. Non-dividend shares sold, 89,500. Total New York, 112,145

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations. Columns include Name of Company, dates from April 20 to April 26, and Sales. Lists companies like Atlantic, Bodine, Bonanza, etc.

\* Ex dividend. Boston: Dividend shares sold, 9,561. Non-dividend shares sold, 12,755. Total Boston, 22,316.

COAL STOCKS.

Table of Coal Stocks. Columns include Name of Company, Par value of shares, and dates from April 21 to April 27. Lists companies like Cameron Coal, Ches. & O. RR, etc.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations. Columns include Company, and dates from April 20 to April 26. Lists companies like Alpha, Alta, Belcher, etc.

\*\*Of the sales of this stock, 112,548 were in Philadelphia, and 464,330 in New York. Total sales, 790,185.

animation, and the quotations, 19.50@20.50 are more or less nominal.

Quicksilver is quiet, and quotations are more or less nominal at 61@63c.  $\frac{7}{16}$  lb.

Advices from Panama state that the General Government has determined to abolish the salt monopoly on the Isthmus.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, April 27.

In some quarters there is a better feeling prevailing as to the future of pig-iron. This is based chiefly on the general improvement in business as indicated in the healthier tone of the stock market, but it has hardly made itself felt in any increased demand for pig-iron. The consumption of all kinds of pig-iron is much less than it was at this time last year. Pig-iron is being much pressed for sale and in small lots. This applies principally to Southern and Western irons.

The Lehigh furnaces have been making a concerted effort to obtain lower freights on coal and ores, nominally to enable them to be on an equal footing with Southern furnaces, which have the advantage of very low rates. Up to the present time they have not succeeded in getting any reduction from the railroad companies.

Scotch irons are very dull and a little weaker in price. The importations this week amount to 900 tons, but the demand is so light that several 200 ton lots have been left on steamer to return to Scotland as ballast in the absence of grain freights. Importations hardly bring cost. Several lots of Dalmellington are reported as being sold at \$18, which is much less than cost of importation. There has been a little demand for Bessemer pig, in which prices are decidedly weaker.

Sales of steel rails during the week will aggregate nearly 35,000 tons, entirely for roads south of the Ohio River. Prices are perhaps a little less firm, and old rails are in rather more demand, but prices are hardly any firmer. Several inquiries have been on the market, but no business of moment has been done, consumers appearing to think that prices can be squeezed down indefinitely.

The Bulletin of the American Iron and Steel Association publishes the following statement of British iron and steel exports in March:

The exports of iron and steel from Great Britain to the United States in March last amounted to 50,064 gross tons, against 42,476 tons in February, and 52,018 tons in January. The following table gives the details of British exports to this country for each month since October last:

ARTICLES.	Gross tons.				
	Nov.	Dec.	Jan.	Feb.	March
Pig-iron.....	22,925	25,407	14,183	7,405	14,311
Old iron.....	5,540	2,716	1,792	1,334	3,426
Steel wrought.....	9,707	6,551	4,311	3,708	3,563
Tin plates.....	18,467	21,322	21,372	21,712	25,263
Hoops and sheets.....	525	1,785	1,500	1,798	1,273
Bar, angle, etc.....	669	585	825	1,251	188
Rails.....	19,078	12,820	7,490	4,850	1,886
Cast and wrought.....	202	274	565	418	156
Total.....	77,113	71,440	52,018	42,476	50,064

The total exports of iron and steel from Great Britain to all countries during March amounted to 295,418 gross tons, as compared with 342,934 tons in March, 1887, and 255,210 tons in March, 1886. The total exports of iron and steel in the first quarter of 1888 amounted to 866,005 gross tons, against 893,433 tons in the first quarter of 1887, and 698,673 tons in the first quarter of 1886.

Louisville, April 24.  
[Reported by HALL BROTHERS & CO.]

The same general tone pervades the iron market, but a better buying movement has displayed itself during the week under review, and several orders for 100, 200, 500, 800 and 1000 tons have been booked mainly for deliveries beginning the latter half of the year. The outlook for the near future of the iron trade through the central West is rather encouraging, and an improved buying spirit is expected. Some furnaces are still refusing to sell ahead at the present prices, preferring to restrict their output or hold their product to selling at the present unremunerative figures. Quotations for cash, f. o. b. cars at Louisville, will be found in our weekly register of prices.

Philadelphia, April 26.  
[From our Special Correspondent.]

**Pig Iron.**—The pig iron makers are realizing the meaning involved in the old saying that when a man is going down hill, every body gives him a kick. The railroad companies can not see how to reduce freights, to the extent at least that makers desire, and it seems quite uncertain whether they will do any thing at all. On top of this come offers from buyers of both foundry and forge for large lots at cost and below it. To make matters worse Southern iron makers and some few Western makers have been consulted within a few days as to what they will deliver certain grades of iron for at certain Eastern points. So far things have not shaped themselves decidedly one way or the other. Quotations are: No. 1, \$20@21; Southern \$19@19.50; No. 2, \$17.50@19; Forge, \$15.50@17. Two or three large producers have renewed expiring contracts, but in a general way business is of small proportions and brokers have very little to say.

**Foreign Material.**—Bessemer is quoted at \$19.50@20. Spiegel, \$16.50@27 (20); \$23.50 (10). Slabs, nominally \$30.

**Muck Bars.**—The exhaustion of stocks among a few consumers has driven them into market, and prices have weakened. Mill quotations, \$28@29. Some

business has been taken very low to keep mills going.

**Merchant Bars.**—Agents for three or four interior mills think business is improving a little, but this opinion is not general. City mill orders are straggling in. Stores are doing a good retail trade. Requirements are becoming more urgent. Prices are \$1.80@1.95. A good order can slip in at less. Western offerings continue.

The rail mills are not booking much large business, though it is said to-day, as it has been before, that there is a large amount of work in reserve, which may and may not be placed during the next ninety days according to developments.

In old rails very little business is possible at present asking prices. For scrap there would be an active demand for choice and No. 1 if holders accepted 50 cents less.

There are no developments in the coal traffic. Quotations will be found in our weekly register of prices.

Pittsburg, April 26.

[From our Special Correspondent.]

The general position of the pig-iron market remains about the same as noted in our last report, with the exception that, if such a thing was possible, business is more depressed for certain descriptions. Consumers are still adhering closely to the hand to mouth policy, determined not to anticipate future wants. Buyers generally seem to be waiting developments with some anxiety, because most of them are reported low in stocks, and know that all are about alike. It is certainly a difficult matter to quote anything very definitely in the present condition of the market, as so much depends upon quality, brand, etc.; but in most cases it is safe to say that if first cost is realized sellers are pretty well satisfied, as in many instances it is believed that sales have been made on terms which cannot return sufficient to let them out without a loss. The Carrie furnace has been banked since the date of our last report. The owners say that the cost of production exceeds the price of pig-iron, and that there is more money in a furnace out of blast than in at the price that iron is selling at this time. While they and others are willing and desirous of continuing in operation, when they can't make both ends meet it is time to call a halt. At this time there are more furnaces out of blast than in. This is something very unusual; a fact nevertheless. A combination of circumstances has so far made the present year one that will long be remembered among the iron men as the most disastrous that has been known for many years; one difficulty is barely adjusted before others are made known. There seems to be no end to the misunderstanding between labor and capital. The present week has been a very exciting one at Braddock between the owners of the Edgar Thomson steel plant and the men formerly employed at that mill. So far everything has been conducted in a peaceable manner; at this writing it looks as if a satisfactory arrangement was not far off. The steel mill has a large number of men at work. The owners say they can obtain all the men they want, but prefer keeping a vacant place for their old hands a short time longer to give them a chance to return.

The coke muddle is still on, with no immediate prospect of a satisfactory adjustment of the difficulties.

**Iron Ore.**—We can report a sale of 7000 tons Lake Superior Bessemer ore on dock at Cleveland, \$5.50 per ton cash. Some dealers are holding out for \$6.

We are reported the following sales:

Coke and Coal Smelted Lake Ore.	
1000 Tons Bessemer.....	17.25 cash.
1000 Tons Bessemer.....	17.25 cash.
850 Tons Bessemer.....	16.85 cash.
500 Tons Bessemer.....	16.85 cash.
500 Tons Gray Forge.....	15.15 cash.
400 Tons Imported Bessemer.....	23.04 mo.
300 Tons Gray Mill.....	15.50 4 mo.
300 Tons White and Mottled Bessemer.....	16.25 cash.
100 Tons Bessemer.....	17.00 cash.
100 Tons Bessemer.....	16.85 cash.
80 Tons Silvery.....	17.00 cash.
50 Tons No. 1 Foundry, all Ore.....	17.25 cash.
50 Tons No. 2 Foundry, all Ore.....	16.75 cash.
25 Tons No. 1 Foundry.....	18.00 cash.

Coke Native Ore.	
100 Tons Gray Forge.....	15.50 4 mo.
100 Tons No. 1 Foundry.....	17.25 cash.
50 Tons Silvery.....	18.00 4 mo.
50 Tons No. 3 Foundry.....	15.50 cash.
50 Tons No. 2 Foundry.....	17.35 4 mo.
25 Tons No. 1 Foundry.....	17.50 4 mo.
25 Tons Silvery.....	17.50 cash.
25 Tons Extra Silvery.....	19.00 cash.

Charcoal.	
225 Tons No. 1 Foundry.....	25.50 cash.
40 Tons Cold Blast.....	27.00 cash.
25 Tons No. 3 Foundry.....	22.00 cash.

Steel Slabs and Billets.	
500 Tons Nail Slabs.....	28.00 cash.
500 Tons Nail Slabs.....	28.00 cash.
300 Tons Billets.....	28.75 cash.

Muck Bar.	
500 Tons May.....	26.85 cash.
500 Tons May.....	26.75 cash.

Cinder.	
350 Tons Mill Cinder.....	2.35 cash.

**FINANCIAL.**

NEW YORK, Friday Evening, April 27.

There is absolutely nothing of interest to report in the mining stock market. Transactions are small, and prices on the whole show a declining tendency.

Nothing is doing in Colorado stocks. Phoenix Lead shows a sale at 50c. Denver City one at 20c. Lee Basin a few at 65c. Silver Cliff again appeared on the list, selling at 8c. Security shows the largest business on the list. The price

opened at 40c. and declined during the week to 30c. Sales were made to-day at from 25 to 55c. Cashier sold at from 9 to 12c. Little Chief at 25c. Dunkin went from \$1.10 to \$1. Colorado Central, which rarely appears on the list, was quoted \$2.25. Bassick at 10c.

Two hundred shares of Alice sold at 65c. per share. Suro Tunnel showed a smaller business as compared with last week, the sales amounting to only 10,100 shares. The prices in the beginning of the week were firm at from 20 to 22c., but towards the close declined to 17c. Consolidated California & Virginia advanced from \$13.25@14.13, but later in the week sold at \$13. The usual weekly transactions occurred in the other Comstock shares.

The Tuscaroras show but little life. Navajo was quoted at from \$1.65@1.50. North Belle Isle went from \$6.50@6.38. Tornado was firm at 70c.

The Taylor Plumas Mill and Mining Company has announced a dividend of 25 per cent in stock, payable to stockholders who have paid their assessment April 26th. No sales of the stock are reported.

Quicksilver Preferred has been active and advanced from \$35 to \$36. Common took a jump from \$9.50 to \$11.13.

Brunswick has ruled at from 18 to 20c. One sale of Hector at 20c. per share is reported.

Some interest was directed to Amador, which was firm at from \$2.20 to \$2.30. Middle Bar declined from 49 to 30c., but later in the week advanced again to 47c.

Bodie showed an upward movement, going from \$2.50@2.85. Bulwer was quiet at from 82@90c. Mono at from \$1.80@1.90. Standard has declared a dividend of five cents per share, but notwithstanding this the stock was lower, going from \$2.80@2.50.

Plymouth Consolidated was quiet at from \$8.38@8.50.

A little more activity is displayed in Cleveland tin, which advanced in consequence from \$1.55 to \$1.70, some 1700 shares changing hands. Homestake shows one sale at \$11.50. Deadwood-Terra one at \$1.60. Caledonia one at \$2. Father de Smet showed more business, selling at from 44 to 45c.

Rappahannock, which has been selling at from 18 to 20c. for many months, declined to day to 11c.

Silver King ruled all week at \$5, but to-day went down to \$4.

Proustite continues on the downward grade, and this week went from \$1.90 to \$1.50. Castle Creek sold at from 9 to 11c.; Holyoke at 6c.

El Cristo was again one of the most active stocks on the list, but continued the declining tendency already shown last week. The price went from \$2.65 to \$2, and to-day advanced again to \$2.25.

The Ontario Silver Mining Company has come forward with its 143d dividend, making a total to date of \$9,125,000. The price of the stock holds its own at from \$28@29. Horn-Silver is quiet at from 85@90c. Stormont shows a sale at 5c.

**Dividends.**

Jay Gould Mining Company, of Montana, has declared a dividend, No. 11, of nine cents per share, or \$36,000, payable April 19th.

Montana Company, Limited, of Montana, has declared a half yearly dividend, No. 12, of fifty cents per share, or \$30,000, payable April 14th.

Ontario Silver Mining Company, of Utah, has declared dividend No. 143, of fifty cents per share, or \$75,000, payable April 30th, at Messrs. Lounsbury & Co., No. 15 Broad street, New York City.

Sierra Buttes Gold Mining Company, of California, has declared a dividend of twelve and one half cents per share, or \$15,312.50, payable April 15th.

Standard Consolidated Mining Company, of California, has declared a dividend No. 73, of five cents per share, or \$5000, payable May 12th, at the Farmers' Loan and Trust Co., No. 22 William street, New York City.

**Assessments.**

COMPANY.	No.	When levied.	D'n'q't in office.	Day of sale.	Am't per share.
Anna, Dak.....	1	Apr. 10	May 10	June 1	.001
Anchor, Utah.....		Mar. 3	May 5	May 26	.10
Belcher, Nev.....	34	Mar. 13	Apr. 17	May 7	.50
Crispin, Ariz.....	1	Mar. 7	Apr. 15	May 5	.10
Crocker, Ariz.....	5	Feb. 5	Mar. 27	May 1	.25
Crown Point, Nev.....	49	Apr. 13	May 16	June 6	.50
Day, Nev.....	16	Feb. 8	Apr. 9	May 7	1.00
Equitable, Utah.....	33	Feb. 14	Mar. 30	May 9	.15
Enterprise M. & M.....	1	Apr. 3	May 4	May 19	.15
Gould & Curry, Nev.....	58	Mar. 12	Apr. 15	May 10	.50
Homeward B'd, Dak.....	5	Mar. 24	May 21	June 21	.001
Idaho, Idaho.....	1	Feb. 15	Apr. 20	May 10	.40
Keyes, Nev.....	1	Feb. 15	Apr. 10	May 7	.20
Mayflower, Cal.....	41	Apr. 9	May 10	June 4	.25
Navajo, Nev.....	19	Apr. 12	May 17	June 7	.30
Oxford, Dak.....	2	Apr. 9	May 9	May 28	.05
Peerless, Ariz.....	11	Apr. 4	May 9	May 28	.25
Phil Sheridan, Nev.....	3	Mar. 7	Apr. 14	May 5	.10
Quincy, Dak.....	3	Mar. 3	May 2	May 25	.024
Rattler-Gilroy, Dak.....	11	Apr. 7	May 7	May 31	.02
Sierra Nevada, Nev.....	91	Apr. 3	May 8	May 28	.25
Silver Mint, Dak.....	1	Apr. 3	May 5	May 23	.01
Spanish, Cal.....	2	Jan. 4	Mar. 10	June 2	.04
Trojan, Nev.....	17	Mar. 27	May 4	May 28	.10
Virginia Creek, Cal.....	5	Feb. 28	Apr. 4	May 1	.05

\* The delinquent day and day of sale were postponed to dates given above.

† Under the resolution levying the assessment, each shareholder is credited as paid on this assessment, the amount paid to the company by him on his shares on and since August 9th, 1887.

‡ This assessment was rescinded April 6th.