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The storm, the greatest in the history of New York, which filled our streets and utterly paralyzed business in this city during the early part of the week, has interfered with our mails, and many of our trade reports from different centers have not been received.

OUR editorial remarks last week concerning "Some Alaskan Bubbles" have created some commotion among those interested in one way or another in inflating the bubbles. The readers of the ENGINEERING AND MINING JOURNAL know that every "wildcat" and every "bubble" exposed by the JOURNAL has subsequently come to grief and fully justified our warnings. So it will be in this case also. What we have said should put proposing investors on their guard, and should induce those whose money is already in these concerns to investigate, through disinterested sources, the "bottom facts" in the case. We have other confirmatory information concerning the properties and those floating them which we may use should occasion call for it.

### THE RELIEF SYSTEM OF THE LEHIGH COMPANY.

At the Cincinnati meeting of the American Institute of Mining Engineers, in February, 1884, a paper was read by Mr. J. S. HARRIS, President of the Lehigh Coal and Navigation Company, giving an account of its beneficial fund, which had then just been inaugurated, on the basis, as some of our readers will perhaps remember, of a monthly contribution of one half of one per cent of his earnings by each outside workman, and of

one per cent of his earnings by each inside workman, the contribution by any workman being limited to one dollar per month. The company agreed to contribute to this fund one cent for every ton of coal that should be produced at its mines. Each contributing workman accidentally injured when actually engaged in the service of the company was to be entitled to a sum equal to one-half the weekly wages of the class of workmen to which he belonged, for each week of his disability; but the benefits in case of accidental disability were limited to six months for any one accident. In case of death, thirty dollars was to be paid for funeral expenses, and a sum equal to one-half the weekly wages was to be paid for one year from the date of the accident. This plan was based on a careful examination of such data as were obtainable in regard to accidents occurring at the mines in the anthracite region, and the contributions were fixed at what seemed to be an entirely adequate sum for the purpose, the expectation being that a surplus would accumulate, which might after a time permit the benefits to be increased.

We have now before us a statement of the Lansford Beneficial Fund of the Lehigh Coal and Navigation Company for the year 1887, being the fourth year during which this plan of relief has been in operation; and we are glad to call attention to it as an example of the working of a well-devised method of relieving the distress arising from the injury or death of employes.

In the four years from 1884 to 1887, inclusive, the employes have paid into this fund \$36,734.62, and have drawn from it in benefits \$55,288.88, and the fund has to its credit \$19,429.15, of which \$10,000 is invested in interest-bearing securities. There are no expenses charged to this fund, except those of the examining surgeon and the small expenses of printing; and these are more than met by the interest which the fund receives. Of course, it is an immense advantage to the beneficiaries under this plan that they are wholly rid of the costs of soliciting business and expenses and commissions which belong to any of the accident-insurance companies. Moreover, they receive also the benefit of the large contribution made by their employers, which exceeds that made by themselves.

The fund has accumulated money during each year of its existence and through the last four months of the year 1887 when on account of the strike in the Lehigh region contributions fell off greatly, its cash balance diminished less than \$500. Of course, such funds are liable to heavy calls in case of any great disaster; but the company feels that, with an accumulated capital of nearly \$20,000 the fund is strong enough to warrant an increase in benefits. Experience has shown that it is not wise to make the benefits in cases of accident more than one-half the weekly wages, as many cases have occurred in the past of men submitting to slight injuries, in order to get upon the rolls of the relief-fund, where the fund paid a larger rate of benefits; while to increase the sum allowed for funeral expenses would often simply lead to an extravagant display at funerals and confer no benefit on the family. No such objection, of course, can be made against increased benefits in case of death, and upon the statement for 1887 the announcement is made that the death-benefits, which have heretofore been paid for twelve months, will hereafter be paid for eighteen months.

This is a good time to call attention to the quiet, generous and wise provision made for its workmen by a company which has so recently encountered the reckless abuse of the "labor" agitators and their conscious and unconscious allies in the press. The system above mentioned is free from the objections which attach, on the one hand, to governmental and enforced relief, and, on the other, to such contributions by employers exclusively as tend to pauperize the employes. This is a purely voluntary matter on both sides; and its steady and increasing success is evidence that both parties appreciate its excellence. If any further evidence were required, the opposition of professional "labor" agitators would furnish it.

### THE COST OF MINING AT SOME PENNSYLVANIA ANTHRACITE COLLIERIES.

The anthracite mines of Pennsylvania present perhaps the best examples of economical mine work that are to be found in the world, and, fortunately, some of the mining companies furnish their stockholders, as all companies should do, with such detailed information that we are able to measure the progress being made in mining and the efficiency of the management.

Among the best examples of mining companies' reports are those of the operations controlled by the Pennsylvania Railroad Company. The report this year covers only the Summit Branch Railroad Company, and the Lykens Valley Coal Company. As these collieries are in course of remodeling and reconstruction, having formerly been among the most expensive in the whole anthracite regions, we cite the detailed figures of cost as an indication of what improvements an efficient and honest technical management can effect, rather than as an example of the maximum economy which can be attained; in fact when the new "breakers" are completed, and the too long deferred mine developments are brought up to the condition of efficiency and reserves in which such work should always be maintained, and which it is evident is intended

from the well-considered plans of the general manager, the cost of mining and preparing coal will be considerably reduced.

The following table gives the itemized cost at the Summit Branch Railroad Company's collieries and the Lykens Valley collieries in 1887.

The coal was nearly all sold by commission agents. We are not surprised, therefore, at the statement that the aggregate selling and collecting expenses of all coal from all companies under the same management, averaged per ton in 1887, 15.02 cents, against 14.16 cents in 1886.

The cost of selling the coal of the Lehigh & Wilkes-Barre Coal Company (see ENGINEERING AND MINING JOURNAL, February 18th), including all salaries and legal expenses of the general office, amounted to only 2½ cents per ton.

	SURFACE EXPENSES.	
	Summit Branch. Cents per ton.	Lykens Valley. Cents per ton.
Insurance.....	00.35	00.88
Legal expenses.....		
Live st. ck.....	00.96	01.37
Office expenses.....	00.28	00.41
Preparing coal.....	16.81	27.02
Repairs and general expenses.....	10.53	14.74
Shops and repairs.....	02.17	02.12
Stable expenses.....	05.03	07.44
Stationary and printing.....	00.19	00.33
Stock coal expenses.....	00.62	01.02
Sup-rintendents and clerks.....	04.61	06.69
Taxes.....	02.61	02.91
	44.16	64.93
	UNDERGROUND EXPENSES.	
Air and gangways.....	13.18	19.10
Cars, slope and drift.....	01.68	03.44
Cross-headings and chutes.....	05.74	06.40
Exhaustion of lands.....	0.60	
Hoisting and pumping.....	04.74	08.46
Mining coal.....	78.77	88.34
Repairs and general expenses.....	24.90	30.80
Timber and props.....	08.76	28.78
	141.37	183.32
	IMPROVEMENT AND GENERAL EXPENSES (CHARGED TO MINING).	
Breakers.....	00.66	02.97
Cars.....	00.29	00.76
General impvts.....	07.86	25.63
Houses and repairs.....	06.95	00.53
Shafts and slopes.....	03.40	00.31
	12.56	30.20
Total mining and preparing expenses.....	\$1.98.09	\$2.78.00
Tons mined.....	338,927	206,013
Average freight paid.....	\$1.46	\$1.54
Daily average tons per breaker.....	1,122	727
Percentage of loss and dirt.....	31	58

It is greatly to be regretted that no report of the operations of the Susquehanna Coal Company has been published this year, and no explanation of the failure to do so has been given. The Susquehanna Coal Company in the Wyoming Valley is far the most economical of the Pennsylvania Railroad Company's collieries, and its coal could not have cost much over \$1.20 a ton, or the same as that of the Lehigh & Wilkes-Barre Coal Company.

It will be noted that the cost of mining at the Summit Branch collieries was reduced 60 cents a ton, from \$2.58 in 1886 to \$1.98 in 1887, and at Lykens Valley 25 cents a ton, to \$2.78 per ton in 1887, against \$3.03 in 1886, \$3.12 in 1885, and \$3.36 in 1884.

The present figures are still far above what they will undoubtedly reach in a few years more, when the new improvements are completed.

These satisfactory results are attained by greater efficiency and economy, and, perhaps, honesty, in the administration at the mines, and yet we have searched the report through without finding one word recognizing this fact, or even saying who the general manager of these companies is. Many of our readers will remember that about two years ago Mr. IRVING A. STEARNS, mining engineer, was appointed general manager of the coal-mining interests of the Pennsylvania Railroad Company, and it is to him primarily that the saying above recorded is due.

Mr. STEARNS is a very modest gentleman and apparently is willing to let his record speak for itself. To the profession he is known as one of the most skillful of our many able mining engineers, and we feel an especial pleasure in thus recording the immense benefits which have resulted to the company from placing the management of its coal mines in the hands of so thoroughly trained and competent an engineer.

It is not many years since any one who had demonstrated his incapacity in every other other occupation was considered capable of managing a colliery. This idea has now given place to the knowledge that it is only to our very ablest engineers that such difficult and momentous problems should be interested, and, to its credit, the Pennsylvania Railroad which long ago recognized this in its road administration, has adopted it also in its mines, with, as we have seen, the most satisfactory results.

**The Bu mese Ruby Mines.**—In the House of Commons, on the 1st inst., Mr. Maclean asked the Under Secretary of State for India whether it was true, as stated by Mr. Streeter at a recent meeting of the Royal Geographical Society, that the Secretary had, by refusing to carry out the concession entered into by Lord Dufferin for the lease of the Ruby mines in Burmah, caused a loss to the Indian revenues in one year of 3½ lakhs of rupees, or £37,500. Sir J. Gorst said it was impossible to state the exact amount of the loss to the government of India by the delay in the working of these mines, but he would point out that as they were not exhausted, that which did not accrue to the revenue of the year would recur when the mines were again worked.

## CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested. All letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

## Formation of Coal Seams.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The very interesting article on the above subject, by W. S. Gresley, F.G.S., in your last number, emboldens me to give you my conclusions after close observation of the great Sewanee seam of coal for over twenty years. I fully agree with Mr. Gresley that the coal seams were not formed from timber that grew on the spot; his proofs and arguments against such theory are conclusive to me, and I think will be to any one who has closely examined and observed the various strata of the numerous coal mines now operated in the United States. The floor or bottom of a coal mine, if such were the formation, would be rough and uneven; the coal would penetrate the underclay and increase the labor of mining a hundred per cent and cost in proportion.

I now come to the point where I differ with Mr. Gresley, and naturally approach this with hesitation, hesitating to differ with an eminent geologist in his own particular science. I trust that, while expressing my doubts of the conclusions he reaches, that as a scientific man he loves truth too well not to listen to the observations and conclusions reached by others, even if they differ from his own. An insurmountable objection to his theory, in my estimation, is that accumulations of timber sufficient to form our large coal seams would have naturally and unavoidably brought with them a large amount of foreign matters mixed with the vegetable. That the coal was formed in or under water I do not dispute. But would not fallen forests, floating about in water and sinking in the same and forming our coal measures, have brought along a tremendous amount of mineral sediments? Would not the shale that now underlies and overtops our coal with such well-defined partings have been mixed irregularly with the coal had those large masses of driftwood floated into a lagoon or lagoons, and settled into the water and formed our coal-beds? Would not the overlying shales, clays, or sandstones have made a very uneven top? Can we imagine that the pressure of water should have been so great on the top of this accumulation as to have made it perfectly smooth, for the sediment to form a sharp, well-defined parting? And, if the pressure was sufficient for this purpose, would not it, as a consequence, have imbedded the timber in the underlying clay? But, as Mr. Gresley says, we have distinct and well-defined partings both above and below the coal strata. Even if we imagined that this stupendous floating forest, drifting about for an indefinite period and washed by the waves, would itself bring no foreign matters to its final resting place, it would not explain the distinct partings mentioned above.

The more the subject has been contemplated by the writer, the more he is forced to believe that the formation of coal seams is of peat origin—immense swamps, with bottom heat, and a very moist, warm atmosphere above, covering thousands of square miles with a rapid-growing moss not at all dependent on the underlying stratum, except that it should be one that held water and made it comparatively stagnant. This moss, under such circumstances, would grow, feeding on the water alone, with immense rapidity, and in ages would form our great or small coal-beds. The "stumps" we find, the fossils, etc., were incidental, not necessary, to the coal formation. They were as foreign to the true origin of coal as are the boulders, or, if you please, the brine, for I doubt if the coal was formed in salt water, the evidence of which I consider too small and very far from being universal. Nor do the fossil stumps we find at all prove solid timber, but quite the contrary. What Mr. Gresley calls the impressions of the "bark" in my opinion, are impressions of all that there was of immense hollow reeds and trunks of the club mosses, etc., of the period. The "pots," so much dreaded by miners overhead, are the sediments with which those hollow stems or trunks became filled. They show no evidence of petrification, but are of the same material that makes up the remainder of the overlying stratum. If the coal was formed from this "timber," of which we find evidence in the under and overlying strata of fire-clay and shale, why is it not transformed into coal there as well as in the coal vein? Why was it turned into sandy shale just above and below the coal seam and into coal in it? If there is a logical scientific answer we would like to hear it. Evidently the Sigillaria and other large vegetations, the tree ferns, etc., grew in the fire-clay before it sunk and was covered with water. In a short time they would break off and float on the water, and in decaying nourish the mosses that formed the true vein of coal. Then, when the shale formed on top of our coal seams, either drifting there when the coal basin sunk too low for the growth of the moss, or thrown up by immense geysers to form the roof of our coal strata, these lepidodendrons, calamites, etc., were filled with this sediment and sunk to the coal, forming part of the top.

One glance at the fossil flora of our carboniferous period, and I am done. We find abundance of fossil remains, some little below the coal, much more above, but still I am constrained to doubt if we have found the fossil plant that made our coal veins; or, if found, no particular notice has been taken of it over the other fossil specimens. We find chiefly the lepidodendron, lycopodium, calamites, canlopteris, equisetaceæ and sigillaria all of them more or less exaggerations of our present ferns, horse-tails, club mosses, etc., almost invariably with hollow, reed-like trunks, easily filled with the mud that afterwards became the shale of the overlying strata of our coal seams. Mr. Gresley speaks of the stigmara and gives it considerable prominence in his paper; but it is now almost universally admitted to be simply the root of the sigillaria. The coniferæ, while their trunks were not hollow, had a large part that must have easily decayed and disappeared, the mud of the period taking its place inside the trunk. So frequently do we meet those mud casts of the coniferæ pith, that they were at one time called sternbergia and classed as a fossil of a distant species.

Now none of these formed the coal strata in my opinion; at least, the part they took in forming our coal was too small to be taken into con-



sideration. Undoubtedly they belonged to the period, probably grew in and on the border of our coal-fields and were by storms frequently carried into them. The storms, upheavals, floods, depressions of the lands, and rains of this period we can have no conception of. Those giant ferns and reeds were broken off or uprooted, floated on the immense stagnant ponds of the coal measure, were filled with mud, sunk, and became part of our coal. Lyell says the aqueous growth along the shores of the lagoons strained the water and kept foreign matters out of his log pile, that was to be our coal of to-day. Even agreeing to this "strained" argument, it does not explain our smooth floor and partings overhead.

It is inconceivable with the facts before me to believe our coal-bed was formed either from timber *in situ*, or drifted there. But I can well conceive of a clean, pure moss growing in luke-warm water 20 or 50 feet deep, and filling with its innumerable branches every space from top to bottom. Then, when the final depression took place and hundreds of feet of water covered this vegetation, it became compressed into the present thickness, and the shale, with its many fossils, was deposited on top, and gradually, may be, the sand and pebbles on the shore were washed in and the immense pond became dry land. In some instances again this was upheaved, bringing up the now perfected coal high above water level.

Excuse my crude attempt to give my ideas of the coal formation, which, although simple themselves, may be for that very reason are not generally accepted. They are here only expressed in the hope that they will give food for thought to others much more able to investigate and elucidate.

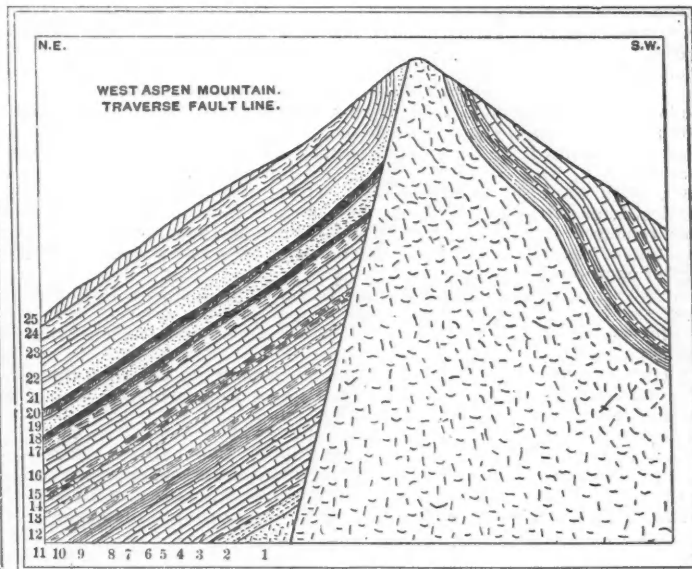
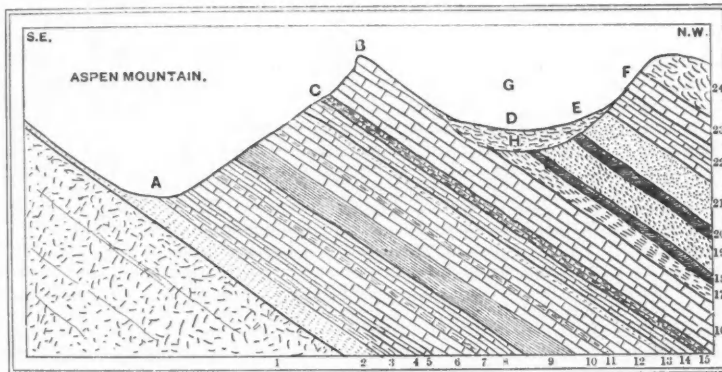
Very truly,  
E. O. NATHURST.

THE GEOLOGY OF THE ASPEN, COLO., ORE-DEPOSITS. I.

By Leonard D. Silver.

The mining districts of Leadville and Aspen, Colorado, with adjacent localities, have produced up to date not less than \$140,000,000, while according to estimates ore-bodies are now blocked out valued at \$10,000,000. At least \$125,000,000 of the total product is the result of the past ten years' operations, while the first three years of that period were mainly devoted to perfecting suitable methods for the extraction and treatment of ores and to other work of an experimental and preliminary nature.

With this showing, according to statistics, these mines have been the



- Archæan.**
1. Granite and gneiss—Metamorphosed.
  2. Lower quartzite—Cambrian.
  3. Dolomitic.
  4. } White limestone.
  5. }
  6. }
  7. Dolomitic.
  8. Drab limestone.

- Upper Silurian.**
9. Conglomerate.
  10. Limestone.
  11. Dolomite.
  12. Drab limestone.
  13. Quartzite—Banded.
  14. Brown limestone.
  15. Dolomite.
- Carboniferous.**
16. Blue limestone.
  17. Black shale.
  18. Lignite.

19. Blue-black shale.
  20. Lignite
  21. Shale.
  22. Brown limestone.
  23. Limestone.
  24. Porphyry—Igneous.
  25. Drift—Sec. II.
- A. Spar Gulch.  
B. Spar Ridge.  
C. Durant Incline.  
D. Emma mine.

- E. Aspen mine.  
F. Conomara mine.  
G. Vallejo Gulch.  
H. Forpnyr—drift.  
N.W. Northwest.  
S.E. Southeast.  
N.E. Northeast. } Section II.  
S.W. Southwest. }  
J. Eruptive granite—Sec. II.: 1500 feet, approximate thickness, at right angles to dip of beds, from granite, inclusive of porphyry.

greatest, or rather richest, producers of any operated during the same term.

The conformation is sedimentary, constituting a belt of great magnitude, continuous from a point about twenty miles south and east of Leadville in a tortuous course, to and beyond Aspen, on the western slope of the Continental Divide.

That portion under consideration constitutes a superficial area of the Roaring Fork mining district, in the immediate vicinity of Aspen, and a few miles of the territory to the N. E., with some general references along the line as far as Leadville.

With the exception of the mines of Aspen, inclusive of some developments to the southwest at Ashcroft, Conundrum Gulch, and a few intervening places of minor importance, a limited amount of work has been performed, while the conditions for opening mines of great value are most auspicious.

The geological structure is best read as exposed in a sharply tilted condition on the eastern portion of Aspen Mountain, where the sedimentary beds rest upon the N. W. slope of the Archæan. Granite and gneiss, changing insensibly from one to the other, with some other rocks of a congenerous nature, constitute the rock formation of a large area to the S. E. of the sedimentary deposits.

Professor S. F. Emmons, in his geological survey of the Leadville district, pronounced the line of contact, where the sedimentary beds ceased and the Archæan exposures began, extending into mountain ranges, the littoral line of the Paleozoic sea, naturally terming the Archæan elevation there the Sawatch continent or island. Such being the case, with Aspen bearing significant features of Leadville, it is fair

to presume Mr Emmons would place a like construction upon the Aspen district, as the shore line is to all appearances quite as pronounced.

Overlying the granite rocks and forming the basis of the Silurian, is a bed of quartzite, variable in width. This is followed in the upward course of the series of strata by the lower stratum of the Silurian rocks.

That evidences exist of the deposition of ore along the line of and extending into the quartzite and the dolomitic limestone with which it comes in contact, is shown in a few unimportant exposures along the trend; but whether this will prove a productive channel is yet to be determined, while to develop it in localities where tilting and eroding have not largely occurred, would necessitate deep sinking resulting in expensive mining.

Next following in the upward course of parallel ore bearing planes is the contact described in section I, as 6 to 7, where, although developments are not extensive, ore is being extracted, as is also the case in the channel above existing at about the lines of strata, 10 to 11. The next ore channel, and the only one shown in section I, having important developments, lies, approximately, at the demarcation of the Silurian and carboniferous rocks, with the matrix or vein filling being chiefly made up of dolomite, locally termed "short lime."

Through this, mineral is erratically disseminated, and, penetrating to some extent the blue and brown limestones (especially the former), practically the wall rocks, the vein at places is imperfectly defined; yet, on the whole, the ore-bodies are traceable from point to point, extensive deposits being found in the trend of ore chutes.

The hanging-wall is a compact blue limestone of the lower carboniferous group, while the foot-wall is a brown limestone, possibly, also, of the carboniferous group, though generally considered a member of the Silurian. It is not readily distinguishable from the vein matter.

At the point described in the cross sectional view section I, this contact has been opened for 800 feet on the dip, and approximately 1000 feet in length, but while the general average dip is an angle of 34 degrees to the N. W., the strata lifted to their present positions have resulted in

some slight folds, and apparently a minor longitudinal fault. As depth is attained and development progresses, such characteristics may be anticipated in displacements of considerable importance, owing to dynamic force, not only being strongly marked on Aspen Mountain, but in almost the entire sedimentary deposits of this region.

Although it is not yet satisfactorily demonstrated, immediately to the south and west of the locality described, the sharp ridge trending from N. W. to S. E., forming the western portion of Aspen Mountain is apparently the result of an extensive fault and sub-faults, dipping the formation on the eastern slope of the mountain sharply to the east and almost at right angles to the dip, as shown in section I, while the dip on the opposite, or Castle Creek slope, is sharply to the west, with occasional exposures of granite and quartzite along the crest and nearing the surface at points on the western slope, all of which render faulting and eroding obvious, while the granite covering the surface at places on these slopes, especially the eastern, is but drift matter from the outshoot at the summit.

The extreme western point of the mountain was not greatly disturbed when this faulting occurred, as with the exception of the upper strata being eroded away, leaving outcrops of limestone, data can not here be submitted, and the angle of dip being somewhat sharper the course is northwest about the same as in section I.

With no important developments in Castle Creek slope to disclose the strata, my attempt to give a perfectly reliable description would be altogether presumptuous. Therefore, the transverse section II, is submitted on y as a probable fault line; but while indications point to its existence, future explorations may explode the theory and critics may even now

deal with it harshly. Transverse section II. is intended to represent that portion of Aspen Mountain approximately midway between the Spar Ridge (the highest outcrop of limestone immediately above the Durant incline given in section I.) and the western extremity of the mountain. One conversant with the configuration of West Aspen Mountain can readily place this locality, where sufficient data may be collected in workings on the Eastern slope, the Summit and the Castle Creek slope, to at least draw reasonable conclusions.

By traversing the ridge from northwest to southeast for a distance not to exceed 1000 feet, along the portion referred to, croppings of granite, quartzite, lime, and quartzite and lime again, are discernible, according to the force given the upward movement and the eroding action at the places of exhibition, all of which point forceably to the existence of a fault which must be continuous to the southeast for at least several thousand feet.

That the granite exposures of West Aspen Mountain are not undisturbed Archæan rocks connected with the granites situated to the S. E. of the sedimentary deposits, and forming a sharp curve in the original shoe line, as a bay, describing a semi-circle from E. to S. to W. (in which case strata would have the same dip as now exists), is quite evident from the fact that the sedimentary beds exposed on East Aspen Mountain are continuous indefinitely along the granites to the S. E. from the point given in Sec. I.

Although the granites along this line may be rendered obscure in some localities by mountain slips, drift matter, etc., nevertheless, their presence here to the south and east of the sedimentary deposits is unmistakable.

That other sub-faults and sharp folds exist also, is apparent in workings on the Castle Creek slope, where, at various points, inversion of strata has taken place.

Section I, without showing form to ore-bodies in workings, or any faulted or folded condition of strata, represents a cross sectional view of about the locality of the Durant incline, which, beginning near the base of the limestone cliff, practically follows the strata 14 to 16, whence it connects with the south workings of the Washington mine, and thence with workings of the Emma and Aspen mines, which cut this contact with perpendicular shafts started in the porphyry forming the surface matter of Vallejo Gulch. These are the mines parties to the recent famous law suit, Durant vs. Emma, involving the ownership of ore-bodies variously estimated at from \$7,000,000 to \$10,000,000, with the point at issue being the character of the vein. The Durant people, as plaintiffs, claimed the apex of a fissure vein and the right to follow it interminably, and the Emma people, as defendants, claimed a contact vein, with the right to follow only within the territory bounded by vertical lines extended down from the surface boundaries. A decision was rendered in favor of the plaintiffs December, 1886, when an appeal was taken. Since then a compromise has been effected in the consolidation of conflicting interests.

In referring to the minerals of this district from an economic and practical point of view, silver, lead and copper (almost entirely the two former) are the only ores reduced to commercial values. Smelting is the process employed.

Silver is found as sulphuret, glance, bromide, chloride, native, argentiferous-galena and is associated with gray copper. Some of the carbonate and sulphate of copper found here have been erroneously, though not intentionally so, pronounced chloride of silver.

Lead is found as a carbonate, oxide, and sulphate, but almost altogether as sulphide, while copper exists as a carbonate, sulphide, and to a small extent as sulphate. Iron is found as sulphate, oxide, sulphide, or pyrite, or to a very small extent as magnetite. Owing to the scarcity of iron ore in the immediate vicinity, it is transported to the local smelters, for fluxing purposes, from Ashcroft, fifteen miles to the south.

There are also as accessory minerals zinc-blend, arsenic and antimony, with traces of other minerals. That dolomite is signally the matrix of these minerals is evident from the fact that wherever it is found on Aspen Mountain, from a trace upwards. In another article I shall conclude this description.

#### THE BRITISH MINING SHARE MARKET.

From Our London Correspondent.

Since last week there has been an upward movement in Indian shares, but the response of the public has not been sufficient to sustain the inside action, and hence a temporary relapse.

The copper syndicate has continued its work since I last wrote, and nothing has occurred to dampen the confidence in its ability to carry out its obligations. Upon this, of course, I need not say, the whole scheme turns. They have brought into their arrangements the Calumet & Hecla mines, and Tharsis has definitely joined them. Panulcillo will follow. The original capital of the syndicate was 40 million francs, but this amount had to be increased when the operations became extended. In regard to the metal itself, it is firmer since I last wrote. It is now nearly £80 per ton. So much cannot be said of the shares, which have fallen upon heavy sales in Paris, but as I write there is a disposition towards recovery. The tin market remains firm at £166, but there is nothing special to note in regard to Cornish mines, which, indeed, seem to be making calls rather than paying dividends.

#### AMERICAN MINES.

The Emma mine held a most satisfactory meeting on February 24th to receive the report of the two directors, Mr. Hutton and Dr. Dunhill, who have just returned from a visit to that property. The proceedings were of a character to reassure the shareholders of this concern, who, like the early Christians, have been passing through much tribulation. The shares just now are a mere trifle, and represent the apathy of the market rather than the intrinsic merits of the speculation. The only point against the mine is the weather, which seems to have been rather too much for Mr. Hutton, who, on coming to the surface, after exploring the mine, fainted, and it needed all the skill of his medical colleague to bring him to his senses. The works are proceeding with a fair amount of vigor, and the machinery is all protected from snow slides by being

placed within the Bay City tunnel, which was lately purchased and which has turned out a very good bargain for the company. The ore is now beginning to appear in the lower workings, where barren limestone only was found before; and it seems probable that there will soon be the recurrence of another of those ore-chambers, one of which enabled the late Trenor W. Park to place this concern on the London market (aided by that astute financier, Baron Grant), with a capital of one million sterling. The shares were originally in the denomination of £20, and I myself was present in the Cannon Street Hotel at an Emma meeting at which Mr. Park offered the shareholders £28 per share for their holdings and invited those who wished to sell to come to the office after the meeting. Only one shareholder took him at his word! The shares afterwards went to £32, but in one day dropped to £16, and now the company, after having been reconstructed twice with fresh capital, sees its shares at about 5s., but with the prospects of a very good future before it. It is held as a good sign that Judge Bennett of Salt Lake City holds 30,000 of the shares, and this fact has often given confidence to the shareholders when they have been reminded of it by their chairman, Mr. Snell. Confidence was felt in the management of Mr. Cullins, whose health has now compelled him to resign; but he will continue to aid the new manager, Mr. Wallace, of Salt Lake City, in the direction of the works. The shareholders have some hope that they are not far from a bonanza, and according to what was said at the meeting that appears to be the opinion of the good people of Salt Lake. I may tell the aforesaid good people that if the Emma proves a success there will be such an inflow of British capital into the Little Cottonwood district as they have never seen before. They should do all they can to aid the Emma company to achieve success.

The Alturas dividend did not keep up the shares, and I hear that several large holders have been selling. They have fallen from about 30s. to 24s. on realizations. No market has yet been made for the Rocky Bar Wide West shares. A good deal of business has taken place in Consolidated Esmeralda shares. Report speaks highly—whether truly you will be the better judge—of this group of mines. One of the properties is that which made Mark Twain "ten days a millionaire." The great humorist was no doubt preparing some fresh jokes with which to convulse the public, but forgot to secure his rights, whereupon a Capt. Johnson and party took possession and discovered the Johnson Chamber, which made that lucky gentleman one of the swells of San Francisco. I ought to say something about the shares of the Empire mine, which have fallen upon Mr. Sizer's resignation. This fall is certainly not justified by the pccorness of the mine, the following being the full returns for the last six months:

1887.		Expenses for:		1888.	
August,	total.....	\$13,750	month .....	\$8,000	
September	" .....	15,000	" .....	8,000	
October	" .....	15,000	" .....	10,500	
November	" .....	22,250	" .....	12,000	
December	" .....	26,250	" .....	14,000	
January	" .....	33,750	" .....	14,500	

It is clear that the New California, after all that has been said in its name, can not pay a dividend just yet, the ore having fallen off in value, though not in quantity. One of the directors, Mr. Henry Davey, has just returned from a visit to the mines of the Stanly Freehold Company, and is delighted with all he saw and heard and tested for himself. The *Mining World* has interviewed him and drawn from him the declaration, which has very much surprised us here, that the "cute people of your city have altogether neglected these valuable gold-fields because they have preferred to take their capital West. Can you tell me if this be so? The samples of gold the energetic Mr. Davey brought home have made this more a matter of surprise than it would otherwise be. Though the concern has only been a short time at work, crushings have already been commenced and the result is expected to be made known by the end of the present month.

Going further south on your continent I have to note that Callao bis is down upon a poor crushing and adverse rumors. The new Chili company is fighting hard with General Guzman Blanco, the late president of Venezuela, and is trying to bring him within the jurisdiction of the English courts. The chairman of the company is Mr. Hugh Watt, M. P., who is the chief mover in bringing the Venezuela boundary question before the House of Commons. The accident to the St. John Del Rey mine is less serious than rumor said, and part of the workings showed a profit for the past month, which they have not done for some time. Don Pedro's shares, which were almost valueless, are now worth 30s. on the rumor of an important discovery. Transvaal mines are not showing well just now. Sheba Reef has been floated on the English market, and has now a working capital of £47,000 in hand. There is nothing worthy to note with reference to Queensland mines, some of which have made good crushings, though without influencing the market much. Of Welsh gold there is an ominous silence. I believe, myself, that the whole affair, viewed from the commercial standpoint, is a myth.

The new companies coming out have their location chiefly in Queensland and the Transvaal, and I may tell your readers that a good deal of machinery is being ordered just now, and that the producers are full of work. The market does not like the appearance of so many new companies, because each new one that floats weakens the market for the old ones, and, after all, the number of persons who put their money into mines is limited.

**Gaseous Fuel the Fuel of the Future.**—Mr. Laureau, the well-known engineer of the firm of Gordon, Strobel & Laureau, of Philadelphia, is reported to have recently said: Water gas, either pure or mixed with producer gas, seems to be the coming fuel. Many minor establishments are using it on a small scale, and lately the Messrs. Disston, of Philadelphia, have had in operation at their saw factory a water-gas plant which they consider satisfactory. Mr. W. J. Taylor, of Chester, N. J., has devised an ingenious arrangement of grate for gas producers which should have considerable influence on the development of the use of anthracite slack for gas-making. This grate disposes of the ashes in a regular manner, which allows continuous running. This is a much-needed improvement in the Eastern manufacturing districts, where gas for metallurgical purposes has always been made of high-price bituminous gas-coal.



THE CLAYTON AIR COMPRESSOR.

The great economies which have characterized modern mining work have been due to the general use of compressed air more than to any other one thing. Compressed air has made the rock-drill and coal-cutter a practical success, and has thus been the chief foundation for reduced cost in tunneling and coal-getting. It was, therefore, but natural that a vast amount of mechanical ingenuity should have been expended on so important a machine as the compressor, and that great improvement should have been made in it. None of the manufacturers have remained satisfied with their original designs. One of the very first of these was Mr. James Clayton, and he has introduced many important improvements in the machine which he manufactures, and which has for many years been deservedly popular among mining men. The man who for a quarter of a century has held a prominent position and a high reputation as a manufacturer of machinery, it need not be said, makes good machines, and Clayton pumps and Clayton air compressors have received the public favor juring about that time to our certain knowledge. They have been continuously advertised in the ENGINEERING AND

CHLORIDIZING-ROASTING AND LIXIVIATION AT YEDRAS MINE, MEXICO.

Written for the Engineering and Mining Journal by Geo. J. Rockwell.

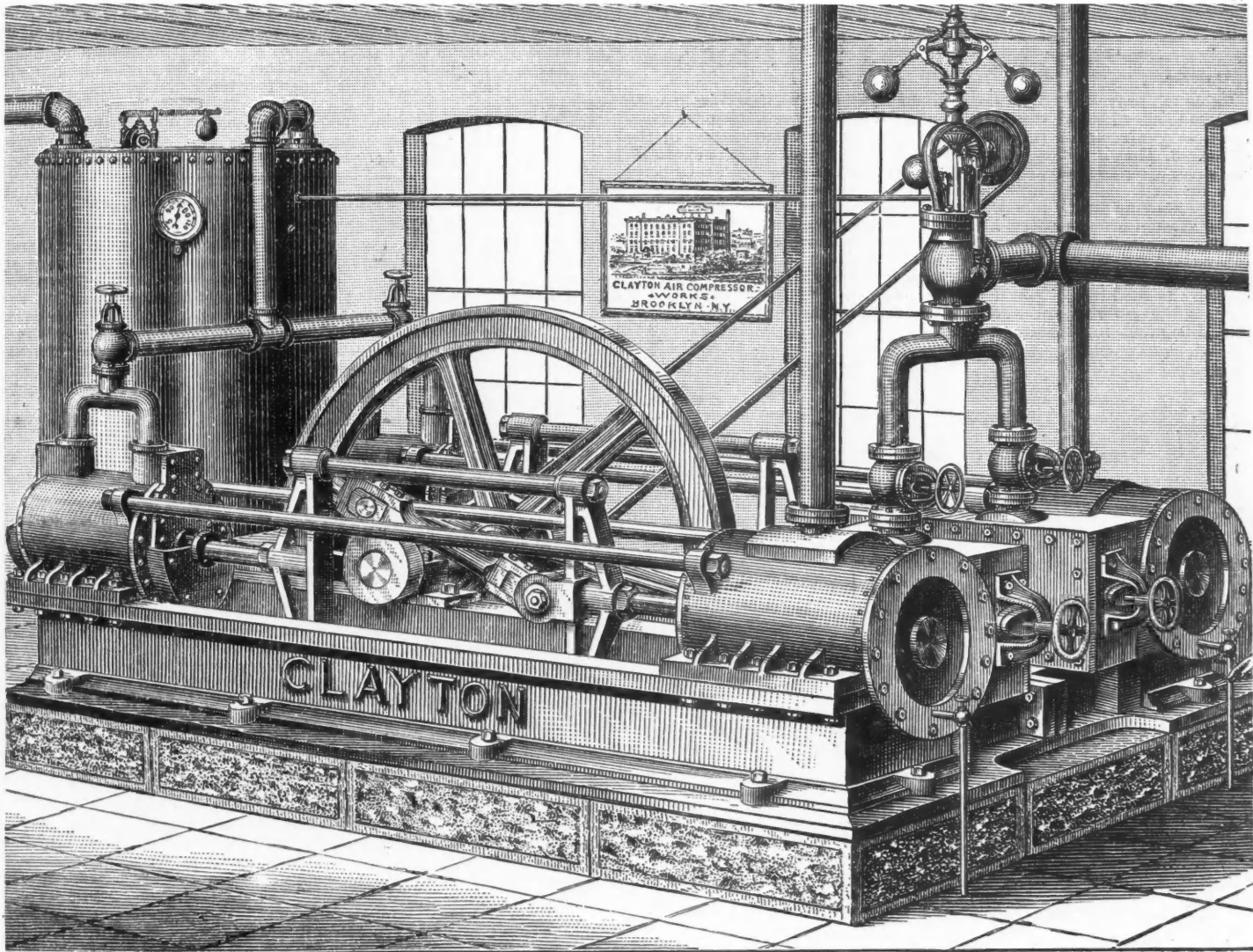
(Continued from page 178.)

EFFECT OF LIME IN ROASTING.

The presence of lime in the ore is disadvantageous because it consumes a large quantity of the sulphuric anhydride. The following experiment indicates that it has nothing to do with the volatilization loss. Clean concentrations free from lime mixed with salt and roasted in the muffle, at a gentle heat, lost 33 per cent silver by volatilization. I think that very little, if any, caustic lime remains in the ore after roasting, because it is natural to suppose that the sulphuric anhydride would combine with it in the furnace before it effected the decomposition of the salt, and because the assays of the vats before leaching agree very closely with the mill extraction :

AVERAGE OF 21 VATS (714 TONS).	
Extraction in assay office with ordinary solution .....	72.1 per cent.
Mill extraction with ordinary solution .....	72.8

Mr. Russell found that the presence of one half of one per cent of caustic



CLAYTON DUPLEX, STEAM ACTUATED, AIR COMPRESSOR.

MINING JOURNAL from its foundation, almost twenty-five years ago, and this fact, which Mr. Clayton kindly certifies to, that his advertisements in this JOURNAL have been very profitable to him, is conclusive evidence of the intrinsic value of the machines themselves. They have always been good and have always been improved, so as to embody, or even initiate, the progress which has characterized this class of machinery, and has made American pumps and air-compressors the best and most economical in the world.

We illustrate herewith the latest form of the Clayton compressor. It is provided with a patent water jacket over the entire length of the cylinder, and uses also a spray of water (or oil) in the cylinder to complete the cooling. The connecting rod is adjustable so as to carry all the weight of the pistons, etc., and relieve the cylinder from wear. A combined speed and pressure regulator or governor adds greatly to the economy of the machine by limiting automatically the amount of steam to what is required to maintain the necessary pressure in the air receiver.

Our space forbids our entering into many details of these machines, which are of interest to those who use them, but our shortcoming is more than covered by the full information given in the company's new catalogue, which our readers can obtain by writing to the company's office, 48 Dey street, New York.

tic lime in sodium hyposulphite solution depressed the percentage of silver extracted from Ontario ore from 11 to 24 per cent. Perhaps our first wash water may have leached out all the caustic lime or the sodium sulphate may have converted it into calcium sulphate in the ore, but it seems probable, if much had been present, that enough would have still remained, say, the small fraction of one per cent, to have depressed the mill extraction two or three per cent.

The loss during the oxidizing period before the action of salt is principally due to the oxides of arsenic and antimony. When we repaired furnace III., we found the crevices in the walls filled with beautiful octahedral crystals of arsenious acid.

That the percentage of base metal chlorides in the roasted ore is very small is proved by the fact that the base metal precipitate in the leaching department amounts to only 4 per cent of the total extraction.

AMOUNT OF SALT TO BE USED.

To obtain the highest extraction with ordinary solution on 60-ounce ore, it is necessary to use from 6 to 7 per cent of salt. Five per cent lowers the chlorination considerably, and 3 1/2 per cent very much. Five per cent has not been tried for extraction with "extra," but I think it would give good results if added in the battery, hence the advantage gained by

using the Russell process would be increased in the chlorination of from 9 to 12 per cent. with a saving of 2 per cent of salt.

Three and one-half per cent of salt added in the third hearth or earlier gave a poor extraction with "extra," as the following figures will show:

3 1/2 PER CENT SALT. AVERAGE OF FOUR EXPERIMENTS  
Time in furnace, 9 1/2 hours. Extraction with extra, 71.7 per cent.  
COMPARISON BETWEEN REVERBERATORIES AND BRUCKNERS, AND BETWEEN ORDINARY AND EXTRA SOLUTIONS.

TABLE VIII  
7 PER CENT SALT IN BATTERY. NO. 24 WIRE SCREEN ON BATTERY.  
Extraction in assay office.

Reverberatory vaults. 2 1/4 tons. Brückner vaults. — tons.	Extraction in		Mill results. 714 tons.	Extraction in		
	Ordinary.	Extra.		Ordinary.	Extra.	Mill.
	74.1	83.5		72.1	85.9	72.8
	71.3	84.3	204 tons.	64.5	83.0	46.7

TABLE IX.  
BRUCKNER FURNACES—SALT ADDED IN FURNACE AFTER OXIDIZING ROASTING. NO. 24 WIRE SCREEN ON BATTERY.

Amount of salt. 7 per cent.	Number of Charges.	End of oxidizing period, extraction with.		End of chloridizing period, extraction with.	
		Ordinary.	Extra.	Ordinary.	Extra.
7 per cent.	9	46.6	71.1	52.9	75.1 (14 charges)
5 "	2	41.4	71.7	38.5	59.0
3 "	1	56.4	83.6	54.3	74.4
Average		48.1	75.4	48.5	69.5

Table IX. proves: 1. That the salt had no effect. 2. That ore can be roasted too dead before the addition of salt; in one case a lower extraction was obtained after the addition of salt due to volatilization of the silver. 3. That ordinary extracts 50 per cent and extra 75 per cent of the silver after an oxidizing roasting. In this it agrees with reverberatory roasting.

The following very important experiment illustrates the possibilities of the Russell process at Las Yedras. It is very evident that the oxidizing roasting was less prolonged than in the experiments in Table IX., otherwise I fear the results would have been any thing but encouraging. All this risk would be avoided by adding salt in the battery. I do not see why as good results could not be obtained by repeating the experiment in the reverberatories, and if satisfactory the capacity of the mill would be much increased.

BRUCKNER FURNACE—SALT IN FURNACE.  
No. 10 Wire Screen on Battery.

Salt. 7 per cent.	No. of charges.	Extraction by ordinary.	Extraction by extra.
	1	32.5	84.1

MILL RESULTS WITH THE RUSSELL PROCESS.  
TABLE X.  
REVERBERATORY ORE—7 PER CENT SALT NOT LATER THAN THE THIRD HEARTH—NO. 24 WIRE SCREEN ON BATTERY.  
ALL SOLUTIONS USED COLD IN MILL.

No. of charges.	Value of ore. Ounces.	Extraction with ordinary in assay office.	Mill extraction by Russell process.	Excess of mill over ordinary.	Lbs. of bluestone per ton ore.	
3	62.7	66.8	81.1	14.3	15.3	No circulating, no special extra.
3	55.1	73.6	83.1	9.5	8.5	" " " " "
6	59.2	71.4	74.6	3.2	7.2	" " " " "
Average		70.8	79.6	9.0		

ALL SOLUTIONS USED WARM IN MILL.

5	58.6	71.0	83.2	12.2	7.5	No circulating, no special extra.
1	57.2	73.8	82.9	9.1	5.9	" " " " "
6	56.4	79.1	85.1	6.0	6.8	Circulating, " " "
1	49.0	73.0	83.4	10.4	7.0	" " and " "
Average		74.2	83.6	9.2		

The weight of each charge used was from 1 to 1 1/2 tons. The depth of ore was about 84 inches or 82 per cent of the depth of the charges used in the old process. In leaching, the regular mill solution was used (containing about 0.8 per cent of sodium hyposulphite). The "special extra" is a solution which has already been used on one charge of ore. "Circulating" means returning the leaching solutions to the ore without previously extracting the silver hyposulphite in solution—this is best done by means of an acid siphon pump, but as we did not have one at the time circulating was very imperfectly performed by means of pails.

The above table shows that 8 1/2 pounds of bluestone give as good results as 15 pounds, even with cold solutions, and that not less than 8 pounds bluestone per ton can be used without lowering the results. Later results, however, give 89 per cent extraction with less bluestone.

As I have restricted myself to giving an account of experiments made while I was at Las Yedras, I will simply state that since then it has been ascertained that with 2 per cent of salt and 24-wire screen on the battery Brückner furnaces yield from 86 to 87.5 per cent extraction with the "extra" solution; but whether this ore can be leached or not I do not know.

The Russell process is now in operation at Las Yedras, and late reports state that the mill results are 17 per cent higher than by the old process, or 72 + 17 = 89 per cent extraction.

I made the first experiments with the extra solution on Yedras ore, and the results were so satisfactory that they led to the introduction of the Russell process.

I might also state that I have made experiments with several raw ores,

and have always obtained a higher extraction with the "extra" solution than either by amalgamation or leaching by the old process.

OBSERVATIONS OF A CHARGE DURING ITS PASSAGE THROUGH A FURNACE.

TABLE XI.  
Furnace VII. Seven per cent. of salt added with the ore.

Time in furnace.	Hearth.	Extracted with ordinary solution.	Volatilization loss.
0 hours.	fourth	...	0.0
1 "	"	...	11.9
3 "	third	...	6.3
4 "	"	...	5.0
5 "	"	45.6	8.2
6 "	"	34.4	10.5
7 "	second	46.0	9.1
7 1/2 "	"	49.7	8.9
8 "	"	51.5	6.3
8 1/2 "	"	54.9	5.4
9 "	"	57.3	9.1
9 1/2 "	"	* 61.2	6.4
10 1/2 "	first	75.3	7.3
11 "	"	77.6	10.0
11 1/2 "	"	78.7	8.4
12 "	"	78.7	14.2

\* Salt begins to act.

After allowing for the inaccuracy in the samples, the above table shows:

1. The three stages of chemical action in the furnace.
2. That the greater part of the volatilization loss occurs early, before the action of salt; in this case, one hour after entering the furnace.
3. That salt has nothing to do with this loss, and that although with the ore from the beginning it had no effect until the second hearth was reached.
4. The excessive loss occasioned by keeping the charge in the furnace after it is chloridized.

(TO BE CONTINUED.)

EXPERIMENTS ON THE CALORIFIC POWER OF COAL.

At a late meeting of the French Académie Des Sciences, Messrs. Scheurer-Kestner and Meunier-Dolfus, says the *Genie Civil*, sent the following note concerning experiments made with Nixon's Navigation Welsh Coal: It is remarkably pure and contains not more than 3 to 4 per cent of ashes, giving 88 per cent of hard and lustrous coke. The quantity of fixed carbon it contains would classify it among the dry coals, but on account of its coke and its intensity of combustion it belongs to the class of fat, or long-flaming, coals.

Chemical analysis gave the following results: Carbon, 90.27; hydrogen, 4.39; sulphur, .69; nitrogen, .49; oxygen (difference), 4.16.

The analysis showed the following composition of the volatile parts: Carbon, 22.53; hydrogen, 34.96; O + Az + S, 42.51.

The heat of combustion was found to be, as a result of several experiments, 8864 calories for the unit of weight. Calculated according to its composition the heat of combustion would be:

	Calories.
Sum of the heat of combustion of its elements (component parts) ..	8,576
Calculated by Dulong's method ..	8,452
Calculated with coefficient 11,214 for volatile carbon (Cornut's) ..	8,674
Calculated by Mr. Ser's formula $N = 26,880 \left( \frac{C}{3} + H \right)$ ..	8,268

It is seen that Mr. Cornut's formula is the one which gives the nearest result to what was found by actual experiment, while Mr. Ser's formula gives the farthest. But this, according to the authors, is not always the case and even sometimes quite the contrary occurs, so that in the present state of our knowledge, it is impossible to calculate the heating power of a coal by taking as a basis its chemical composition.

These experiments, which have purely scientific value, have been supplemented by Messrs. Scheurer-Kestner and Meunier-Dolfus with some experiments of a practical nature, the combustion of this coal having been made in a steam generator which they describe. The average composition of the gas during combustion was found to be: carbonic acid, 10.3; oxygen, 8.3; combustible gases, traces; nitrogen, 81.4.

In these experiments it was determined by calculation that 15,500 liters of air at 0° (32° Fah.) and normal pressure were consumed for each kilogram of coal burned; so that the gaseous products of combustion were calculated to contain: 6.122 liters excess of a r. = 39.5 per cent; 1.596 liters carbonic = acid, 10.3 per cent; 7.782 liters nitrogen. = 50.2 per cent.

The steam at a mean temperature of 146° C. contained 651 calories; one kilogram pure coal evaporated 10.440 kilos. of water, so that in the steam there were 6796 calories.

The gaseous products of combustion contained for one kilogram of pure coal:

15.782 kilos. of air and nitrogen at 0.237 sp. cal ..	3,740 kilos.
3.137 " carbonic acid at 0.217 sp. cal ..	0.680 "
	4.420 "

which, reduced to 108.9° C. (difference in temperature between the external air and the products of combustion on escaping) have gained 481 calories.

The combustible gases have been omitted. The steam contained in the gaseous products, according to calculation, took away 252 calories. Finally the loss through radiation has been valued by the authors, with the assistance of special apparatus, at about 4.46 per cent. So that the following table of the repartition of calories is obtained:

Calories in the steam ..	6,603	74.50 per c.
" " gas ..	481	5.42
" " steam in the g's ..	257	2.89
" " lost through radiation ..	395	4.46
Calories not found ..	7,736	87.7
	1,128	12.73
	8,864	100.00

This is the result obtained by the authors, showing still a loss of about 13 per cent. in calories, the largest portion of which may, however, be charged to radiation.



UNITED STATES COAL PRODUCTION AS INFLUENCED BY THE MANUFACTURE OF PIG-IRON.

By Charles A. Ashburner.

One of the causes of the increase in the coal production of the United States for 1887 over that for 1886 has been due to the increase in the production of pig-iron, and that of manufactured iron and steel. The extent to which the increase in the production of coal can be accounted for by the blast furnace consumption may be appreciated by an inspection of the following figures:

The total production of pig-iron in the United States for 1886 was 6,365,328 tons (2000 pounds), and for 1887, 7,187,206 tons. Of the total production for 1887, 2,338,389 tons were pig-iron, manufactured with anthracite coal and coke; 578,182 tons were manufactured with charcoal, and 4,270,635 tons were manufactured with bituminous coal and coke. The production of pig-iron in the following States was greater in 1887 than in 1886: Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Virginia, North Carolina, Alabama, Texas, Tennessee, Ohio, Illinois, Michigan, Wisconsin, Missouri and Colorado, while in the following States the production for 1887 was less than it was for 1886: Maine, Georgia, West Virginia, Kentucky and Indiana.

The most notable increase in the production was in Pennsylvania, where the product for 1887 was 11 per cent over that for 1886, and in Ohio, where the product for 1887 was 7 per cent over that for 1886. This increase was principally in pig-iron manufactured with anthracite and bituminous coal, in conjunction with coke, so that the increase in pig-iron production means a corresponding increase in the coal production in these two States. The increase in the production of pig-iron means a greater proportionate increase in the production of coal from the Pennsylvania mines than from the Ohio mines, since in a number of States where there is an increase in the pig-iron production, the iron is manufactured exclusively or largely with Pennsylvania coal and coke. Among such States may be noted the following: Massachusetts, Connecticut, New York, New Jersey, Michigan, and Wisconsin. In the State of Colorado 1,791,735 tons of coal were produced in 1887, as against 1,368,338 tons in 1886, and there was a corresponding increase in the production of pig-iron, which for 1886 was 10,451 tons, and for 1887 95,291 tons. No immediate increase can be looked for during the first quarter of 1887 in the production of the coal mines of the United States, due to the consumption of coal by blast furnaces, on account of the condition of the iron trade and the increase of stocks of pig-iron on hand on the first of January, 1888, over that on hand on the first of January, 1887.

The amount of pig-iron, manufactured from coal, which was on hand on the 1st of January, 1887, and also on the 1st of January, 1888, is shown by the following table:

	1887.	1888.
Anthracite and coke pig-iron.....	50,503 tons.	114,107 tons.
Bituminous and coke pig-iron.....	70,634 "	127,978 "

The greatest amount of these stocks on the first of January, 1888, was in the Lehigh Valley, in the Shenango Valley, and in Allegheny County, Pennsylvania, about 30,000 tons being in each locality; the iron in the Lehigh Valley being made with anthracite and coke, and that in the latter two localities being made with bituminous coal and coke.

These facts are interesting as showing the relation existing between the coal mined and the pig-iron produced in the United States.

AMERICAN METHODS OF COPPER SMELTING.

Mr. James E. Mills reviews Dr. Peters's book in the *San Francisco Mining and Scientific Press* of February 4th, as follows: "A work on copper smelting has recently been published which will be found a great use to mining engineers and copper miners. Copper smelting in the United States has been developed along lines of progress quite widely divergent from those followed in Europe, until the treatment of copper ores here is as characteristically American as the treatment of gold ores.

"No strikingly new principles of metallurgy have been developed in American copper smelting, but new and much improved methods of applying known principles have been discovered and worked out until American practice is in advance, and in some respects far in advance of the practice elsewhere, especially in application to American conditions of high cost of labor and material. And all that characterizes this advance is set forth by Dr. Peters in an unusually useful and available form.

"The improvements have been made by a few able metallurgists, and among them and associated with them was Dr. Peters himself. The results of their work have heretofore been unheralded, and are here for the first time adequately presented.

"No part of the treatise is taken up with general metallurgical principles such as belong to a work on general metallurgy; but it is packed full of available and helpful information, just such as a metallurgist needs when he turns to any particular branch of his profession, and much of this information applies to other branches than copper metallurgy.

"Tables of cost, details of construction, and manipulation and results of experience abound. In fact, the book consists of the notes of an able metallurgist, thoroughly trained in the general principles of his science and of large experience in the particular branch of which he treats.

"That this is precisely the case the writer can state confidently, for on one occasion when it became necessary for him to learn the bearing of the very latest American improvements in treating copper ores upon the probable future cost of production at the great Butte, Mont., copper lode, Dr. Peters, then in charge of the Parrott smelting works at Butte City, gave him all the required information out of the stores of his memory and his notes, and here in published form is almost the same presentation of the subject.

"The information so liberally imparted from unpublished notes was very helpful and very warmly appreciated, and the same notes published will undoubtedly be widely and warmly welcomed and appreciated by metallurgists and others who take part in the great industry of copper production."

**Resolving Hydrogen, Oxygen, etc., into Their Elements.**—A paper by Professor Gruenwald, recently published in the *Chemical News*, upon the spectra of hydrogen, oxygen, and aqueous vapor, is an extremely important one. Gruenwald claims to have discovered, from the spectra of these gases and vapors, that hydrogen is a compound of one volume of a primary substance *b*, with four volumes of another primary substance *a*, and is therefore a compound substance, analogous to ammonium (NH), the volume of which, on its dissociation at a sufficiently elevated temperature, is in the proportion of 2 to 3. The substance *a* is the lightest of all gaseous bodies—much lighter than hydrogen; and *b*, if we regard *a* as a univalent element, is a pentavalent gaseous element similar to nitrogen. He has also found oxygen, carbon and nitrogen to be compounds of simpler substances. The element *b*, noted above, corresponds with the assumed element occurring in the sun and known as "helium," thus proving that hydrogen is disassociated in the sun's atmosphere. Another unknown substance present in the sun's corona which gives the spectral line 1474, he concludes, is due to the other constituent of hydrogen *a*. Much more extended observations will be necessary to prove the correctness of this alleged discovery; but the facts brought forward by the author are sufficiently confirmatory to justify the most thorough investigation of the matter.

**The Effect of Good Management on the Profits of Coal Mining.**—The following extract from an article by Mr. André in a recent number of the *Colliery Guardian* is very suggestive and instructive:

"The reforms introduced into the management of the Anzin collieries in the north of France in 1884, which occasioned the great strike and raised the ex-collier and tavern-keeper Basly to the position of a member of the French Parliament, are beginning to show themselves in larger dividends for the shareholders and better wages for the men. The efficiency of the miner, that is, the average annual production per man, has been raised in three years from 206 to 286 tons, an increase of 38.8 per cent. This important reduction in the cost of production has so improved the financial position of the company that they are able to prosecute vigorously the exploratory works that had been commenced in more prosperous days, and thereby gradually to increase the output. There are now eighteen pits being worked, the average annual output from each of which is 129,800 tons."

Among our own colliers it would be easy to show the difference which good or bad management makes in the cost of production, and the data to make such comparison is generally to be found in the annual reports of the companies, though it can be brought out into relief only by careful analysis and comparison of statements.

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.)

*Notes and Formulae for Mining Students.* By J. H. Merivale, M. A., Professor of Mining in the Durham College of Science, Newcastle-upon-Tyne, England. Published by Messrs. Crosby, Lockwood & Son, London, England, 1888. Second edition, Revised. Pages 151 and Index.

*A Treatise on Mine Surveying.* By Bennett H. Brough, Instructor of Mine Surveying at the Normal School of Science and Royal School of Mines, London. Published by Charles Griffin & Co., London, England, and the J. B. Lippincott Company, Philadelphia, Pa. 1888. Pages 302, with Index. Illustrated. Price \$2.50.

*Boiler and Factory Chimneys, their Draught Power and Stability, with a Chapter on Lightning Conductors.* By Robert Wilson, A. I. C. E. Published by Messrs. Crosby, Lockwood & Son, London, England. 1888. Second edition. Pages 64 and Index. Illustrated.

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 MARCH 13TH, 1888.

- 379,243. Lubricator. James Powell, Cincinnati, Ohio.
- 379,253. Mechanism for Separating Coal, etc. Septimus Thomas, Seranton, Pa.
- 379,272. Piston-Rod Packing. William R. Ford, Allegheny City, Pa., Assignor to Charles Walker and James B. Walker, both of same place.
- 379,280. Throttle and Governor Valve. Richard H. Mather, Windsor, Conn.
- 379,284. Dynamo-Electric Machine. Lewis C. Rice, Denver, Colo.
- 379,330. Nail Distributing and Feeding Machine. Freeborn F. Raymond, 2d, Newton, Mass.
- 379,351. Device for Reseating Valves. Charles P. Wetts, Susquehanna, Pa., Assignor of one half to Charles M. Morse, Buffalo, N. Y.
- 379,370. Manufacture of Sheet Iron. Isaac E. Craig, Camden, Ohio.
- 379,385. Rotary Engine. Willis J. Fisk and Homer L. Phelps, Lockwood, N. Y., Assignors of one half to Thomas J. Simcoe, same place.
- 379,386. Axial Rolling. Henry H. Forsyth, Pittsburg, Pa.
- 379,390. Device for Discharging Coke-Ovens. William T. Giles and William Booth, Shanokin, Pa.
- 379,392. System of Irrigation. Augustin S. Haines, Nashville, Iowa.
- 379,397. Gas-Engine. I. Newton Hopkins, Brooklyn, N. Y.
- 379,400. Valve-Gear. Kennard Knott, Chicago, Ill.
- 379,411. Slag-Furnace. Jesse E. Peck, Chicago, Ill.
- 379,412. Slag-Furnace. Orrin B. Peck, Chicago, Ill.
- 379,413. Nail Finishing Machine. Erastus E. Pierce, New Brighton, Pa.
- 379,418. Ore-Concentrator. Joseph Sandon, Virginia City, Mont.
- 379,436. Slag-Furnace. Orsemas T. X. Adams, Chicago, Ill., Assignor to Melinda Peck, same place.
- 379,437. Slag-Furnace. Phineas H. Adams, Jr., Chicago, Ill.
- 379,438. Treatment of Metals. William A. Baldwin, Chicago, Ill., Assignor of one fourth to Ammi A. Thomas, J. Clement Smith, and James J. Sheeby, all of Washington, D. C.
- 379,453. Working Metals by Electricity. Nicholas De Benardos, St. Petersburg, Russia.
- 379,466. Regulation of Electric Motors. Daniel Higham, Philadelphia, Pa., Assignor to the Higham Electric Motor Co., same place.
- 379,468. Oil Burner. Clement R. Hoopes, Philadelphia, Pa.
- 379,487. Obtaining Ammonia and Hydrochloric Acid. Ludwig Mond, Northwich, County of Chester, England.
- 379,488. Obtaining Ammonia and Chlorine from Ammonium Chloride. Ludwig Mond, Northwich, County of Chester, England.
- 379,492. Process of Distilling Petroleum. William H. Pitt, Buffalo, N. Y., Assignor of one half to George H. Van Vleet, same place.
- 379,507. Apparatus for Transferring Blooms. Robert P. Dolan, Steelton, Pa., Assignor, by mesne assignments, of one half to Frederick E. Smith, same place.
- 379,510. Housing for Rolling-Mills. Joseph Eynon, Mansfield Valley, Pa.
- 379,527. Slag-Furnace. Orsemas T. X. Adams, Chicago, Ill., Assignor to Melinda Peck, same place.

## THE METALLURGY OF STEEL.\*

By Henry M. Howe.

(Continued from page 183.)

When bored with a sharp drill iron evolves much less gas than this: boring with a dull drill in one case sets free eleven volumes of gas, and possibly still finer comminution might release still more. Again, the gases obtained on heating in vacuo doubtless include at least a part of the gas which would have been set free had the metal being bored before heating in vacuo. Again, the gases escaping during solidification from the already pasty metal are doubtless contaminated with those which escape before solidification from the central portions of the metal, which remain molten longest.

Of two of these classes, A2 which redissolves in the metal, and B2 which remains in the solid metal and cannot be extracted even by heating in vacuo, we have little knowledge. §§ 172 and 176 give certain facts which suggest that most and perhaps all of the nitrogen and hydrogen of solid iron can be removed either by heating in vacuo or very fine grinding.

The gases which directly interest the steel-maker are the "mould" gases,<sup>a</sup> those which are evolved during solidification and which cause blowholes. It is the formation of cavities that gives the gas question moment: it is not clear that their sides can ever be so completely welded together, even in small forgings, as to wholly efface their effects. In large forgings it is still more difficult to close them, while in castings their effects may be disastrous. Were we, however to confine our attention solely to the phenomena of this class of gases, we could obtain but a very incomplete notion of the causes of their generation and of the means likely to prevent it: a general study such as we will now attempt may give us a better insight.

I will now detail certain phenomena touching this question, and later seek their explanation and the means of preventing and obliterating gas-formed cavities. The shape and position of the blowholes and pipes is discussed in Chapter XII.

### § 201. CONDITIONS OF THE ESCAPE OF GAS FROM MOLTEN AND SOLIDIFYING METAL.

A. *Scattering and Rising.*—Gas may escape from molten iron so rapidly as to cause violent boiling. In this way the contents of a five-ton ladle may be nearly completely ejected. Commonly a gentle bubbling occurs till the top of the ingot crusts over: after this the gas escaping from the still liquid interior may keep minute passages open, as at J, figure 12, through which it escapes, "scattering" particles of molten metal.

Scattering then is caused by gas which is able to swim to the top of the ingot. Such gas might be evolved either from the still molten interior, or from the already pasty metal, or at their contact, being gasified at the instant of solidification. But when the pasty metal evolves bubbles of gas, whether they form wholly within the already pasty portions as at M, figure 13, or whether they form at the contact of the liquid and pasty portions, their spherical ends projecting into the liquid mass as at L, unless they free themselves and swim to the top of the ingot and thus escape, they must occupy room which had been oc-

cupied by the metal, and must thus tend to force the still liquid interior upwards, pressing against the ingot top, or

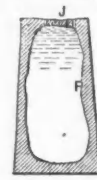


Fig. 12

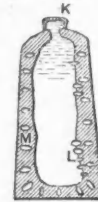


Fig. 13

even piercing it as at K. This pressure against the top of the ingot causes it to rise. This rising is often gradual, the top of the ingot being gradually forced upwards, till, even if the mould was originally but half filled, the top of the ingot may eventually protrude above that of the mould.

The blowholes in ice appear to form like those at L, their ends projecting into the still liquid water. Water passes so suddenly from the liquid to the solid state that, once the blowhole is formed, it does not appear to be subsequently enlarged by fresh secretions of gas from the surrounding ice. Just how the blowholes form in steel is not certain. On the one hand, when the molten interior of partly solidified ingots of rising steel is poured out,<sup>b</sup> the perforations found in the inner side of the shell indicate that the blowholes initially form as at L, figure 13: on the other hand, the gradual rising of the whole top of the ingot suggests that, even after the blowhole is formed and completely inclosed, fresh gas enters it from the adjoining metal, increasing the pressure till it becomes strong enough to elongate the already partly solidified walls of the ingot.

Thus gas which forms within the ingot during solidification will cause frothing, boiling, or "scattering" if it is able to swim to the upper portion of the mass and escape, and "rising" if it is unable to escape.

Thus scattering, when unaccompanied by rising, appears to be due to the early escape of gas: while rising is rather connected with its later escape. Clearly the bubbles which cause rising must form blowholes: hence the blowholes are referable to the late escape of gas.<sup>c</sup>

It would not be anticipated that the escape of gas at the instant of solidification would necessarily cause rising and blowholes. If the gas then evolved remains attached by capillarity to the growing walls as at L, or if it be mechanically enclosed by the metal, it will cause blowholes. But it is altogether conceivable that it may not be detained in either of these ways, but that all of it may swim to the surface. As the solid portion gradually encroaches on the liquid interior, the condition and texture of its surface may vary according to the rate of solidification, the composition of the metal, etc.: and some kinds of surfaces may be expected to have a greater tendency to retain gas bubbles by capillarity than others. Again, if the metal passes directly from a highly liquid to a distinctly

<sup>b</sup> See figure 32, § 222.

<sup>c</sup> Müller's calculation, implying that if the gas found in the cold blowholes had existed in them when the metal was at 1,400° C. its pressure would have been between about 191 and about 346 pounds per square inch, harmonizes with the view that the blowholes are formed by a late rather than an early escape of gas during solidification, and that much gas enters them after they have been completely enclosed by pasty metal. For, unless the metal were decidedly stiff and hence comparatively cool, we should expect that gas at such a pressure and in the considerable quantity in which it exists in the larger blowholes, would push the surrounding metal aside and enlarge its own cavity till its pressure became much diminished, unless indeed the ingot's outer crust had become so strong and rigid as to completely resist the expansive tendency. In arriving at these numbers Müller deducts for the gas which, from boring solid blowhole-less iron, he infers exists in the solid metal between the blowholes. Cf. § 205, B. The pressure which he arrives at appears to me somewhat conjectural. Iron, Jan. 19, 1883, p. 52; Sept. 14, 1883, p. 244.

\* Copyright by the Scientific Publishing Company, 1887.

<sup>a</sup> For brevity I frequently refer to the gases evolved from molten and solidifying iron at the atmospheric pressure as "mould gases," to those found on boring the cold solidified metal under water, etc., as "boring gases," and to those extracted on heating it in vacuo as "vacuum gases."



solid condition, gas set free at the instant of solidification should have a better chance of escaping from the solidifying metal and of swimming upward to the surface, than if the metal passed through an intermediate pasty or gummy state.

So, too, if the metal on solidifying becomes porous, gas which forms will be more likely to work its way out through the ingot's walls and less likely to collect and push the metal aside so as to form blowholes, than if the metal becomes pasty or gummy on solidifying.

According to Müller both grey and white cast-iron evolve gas copiously in setting. White iron often contains blowholes, grey iron rarely does. It is natural to refer this difference to the fact that white iron passes through a pasty condition in solidifying, while grey iron is said to pass more instantaneously from the liquid to the solid state. Indeed, from its behavior in the foundry one would hardly suspect that it evolved gas at all, so tranquil is it, save for the beautiful, kaleidoscopic, shifting play of its surface.

It is probable that the same water may, under different conditions of cooling, yield either very porous, or comparatively compact, or even perfectly solid ice, though it may evolve the same quantity of air in each case. In the first case much of the air is mechanically entangled or retained by capillarity; in the last the conditions of freezing enable it to escape completely. How much more may we expect differences when not only the rate of freezing and the other external conditions differ, but when different varieties of metal differ widely in the order and kind of changes in their physical condition which they themselves undergo in solidifying? With our present imperfect knowledge and with such complex conditions it were idle to seek a full explanation of all the variations in the effects of our escaping gases.

The top of a scattering ingot will evidently be porous, but, if solidification progresses regularly from without inwards and from below upwards, all the gas evolved from the still molten metal and all that is evolved at the instant of solidification may escape through the top crust, or collect beneath it, and the rest of the ingot may be free from blowholes: but it may still contain the central pipe.

If the still molten metal evolves gas so rapidly that it boils violently, and if, as solidification progresses, the escape of gas decreases somewhat, the metal will now sink back. Very soft and especially basic ingot iron may behave in this way to such an extent that it is not practicable to fill the mould at one teeming. With soft basic ingot iron it is often necessary to pour but a little metal at a time, returning perhaps as many as nine times at intervals, and adding a little metal each time as the frothing slackens. This metal often pipes slightly: yet it sometimes develops a sufficient number of blowholes to rise, when, in spite of its previous sinking back, it is strictly speaking a "rising metal." To the superficial observer its rising is masked by the more violent and conspicuous frothing which precedes it. In this case our nomenclature is rather misleading, and calls for a change. Confusion may be lessened by calling such metal "blowhole-forming" rather than "rising."

B. *Piping* is due to the contraction of the interior of the ingot after the exterior has grown cool and rigid. The volume and position of the pipe will be considered in §§ 224-5. Suffice it here to point out that the blowholes, displacing the molten or pasty metal and forcing it inwards and upwards, must diminish and may obliterate

the pipe. And in fact, other things being equal, the fewer and smaller the blowholes, the larger is the pipe. But that portion of the blowholes which forms before the ingot-top has frozen across merely raises the level of the ingot-top, and does not lessen the volume of the pipe.

Piping proper is not to be confounded with the sinking back which occurs when metal which has been boiling becomes relatively tranquil, or at least boils less violently: this occurs because the evolution of gas slackens, and it has but little and remote connection with contraction.

§ 202. WHAT CLASSES SCATTER AND RISE?—Irons may be classified into those which

- |   |                             |
|---|-----------------------------|
| 1. Neither scatter nor acquire blowholes.       | } They usually pipe.        |
| 2. Scatter without acquiring blowholes.         |                             |
| 3. Acquire blowholes (rise) without scattering. | } They do not usually pipe. |
| 4. Both scatter and acquire blowholes (rise).   |                             |

Classes of iron which scatter much usually acquire blowholes, and those which acquire blowholes abundantly usually scatter.<sup>a</sup>

A. *Influence of Temperature*.—An excessively high casting temperature renders the metal wild,<sup>b</sup> and favors the formation of blowholes, but, according to Walrand,<sup>c</sup> only when the metal is cast in metallic moulds whose walls have become oxidized. In this case an external zone of innumerable small, narrow, very elongated, closely packed blowholes forms, causing the ingot to crack in forging. In soft basic ingot iron an excessively high temperature produces numerous pear-shaped subcutaneous blowholes, together with many central ones.<sup>d</sup>

An unduly low casting temperature likewise causes rising and blowholes under many conditions, whose limits are not well known.

B. *Influence of Composition and of Additions*.—In general, the freer the iron from carbon, silicon and manganese, the more does it form blowholes. Thus oxygenated metal scatters violently and forms blowholes.<sup>e</sup> Ingot iron comes next: it occasionally rises so violently as to burst the firmly wedged cover from its mould, causing a violent explosion. If at the same time it be unduly cool it boils all the more violently. Highly carburized steel is normally comparatively tranquil, is nearly or quite free from blowholes, and pipes deeply: the harder *i. e.* more highly carburetted crucible steels pipe more deeply than the softer ones.

There may be exceptions to this rule. Thus in the basic Bessemer process it is found that steel which has not been thoroughly after-blown, and hence has say 0.15% of phosphorus or more, is much wilder than that which is thoroughly dephosphorized: it boils like porridge, with large bubbles and violent spirting.<sup>d</sup>

(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.

<sup>a</sup> The statements in this chapter concerning the behavior of the different classes of iron, are in large measure based on Müller's authority, in part on personal observation. My own observations are not sufficiently extended to enable me to speak with perfect confidence on certain points; nor do I feel certain that the published statements of others on these same points are based on sufficiently systematic observation.

<sup>b</sup> Stead, Journ. Iron and St. Inst., 1882, II., p. 526.

<sup>c</sup> Troilius, Van Nostrand Eng. Mag., XXXIII., p. 364, 1885, from Jernkont. Ann.

<sup>d</sup> J. Hartshorne, private communication, March 1st, 1888.

<sup>e</sup> As pointed out at the end of § 201, A. oxygenated metal and soft ingot iron often sink back in the mould, so that fresh metal has to be added after teeming: but nevertheless oxygenated metal is strictly speaking a "rising," *i. e.* blowhole-forming metal, and soft ingot iron often is.

## PERSONALS.

Mr. John W. Mackay is about to visit the mines under his control at Quijotoa, Arizona.

Mr. Josiah E. Rutter, secretary and treasurer of the Lickdale Iron Company, died at his residence in Lebanon, Pa., on the 9th inst.

Mr. William G. Tiffany, a mining expert, it is said, has brought suit in San Francisco against Mr. George T. Coulter for \$220,000, alleged to be due him on a deal in which the Con. Esmeralda, a Nevada mine, was manipulated.

It is announced that Captain Robert W. Hunt has opened offices of metal inspection in New York and Chicago, and is also a member of the firm of Ferres & Co., in the same business, at Pittsburg. He will make his home hereafter in Chi ago.

Mr. A. M. Wellington, civil engineer, has proposed elaborate improvements in the terminals of the East River Bridge, by which the capacity of the bridge can be quadrupled and its service be effected with greater economy. These plans have been unanimously adopted by the Board of Trustees of the bridge.

The Board of City Trusts, Philadelphia, Pa., on the 14th inst., on the recommendation of the Franklin Institute, awarded the Scott medal and premium to C. J. Hexamer for his system and apparatus for preventing and extinguishing fires in grinding mills; and to Alexander E. Outerbridge for his method of carbonizing fabrics and obtaining castings of the same in metal.

Mr. Julian Kennedy, to whose resignation as General Superintendent of the Homestead Steel-Works, of Carnegie, Phipps & Co., Limited, at Homestead, Pa., we referred in our issue of February 11th, has accepted the position of Manager of the Allegheny Bessemer Steel Company, recently organized, and who have purchased the works of the Duquesne Steel Company at Duquesne.

Col. David E. Buel died recently in St. Louis in extreme poverty. Col. Buel was a noted figure on the Pacific Coast for thirty years, and at one time was the leading mining operator of Eastern Nevada. He figured extensively and prominently in the early days in the mining affairs of Austin, Belmont and Eureka. It was the firm of Buel & Bateman that gave Eureka its first substantial upward start. They bonded and placed in the San Francisco market the Eureka Consolidated mine.

## FURNACE, MILL, AND FACTORY.

A large furnace for heating old rails is being erected by the Hubbard Iron Company at its mill at Youngstown, O.

The rolling-mill of P. L. Kimberly & Co., at Sharon, Pa., has been closed down for the present. The Greenville mill of this company closed at the same time. No cause was given for the shut down.

Messrs. Hunt & Clapp, of Pittsburg, Pa., have sold their magnesia sectional covering business to the Pittsburg Pipe Covering and Beting Company, Limited, composed of F. F. Turner, Dr. Wm. Brinton, and S. V. D. Huntingdon.

The Beecher Furnace Company has been incorporated in Cleveland, Ohio, with a capital stock of \$50,000; the incorporators are William F. Beecher, Theodore H. Cahoon, William H. Beecher, Robt. H. West, and Clifton D. Ellis.

The Cincinnati Forge and Iron Company, of Cincinnati, Ohio, has concluded to rebuild its works, which were destroyed by fire last November. Arrangements have been made for constructing them on a larger scale. In about six weeks operations will begin.

A rolling mill for turning out railroad iron is projected at the Flat Shoal depot, N. C., of the Cape Fear & Yadkin Valley Railroad. Dr. Worth and Mr. J. L. Worth own a force and ore lands in Surry County, and the product of their works will be used in the projected mill if it be built.

The South Chicago works of the North Chicago Rolling-Mill Company are now in full operation, with the exception of one blast-furnace. The stoppage of the steel-works and rail department in December and January enabled the machinery to be thoroughly overhauled and put in complete order, so that the production is now above the average of the previous run.

The Sagendorf Iron Roofing and Corrugating Company, of Cincinnati, Ohio, made an assignment to Harlan P. Lloyd on the 13th inst. The assets are stated at \$40,000 and liabilities at \$35,000. The company had a branch at Birmingham, Ala., which proved, it is said, a losing concern, embarrassing the home firm. It is expected that the company will make satisfactory arrangements with the creditors and resume business.

A number of improvements are being made at the Pennsylvania pipe mill, Pittsburg, Pa., and are not yet completed. The capacity of the mill has been increased from 200 to 400 tons a day with the employment of a few more men. Several of the lap-weld furnaces were lighted up last week. The butt-weld department has also been set in motion, turning out 300 tons of pipe per day.

The Paducah Iron Company, organized under the laws of Kentucky, with a capital stock of \$250,000, intends to move the Nova Scotia furnace, now located near Salem, Mo., to Paducah, Ky., and enlarge the

same to a capacity of 90 to 100 tons per day. It is expected to put the furnace in blast some time in September next. The ore and limestone to be used will come from Tennessee River, a short distance from Paducah, and the fuel from Pittsburg and Jackson County, Ill.

In reference to the rumor that the Pennsylvania Tube Company would run Graff, Bennett & Co.'s Millvale and Clinton mills to supply the former's pipe mill, Mr. Latshaw, of the Tube Company, says that the firm has never contemplated such a proceeding. "We have no trouble in getting all the pipe iron that we want. There might be a little delay if we run as full as usual. As it is, we shall be able to buy all we want as soon as we are ready to resume full operation."

## CONTRACTING NOTES.

Contracts open will be found on page xix. New contracts this week: No. 811, Pumping Engines; No. 812, Sewers; No. 813, Tunnel; No. 814, Asphalt Pavement; No. 815, Iron Bridge; No. 816, Water-Works; No. 817, Water-Works Supplies, Iron, Brass Castings, etc.; No. 818, Iron, Copper, Zinc, and other supplies for building.

Messrs. P. P. Kellogg & Co., Springfield, Mass., are in the market for two steam engines, 75 horse-power each; Mr. W. J. Partridge, corner Dubois and Croghan streets, Detroit, Mich., for a gas engine, 1 to 2 horse-power; C. W. Mackey, Franklin, Pa., machinery for an extensive plant for manufacture of red lead; Messrs. Hayes & Co., Springfield, Mass., for a high-speed engine, 15 to 20 horse-power; the Belle Vernon Natural Gas Company, Belle Vernon, Pa., and Monongahela City & Bellwood Natural Gas Company, Monongahela City, Pa., for about six miles of pipe; Mr. J. R. Rumbard, Lincoln, N. C., for mining machinery; Mr. James H. A. Shaver, Freeport, Md., for one 40 horse-power return tubular boiler, and one 20 and one 60 horse-power steam engine; the Galena Oil Works, Franklin, Pa., one 100 horse-power steel stationary boiler; Mr. Geo. H. Sullivan, Elizay, Fla., a 50 horse-power boiler; Messrs. Webb, Stevenson & Co., Nashville, Tenn., dynamos for electric lighting and elevators; Macon Gas-Works, A. E. Boardman, Supt., Macon, Ga., a water-gas apparatus. The Edison Sault Light and Power Company, Sault Ste. Marie, Mich., for an elevator for a tower; Mr. J. B. Willis Walden, Ga., for a 10 horse-power portable engine and a 25 horse-power tubular boiler; Mr. F. Jones, Decatur, Ala., for 72 tons 16-lb. steel rails, 2½ tons spikes, half ton of splice bars; Messrs. Storall Bros., Cleveland, Ga., for a 12 horse-power boiler and engine; the Atlanta Piano forte Manufacturing Company, Atlanta, Ga., for an automatic engine and boiler from 50 to 70 horse-power; Messrs. Coles, Simkins & Co., Brunswick, Ga., for electric light machinery; the Flat Rock Canning Company, Flat Rock, Ind., for two tubular boilers and fixtures complete and a 12 horse-power stationary engine; Messrs. Heller & Barns, Beebe, Ark., machinery for grinding marl and hoisting machinery; and Messrs. Drewry Bros., Choccolocco, Ala., for 200 grate bars, small iron Trails and a small hoisting engine.

## GENERAL MINING NEWS.

STANDARD OIL COMPANY.—The Detroit *Free Press* of the 16th inst. says that several gigantic oil schemes more or less in embryo are in process of incubation in that city. The stockholders are directors in the Standard Oil Company, the International, Continental, Alpha and several of the independent companies, as well as producers of crude oil from Ohio and Pennsylvania, and have been here for some days past. The common object appears to be to control the International Oil Company, which owns the Hall European patents. It is announced that President Rockefeller, of the Standard Company, will be in Detroit in person next week.

As the European oil business is worth from \$15,000,000 to \$20,000,000 a year, it will readily be seen that there is an object in getting control of it, and the Standard Oil Company is fearful of losing its grip unless it gets into the Hall process deal, experiments having shown that this process gives about 50 per cent more refined oil from Russian petroleum than old methods.

## ALABAMA.

## JEFFERSON COUNTY.

PIERCE-WARRIOR COAL COMPANY.—It is the intention to build twenty coke-ovens at Warrior Station.

WATTS COAL AND IRON COMPANY.—This company is about to double the output of its mines at Warrior Station, which is now 150 tons daily. Work on 22 additional coke-ovens will begin shortly.

## CALIFORNIA.

## MONO COUNTY.

HOMER DISTRICT CONSOLIDATED GOLD MINES, LIMITED.—This company, to the organization of which we referred in our issue of November 26th, 1886, was brought on the London market about that time. The *Financial News* attacked the scheme and only £3000 out of the £1,000,000 wanted was subscribed by the public. Mr. George W. Butterfield is reported to have brought a libel suit against the *Financial News* and Mr. Marks, the editor of that paper, claiming £1,000,000 damages.

## NEVADA COUNTY.

CHICAGO QUARTZ MINING COMPANY.—The Supreme Court has confirmed the decision of Judge Walling in favor of the plaintiff in the case of this company, whose claim is located on Gold Flat, on a tract of land

which had been patented to the Central Pacific Railroad Company. The patent to the company was executed in 1870, and the mining company made their location in 1871.

## CANADA.

## PROVINCE OF NEW BRUNSWICK.

Mining licenses have been recently sold in the northern portion of New Brunswick on Crown lands, and it is said valuable deposits of galena, manganese and iron exist thereon.

The Stockton manganese mine is about being placed in Baltimore, says the *Halifax Critic*, and no doubt vigorous measures will be taken to develop and ship the ore in larger quantities. The price to be paid for the property is \$55,000.

## PROVINCE OF ONTARIO.

We are officially advised that Messrs. Morrison & Macfarlane, brokers in mineral lands, Duluth, Minn., have recently bought from original owners 1200 acres, known as the Cariboo vein, situated in Black Bay, east of Port Arthur. The property has been indifferently developed, there is indication of a rich silver lead deposit running through the location.

## COLORADO.

COLORADO COAL, COKE, AND IRON COMPANY.—The Secretary of the Interior has requested the Attorney General to bring suit for the cancellation of the patents on 42 homestead entries made at Pueblo, Colo., covering 6720 acres of land said to contain valuable coal deposits and well-known mines. The persons making the alleged entries are said to be fictitious, and the lands are now owned by the Colorado Coal, Coke, and Iron Company of Cincinnati.

## BENT COUNTY.

Arrangements are making to begin boring for coal on the hill south of La Junta. Coal experts, it is said, have offered to give a guarantee that a paying vein of coal could be found there at a depth of 300 feet or less, and the region will be thoroughly explored this spring.

## CLEAR CREEK COUNTY.

CASUO MINING COMPANY.—This company has been organized with a capital stock of \$250,000, by Charles Latimer, Hiram Kimball, Marius E. Rawson, B. F. Morse, J. N. Stockwell, James Barnett and Huston R. Hurd. Idaho Springs is named as the place for the principal office, while operations are to be carried on principally in Clear Creek County. A branch office is to be located at Cleveland, Ohio.

## GUNNISON COUNTY.

SYLVANITE.—According to the Denver *Mining Industry*, this mine is in bonanza at the present time, and will be famous just as soon as the snow will permit shipments. This was a mine that was played out and exhausted, as many supposed, but the last shipments of eight cars, aggregating 92 tons, brought \$19,376.40 at the Denver Public Sampling Works.

## LAKE COUNTY.

LEE BASIN MINING COMPANY.—The company is now working the Lee Basin proper on franchises from the Tip Top owners, nor does any portion of the territory under its name present more encouraging prospects, or promise to yield more substantially. In its recent development, a body of sulphide ore, the magnitude of which is not yet defined, has been penetrated, the general average of which is about 16 ounces, and which appeals to a lower rate of treatment before it can enter the market. There are streaks and pockets in this body, however, that carry sufficient silver to permit shipment, but which the management does not feel justified in doing at the present rate of treatment. All of it will eventually be hoisted as pay, the only question being a matter of time.

## SMALL HOPES CONSOLIDATED MINING COMPANY.

—The output of this property during February has been upon an average of nearly 70 tons per day, which has, it is said, realized the company a good surplus after deducting the expenses of a heavy pay roll and extensive prospecting. Mr. C. M. Donaldson, the manager, has stated that with the present amount of development work under way, and in support of the management's very intelligent and commendable ideas of proving up ore-bodies, it is scarcely probable that the directors will feel disposed to appropriate any of the surplus that the mercenary howls of those who are constantly clamoring for a dividend may be gratified. Indeed the necessity for proving up new ore-bodies before the old ones have been exhausted has been made so apparent in the past few years that it would appear to be the duty of a management to itself, if not to the protection of the stockholders, to keep the prospecting a considerable distance in advance of the output.

## PITKIN COUNTY.

ASPEN PUBLIC SAMPLING WORKS.—This company has been organized with a capital of \$20,000. The directors are Charles Ruter, M. Stockder and J. M. Beach.

LIME CREEK MINING COMPANY.—This company has been organized with a capital stock of \$50,000. The directors for the first year are Sidney P. Madeira, Samuel L. Boyer and Charles M. Payn. The principal office of the company is to be at Colorado City, while mining operations are to be carried on in Pitkin County.

## PUEBLO COUNTY.

PUEBLO SMELTING AND REFINING COMPANY.—Furnace No. 8 of this company was blown in on the 10th inst., making eight now in operation. Five others will be blown in this month.



DAKOTA.  
CUSTER COUNTY.

**TIN MOUNTAIN MINING COMPANY.**—This company has shipped a carload of tin concentrates to Chicago. This will be converted into pig tin and it is expected that it will be followed by shipments at regular intervals hereafter. The severe winter interfered with operations at the mines or shipments of concentrates would have been made much earlier.

**RATTLER GILROY MINING COMPANY.**—At the regular monthly meeting of the directors it was decided to take a bond on the outstanding eleven twenty-fourths of the Gilroy fraction, with the privilege of purchasing them, eight months from date, for \$12,000. This privilege is amended, however, by a clause which requires the company to make final decision at the end of sixty days, as to whether it will assume the obligations of the bond. It is also understood that by or before the end of sixty days \$2500 on the purchase price shall be paid over to Messrs. Harri-Franklin and Huger Wilkinson, owners of the outstanding interests.

LAWRENCE COUNTY.

**IRON HILL MINING COMPANY.**—Mr. D. A. McPherson has resigned as treasurer of the company and Mr. George C. Hickock, of the Deadwood National Bank, has been appointed to the vacancy. The smelter shut down last week for a short season, or until certain repairs to the lead well, which was leaking badly, can be effected. Material to make them has been telegraphed for from Chicago. The company is said to have an indebtedness of \$5700. The pay-roll to be met on the 15th inst. called for \$9500, and the roll April 15 for \$5000, necessitating provision to meet a total indebtedness of \$20,200. In consequence of this state of affairs an assessment of 7½ cents per share, or \$18,750 was levied. The smelter will not be blown in until at least thirty days' supply of ore is in the bins.

LAWRENCE COUNTY.

**ORO FINO MINING COMPANY.**—All the miners at this mine have been discharged, and the mine shut down. It is stated that the mine was barely paying expenses, leaving no margin for dead work necessary to its thorough development. A large sum is required for this, and as the stock is non-assessable, no means for raising it is apparent. The property is free from debt at present.

SPINK COUNTY.

The natural gas well at Ashton has reached a depth of over 125 feet, and it is stated gas has been found in greater volume. The pressure is now estimated at from 150 to 200 pounds.

GEORGIA.

BARTOW COUNTY.

**GEORGIA GRAPHITE COMPANY.**—This company has been organized at Carter-ville by Col. C. M. Jones and associates, with a capital of \$50,000. The company, it is stated, will proceed at once to erect buildings for the manufacture of this graphite.

CHEROKEE COUNTY.

**LA BELLE MINING COMPANY.**—This company, in which New Orleans capitalists are interested, is working its property at Holly Springs. Two shafts are now down 50 feet each. There are several hundred tons of a very low grade of ore on dump. Arrangements are making for the erection of a new stamp mill, which, it is expected, will be in operation in six weeks.

IDAHO.

LEMHI COUNTY.

**SALMON RIVER MILL AND MINING COMPANY.**—This company, recently organized, is about to erect a 50-ton concentrator near Salmon City.

INDIANA.

DUBOIS COUNTY.

Recent tests of ore found at Buck Shoals, on East White River, while sinking a well last summer yields, it is said, an average of 58 ounces of silver and 4½ ounces of gold to the ton. In our last issue we referred to a strike of gold and silver ore at Hartford City, Blackford County.

MAINE.

HANCOCK COUNTY.

It is rumored that Boston parties will reopen the Blue Hill copper mine which is to be sold by auction on the 23d inst.

MICHIGAN.

COPPER MINES.

**TAMARACK MINING COMPANY.**—The company has declared its first dividend of \$3 per share. It is stated that the accounts will show a surplus of \$500,000 April 1. March being partially estimated. This includes about \$60,000 supplies. The dividend on the outstanding shares will call for \$120,000.

MINNESOTA.

**PIONEER & ZENITH IRON MINING COMPANY.**—Our special correspondent sends us the following: The history and geological formation of the northern part of Minnesota (visited by the Institute of Mining Engineers in July) has been already gone over so often that no introduction may be necessary, the Minnesota belt being so well known to mining men, and more especially those interested in iron. The Pioneer & Zenith mining properties, situated on the southwest quarter town 63, range 12, owned by parties in and around Duluth. Adjoining the Pioneer to the west is the Chandler mine, first located and afterwards leased to Mr. James, who disposed of his interest to Messrs. Pickands, Chandler & Morse, of Chicago, the gentlemen being the principals in the Minnesota Iron Company. This (Chandler) property is now in an advanced state, is superin-

tended by Captain Jos. Sellwood, of Colby mine, and on completion of the Duluth & Iron Range Railroad in June will be in a position to ship ore. The Pioneer property, discovered in 1883, and known as the Pattison find, was leased by Mr. J. H. James, the present general manager of the mine, for \$10,000. Work has been pushed forward, and neither time nor money has been spared in order that everything may be as far advanced as possible. Several shafts have been sunk at certain intervals across the property (160 acres), to a depth from 25 feet to 40 feet, proving two different lenses of ore varying in width. This body of hard specular ore is encountered at each of the pits, showing a rich deposit through the property, or from the Chandler to the Zenith boundary. The vein widths are from 40 feet to 100 feet, and the ore assays 67 per cent to 69 per cent metallic iron. In phosphorus it is similar to the Minnesota, 0.04 per cent. Plant of the most modern kind will be contracted for within the next 30 days. Mr. J. A. Humbird, of Hudson, N. J., has the controlling interest, and the works are under the charge of Capt. Haney, lately of Marquette. To the east of this mine is the Zenith property (80 acres), owned and controlled to a great extent by the Pioneer holders. Its character is similar to that of its neighbor. The location is on the southeast quarter, Sect. 27, 63-12, and bids fair to be the equal of any mine in the East Vermilion District. With the railroad in the vicinity these mines should be able to supply the market with a high class ore, and if the proposed Duluth Rilling Mills scheme, at present *sur le tapis*, be carried through, a near purchaser for Minnesota ore might find the location advantageous.

MONTANA.

The Montana Central Railroad will be able to put coal on the market at Helena much cheaper than the people have been accustomed to pay for it. The coal in question will be the product of the San Coulee coal mine. The railroad company has been using it exclusively for some time, and finds, says the *Independent*, that it gives just as good satisfaction as the Rock Springs coal. While the latter has to be transported 700 miles before reaching Helena, the coal from the San Coulee mines will be brought by one sixth the hauling, only a little over 100 miles from the city. This is the first mine of any consequence that has been opened near Helena.

LEWIS & CLARKE COUNTY.

**ALPHA & OMEGA MILL AND MINING COMPANY.**—Official advices to us report that the production for 1887 amounted to \$12,899.48 in gold and \$8280.52 in silver. Making a total of \$21,180.

**MONTANA COMPANY, LIMITED.**—The bullion production for February amounted to \$130,000, and the working expenses to \$51,000, leaving a net profit of \$79,000.

MADISON COUNTY.

**BEDFORD MINING COMPANY.**—The mines to be operated by this company are known as the Bedford and Melrose mines, and are situated on Ramshorn Gulch, twelve miles north of Virginia City. They extend over a distance of five miles. The ores are argentiferous galena, carrying 40 to 65 per cent lead, and rich in gold and silver. The mines are in an advanced stage of development. The general manager is now in the East purchasing the necessary machinery, boilers, etc., for the works.

MISSOULA COUNTY.

**WHITE CLOUD.**—This mine, located on the head of Eight Mile Creek, and owned by Thomas C. Marshall, R. J. Latimer and Bowden & Jamison, has been bonded to the Anaconda Company for \$12,000, bond to expire six months from date. The company will begin development during this month, and if the property meets its expectations a branch road will be run from Florence to the mine.

SILVER BOW COUNTY.

**CONSTITUTION MINING, MILLING, AND PROSPECTING COMPANY.**—The first annual meeting of this company was recently held at Butte. Little development work has been done on the property. The mines, five in number, are located about six miles northeast of Butte. It was decided to place 25,000 shares of the capital stock upon the market, the proceeds of which will be solely used for the development of the mine. The capital stock of the company is \$1,500,000, \$5 each. The following officers were elected: President, M. D. Pratt; Vice President, Christian Weideman; Secretary, Simeon Kemper; Treasurer, Isaac Lowmsbro.

**LXINGTON MINING COMPANY.**—Official advices to us show that the bullion production for February amounted to \$6,943.48 in gold, \$77,110.04 in silver, making a total for the month of \$84,053.52, and since January 1st, a total of \$174,185.53.

NEVADA.

STOREY COUNTY—COMSTOCK LODGE.

We take the following from the Virginia City *Chronicle*:

The pay-rolls of the different Comstock mining companies for February amounted to \$226,639. This is merely the sum disbursed in wages to employes, and does not include other operating expenses. Of the total sum disbursed the Consolidated California & Virginia Mining Company paid out \$59,422.

Before the close of the current month the weekly bullion product of the lode will exceed \$160,000, divided as follows: Consolidated California & Virginia, \$90,000; Hale & Norcross, \$30,000; Savage, \$10,000; Yellow Jacket, \$15,000; and Caollar and Potosi, \$15,000.

The bullion product of Storey County mines for the quarter ended December 31st, 1887, according

to the Assessor's abstract statement, filed with the Recorder, was as follows:

Consolidated California & Virginia Mining Company produced 38,940 tons of ore, which yielded bullion valued at \$789,661.88; cost of extraction, \$276,898.58; transportation and reduction, \$272,580.50; total cost, \$549,478.58; net yield, \$190,183.30; average yield per ton, \$19.

Chollar Mining Company produced 1700 tons of ore, which yielded bullion valued at \$27,144.87; cost of extraction, \$29,857.37; transportation and reduction, \$11,900; total cost, \$41,757.37; excess of cost of production above yield, \$14,632.50; bullion yield per ton, \$15.97.

Hale & Norcross Mining Company produced 1594 tons of ore, the total bullion product from which was \$45,666.83; cost of extraction, \$18,726.83; transportation and reduction, \$8818.56; total cost, \$27,545.89; net yield, \$18,120.94; average yield per ton, \$28.59.

Kentuck Mining Company produced 1656 tons of ore, which yielded bullion valued at \$23,190.65; cost of extraction, \$13,683.70; transportation and reduction, \$10,104.60; total cost, \$23,788.30; excess of cost of production above bullion yield, \$597.65; average bullion yield per ton, \$14.

Savage Mining Company produced 5445 tons of ore, the gross bullion yield of which was \$113,404.45; cost of extraction, \$62,579.18; transportation and reduction, \$40,460; total cost, \$103,039.18; net yield, \$10,365.27; average yield per ton, \$20.83.

Yellow Jacket Mining Company produced 24,828 tons of ore, which yielded bullion valued at \$196,441.64; cost of extraction, \$121,922.56; transportation and reduction, \$186,220.71; total cost, \$308,143.27; excess of cost of production above yield, \$111,701.63; average bullion yield per ton, \$7.91.

The total bullion product of the Comstock lode amounted to \$1,145,509, against \$584,614 total product of the preceding quarter. It is estimated that the bullion yield of the current quarter will reach \$2,000,000.

**BULLION MINING COMPANY.**—Ore is said to have been developed on the Bullion 500 level, but nothing is definitely known as yet of its extent or value, as the air in the drift is bad and the face has not been carefully inspected.

**CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.**—During the week ended the 3d inst., 1252 tons of ore were shipped to the Morgan mill and 1879 tons to the Eureka mill. The average assay value of all the ore worked at the above mills during this period, according to battery samples, was \$32.67. The production for February amounted to \$350,000.

**HALE & NORCROSS MINING COMPANY.**—The Mexican, which has a 44-stamp capacity, has begun crushing this company's ores. The daily ore shipments to the Vivian mill average 40 tons. The stopes between the 600 and 700 levels are yielding the usual quality, and the area of ore is being constantly increased by explorations. Bullion valued at \$35,000 was on hand during the week ended March 3d.

The present output of ore from this mine, if the assay value runs as high as heretofore, will leave a bullion balance of \$48,000 in the treasury at the close of the current month—after deduction the cost of the production. By May 1st there will be a balance in the treasury above the cost of production sufficient to admit of disbursing a dividend of 75 cents per share to stockholders.

**SAVAGE MINING COMPANY.**—This company has concluded negotiations for the lease of the Rock Point mill at Dayton, which has a complement of 20 stamps. Ore from the mine will be delivered by teams, as it is off the line of the railroad. Daily ore shipments average 140 tons, car samples showing a value of \$33 per ton. Bullion valued at \$70,000 on hand and shipped on February account.

NEW YORK.

ONTARIO COUNTY.

Press dispatches report that natural gas was struck at Canandaigua, on the 15th inst., at a depth of 300 feet.

NEW MEXICO.

**NEW MEXICO PIPE LINE, REAL ESTATE AND CATTLE COMPANY.**—It is understood that this company has given parties an option on the famous Valverdi copper mines, and that they may be made productive.

GRANT COUNTY.

**PEERLESS MINING COMPANY.**—The company has an indebtedness of about \$6000. At a recent meeting it was resolved that stockholders should assume the debts, that the property be sold under the deed of trust near maturity, and all stockholders so choosing be allowed to come in. A committee was appointed who state that there is no desire to freeze out any one. It is proposed to buy in the mine when the sale occurs and then sell, lease or manage the property for the benefit of the stockholders who contribute to the purchase. To clear up the debt each stockholder is asked to pay five cents per share. In case any fail others desiring to do so can increase their subscriptions to an amount not exceeding twenty cents per share and thus gain an increased interest in the mine. Remittances must be made to T. C. Harris, 519 North Main street, St. Louis, Mo., on or before the 15th inst.

SIERRA COUNTY.

**COPPER KING SMELTING AND REFINING COMPANY.**—This company, recently incorporated, will erect works at Hillsboro this spring.

**SILVER MINING COMPANY OF LAKE VALLEY.**—Considerable ore has accumulated on the dumps during the temporary shut down of the sampling works,



which will be shipped as soon as the works resume operation. Between 50 and 75 men are employed on leases on the different properties, and about 40 men all told are working for the company. Surveys are being made of several of the company's claims for patents, application for which will be made as soon as the work is completed.

#### NORTH CAROLINA. GREENVILLE COUNTY.

**BLUE WING COPPER COMPANY.**—This company was recently organized with a capital stock of \$500,000. The officers are Judge W. H. Whitmer, president; D. A. Musser, vice-president; C. R. Savidge, secretary, and A. Walter, treasurer. It is the intention of the company to develop its property and erect early this summer concentrating reduction and refining works with a 60-ton capacity.

#### PENNSYLVANIA.

**FAYETTE FUEL GAS COMPANY.**—This company struck gas in its No. 2 well, situated on the Mack farm, not far from its famous Rider well.

**LEHIGH VALLEY RAILROAD COMPANY.**—The company has declared the regular quarterly dividend of 1½ per cent. The directors have also authorized an increase of 20 per cent in the capital stock of the company, or about \$6,750,000, which will be allotted to present stockholders proportionately at par. Fractional shares in the new issue will be recognized as entitled to full shares. Payments may be made in full between April 1 and 15 or in five equal installments, at intervals of three months, from April, 1888, to April, 1889. The new capital will be used in payment for the Roselle and South Plainfield Railway, lands recently acquired at Jersey City, terminals now being constructed at that point, additional equipment, increase of the lake fleet, etc. The aggregate capital of the Lehigh Valley Railroad, after this new stock is issued, will be about \$39,717,950.

In connection with this action of the Lehigh Valley, the Philadelphia Ledger has the following in regard to the Pennsylvania:

"We understand that the Pennsylvania Railroad will not make any issue of its capital stock to its shareholders at par this year, as has been done for the past two or three years, to provide funds for construction and equipment expenditures, but will rely in part upon a sale of \$3,000,000 of consolidated mortgage 4 per cent bonds of the Western Pennsylvania Railroad in its possession, due June 1st, 1928, under its guarantee of the payment of the principal and interest. Almost the entire capital stock of the Western Pennsylvania Railroad is owned by the Pennsylvania Railroad. The road has been rebuilt within a few years and now forms a profitable portion of the system as a low-grade line for the cheap movement of traffic from the western base of the Allegheny Mountains to Pittsburg. The Western Pennsylvania Railroad has paid dividends upon its capital stock for some time past."

**MASONTOWN GAS AND OIL COMPANY.**—This company has struck a slight flow of gas in its well on the Gray farm, near Uniontown. Going a little deeper, they struck oil.

#### COAL.

**COAL VALLEY COAL COMPANY.**—This company, of McKeesport, has failed for about \$100,000, with assets something under that figure.

**PENN GAS COAL COMPANY.**—The Paintertown mine belonging to this company has begun work, after two years' idleness.

**PINE GROVE COAL COMPANY.**—The company operating in the Mercer coal-fields has been reorganized. The following officers have been elected: F. A. Mizener, Erie, President; L. S. Reed, Erie, Secretary; J. A. Spears, Sharon, Superintendent.

#### NATURAL GAS.

**BADEN GAS COMPANY.**—This company to the failure of which we referred in our issue of November 19th, 1887, has been reorganized under the name of the National Gas Company. The plant of the Baden Gas Company was recently sold by a receiver to Geo. B. Hill & Co. for \$10,000, subject to first mortgage bonds aggregating \$196,000 for 10 years at 6 per cent. The real purchaser was the Pennsylvania Tube Company. J. J. Speck was placed in charge of the plant, which has been run by the National Gas Company. It is intended to enlarge the line in every way and increase the capital stock. The plant will be extended into three separate fields where valuable territory has been secured.

A bill in equity was filed in Pittsburg on the 7th inst., against the Baden Gas Company and others by the American Tube and Iron Company, the National Tube-Works Company, and others. The bill recites that the capital stock of the Baden Company was \$500,000, divided into 50,000 shares at a par value of \$10 each, which was subscribed as follows: J. Sharp McDonald, \$50,000; J. K. Dorrington, \$50,000; W. S. B. Hays, \$50,000; H. W. Wier, \$50,000; G. J. Grammar, \$37,500; J. J. Surzich, \$37,500; Charles H. McKee, \$25,000; Charles H. McKee, as trustee, \$122,500; W. G. Hunter, \$62,500; Thomas M. Clees, \$5,000; Thomas M. Jones, \$5,000, and John Werner, \$5,000. It charges that the certificate showing 10 per cent of the capital stock to have been paid is false, and that no part of the capital stock was ever paid in. It is further claimed that J. J. Speck and S. E. Gill have taken by assignment a number of shares of the capital stock, the former holding 1215 and the latter 1150, and that they are liable for the par value of the stock. The plaintiffs allege that they are large creditors of the company and ask the court to order C. H. McKee to disclose for whom he holds 1225 shares in trust, and

that a master be appointed to take account of the amounts remaining unpaid upon the capital stock and that when this is ascertained that the subscribers be required to pay over the amounts due upon the stock subscribed by each of them.

**FAYETTE FUEL GAS COMPANY.**—In order to prevent a monopoly by the Southwest Company, this company has decided to offer free gas to the citizens of Uniontown, as well as to all others who may be induced thereby to become citizens, natural gas for domestic and all manufacturing purposes, absolutely free, so far as any profit to said company is concerned. The condition to the above tender, briefly stated, is this: If the borough will equip and maintain an entirely new plant of sufficient capacity for supplying the same, the company will furnish gas to all consumers at actual cost for service. This cost, divided among consumers proportionately to the number of fires burned by each, would reduce the price of gas to a mere nominal sum per fire per month—only a few cents—instead of the exorbitant rates now charged. The offer has been accepted.

**PHILADELPHIA COMPANY.**—It is now stated that at the last meeting of the board of directors of this company the proposition to increase the capital stock to \$9,000,000, in order to bring it on a level with the increased value of the plant, was discussed at length and finally decided against. The capital will therefore remain at \$7,500,000.

**PINE RUN GAS COMPANY.**—It has been decided to increase the capital stock, for the purpose of meeting contemplated improvements in the plant and the acquisition of addition territory. The company has about 25 miles of pipe, supplying gas to Apollo, Leechburg, Freeport, the Pennsylvania Salt Company at Natrona, and all the manufactories at those places, having no competing lines.

#### OIL.

The Chief of the Bureau of Statistics reports the total values of the exports of mineral oils from the United States for the month of February, 1888, and during eight months ended February 29th, 1888, as compared with similar exports during the corresponding periods of the preceding year, as follows: February, 1888, \$3,518,538; February, 1887, \$2,400,182; eight months ended February 29th, 1888, \$30,578,397; and eight months ended February 28th, 1887, \$30,476,062. The exports from the above-named ports comprise about 99 per cent of the total exports of mineral oils. It is stated on good authority that the distillation of 100 gallons of crude petroleum will yield 76 gallons of illuminating oil, 12 gallons of gasoline, benzine or naphtha; 3 gallons of lubricating oil, and 9 gallons of residuum.

#### SOUTH AMERICA.

##### VENEZUELA.

The counsel for Guzman Blanco, the ex-President of Venezuela, appeared before Judge O'Gorman in the Superior Court, Chambers, on the 10th inst., and obtained a postponement until the 16th inst. of the arguments on the motion to vacate the judgment secured against Guzman Blanco for \$2,194,000 on November 28th, 1887. (See ENGINEERING AND MINING JOURNAL of December 10th, 1887.) It is charged by the complainant, in whose favor the judgment was entered, that Guzman Blanco, when President elect of Venezuela and Minister Plenipotentiary from that country to France and England, made a written agreement at Cannes, in France, on January 1st, 1886, with Geo. Turnbull, of New York, to the effect that Blanco would secure to Turnbull a valuable grant of land in Venezuela, the two of them to divide the profits from its sale or development. The land in question aggregates seven million acres, near the mouth of the Orinoco River, and includes valuable gold mines and timber forests. A part of it is said to lie within the Yuruari district to which Great Britain now lays claim. It had been granted to one Cyrenius C. Fitzgerald, an American citizen, who assigned it in June, 1884, to the Manoa Company, limited, incorporated under the laws of New York State and of Venezuela, and of which Guzman Blanco was one of the original stockholders. The Manoa Company mortgaged it to the American Loan and Trust Company, which issued stock of the par value of \$5,000,000. George Wilson, of Eleventh street and University place, New York, bought \$2,194,500 of the stock and bonds of the Manoa Company, and most of the remainder was taken up in New York.

Guzman Blanco was inaugurated President of Venezuela in September, 1886, and one of the first acts of his government was to declare void the original grant to Fitzgerald, which was for ninety-nine years, on the ground that he had failed to carry out his part of the agreement, which included the opening of roads, the erection of buildings, &c. Wilson alleges in effect that the agreement made at Cannes was fully carried out. He says Blanco and Turnbull were partners in business, having an office at 31 Broadway, in this city, and further stated that upon the expiration of his term of office Blanco sold all his property in Venezuela and removed from that country permanently, so as to evade liability for this act. Wilson brought suit against Blanco and Turnbull for the recovery of the money which he claimed to have invested, and when the late President of Venezuela was en route from that country to France, where he is now accredited, the summons was served on him while he was on board of a French steamer in the port of New York, a few hours before the vessel sailed. The defendants made no appearance when the case came up for hearing, and judgment was

entered by default. The plaintiff is now seeking to enforce the New York judgment against Guzman Blanco in France. No answer to the complaint has yet been filed, but the defendants make a general denial of all its allegations. Guzman Blanco is said to be a millionaire, but to have no property in this country. The manner in which the summons was served is believed by the defense to be sufficient to justify a reopening of the case.

**CARUPANO MINING COMPANY.**—The company has been developing and placing the machinery preparatory to pushing the extraction of ores, and is now about having a cargo of the ores shipped to New York for the purpose of making tests.

#### SOUTH CAROLINA.

##### BEAUFORT COUNTY.

**OAK POINT MINES COMPANY.**—This company has been organized, with a capital stock of \$100,000, to mine phosphates, etc., by John F. Gordon, of London, England, and David Roberts, W. D. Hard, and Charles Inglesby, of Charleston.

#### TEXAS.

It is stated that while boring for water near Gatesville, oil in paying quantities was struck at a depth of 560 feet, and the oil rises within 45 feet of the surface. Gatesville is near the centre of Texas, and this news chronicles the opening of what is likely to prove an important new oil field. Engineers have long contended that petroleum in paying quantities is to be found in Texas, but the fields there have awaited development, though it is believed that they have not been wholly neglected by the Standard Oil Company, which has large Texas real estate investments.

#### UTAH.

Bullion receipts in Salt Lake City for the two past months of the present year, excluding all ore returns, according to the Tribune were as follows: January, \$327,141.43; February, \$280,538.20; total \$607,679.63.

#### BEAVER COUNTY.

**HORN-SILVER MINING COMPANY.**—The Horn-Silver makes shipments of ore occasionally, says the Salt Lake Tribune, and undoubtedly has some good ore.

#### EMERY COUNTY.

Reports state that the prospects of the new coal mines near Sunnyside are good. Tunnels have been run in to an aggregate of 128 feet, opening up a sixteen-foot vein of coal. Experiments in converting it to coke, on a small scale, have proven satisfactory, and the company is now shipping a forty-ton lot to Scofield to be converted into coke for a trial run in one of the smelters near Salt Lake City. It is intended that this experiment shall fully demonstrate the value of this coal for coking.

#### SUMMIT COUNTY.

**ANCHOR MINING COMPANY.**—In running the tunnel for this company at Park City, work commenced at the outer end, cutting the gentle slope of the hill at first, getting deeper beneath the surface all the time, till it reaches a depth of 1200 feet at the mine. The tunnel when finished will be 6600 feet long. Above it the surface presents numerous gulches and uneven ground, such as is difficult in making correct surveys. In driving the tunnel to expedite work, a shaft between 300 and 400 feet deep was sunk on the line 3000 feet from the mouth of the tunnel. From the bottom of this shaft work pushed out to meet the tunnel coming in. Connection was made between these two headings about half way last week. It took about six months to drive this tunnel 3000 feet, and the work is progressing so well that another six months will probably complete the tunnel.

**ONTARIO SILVER MINING COMPANY.**—The production for February was 70,087 fine ounces of silver and \$44,385 from ore sales.

#### COAL TRADE REVIEW.

New York, Friday Evening, March 16.

**Production Statistics.** Coal for week ended March 10th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.			
EASTERN AND NORTHERN SHIPMENTS.			
	—1888.		1887.
	Week.	Year.	Year.
Phila. & Erie RR.	19	11,073	.....
*Cumberland, Md.	79,205	601,554	532,285
Barclay, Pa.	+	32,797	51,415
Broad Top, Pa.			
H. & Broad Top, RR.	9,002	90,533	85,238
Clearfield Region, Pa.			
Snow Shoe	1,982	30,581	36,364
Karthauss (Keating)	4,600	42,676	39,401
Tyrone & Clearfield	77,251	705,597	577,802
Tipton	1,343	9,168	.....
Allegheny Region, Pa.			
Gallitzin & Mounain	25,399	195,433	197,562
Pocahontas Flat Top Coal.			
Norfolk & West, RR.	38,227	301,214	228,235
Kanawha Region, W. Va.			
Ches. & Ohio RR.	552,657	342,683	266,411
Total	290,375	2,363,314	1,984,713
*Tons of 2240 lbs. † Report not received.			‡ Week ending February 29th.
WESTERN SHIPMENTS.			
Pittsburg Region, Pa.			
West Penn RR.	6,668	83,245	66,173
Southwest Penn. RR.	2,097	21,902	32,294
Pennsylvania RR.	5,563	57,098	47,312
Westmoreland Region, Pa.			
Pennsylvania RR.	33,015	317,168	296,059
Monongahela Region, Pa.			
Pennsylvania RR.	4,480	65,046	70,450
Total	51,823	544,459	512,288
Grand total	342,198	2,907,773	2,497,001



**Production Anthracite Coal for week ended March 10th, and year from January 1st:**

TONS OF 2240 LBS.	1888.		1887.
	Week.	Year.	Year.
P. & Read. RR. Co. 140,441	1,087,098	1,433,488	889,872
Cent. R. R. of N. J. 94,157	1,213,045	774,957	1,359,806
L. V. RR. Co. ....	1,406,440	932,187	902,440
D., L. & W. RR. Co. 123,950	902,876	917,020	505,570
D. & H. Canal Co. 90,747	678,022	220,319	.....
Penna. RR. ....	316,776	.....	.....
Penna. Coal Co. ....	.....	.....	.....
<b>Tota</b> .....	<b>542,106</b>	<b>6,494,129</b>	<b>6,101,947</b>
Increase.....	.....	392,182	.....
Decrease.....	125,061	.....	.....

† 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.....	4,915,233	1885.....	4,558,308
1884.....	4,558,303	1886.....	5,880,869

**Production of Coke on line of Pennsylvania RR. for week ending March 10th, and year from January 1st, in tons of 2,000 pounds:** Week, 63,431 tons; year, 770,855 tons; to corresponding date in 1887, 859,127 tons.

**Anthracite.**

The storm early this week completely paralyzed the coal business, and nothing is doing except deliveries to yards which are situated directly on the harbor. There is in fact very little occasion to transport coal, for the demand is quite slack, and no one seems disposed to do anything while trade is in its present condition of suspended animation. The accompanying circular of the Philadelphia & Reading gives the new prices for some of the Reading coals.

PHILADELPHIA, March 8, 1888.

The present prices for this company's coals, delivered on board vessels at Port Richmond, Philadelphia, Pa., for shipments beyond the Capes of the Delaware and Elizabethport, N. J., subject to our printed conditions of sale, are as follows:

PORT RICHMOND.				
	Lump.	St. Boat.	Broken.	Egg.
Hard white ash.....	\$4.25	\$4.25	\$3.75	\$3.85
Free white ash.....	.....	.....	3.50	3.75
Lykens Valley.....	.....	.....	4.50	5.00
Stove. Chestnut. Pea.				
Hard white ash.....	\$4.00	\$3.90	\$2.75	\$2.75
Free white ash.....	4.00	3.90	2.75	.....
Lykens Valley.....	5.25	5.00	.....	.....

ELIZABETHPORT.				
	Lump.	St. Boat.	Broken.	Egg.
Hard white ash.....	\$4.50	\$4.50	\$4.00	\$4.10
Free white ash.....	.....	.....	3.75	4.00
Lykens Valley.....	.....	.....	4.75	5.25
Stove. Chestnut. Pea.				
Hard ash.....	\$4.25	\$4.15	\$3.00	.....
Free white ash.....	4.25	4.15	3.00	.....
Lykens Valley.....	5.50	5.25	.....	.....

The company reserves the right to change prices at any time except on orders entered prior to such change, and orders sent in will not bind the company until accepted.

THOMAS M. RICHARDS,  
General Coal Agent.

These may be assumed as representing the current circulars, and it is supposed that they represent what the companies intend to make the minimum prices for the year.

It is very important that the minimum for the year should be established at its commencement and that consumers should be educated up to the conviction that prices thereafter will be maintained and advanced. Nothing is so demoralizing as to have a break in prices after a minimum has been nominally fixed. The companies generally believe that the present prices can be maintained as a starting point; but there is a difference of opinion among the dealers, and even some little difference among the companies as to this point. In any event, there can be but little reduction from present rates, and that could only come by the intensity of the competition which the Lehigh operators may resort to in order to recover their lost trade.

The Lehigh has suffered very heavily in the recent strike. It has not only lost its customers, and especially those who formerly believed that Lehigh coal was worth a great deal more than free-burning or Schuylkill coals, but it has educated many of this class up to the belief that they can get along without Lehigh. It is not to be supposed that the operators of this district will quietly allow their trade to be taken away from them. And this is the reason why they made the break in prices a week ago.

The storm prevented the resumption of work in the Lehigh collieries on Monday, but they go to work tomorrow, and thereafter we may expect a pretty large output from that district. This strike has been officially called off, though this really makes no difference, for the men were at work before this decision of their leaders was announced.

The Lehigh Valley Coal Company announces the following prices for anthracite at the mines for March: Lump, steambot, stove and small stove, \$2.75; broken and egg, \$2.30; chestnut, \$2.60, and pea, \$1.50. These prices are about five cents per ton higher than last September's circular prices, and, compared with the figures of the March, 1887, circular, they show the following advances: Lump and steambot 25 cents per ton, broken, egg, stove, small stove and nut 10 cents, and pea 35 cents.

The general impression in the trade at present is that when it comes to restricting the output there will be no disagreement. We trust this will prove true, and that the dissensions and their disastrous results of previous years will be avoided.

The stoppage of the mines and of transportation for the past week has been a benefit rather than a disadvantage to the coal trade. It will reduce the stock and has already given a better tone to the market. The consumption of coal, except in a very few instances, has gone on as before and only the production has ceased.

Freights have been reduced on the Lehigh Valley road from Hazleton to Harsimus Cove for shipment by floats to ports on New York harbor. It is \$1.75 per gross ton for all sizes down to pea, and \$1.60 for pea coal. From Wyoming region the corresponding prices are \$1.85 and \$1.70.

**Bituminous.**

There is absolutely nothing new in bituminous coal. It has been completely suspended for a week except stock deliveries where the coal was actually at tide-water. Prices remain, of course, as they were announced in our last issue, as follows:

Free on board at Philadelphia, Norfolk, Newport News, Baltimore, and Georgetown, \$2.60 per ton of 2240 pounds. Free on board at South Amboy, Perth Amboy, Elizabethport, Port Johnson, Weehawken, Eoboken, and Port Liberty, for shipment to points on the North River south of Fifty-seventh street, and to points on the East River west of Hell Gate, \$3.25 per ton. Delivered alongside in New York harbor south of Fifty-seventh street, North River, and on the East River west of Hell Gate, \$3.50 per ton. For Eastern markets the prices have not been fixed yet, but will, no doubt, be the same as last year.

Press dispatches announce that the coal operators and shippers of the Hocking Valley and Pittsburgh districts were in consultation at Cleveland on the 13th and reached an agreement as to prices and lake freights, and a greater degree of co-operation than has ever existed has been secured between the coal men of Ohio and Pennsylvania. Hitherto, on account of difference in lake freights, there has been a cutting of prices between the operators of the two districts, and loss to both. The Pittsburg operators and shippers have been at loggerheads, and to harmonize these differences and maintain prices has been the object of the conference. The result will be higher prices at the upper lake ports and westward. The price of coal is fixed at \$2.35 for Pittsburg, \$2.15 for Hocking Valley lump, free on board vessels, and a board of managers will meet from time to time to fix a minimum lake freight. In cases where time is given, 6 per cent interest will be charged after sixty days. This arrangement has yet to be ratified at a general meeting of operators, but no doubt is entertained that the plan will be carried out.

**Baltimore.**

Prices of anthracite in cars on track, or in dealers, yards to trade:

	Hard white ash. Shamokin.	Lykens Valley.
Lump and steamer.....	.....	.....
Broken.....	\$4.50	\$4.75
Egg.....	4.50	5.00
Stove.....	4.75	5.25
Chestnut.....	4.50	4.75
Pea.....	3.10	3.60
Buckwheat.....	2.70	.....

Afloat alongside, by cargo, fifteen cents less than by cars.

**Boston.**

March 15.

[From our Special Correspondent.]

The principal feature in the anthracite branch of the coal market has been the weakening of quotations. It is understood here that most of the companies were willing to put up with a light trade for some little time by keeping prices at old figures, and thus allow retailers to work off their stocks without a decline in their prices. The failure of this scheme is attributed to the Wilkes-Barre and Lackawanna companies and to the individual operators, who are almost all eager to market what coal they could. So we have the f.o.b. quotations of \$4.25 for Stove, \$4 for Egg, and \$3.75 for Broken, at New York. The smaller sizes are nominally unchanged, and owing to the scarcity can not be closely quoted. Pea coal is held at about \$3.25 f.o.b., at New York, and Buckwheat at \$2.75. There has been very little business since new prices were announced.

The bituminous branch of the market is beginning to be active. Among the large contracts already taken are the Fitchburg R. R., 60,000 tons, water freight; Standard Sugar Refinery, Boston Rubber Shoe Co., Tremont & Suffolk Mills, Boston, Revere Beach & Lynn R. R., about 10,000 tons each. No other railroad contracts are reported, and it looks as if the Boston & Maine (which now buys for three roads) has some arrangement by which it has quite a large supply of coal due them even now. The Fitchburg will buy 100,000 tons all-rail coal, but no one party is expected to take this contract. It is quite an interesting conundrum just now as to what part all-rail coal will play in this season's business. It is claimed that all-rail coal is being brought with profit nearer and nearer this port every year, but there is a question as to this which future developments will shortly determine. The fact that all-rail coal is not subject to pool provisions is not to be lost sight of.

A most interesting consideration now is whether the rule not to sell delivered will be virtually abandoned. I learn of no delivered contract as yet, but the barge lines are said to be willing to make contracts for delivery so that the shipper or the buyer can cover himself. The Fitchburg contract is said to be covered in this way. The pool price is nominally \$2.60 f.o.b. at all ports, but what the contracts above

mentioned were actually placed at does not transpire. It is thought that quite a large tonnage will be contracted for without delay.

The freight rates continue to show signs of weakness, and the business seems to be in an uncertain condition. The last bit of information showing how things are tending in this line is the building of a five-masted collier at Bath to have a tonnage of 3000 tons of coal. We quote, exclusive of discharging: New York, 80c.; Philadelphia, \$1.05; Baltimore, \$1.15; Newport News and Norfolk, \$1.05; Richmond, \$1.25.

There is both dullness and weakness in retail coal trade circles.

We quote delivered prices: Stove, \$7.25; Egg, \$7.00; Broken, \$6.75; Franklin, \$8.50; Lehigh Egg, \$7.25; Broken, \$7.00; Bituminous coal, on the wharf, \$4.75.

**Buffalo.**

March 15.

Nothing has been done here in the line of coal charters, shippers and vessel men being too far apart in their figures. Vessel men are asking 75 cents and shippers offering but 35 cents to Chicago. The shippers say they will stand out for the low rate. The shippers are all ready to jump in and secure all the tonnage they can as soon as a break is made, although there is not much coal in stock here at present. It is not likely that any move will be made until navigation is almost ready to open.

It has been decided not to buy any more boats for the Pringle tow, although another boat will be taken on. They will bring 4,000,000 feet of lumber from Menominee and 3,000,000 feet from Tawas the season, on owners' account.

**Pittsburg.**

March 15.

[From our Special Correspondent.]

The coal market remains quiet; prices show no change. Prices in the Western markets are down to a very low figure. Another rise in our rivers has caused shipments to the extent of 3,000,000 bushels.

PRICE OF COAL PER 100 BUSHELS = 7600 LBS.	
First pool.....	\$4.75
Second pool.....	4.25
Third pool.....	3.75
Fourth pool.....	\$3.25
Railroad coal.....	5.00

**Connellsville Coke.**—The coke manufacturers, after holding a number of meetings, have failed to agree among themselves. The result has been a split, and a decline in prices of 25 cents per ton. Here are the new and the old rates, f.o.b. at ovens:

	Old prices.	New prices.
blast-furnace.....	\$1.75	\$1.25
To dealers.....	1.85	1.60
Foundry.....	2.00	1.50
Crushed coke.....	2.50	2.00

If the fight goes on coke will be further reduced to \$1.

**FREIGHTS.**

The latest actual charters to March 15th, per ton of 2240 pounds:

**From Philadelphia to:**—Boston, 1.05\*; Charleston, 1.15; Charlotte, 1.30; Gloucester, 1.35\*.

**From Baltimore to:**—Bangor, 1.15; Bath, 1.15; Boston, 1.15; Bridgeport, Conn., 1.00; Bristol, 1.05; Charleston, .90@1.00; Fall River, 1.00; Galveston, 3.20@3.25; New Bedford, 1.00; New Haven, 1.00; Newburyport, 1.30; New York, 1.00; New London, 1.00; Portland, 1.15; Portsmouth, N. H., 1.15; Providence, 1.00; Quincy Point, 1.15@1.20; Savannah, 1.05@1.10; Somerset, 1.00; Weymouth, 1.20; Williamsburg, N. Y., 1.00; Wilmington, N. C., 85@90.

**From New York to:**—Boston, .85\*; Bridgeport, Conn., .55; Chelsea, .80\*; Com. Pt., Mass., .80\*; B. Boston, .80\*; E. Cambridge, .80\*3c.; Fall River, .75; New Bedford, .85; New Haven, .55; Newport, .75; Portsmouth, N. H., .90\*; Providence, .75.

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

**MARKETS.**

NEW YORK, Friday Evening, March 16.  
Prices of Silver per ounce troy.

Mar.	Sterling exchange	London Pence.	N. Y. Cents.	Car.	Sterling exchange	London Pence.	N. Y. Cts.
10	4.87	43½	94¾	14	4.87	43½	94¾
12	4.87	43½	94¾	15	4.87	43½	94¾
13	4.87	43½	94¾	16	4.87	43½	94

The exchanges have been declining, and market has been weak, but closes more steady.

**Foreign Bank Statements.**—The governors of the Bank of England at their weekly meeting on the 15th inst. reduced its minimum rate of discount from 2½ to 2 per cent. The usual weekly statements have failed to reach us at this writing.

**Copper.**—Owing to the operations of the blizzard during the past week, all other operations have been greatly interrupted, and transactions on the various exchanges have been very limited. On Monday and Tuesday business was almost entirely suspended, and since then the trading has only been of moderate dimensions.

The usual communications by mail and telegraph were quite impossible in the early part of the week, with the exception of the Atlantic cables, reporting the condition of the European markets, which came to hand pretty regularly. But yesterday and to-day whilst the inland communications are gradually resuming their regular working condition, the European cables are very greatly delayed. Very little change has taken place in the quoted prices, but if anything, they are slightly lower, and we quote Spot, \$16.10; March, \$16.10; April, \$16.15;

May, \$16.35; June, \$16.30; July, \$16.30; August, \$16.25.

In London, Chili bars opened on Monday at £80 2s. 6d., and the last quotation received is £80 10s.

Although no public announcement of the fact has been made, it is now generally understood that the French Syndicate have at last succeeded in carrying out their scheme and that they now control the whole output of nearly all the principal mines in this country for some time to come.

Messrs. Henry R Merton & Co. cable that the increase in the visible supplies of copper for the first half of March amounts to 3000 tons.

The negotiations between the American representatives of the French "syndicate," or, more properly, La Société Industrielle des Metaux, have been completed, says the Boston Transcript; the official announcement of the entry of the Franklin and Huron was made on the 10th inst. The Frenchmen now control the product for the next three years of the Calumet & Hecla, Tamarack, Quincy, Franklin, Osceola, Atlantic, Huron, Central and possibly Copper Falls and Alouez, or all of the producing mines of Lake Superior (the Kearsarge will probably in the end to the arrangement which it becomes a producer), besides the Boston & Montana. The terms are understood to be the same in all cases—a certain price, about thirteen cents per pound, and a division of profits of the purchasers with the contracting parties, amount of product not restricted in the case of the smaller companies. It is understood that the Calumet & Hecla is restricted to 150,000,000 pounds in the three years, and the Tamarack to 55,000,000 pounds in the same time, of which the French company takes 50,000,000 pounds. Deliveries probably will begin in May 1 in all cases. The last contracts were closed late yesterday afternoon. The gross amount of copper thus controlled by the Frenchmen will figure up fully 250,000,000 pounds for the three years from the Lake Superior companies, plus the Boston & Montana's product of 100,000,000 pounds, and the other Montana, Arizona, and other companies will foot up fully 400,000,000 pounds and probably more of American copper secured by the French company for delivery during the next three years.

The Boston & Montana product in February was 1,631,965 pounds of matte bearing 60 per cent of refined copper, or 965,179 pounds. In the summer months the company expects that the mine will produce 1000 tons of copper per month.

The shipments of refined copper from Houghton during the month of February were: Calumet & Hecla, 49 cars; Tamarack, 32; Quincy, 25; Atlantic, 11; Franklin, 11; Osceola, 20; Huron, 8; Central, 5. Total, 161 cars, or about 4,186,000 pounds. Previous shipments were 189 cars in December and 223 cars in January.

The Houghton (Mich.) correspondent of the Boston News Bureau wired the output of the Calumet & Hecla under date of March 13th as 412 tons for the past week, the second week of March, which compares with 443 tons for the week ending March 5th, and 476 tons tons, 403 tons and 421 tons in the fourth, third and second weeks of February respectively.

The gossip of the trade centres still is the doings of the syndicate. It is generally conceded that all the important producers of the world have now been captured, the English smelters being about the last to enter the fold of the faithful. By controlling the smelters the syndicate practically covers all the scattering production that comes from new and unimportant sources and thus immensely strengthens its position.

The question now is as to the price the syndicate will make for copper to manufacturers, and on this no definite information is given. There is no one to prevent the price being heavily advanced; nevertheless, it would, in our opinion, be extremely injudicious to do so, and the general impression is that 16 or 16½ cents per pound will be named as the opening price. Of course the small lots that will be sold on the exchange will probably be at somewhat above this price.

While our smelters in this country are not limited in what they may smelt for outsiders, or what they may buy, they practically control the outside scattering production in the interest of the syndicate.

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

Table with columns: Destination, Copper matte, Copper, Lbs., Pounds, and Amount. Includes entries for Liverpool, Rotterdam, and Hamburg.

Summary table for copper exports with columns: Destination, Copper matte, Copper, Lbs., Pounds, and Amount. Includes a total row.

In addition to the above, there was exported 9854 lbs. of old copper; 100,554 lbs. of old sheathing and 98,149 lbs. of old brass.

Tin.—Business has been much restricted, owing to the causes previously indicated. The present quotations are: Spot, 37c.; March, 35½c.; April, 33c.; May, 31½c. The market closes rather firmer, the lower prices having attracted the attention of consumers who are, so to say, without stocks.

Lead.—This market alone has shown some life, and considerable transactions have taken place at somewhat irregular prices. Between 400 and 500 tons were sold yesterday at 5½c. for May and October delivery, but the market was a little easier to-day, at 5½c. for prompt delivery, net cash. The market remains in an unsettled state, with consumers altogether abstaining from buying. The last private cables received from Europe report Spanish lead at £14 7s. 6d. Messrs. John Wahl & Co., of St. Louis, telegraph to-day as follows: Lead is slightly lower, owing to unfavorable advices from the seaboard. Refined is saleable at 4½c. and Common at 4½c.

Messrs. Everett & Post, of Chicago, telegraph to-day as follows: There are no buyers in the market, consequently it is hard to give figures. Quotations are nominal at 4 90 to 4 95. Offerings are only moderate, yet they are sufficient for all requirements. Spelter is dull at 5½c. and nothing worthy of note.

The Bertha Zinc Company, Pulaski City, Va., will, during the year, add 10 furnaces to its plant, doubling the capacity.

Antimony unaltered at 10½c. for Hallett's, and 14½c. for Cookson's. Cables report London prices as £47 10s. @ £48 for Hallett's, and £55 for Cookson's.

Chemicals.—The unprecedented storm of Sunday and Monday nights and the consequent blockade had the effect of completely paralyzing trade. The impossibility of delivering heavy chemicals for some days to come, of course, affects the jobbing trade, and merchants and consumers are so busy repairing the damages of the late storm that small attention is paid to buying for the future.

Liverpool caustic soda ash is not in any demand, and the quotations are nominal at 1 25 @ 1 30 as to quantity. High test is without animation and is quoted at 1 12½ @ 1 15.

Carbonated soda ash continues very dull, with no appreciable change in prices. We continue to quote 1 25 @ 1 30 for 48 per cent and 1 12½ @ 1 15 for high test.

In bleaching powder nothing whatever has been

done, the quotations of 1 82½ @ 1 90 are entirely nominal.

In the acid market no business of moment has been transacted; indeed, many of the factories in the immediate vicinity are so snowed under that it will be some days before the delivery of any goods is feasible.

On acetic acid the quotations remain unchanged, though the brisk competition renders the price unsteady. Quotations range from 2½ @ 2½c., according to quantity and seller.

Sulphuric acid is without animation at our former figures.

Oxalic acid is without change; 7c. per pound is the price for lots over ten tons; 7½c. for smaller quantities.

The fertilizing chemical market is now as dull as any other branch, owing entirely to the storm. Many manufacturers are in need of supplies, and at the earliest possible moment goods will be shipped to meet current demands.

The quotations remain about the same as in our last.

Sulphate of ammonia is worth \$3.30 @ \$2.40 per cwt., according to quantity, etc.

Kainit is firm at \$10.50 @ \$11 per ton.

Muriate of potash is quoted at 1 72½ @ 1 80c., according to quantity and time of arrival.

Nitrade of soda continues firm, with no change in our last quotations.

Brimstone continues dull, with quotations at \$21 for goods now on the spot; futures, \$20 @ \$20.50.

CEMENT TENDERS.—At a recent tender for delivery of cement, in Germany, S-hottländer offered 25,000 t. at 4 37 marks, and further 25,000 t. at 4 60 marks. The Schlesische Portland-Cementfabrikz Grochowitz tendered 30,000 t. at 4 62 marks, G-e-e-l in Oppeln 10,000 t. at 4 62 marks, and the Oppelner Cementfabrik (Aktiengesellschaft) 20,000 t. also at 4 62 marks. These prices are considerably lower than those at the last tender.

THE CHLORIDE OF POTASSIUM INDUSTRY.—The salt works belonging to the carnalite output union which expires at the end of this year have agreed, in order to make a new treaty of a similar nature possible, to abandon all sales of salts of all kinds until the 30th of June of this year, including the production for delivery in the period from July to December, 1888. The works also bind themselves to have nothing to do with any measure previous to the 30th of June which could disturb the condition of the market. The potassium chloride factories have joined in this treaty.—Kuhlow's.

IMPORTATIONS AT NEW YORK DURING WEEK ENDING MARCH 12, AND FROM JAN. 1 TO SAME DATE.

Large table with multiple columns: Commodity (Spelter, Nickel, Tin Plates, Pig-Iron, Steel & Iron Goods, Steel Sheets, Blooms, Billets, etc., Old Rails, Scrap-Iron, Sheet Iron, Spiegeleisen, Iron Ore, Iron Pipe), Unit (Tons, Lbs., Boxes), and Amount. Includes sub-totals and totals for each category.



WEEKLY REGISTER OF CURRENT QUOTATIONS.

CHEMICALS.

Table listing various chemical products and their prices, including acids, salts, and other compounds.

Table listing various metal ores and their prices, including Strontium, Sulphur, and others.

BUILDING MATERIAL.

Table listing various building materials and their prices, including bricks, stone, and slate.

THE RARER METALS.

Table listing various rare metals and their prices, including Aluminum, Barium, Bismuth, and others.

METALS.

Table listing various metals and their prices, including Aluminum, Copper, Lead, and others.

IRON AND STEEL.

Table listing various iron and steel products and their prices, including American Pig-Iron, Scotch Pig, and others.

Table listing Bessemer Pig and other iron products with their prices.

Table listing Structural Iron and Steel products and their prices.

Table listing Iron Plates and other iron products with their prices.

Table listing Merchant Steel and other steel products with their prices.

Table listing Cast-Iron Pipe and other iron pipe products with their prices.

Table listing Wrought Iron Pipe and other iron pipe products with their prices.

Table listing Boiler Tubes and other boiler components with their prices.

Table listing Wrought Scrap and other scrap iron products with their prices.

Table listing Hot Blast Irons and other iron products with their prices.

Table listing Forge Irons and other iron products with their prices.

Table listing Coke or Bituminous Pig and other iron products with their prices.

Table listing Charcoal Pig and other iron products with their prices.

Table listing Plate Iron and other iron products with their prices.

STOCK MARKET QUOTATIONS

Table listing Baltimore, Md. stock market quotations for various companies.

Birmingham, Ala.

Table listing Birmingham, Ala. stock market quotations for various companies.

Pittsburg, Pa.

Table listing Pittsburg, Pa. stock market quotations for various companies.

Foreign Quotations.

Table listing foreign stock market quotations for various companies in London, Paris, and Philadelphia.



DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns for Name and Location of Company, Capital Stock, Shares, Assessments, Dividends, and Date of last payment. It lists numerous mining companies and their 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, \$4,390,000. Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1878, the Copper Queen had paid \$1,350,000 in dividends.



NEW YORK MINING STOCKS QUOTATIONS.

Table with columns for 'DIVIDEND-PAYING MINES' and 'NON-DIVIDEND-PAYING MINES'. Each section lists company names and locations, followed by price columns for various dates (March 10-16) and sales volume.

\*Dealt in at the New York Stock Ex. Unlisted Securities †Dealt in at the Metal Ex. ‡Assessment unpaid. Dividend shares sold, 17,661. Non-dividend shares sold, 59,480. Total New York, 77,141.

BOSTON MINING STOCK QUOTATIONS.

Table listing Boston mining stock quotations with columns for company names, dates (March 9-15), and sales. Includes companies like Atlantic, Bodie, Bonanza, etc.

Boston: Dividend shares sold, 6,193. Non-dividend shares sold, 14,860. Total Boston, 21,053.

COAL STOCKS.

Table listing coal stock quotations with columns for company names, par value, and prices for dates from March 10 to March 16.

San Francisco Mining Stock Quotations.

Table listing San Francisco mining stock quotations with columns for company names and closing quotations for dates from March 9 to March 15.

\*\*Of the sales of this stock 19,230 were in Philadelphia, and 125,870 in New York.

Total sales, 253,452.

\*No quotations received.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 16. Business has been at an almost entire standstill this week on account of the great storm which completely isolated New York for three days. No pig-iron has reached tidewater this week.

We called attention last week to the remarkable restriction of production of pig-iron in the Lehigh region. From figures published since our last issue it appears that out of 141 anthracite furnaces in blast March 1, 1887, with a weekly capacity of 43,724 tons, only 98 are now in blast, with a weekly capacity of 28,598 tons.

The reduction in production of coke and bituminous iron is not quite so strongly marked. Out of 146 furnaces in blast March 1st, 1887, capacity 79,682 tons, 128, with capacity of 68,892 tons per week, were in blast March 1st.

Although the Lehigh and Reading coal strikes have been declared "off," yet the furnaces supplied from those regions are still suffering from the very limited amount of coal reaching them.

Prices are very dull, with no pressure to sell, and buyers apparently utterly indifferent.

Scotch irons are quiet, with prices unchanged. There has been the greatest difficulty in making deliveries.

Old rails are very dull and prices are weak. We note a sale of double heads at a concession from \$22. No business is reported in any other articles, and we repeat last week's quotations.

Louisville, March 13.

[Reported by Messrs. HALL BROTHERS & Co.]

The situation remains practically unchanged and without any special redeeming feature. There are no special large transactions to note at this writing, but the current business is considerably better than a week ago. The foundry trade in general report business as being very dull, but the outlook is rather hopeful for the future and better business is expected. The feeling is that prices on pig metal have about touched bottom, and with this view it is likely that buyers will in the near future take hold more liberally.

Quotations for cash f.o.b. cars at Louisville will be found in our weekly register of prices.

Philadelphia, March 15.

[From our Special Correspondent.]

The week has been in bank parlance, so far as actual business is concerned, a dies non on several of them. The last two days of last week brought out buyers and inquirers, but the sales of crude and finished iron were small and qualities low. Since Monday every thing has been at a complete standstill, and it is no use to multiply words about it. Scarcely a stroke of business has been done, and only this morning the mails of last Saturday reached our offices. The tone of the market so far as it has any is good. The favorable indications of last week are the basis to-day for encouraging expressions of opinion as to business in the near future. The termination of the Reading Railroad strike and the resumption of work, so far as it has been possible in the Lehigh region, leaves the way clear for business. It will, of course, be several days yet before there will be any actual business in iron. The Schuylkill Valley furnaces are still out, but preparations are about completed for the blowing in of six or seven.

Work was stopped at several rolling mills and they will not start until Monday. The situation is not different from what it has been, with the exception that the near approach of spring is bringing a great deal of business in sight. Pig-iron brokers said to-day there would be no further weakening in pig-iron. Bar iron makers say that at present prices demand will soon enable them to load up.

Plate iron makers report prices weak, and a desire to make all reasonable concessions to get business.

Steel rail makers report no important transactions, and give quotations at \$31.80@32. The stores are well supplied with nails, sheet iron, merchant bars and steel.

Pittsburg, March 15.

[From our Special Correspondent.]

A combination of circumstances makes the iron market one of the duller that we have had for a long time, the storm that passed over the country destroying telegraph wires, blocking up the railroads to a certain extent, has shut us out from the business world. We have no Eastern mails, few telegraph dispatches from leading cities; in fact, we have been an inland town, fenced in so to speak. In conversation with brokers about sales the answer generally was "you will have to wait for information until our mails arrive."

Price of coke in the Connellsville region has been reduced 25 cents per ton for the month of March, with hints thrown out that the price in April will be lower. The price for blast-furnace, \$1.25 per ton, or 2 1/2 cents per bushel, is certainly a low figure. The committee that went to Philadelphia to attend the coke meeting telegraphed that the following rates were made: From Connellsville to Pittsburg, 84 cents per ton, decline 4 cents; to the Shenango and Mahoning Valley points, \$1.57, a decline of 8 cents; to Cleveland, \$2.10, a decline of 10 cents; to Chicago, \$3.15, a decline of 15 cents. The Allegheny Bessemer Steel Company has filed its charter with the Recorder. Capital stock, \$700,000, divided in 7000 shares of \$100 each. It is held by Edward L. Clark, Wm. G. Park, D. E. Park, Richard C. Gray, H. P. Smith, R. B. Brown, George Boulton.

Consumers continue the policy of purchasing from hand to mouth in view of the possibility of lower prices. Manufacturers draw comfort from this by

saying that it will lead to a heavier demand later on, which will improve prices. Buyers answer this by saying that the productive capacity now idle, if started, would oversupply all markets and keep prices where they are or force them lower, hence neither side shows much anxiety to sell or buy beyond what is required for immediate wants. Pig iron in the South is both active and strong; the same may be said of most of the Western markets. The Pittsburgh market is one of the duller in the country. Prices show no quotable change.

SALES REPORTED SINCE OUR LAST.

Table listing sales of various iron and steel products such as Bessemer, Gray, and Foundry iron, along with prices per ton.

FINANCIAL.

NEW YORK, Friday Evening, March 16.

Mining Stocks.

The mining market has suffered but little from the ill effects of the "blizzard" which so completely paralyzed business in the beginning of the week. The market shows a firmer tendency, which is no doubt due to favorable reports received from the Pacific coast.

We are officially advised that the mines of the Plymouth Consolidated Gold Mining Company are still closed. The company had hoped before this to have been at work again, but think it wiser to wait till they are sure the fire is entirely out, and it is probable that three or four months work will be lost as the result of the fire. There will be some damage in the way of necessitating new timbering, reopening tunnels, etc., but the principal loss is the enforced idleness of the mills.

The fire started in an upraise about 40 feet above No. 4, or the 1300 foot level. It is believed that there is no fire below this level.

Very little stock has been offered for sale. The week's business amounted to 330 shares at from \$13 @ \$13.50.

Brunswick shows the largest business on the list, some 11,600 shares changing hands. The price has been steady at from 19c. to 21c.

No sales were made of Quicksilver Preferred. Common shows one of 50 shares at \$9.25.

Standard Consolidated advanced from \$3.40@3.90, and Bodie Consolidated does not seem to feel the weight of the recent assessment, the stock advancing from \$2.55@3.80, with one sale at \$2.20, assessment unpaid. Bulwer also shows a higher movement, which is due, no doubt, to the fact that the Standard Consolidated Mining Company is endeavoring to secure control of the company, to which we already referred in our last issue. The price of the stock advanced from 90c. @ \$1.45, selling to-day at \$1.25.

Amador and Middle Bar are still being quoted, the former at \$1.40, and the latter at 35@46c.

Taylor-Plumas records one sale at 2c. Attention continues to be directed to Silver King, which shows an increased business; the price opened at \$6.25, and has since declined to \$5.63.

Colorado stocks were almost entirely neglected. Silver Cord was quoted at 36@37c. Lee Basin at 56c. Security was not dealt in until to-day, when a few shares changed hands at from 45@55c. Iron Silver remains firm at \$4. Bassick at 9@10c.

Rappahannock was firm at 20c. Carupano is quiet at \$2.00.

El Cristo has been active, ruling at from \$1.20 to \$1.40.

Iron Hill has come forth with an assessment of 7 1/2 c. per share, and according to the company's present condition of affairs it is probable that another assessment will follow ere long. Some 300 shares of the stock sold at 40c. Father de Smet sold at 45@47c. Caledonia at \$1.80, and Homestake at from \$10.50 @ \$11.

Proustite has sold some of its attraction. The business was small and prices steady at from \$2 to \$2.10. Castle Creek was quoted at 10c and Holyoke at 6c.

Ontario, a business of 51 shares at \$28.50. Horn-Silver was neglected and sold at \$1@1.10.

The annual meeting of the stockholders of the Sutro Tunnel Company did not take place on the 5th instant, but was adjourned to May 3d. As this meeting takes place at San Francisco, stockholders are not usually present to any extent in person. Whatever steps,

therefore, it may be requisite to take to effect a settlement with McCalmont Brothers & Company must be taken irrespective of such annual meeting. The only practicable way of effecting this object is for every shareholder to subscribe for bonds under the plan heretofore announced. Mr. Theodore Sutro advises us that nearly half of the shareholders have already so subscribed, but if the property shall eventually be lost to all the shareholders, it will be directly due to those who were so shortsighted as not to see the necessity of protecting their shares on so favorable an arrangement as the said plan presents.

He says: "I have done everything within human power to reach the present point of success, both in raising money and delaying the foreclosure of the property, but I cannot supply the requisite balance of the former nor delay the latter forever."

"In regard to the value both present and prospective of the company's property, I have not changed my mind; on the contrary the views which I expressed in my report to the shareholders of last year have been more than confirmed by subsequent events."

The stock is neglected for the present, and probably will be until the company's affairs have been settled. The price is firm at from 10c. to 12c.

The Comstock were quiet. The official statements published elsewhere show cash balances in the treasuries of all the Comstock mining companies except three, and that of one of these, the Savage, will be partially wiped out when the bullion on hand is sold. Consolidated California & Virginia, notwithstanding the payment of regular monthly dividends, does not advance much in price, which ruled this week at from \$14.50 to \$16.25.

Yellow Jacket shows a few sales at from \$11.50 @ \$11.88. Sierra Nevada one at \$5.75. Savage one at \$7. Ophir at \$11. Hale & Norcross at from \$11.25 @ \$11.38. Gould & Curry at from \$4.80 @ \$4.85. Crown Point at \$7.13. Chollar at \$6.25. Alta at \$2.40. Best & Belcher at \$6. Consolidated Imperial at \$9.63. Exchequer at from 45 @ 47c. Julia at from 70 @ 75c. Union Consolidated at \$5, and Utah at \$2.25.

The Tuscarora stocks show a small business. North Belle Isle was dealt in to the extent of 150 shares at from \$6 @ \$6.25; Found Treasure at \$2.10, and Tornado at 70c.

Eureka Consolidated is neglected; a few sales were made at from \$11 @ \$11.13.

Dividends.

Calumet & Hecla Mining Company, of Michigan, has declared a dividend of five dollars per share, or \$500,000, payable April 4th, at No. 12 Ashburton Place, Boston, Mass.

Daly Mining Company, of Utah, has declared dividends Nos. 12 and 13, of twenty cents per share each, amounting to \$75,000, payable March 31st, at the transfer-agency of Messrs. Lounsbury & Co., No. 15 Broad street, New York City.

Homestake Mining Company, of Dakota, has declared dividend No. 116, of twenty cents per share, or \$25,000, payable March 26th, at the transfer-agency of Messrs. Lounsbury & Co., No. 15 Broad street, New York City.

Morning Star Consolidated Mining Company of Colorado has declared a dividend, No. 31, of twenty-five cents per share, or \$25,000, payable March 15th, at No. 53 Broadway, Room 34, New York City.

Philadelphia (Natural Gas) Company has declared a dividend, No. 29, of 1 per cent, or \$75,000, payable March 25th, at Pittsburg, Pa.

Tamarack Mining Company of Michigan has declared a dividend, No. 1, of three dollars per share, or \$120,000, payable April 2d.

Assessments.

Table with columns: COMPANY, No., When levied, D'l'nq't in office, Day of sale, Am't per share. Lists various mining companies and their assessment details.

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

† Stockholders who paid the voluntary assessment No. 2 will be credited with the same on surrendering the company's obligation to repay said assessment out of the first earnings of the mine.

‡ 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.