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EMPLOYERS in any part of the world who require the services of superintendents, mining or civil engineers, metallurgists, chemists, mine or furnace foremen, or other assistance of this character, can have their wants advertised in the ENGINEERING AND MINING JOURNAL without charge.

THE reconstruction of the Reading Railroad is certainly one of the most important questions before the public to-day, and we trust it will be appreciated at its value by those who can aid or mar it.

The alternatives are :

C

1. Will Mr. Gowen succeed in reorganizing the company on the basis of independence of control of its business ? or

2. Will the Pennsylvania Railroad get the control?

The Morgan syndicate plan, however specious its published terms may be in reality, means simply the handing over of the Reading property to

the control of the Pennsylvania Railroad. As we have already pointed out, with this in its control, the Pennsylvania Railroad could and would control absolutely the other anthracite companies, and would in a brief time crush them out or absorb them in some way so as to monopolize the entire anthracite trade. It would then, through the combination with the Baltimore & Ohio and one or two other roads, control all the coal coming to tide-water. Have the managers of the Delaware & Hudson Canal Company and of the Delaware, Lackawanna & Western and of the Lehigh Valley considered the effect on their interests of this absolute control of the trade by one company? And has the public considered the effect of placing the entire coal trade in the hands of a single great monopolist, a "Standard Coal company"?

It is certainly to the interest of every industry in the East that a monopoly of the anthracite coal market be prevented, and the only possible escape that is now proposed is the reconstruction of the Reading under Mr. GOWEN. We believe Mr. GOWEN will succeed, and we are cer-

occurs in very limited areas, though probably not so limited as petroleum ; but being a compressible fluid, it will take longer to exhaust a given field. Prof. J. P. Lesley puts it as follows :

"1. As gas is a direct product of petroleum by spontaneous evaporation, the life of the gas production will be limited by the amount of the volatile elements held in a definitely limited quantity of petroleum existing under grounds; and therefore those who are producing and using this enormously valuable mineral sub-stance should take every precaution to prevent its waste, seeing that it is bound to e to an end

stance should take every preclation to prevent its waste, seeing that it is bound to come to an end. "2. I have for a long time looked upon the extension of the Butler oil-belt in a general southwest direction through Washington and Greene counties and into Virginia as probable, and I believe now more confidently than ever, since the drilling of the Washington district wells, that a considerable addition to our oil and gas wealth will be made in future years by a long series of oil and gas strikes at greater depths in that direction."

Will the final exhaustion of natura' gas be disastrous to the industries that have come into existence or have been greatly developed by its use? This is a question frequently asked, and sometimes answered with a pretentious shake of the head.

We see no cause for anxiety. That the supply will certainly give out. we believe has already been proved by the rapid reduction of pressure at the wells now running ; but the advantages that Pittsburg is now enjoying above every other part of the country will certainly lead to the adoption of gaseous fuel elsewhere. Gaseous fuel is beyond all question the fuel of the future, and those who have not been favored by nature with a supply ready made must and will make it from coal. Manufacturing industries, and more particularly metallurgical industries, such as iron and steel manufacture, glass, brick, and pottery making, smelting and refining of metals, etc., will hereafter depend almost exclusively on gas.

Water-gas is the most concentrated form of gaseous fuel that we can expect to produce economically, and the present revolution caused in Pittsburg by the use of natural gas will quickly be followed by a no less important revolution in the East and elsewhere by the general use of water-gas. Natural gas will greatly hasten the day that the ENGI-NEERING AND MINING JOURNAL has looked and worked for during the past twelve years, when our anthracite, both that now lying waste in our culm-banks and that freshly mined, will be converted into water-gas, and brought to our centers of consumption through large mains, or be manufactured from coal at the great centers in large and economical establishments.

With water-gas at 10 cents per 1000 feet, the East will be able to compete with Pittsburg in many industries now threatened by the economy of natural gas over coal.

In Pittsburg, water-gas at say 7 cents, and natural gas at 8 cents, are cheaper than the phenomenally low-priced coal that this great industrial center has been blessed with.

In developing the use of water-gas, our Eastern industries will not only be saving themselves from extinction, but will be preparing the means by which the great industries of Pittsburg will prosper and grow without interruption or set-back when the supply of natural gas has been exhausted.

In other words, the utilization of natural gas will prove of benefit to

other districts than those in which it is used ; and we see no cause for anxiety on the part of manufacturers in the East, provided they realize the fact that the day of the wasteful consumption of coal, as now used, has gone by, and that gaseous fuel is the fuel of the future. Those who do not early appreciate this fact will succumb, but "the fittest will survive."

#### THE COAL PRODUCTION OF THE UNITED STATES IN 1885.

The following table, taken from Bradstreet's, is the first estimate that has appeared of the production of coal in the United States in 1885. It is stated that the statistics of production of 1884 and 1885 here given were compiled by Bradstreet's. The table for 1883 is practically that published in the Mineral Resources of the United States, which we have already criticised. We are surprised to find in our excellent contemporary the same errors already exposed in the ENGINEERING AND MINING JOURNAL, namely, the addition of short and long tons.

Thus, for example, the output of Maryland, published a week ago in the ENGINEERING AND MINING JOURNAL, is given in gross tons, while that of most of the other States is reported in short tons. Anthracite is reported in gross tons, and yet we have these added in this table to the short tons to get a total. This looseness in compiling statistics throws a suspicion over the figures that are avowedly estimated by the same authority, and it is altogether unworthy of so excellent a paper as Bradstreet's. It is true the report does not say in what kind of tons the output is given; but we know that of the official figures quoted, some are gross and some are net tons

Also the shipments of anthracite, as given by Mr. J. H. JONES, are not the total production, which exceeds this shipment by about 6 per cent. Some of the bituminous coal estimates, we have reason to believe, are exaggerated, so that we may say that the bituminous coal marketed in 1885 was probably not over 65,000,000 net tons; and of anthracite, 35,000,000 net tons, or a total of 100,000,000 net tons ; while the total production, including the coal used at the mines, would probably increase these totals to

### Bituminous.... 67,000,000 37,000,000

or a TOTAL PRODUCTION of 104,000,000 net tons, or say, in round numbers 92,500,000 gross tons or metric tons. The data are necessarily only approximately correct, so that round figures are substantially correct. We believe the production of bituminous coal in 1884 did not exceed that of 1885, if it equaled it.

The allowance made for coal consumed at the collieries is very much less in the case of bituminous coal, where most of the mines are worked from adit levels, than in the case of the shafts and breakers of the anthracite fields.

"In most instances, the figures are represented as official and final : in a few, there is a possibility of slight alteration when detailed mine reports are revised, and in a few cases (specified) the totals, all small and not relatively important, are careful estimates. The exhibit as a whole, however, furnishes a comparative view of the production of bituminous coal for 1885 which is substantially correct.

UNITED STATES BI	TUMINOUS COA	L OUTPUT.		
Calendar years.	1885.	1884.	1883.	
Pennsy Ivania	25,000,000	24.000.000	24.000.000	
* Illinois	9,791,874	10,101,000	10.508.790	
Ohio	6,750,000	9,000,000	8,230,100	
Iowa	3,600,000	3,903,450	3,881,300	
West Virginia	3,250,000	3,100,000	2.805.560	
Missouri	1.500.000	2,500.000	2.250.000	
Maryland	2,866,000	2,765,000	2,206,170	
Indiana	1.000.000	2.260.000	2.560.000	
Alabama	2,225,000	2,000,000	1,400,000	
Kentucky	1.600,000	1,550,000	1,650,000	
C lorado	1,400,000	1.334.270	1,000,000	
Tennessee	1.100.000	1.200.000	1.000.000	
Kansas	1,283,500	1,100,000	>50,000	
Wyoming Territory	766.500	1,000,000	700 000	
Indian Territory	481,800	400,000	175,000	
Virginia	630,000	350,000	225,000	
New Mexico	300,000	350,000	250,000	
Washington Territory	281,572	307,000	260,000	
Utah	136,000	250,000	250,000	
California.	90,000	157,000	200,000	
Georgia	370,000	200,000	200,000	
Arkansas	547,000	150,000	75,000	
Michigan	150,000	135,000	135,000	
† Texas	125,000	125,000	100,000	
Oregon	43,000	60,00)	CO,000	
Montana	185,000	75,000	50,000	
Dakota	26,000	32,000	50,000	
+ Idaho	10,000	20,000	10.000	

68,424,720 65.081.820

are plainly with 1884.

Illinois, for year ended June 30th, 1885.
 † Estimated as reported in previous years.

"The total production in Iowa, partly estimated by local authorities, while ome 300,000 tons less than in the year before, represents the averages of five

The total production in 100%, party estimated by local autorities, while some 300,000 tons less than in the year before, represents the averages of five years past.
"The coal production of Virginia, of Maryland, and of West Virginia in 1884 and 1885 has been carefully calculated for this journal by one quite familiar with the region, actual returns from the larger mines being used both for 1884 and 1885. There is reason to believe that the aggregates are as nearly accurate as can be obtained with existing facilities for getting requisite data.
"The decline noted in the total of coal mined in Indiana in 1885 is due to labor troubles, which were frequent, lasting from one to three weeks. Kentucky and Tennessee have about held their own in the matter of coal production, furnishing in 1885 about their average for three years past. The outlook for 1886 in Tennessee try is developing rapidly, the increase being 225,000 tons in 1885, or over 10 per cent. In 1880, Alabama had 316 coke-ovens, and in 1884 976 ovens. The increase continues marked, amounting to 1200 ovens on January 1st, 1886, consuming annually 515,000 tons of coal and producing State in the Union, West Virginia ranking third. Only one coal mine was in operation in Georgia in 1885. The Arkansas coal product was chiefly from mines on the Little Rock & Fort Smith Railroad.

Smith Railroad. "It is believed that previous records of coal production in Texas must be httle better than guesses. The coal-fields of Texas are not developed. More progress was made last year than ever before. The coal is mainly of recent formation, and has been discovered in various parts of the State, particularly along the Rio Grande : but thus far, none has been shipped, the product being mainly used in the immediate locality of the mines. "The Northern Pacific Coal Company officials state that the Dakota decrease in 1885 is accounted for by the larger output of Montana, from which more of the supply was derived, this coal being used principally by the Northern Pacific Railroad, and also by the fact that the price of Eastern coal, delivered at Duluth, was lower last season than the preceding, and hence more of it has been used in Dakota."

#### 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 MANGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.]

### Drying Air for Blast-Furnaces.

Drying Air for Blast-Furnaces. EDITOR ENGINEERING AND MINING JOURNAL: SIR: In regard to the use of dried air for blast-furnaces, I would say that in November last United States Patent No. 330,381, entitled, "Pro-cess of Drying Air for Meuallurgic Operations," was issued to John H. Cremer, of Braddock, Pa. Mr. Cremer claims "the method of drying air continuously for use in smelting-furnaces or the like, which con-sists in exposing the air supply alternately to separate portions of desic-cating material to abstract the moisture therefrom, and alternately revi-vifying the separate portions of waste desiccants *in situ*." The apparatus is necessarily bulky, but the process need not be expensive. Mr. Cremer is now in Europe, but on his return will no doubt be glad to give you further information. CHICAGO, Feb. 15.

CHICAGO, Feb. 15

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Permit me to take issue with you in your editorial comment on my letter of the 8th inst. You ask, "Can the air be economically dried my letter of the 8th inst. You ask, "Can the air be economically dried without compressing, which is expensive, or cooling, which is work that has to be undone?" You mistake my argument, if you infer from my letter that compression is an essential element in the drying process by cold water. A mere blast of two or three pounds' pressure, such as would in any case be furnished by the blowing-engines, is sufficient to effect the deposition of moisture. It is essentially a question of tempera-ture. The air must be cooled; but the heat lost in cooling can readily be utilized, as you suggest, for boiler-feeding; and furthermore, the temperature of the dried air may be easily raised by bringing the pipes in contact with the exhaust-steam from the blowing-engines. Ordinary atmospheric air contains about 75 per cent of moisture, and in conseatmospheric air contains about 75 per cent of moisture, and in conse-quence has a high specific heat. The specific heat of air, according to Regnault's experiments, is 0'2379; hence the quantity of heat necessary to effect increase of temperature is much less than in the case of water vapor or saturated air.

In the use of compressed air for vulcanizing wood, as at the works of the United States Wood Vulcanizing Company, East Nineteenth street, New York, the air-receiver contains the exhaust-pipes from the compressor, and the temperature of the air is raised to a point nearly equal to that of the exhaust steam.

Of other ways of drying the air, might be mentioned the laboratory process of passing it over concentrated sulphuric acid; or, what is still better, chloride of calcium; but the water-cooling system is so simple and inexpensive that it seems especially applicable to the blast-furnace. No 10 PARE PLACE, NEW YORE, Feb. 15. WILLIAM L. SAUNDERS.

### Relative Efficiency of Fans and Pressure Blo

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In his extremely valuable and most welcome work on copper smelting, Dr. Peters states, in your issue of January 2d, that the Orford

Since in this extremely variable and most wereary 2d, that the Orford Company uses a fan for producing blast for its copper smelting cupolas that consumes about three times as much power as would be required to produce the same blast by means of a positive blower, as indicated by both theory and experience. As this fan was adopted by the Orford Company on my advice as con-sulting engineer, I feel called on to reply to this assertion as to the con-sumption of power. First. There is no generally accepted theory that indicates that a fan consumes three times as much power as a positive blower under identical conditions; for example, in delivering a cubic foot of air at a given pressure. Secondly, I think that Dr. Peters has misinterpreted the teachings of experience. One can not infer that fans consume more power than positive blowers per unit of blast delivered. from the fact that, in certain cases where fans are employed, more power is consumed per ton of ore smelted than in certain other cases where positive blowers are used, because the quantity and pressure of blast bear no fixed relation to the quantity of ore smelted. But by direct determinations of the volume and pressure of blast and of the power consumed by both blowers when blowing, not against the rapidly

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hlast producers

I adopted this particular fan after a full investigation of the subject, the chief results of which are given in a paper entitled the Comparative Efficiency of Fans and Positive Blowers.\* By a series of many hundred Efficiency of Fans and Positive Blowers." By a series of many hundred direct determinations, I demonstrated that the consumption of power in doing identical work was nearly identical, whether we employed the best fans or the best positive blowers, at least for the pressures experi-mented on, which covered all that are called for in the best practice in copper smelting. I am not aware that the accuracy of my determina-tions has ever been assailed, nor do I see how Dr. Peters can logically hold his position without producing direct experimental evidence in country of the second secon rebuttal

So much for the consumption of power by these two classes of blowers. The expediency of employing fans is quite another matter, and is, of course, an open question. Many of our most eminent engineers prefer fans to positive blowers under conditions such as arise in copper smelting.

In iron-melting cupolas for the Bessemer process, in which the condi-tions of pressure and volume of blast closely resemble those of copper tions of pressure and volume of blast closely resemble those of copper smelting, fans and positive blowers have been used side by side for many years, and I am inclined to think that the balance of opinion among the best judges is somewhat in favor of fans. Thus, in three admirably designed works that are now constructing, certain of them by engineers not only of prolonged experience, but of eminence (the Union Steel-Works and the Bessemer plants of Shoenberger & Co, and of Jones & Laughlins), fans are to be used for the cupolas. In some large Bessemer works Baker blowers have been abandoned and replaced by fans. I mention this as showing the favor in which fans are held in a branch of mention this as showing the favor in which fans are held in a branch of metallurgy in which mechanical engineering has reached a much higher metallurgy in which mechanical engineering has reached a much higher stage of development than it has in copper smelting. In these, as in the Orford Works, skilled mechanics will have charge of the machinery. In copper smelting in remote and small establishments, where it may be desirable to dispense with skilled mechanics, I am inclined to think that the Baker blower may be on the whole preferable to the fan, not because it consumes less power, but because tolerable results can be obtained with it, even when only the rudest labor is employed. Feb. 6. HENEY M. HOWE.

### Concentration Results and Theory.

EDITOR ENGINEERING AND MININGJOURNAL SIR: Professor Church, in a late issue of the JOURNAL (January 30th, 1886, page 75), refers to some general remarks of the writer in former arti-Had my own experience in the concentration of San Juan ores been as extensive as it was varied in character, there would have been much more specific treatment of the subject than I had felt warranted in undertaking. It would give me great pleasure to be able to comply with Professor Church's request for such details as are confessedly lacking, although it seemed to me that, in the matter that he uses as the text of his kind criticism, I had been explicit enough to make clear my own meaning. That this was not the case, is evident from the manifest misunderstanding of the subject by so intelligent a person as Profestor Church

Thanking him cordially for his own interesting contribution of facts, Thanking him cordially for his own interesting contribution of facts, and adding, in passing, that my own experience, as far as it goes, agrees very well with what he states concerning the machine-dressing of slimes, I will refer him again to my articles, where I think I stated very plainly that the exceptional cases quoted were not of a kind commonly met in practice elsewhere. In fact, considered as a record of past work, they are very insignificant in amount, relative and absolute ; but they derive their weight in the review of the San Juan region from the fact that they may become economically important in the future industry of that particular district. Mr. Church will note that I did not state that my results in concentration were unprofitable in the greater number of cases. I did say that the results proved clearly the impossibility of transporting I did say that the results proved clearly the impossibility of transporting many of the ores to distant mills for concentration, and that certain grades of ore (which I fully described) could not be profitably concengrades of ore (which I fully described) could not be profitably concen-trated even at the mines, although the most perfect metallurgical results might be attained, as I had practically determined. I stated also that I had met with marked success in treating certain ores carrying the value in brittle minerals, producing large proportions of *slimes* (intending Rittinger's definition, as quoted by Professor Church). The two cases that I mentioned as examples of unexpectedly bad results were explained as fully as possible. Both were small lots, barely sufficient to enable one to judge of their concentrating qualities, and both were of such a character as to furnish no material, when crushed enough to effect a good separation of gangue and ore, that would not come within such a character as to turnish no material, when crushed enough to effect a good separation of gangue and ore, that would not come within our accepted definition of "slimes." The *stylotypite* would *not* mix with water after vigorous stirring for half an hour. Professor Church thinks it should have done so, because he has successfully mixed 30,000 tons of slimes of other minerals. I am not aware that any one but myself has heretofore made any tests of *stulotymite* occurring alone in a

tons of slimes of other minerals. I am not aware that any one but myself has heretofore made any tests of stylotypite occurring alone in a quartzese gangue, and I merely stated what I supposed to be a newly observed fact regarding that mineral. I did not write that tetrahedrite had usually caused me great difficulty in concentrations, but that one lot of ore of this class had proved rebel-lious—a result that tallied with the experience of other operators in treating the product from the same mine. As Imentioned that the mines and the localities, and my own opportunities for studying these two qualities of ore were limited, I did not think it advisable to write more in detail. As Professor Church has requested more information, I may add here that the gangue in both cases (the Excelsior and San Juan ores) in detail. As Professor Church has requested more information, I may add here that the gangue in both cases (the Excelsior and San Juan ores) was a dark, very compact, amorphous quartz, with a very smooth frac-ture, not unlike *cacholong*, in one respect (that of clinging to the tongue), though in a less degree. But, whatever may be the special cause, it is certain that the *stylotypite* of the Excelsior mine, notwithstanding its non-wetting qualities, concentrates more readily than the San Juan mine product, which appears to carry off value in the tailings by the adhesion of the *tetrahedite* to the quartz. While I am not prepared with all the evi-

\* Transactions of the American Institute of Mining Engineers, Vol. X., page 482.

changing and undeterminable resistance of a cupola furnace, but dence necessary for a full discussion of this matter. I believe myself that directly into the the open air, we may deduce their relative efficiency as this particular mineral is more malleable than many of its congeners, and that its concentrating properties are in a measure affected by this CHAMPAIGN, Ill., Feb. 13. THEODORE B. COMSTOCK.

### THE PITTSBURG MEETING OF THE AMERICAN IN STITUTE OF MINING ENGINEERS.

On Tuesday, February 16th, the Institute met in Pittsburg, Pa., in one of the most successful of its many great meetings. The attendance was unusually large-probably, next to the famous Denver meeting in 1882, the largest in the history of the Institute. The vast industries of Pittsburg drew together engineers from every part of the country, and more particularly those who are interested in iron and steel, and certainly there was good occasion for their attendance in the wooderful progress that was good occasion for their attendance in the wonderful progre s that has been made there in iron and steel manufacture within the past ten years

The number of members and associates in attendance will probably

The number of members and associates in attendance will probably exceed 150 before the close of the meeting. The Institute was welcomed very briefly by Mr. John Chalfant, of Spang, Chalfant & Co., after which President J. C. Bayles responded for the Institute in his usual felicitous manner. President Bayles then delivered a very interesting address on the subject of Professional Ethics. The subject was ably treated, and no doubt it will form a guide to the younger engineers in shaping their professional standard of morality; but it is a subject apparently not admitting of a great variety of treat-ment; for the substance of the president's address will be found in a paper read at one of the first meetings of the Institute, by Richard P. Roth-well, and entitled Professional Morality. Though President Bayles made no reference to this fact, which is familiar to mo-t of the older members of the Institute, we would not for one moment have any one suppose no reference to this fact, which is familiar to mo-t of the older members of the Institute, we would not for one moment have any one suppose that the rules of professional ethics, which our distinguished president so ably laid down, were intended only as teachings of abstract morality. We need scarcely say that we warmly indorse the lessons that were delicately and courteously enforced in the paper from which we make the following extracts ; for a reference to the ENGINEERING AND MINING JOURNAL will show the same sentiments stated in emphatic though probably less polite language : "It is not asking too much of the engineer that his professional

probably less polite language: "It is not asking too much of the engineer that his professional morality shall conform to higher standards than those that govern men who buy and sell with no other object than the getting of gain. The professional man stands in a more confidential relation to his client than is supposed to exist between buyer and seller in trade. For the reason that he can not be held to the strict accountability that law and usage establish in mercantile business, he is under a moral obligation to fix his own rules of conduct by high standards and to conform to to fix his own rules of conduct by high standards and to conform to them under all circumstance

An ever-present stumbling-block in the path of the young engineer is what is lightly spoken of as the 'customary commission'—a percent-age paid him on the price of machinery and supplies purchased or recom-mended by him. That manufacturers expect to pay commissions to engineers who are instrumental in effecting the sale of their products is a striking proof that the standards of business morality are quite as low as I have assumed them to be; that engineers do not unite in indignant protest against the custom, and denounce as bibe-givers and bribe-takers those who thus exchange services, shows that the iron has entered the

those who thus exchange services, shows that the iron has entered the souls of many who may be disposed to resent such plain terms as those in which I decree it my duty to describe transactions of this kind. "The plain truth about the commission is, that the manufacturer or dealer adds it to the selling price of his goods, and the buyer uncon-sciously pays the bribe designed to corrupt his own agent. Can an engi-neer receive and retain for his own use a commission thus collected from his client without a surrender of his independence, and, having surren-dered that, can he conscientiously serve the client who seeks disinterested advice and assistance in the planning and construction of work? "The young man in professional life who begins by accepting commis-sions will soon find himself expecting and demanding them, and from that moment his professional judgment is as much for sale as pork in the shambles. I counsel the young man thus tempted to ask himself, Am

that moment his professional judgment is as much for sale as pork in the shambles. I counsel the young man thus tempted to ask himself, Am I entitled to pay from the manufacturer who offers it? If so, for what? If not. will my self-respect permit me to become his debtor for a gratuity to which I have no claim? Does not this money belong to my client, as an overcharge unconsciously paid by him for my benefit? If I refuse it, can I not with propriety demand in future that the percentage which this commission represents shall be deducted in advance from the manu-facturer's price, that my client may have the benefit of it? If this is denied (or L respect to the conclusion that it is a bride to command future facturer's price, that my client may have the benefit of it? If this is denied, can I resist the conclusion that it is a bribe to command future services at my hands? Is not the smile of incredulity with which the dealer receives my assurance that I can only take it for my client and hand it over to him, an insult to the profession, which, as a man of honor. I am bound to resent ?

honor, I am bound to resent? "Gentlemen, it is not true that custom sanctions the acceptance of commissions by the engineer. That it is much too general, I will not deny; but there are very few men of recognized professional standing who would confess that they have yielded to the temptation and retained for their own benefit the commissions received by them. I do not hesi-tate to give it as my opinion that the acceptance and retention of a com-mission is incompatible with a standard of professional honor to which

mission is incompatible with a standard of professional honor to which every self-respecting engineer should seek to conform. "With equal emphasis, would I characterize as unprofessional the framing of specifications calling for patented or controlled specialties, when to deceive the client bids are invited. There is nothing unprofes-sional in recommending a patented article or process if it be, in the judg-ment of the engineer, the best for the purpose to be accomplished; but he will do it openly and with the courage of his convictions. "In the relations of engineers to contractors, there is many a snare and pitfall for the unwary feet of the beginner. In superintending the construction of work, the engineer may err on the side of unreasonable strictness or on that of improper leniency. If so disposed, he can involve any contractor in loss and do him great wrong; but it more often happens that the engineer is forced to assume a defensive attitude and to resist influences too strong for a man of average courage or strength of will,

especially if his experience in charge of work is limited. He should enter upon the discharge of his delicate and responsible duties with a desire to do impartial justice between client and contractor. He is warranted in assuming that his judgment and discretion are his chief qualifications for the position of supervising engineer, and that all speci-fications are designed to be in some measure elastic, since the conditions to be encountered in carrying them out can not possibly be known in edwarde. He should not impose unnecessary and unreasonable requires advance. He should not impose unnecessary and unreasonable require-ments upon the contractor, even if empowered to do so by the letter of the specifications. The danger, however, is principally in the opposite

direction. "With equal confidence may it be asserted that the engineer who secretly participates in the profits of the contractor, whatever the arrange-ment by which such participation is brought about, sacrifices his profes-

ional standing. "In making reports for contingent fees or fees of contingent value, the young engineer needs to exercise great discretion. This may be done without impropriety if done openly; but it is safe to assume that few opportunities will come to the young man with a reputation still to make in which he can do clean and creditable work on any such basis. make in which he can do clean and creditable work on any such basis. The engineer called upon to make a report for a fee in stock which depends for its value upon the effect of his report in creating confidence in the public mind takes a fearful risk. Contingent fees are a delusion and a snare, and in making it a rule to refuse them the young engineer will be likely to gain more than he loses. "Reports intended to influence the public upon subjects concerning which the engineer knows himself unqualified to speak with authority are to be classed with other forms of charlatanry. "How far an engineer can properly use for his own advantage infor-mation gained in the discharge of duties of a confidential nature, is a question at once delicate and difficult. He can not help knowing what he has learned, and his knowledge is his capital. He must be governed in this matter by the considerations which influence men of honor in the

he has learned, and his knowledge is his capital. He must be governed in this matter by the considerations which influence men of honor in the ordinary relations of life. Stock and real estate operations on confi-dential information which belongs to one's principals are usually in violation of the simplest rules of professional honor. The manager who advises his brokers by telegraph and his principals by mail can not, I think, claim to have a very delicate sense of right and wrong. He can judge his own conduct by the standard he would apply in judging like infidelity on the part of those employed by him. "Criticism that is designed merely to advertise the critic serves no good purpose, and savors of charlatanry, or something worse. I regard as unprofessional every effort to discredit honest and intelligent work, and every form of disguised advertising designed to give an engineer a greater prominence than he has earned by successful and creditable work, or is entitled to claim by virtue of fitness for more than average pro-ference a substance.

or is entitled to claim by virtue of fitness for more than average pro-

or is entitled to claim by virtue of fitness for more than average pro-fessional achievements. "I know that, in this busy world, men of affairs do not always stop to weigh motives, and that confident assurance often commands respect, while modest merit is distrusted. But I do not know that a man can sell his honor for a price and retain thereafter the right to stand erect in the presence of his fellows. I do not know that any engineer can make for himself a creditable and satisfactory career of whom it can not be said that, whatever his mistakes or successes, his failures or triumphs, he has held his professional honor above suspicion." The next paper read was a review by Mr. W. P. Shinn of the progress

that, whatever his mistakes or successes, his failures or triumphs, he has held his professional honor above suspicion."
The next paper read was a review by Mr. W. P. Shinn of the progress made in Pittsburg, Alleghany County, and Pennsylvania during the past seven years. The paper was a valuable and very striking collection of statistics of the production of iron and steel in various conditions, and of lead, and it showed that Pittsburg is not only increasing its production of the cruder as well as the higher forms of the products of the furnace, but that more rapidly than any other portion of the United States. This has been due to the extreme cheapness of fuel, even before the introduction of natural gas.
The next paper was by Mr. William Metcalf, on that all-engrossing subject, Natural Gas, and we regret that we can not at present give a fair summary of Mr. Metcalf's remarks. Though Mr. Metcalf treated the subject in a jocular manner, many of his remarks were evidently does not look upon the future of the natural gas question as entirely free from trouble and perhaps disaster.
Dr. R. W. Raymond then read a notice of the death of Oswald J. Heinrich, which we publish in another column.

Heinrich, which we publish in another column. Wednesday, February 17th, the engineers went by special train to visit some of the gas wells at Tarentum, the Pittsburg Plate-Glass Works, the Crescent Steel-Works, the Black Diamond Steel-Works, and the O'Hara Glass-Works. A magnificent lunch was served on the train, and every arrangement that could contribute to the pleasure of the visitors was provided.

Thursday was devoted to the reading and discussion of papers; and Friday, to excursions to Oliver's Clapp-Griffiths plant, Jones & Laughlin's Steel-Works, Duncan's Glass-Works, and the Edgar-Thomson (Carnegie's) Steel-Works. Among the papers read at the meeting are the following:

Professional Ethics, by Pres. J. C. Bayles.
Pittsburg and Vicinity, by W. P. Shinn, New York City.
Natural Gas, by William Metcalf, Pittsburg, Pa.
The Geology of the Pittsburg Coal Region, by J. P. Lesley, State Geologist of
Pennsylvania, Philadelphia, Pa.
The Constitution of Pig-Iron, by C. B. Dudley, Altoona, Pa.
The Microscopical Structure of Car-Wheel Iron, by F. L. Garrison, Philadelphia, Pa.
Recent Failures of Steel Boiler Plates, by William Kent, New York City.
Soft Steel for Boiler Plates, by Alfred E. Hunt, Pittsburg, Pa.
The Heating of Steel, with Remarks on Certain Phenomena Observed in the
Manipulation of Open-Hearth and Bessemer Steel, by William Garrett, Pittsburg, Pa.

Manipulation of Open-Hearth and Bessemer Steel, by William Garrett, Pittsburg, Pa.
The Sampling of Cast-Iron Borings, by Porter W. Shimer, Easton, Pa.
The Operation of the Warwick Furnace, Pottstown, Pa., from 1880 to 1885, by John Birkinbine, Philadelphia, Pa.
A Chilled Furnace Hearth, by James Gayley, Braddock, Pa.
The Cornwall Iron Ore Mines, by E. V. a'Invilliers, Philadelphia, Pa.
Note on the Hibernia Mines, by J. Wesley Pullman, Philadelphia, Pa.
The Iron Ores and Coals of Alabama, Georgia, and Tennessee, by John D. Porter, Cincinnati, Ohio.

The Iron Ore Deposits of Southern Utah, by William P. Blake, New Haven.

onn. The Classification and Constitution of Pennsylvania Anthracites, by C. A. Ash-urner, Philadelphia, Pa. The Mineral Resources of the Hudson's Bay Territory, by Robert Bell, Ottawa,

Zanada. The Geological Map of the United States, by Prof. C. E. Hitchcock, Hanover,

The Geological Map of the United States, by Prof. C. E. Hitchcock, Hanover, New Hampshire. The Nova Scotia Gold Mines, by E. Gilpin, Jr., Halifax, N. S. Note on a Deposit of Fire-Sand in Clinton County, N. Y., by Alfred F. Brain-erd, Birmingham, Ala. Contributions to a Knowledge of the Structure and Formation of Mineral Veins, by William P. Blake, New Haven, Conn. A New Method of Submarine Tunneling, by R. P. Rothwell, New York City. The Use of Hydraulic Wedges, as Substitutes for Explosives in Coal Mining, by R. P. Rothwell, New York City. The Use of Gasoline Gas in a Chemical Laboratory, by Prof. Charles E. Wait, Rolla, Mo.

Rolla, Mo.
A Cupel Machine, by Prof. Charles E. Wait, Rolla, Mo.
The Mining Compass and Trigonometer, by Erich G. Gaertner, New York City.
An Automatic Detector of Marsh-Gas, by Nelson W. Perry, Norwood, Ohio.
The Process used at the Constock for Refining Coppery Bullion from the
Amalgamation of Tailings, by A. D. Hodges, Jr., Boston, Mass.
The Ives Photo-Engraving Process, and its Usefulness to Engineers, by R. W.
Raymond, New York City.
The Clapp-Griffiths Process, by J. P. Witherow, Pittsburg, Pa.
The Manufacture of Fire-Brick at Mount Savage, Md., by Robert Cook, Mount

Savage, Md. Apparatus for Determining the Heating Power of Different Fuels, by William Kent, New York City. The Heine Boiler, by E. D. Meier, St. Louis. Ke

Many of these will hereafter appear in our columns. They are most of them such as to preclude brief abstraction.

OPERATION OF WARWICK FURNACE, PENNSYLVANIA, FROM AUGUST 27th TO SEPTEMBER 1st, 1885.\*

### By John Birkinbine, Philadelphia.

The experience of the past five years has furnished opportunities to study and to partially explain the operation and some of the causes of the short blast of Warwick Furnace at Pottstown, Pennsylvania, as described in the paper read at the Lake Superior meeting, in August, 1990 k 1880.+

1880.<sup>4</sup> The many inquiries concerning the details of furnace operation that followed the publication of the paper, and the expressed desire of furnace managers to be informed as to future operations of this plant, have encouraged the preparation of the following data. To make the record continuous, and add to the value of both contributions, the present paper commences where the review of a short blast of Warwick Furnace ended, and includes the data of another short blast of two months [The pressure on our columns obliges us to omit these], and a subse-cuent continuous campaign of nearly five years which by comparison

quent continuous campaign of nearly five years, which, by comparison, we shall designate as "the long blast." Frequent visits to the plant in the five years during which its operation could be studied, and correspondence with the manager, Mr. Edgar S. Cook, have given a knowledge as to general features and details, and the Cook, have given a knowledge as to general features and details, and the courtesy of the officers of the company, who have given free access to the books of record, permit the presentation of data that it is believed will be welcomed by furnace managers. Interest will undoubtedly be increased by the remarkable results that Mr Cook has achieved, chiefly with anthracite coal, in a furnace whose details of construction will scarcely be generally admitted as embodying advanced ideas, its hight being but 55 feet, with a bosh diameter or 15 feet 6 inches, its bosh-slope comparatively flat, its crucible smaller than the average, and the heat of the blast never reaching 1000 degrees Fahr. At present writing, the credit of the best recorded anthracite blast-fur-nace practice is conceded to be that pursued by Mr. Fackenthal, at the Dur-ham Furnace, and by Mr. Cook, at the Warwick Furnace. Fortunately, each gentleman seems desirous of giving the credit to the other, and it

ham Furnace, and by Mr. Cook, at the Warwick Furnace. Fortunately, each gentleman seems desirous of giving the credit to the other, and it is not the purpose of this contribution to decide this matter ; but a perusal of the results herein given, with those presented in Mr. Fackenthal's paper on the Durham Blast-Furnace, Pennsylvania, read at the Chatta-nooga Meeting, May, 1885,‡ will demonstrate that both gentlemen have, by hard work and persistent application, earned for themselves enviable renown as blast-furnace managers. Although this paper is intended as a sequel to that read in August, 1880, it is deemed advantageous to present a *résumé* of the paper upon a Short Blast at Warwick Furnace, read by the writer at the Lake Superior Meeting.

Superior Meeting.

### THE LONG BLAST.

THE LONG BLAST. The furnace was blown in December 15th, 1880. It started off very satisfactorily, making, in the first nine days, 4474 gross tons of No. 1 and No. 2 foundry iron. It continued to work regularly and well for seven weeks, the average weekly yield for that time being 4084 gross tons of iron. The fuel consumption, all anthracite, was 1°35 gross tons (3024 pounds), including "blowing in," the yield of the mixture of ores being 42°7 per cent, and the largest weekly product was 4334 gross tons. On the Saturday previous, "February 26th, the iron broke out through the jacket, at the bottom of the furnace, just as the cast was being run. It ceased to run at the iron notch, but large streams of cinder and iron came out from this hole. The furnace was stopped nearly two hours, and, on starting, the pressure became irregular, and the stock settled by jumps. After the second flush, the iron broke out again at the same place, caus-ing another stoppage of three and a half hours. The stock settled regu-larly and level.

appeared normal; cinder, good and gray, hot and fluid." Sunday, 27th.—The manager's notes state, "No trouble anywhere;

A paper read at the Pittsburg Meeting of the American Institute of Mining Engineers, Februarv, 1886.
 + Vide A Short Blast at the Warwick Furnace, by John Birkinbine. Transactions, Vol. IX., pages 51-59.
 + Vide Transactions, Vol. XIV.

Diam

metallic iron. It was chiefly found in the lower end of the runner. Another important indication was the variation of the pressure-gauge close to the furnace; every considerable variation was noted by the keeper, on cards prepared for the purpose, particularly before and after flushing. The gas also received special attention; the furnace was as carefully watched in every particular as a sick patient would be at the hands of a trained nurse and efficient physician. The results, after months of waiting, proved their own reward, and the manager's apprehensions proved to be well founded. From Sunday, February 27th, 1881, to Saturday, March 5th, 1881, no further disturbance was noted; the furnace worked along regularly and with good results.

with good results.

further disturbance was noted ; the furnace worked along regularly and with good results. Quoting again from the diary : "Saturday night, March 5th, 1881.—Irregularities began to show them-fluid, analysis showing silica 35°25 per cent ; stock settled chiefly by jumps; large amounts of black, heavy flue dirt were carried over by the gases; gas, abundant and hot, but very dirty ; tuyeres worked clean ; pressure irregular, being always highest, however, before the flush than after it." (It may be well to remark here, what was afterward learned to be an almost invariable rule, that, whenever the pressure after flush-ing was repeatedly and continuously higher than before, it was a rea-sonably sure indication, not of the presence of ore-sand filling the cavities of the brick-work, but that it was in motion and moving down to the tuyeres. Ordinarily speaking, when the slag is allowed to nearly reach the tuyeres, the pressure will be higher before than after the discharge of slag. The reverse invariably indicated a cause disturbing to the uni-formity of the operations of the furnace.) "Sunday, March 6th, 1881.—Cinder fair, gray, hot, and fluid ; stock con-tinued to settle mostly at flushes ; soon Nos. 5, 4, and 3 tuyeres began to work dirty ; the next two flushes were cold, black, heavy cinder. After this, the stock settled regularly and became level ; previously it had been high at No. 4 filling place, and lowest at No. 2, the difference at one time being fully six feet ; the cast was Nos. 3 and 4 mill iron. After cast, stock settled regularly ; gas, clean and hot ; pressure, regular ; cinder, fair and gray ; the cast following being 14 tons of No. 2 foundry iron" (6 hour casts). From Sunday night, the furnace worked fairly and regularly, making

iron" (6 hour casts).

cinder, fair and gray; the cast following being 14 tons of No. 2 foundry (iron" (6 hour casts).
From Sunday night, the furnace worked fairly and regularly, making 17 and 58 tons of No. 2 and No. 3 iron per day until—
Tuesday night, March 8th, 1881, when "the stock became uneven being low between No. 1 and 2 filling places, and high at No. 4. Stock falling between the flushes; pressure very irregular, sometimes if falling between the flushes; with rushes of dirt and a red, smoky, very hot gas." As a rule, the gas was plentiful and hot with the high pressures, although sometimes it would be short; the tuyeres kept open and bright. A hole was drilled through the brick-work about 8 feet above No. 4 tuyere, and the masonry was found to be 30 inches thick instead of about 42 inches, as when first laid; no brick was left in front of the coils, it having been all melted away. Next to the coils, were two or three feet of ore-sand similar to analysis given beyond. It was not burned or melted in mass, but wes comparatively loose, except a thin layer next to the active part of the furnace; a bar could be easily pushed in through it, and would not get hot. A one-inch pipe was put in this hole and air blown through it. To quote again :
 "Wednesday.—After the two A.M. cast, the stock did not settle until the flush; it then made a jump, and afterward continued to settle rapidly during the balance of the might; pressure, uniform, being about 6 pounds; revolutions, 12; blast, 900 degrees; tuyeres worked hot, but a good deal of soft dirt came before them and melted; gas, good; cinder, gray and very hot.

very hot.

"At the two P.M. cast, tested the opening above No. 4 tuyere, found dirt all gone and the bar was hot just inside of the brick-work; stock perfectly level on top; the one-inch pipe was then taken out." For the remainder of the week, the furnace worked with perfect regu-larity, making a fair yield of iron, from 55 to 60 tons a day, mostly of foundry grades. The average analysis of slag was:

The following notes on the work of the week ended March 19th, 1881, are of interest

Monday, March 14th .- The stock commenced to settle by jumps at "Monday, March 14th.—The stock commenced to settle by jumps at flushes; it had previously worked regularly in all respects for four or five days; it continued to settle at flushes all night, and early in the evening the stock got uneven on the top, being lower at No. 2 filling point and high at No. 4; the lowest point seemed to be directly above the iron notch. Pressure, irregular; gas also irregular in volume, although mostly of very good quality; aimed to keep up 12 revolutions and run the blast as hot as possible, being about 900 degrees. The high heat of the blast seemed to give the best results when the stock is sticking and jumping. jumping. "Tuesday, March 15th.—The stock settled regularly and evenly. During

worked regularly ; made 58 tons of No. 2 foundry iron ; charges, 84 ; burden, 3500 pounds of ore to 2000 pounds of anthracite coal." During the week, the manager, from his notes, appears apprehensive of a return of the former "dirt troubles." All the indications were care-fully noted, seemingly only trifling, yet from previous experiences he felt confident of another "campaign." One incident was the dirty con-dition of the slag, which, though it flowed hot and liquid, carried quar-tities of fine dirt ; as the cinder was run into the cars from the spouts, the dirt would separate from the slag being thrown out at a different angle, and could be collected on a shovel. On examination, it proved found : to ascertain whether this came from the furnace in the metallic found : to ascertain whether this came from the furnace in the metallic istate, several deep holes were made in the upper part of the runner, mearly on a level, to collect any iron that might be carried over by the slag. No metal could be found in these holes; but still the globules of iron would be noticed in the lower part of the runner. The manager soon became astisfied that it was produced from the material designated as ore-dir stand, aft after-experiments proved this quite conclusively. This sand was washed out of the furnace, and in flowing down the long runner carried by the molten slag it was fused and converted into state, several due pholes were word the runner. The manager soon became astisfied that it was chiefly found in the lower end of the runner. Another important indication was the variation of the pressure gauger. Another important indication was the variation of the pressure gauger. Another important indication was the variation of the pressure gauger. Another important indication was the variation of the pressure gauger.

the blast at the nusnes. "Thinking this view plausible, on March 17th, Nos. 3 and 4 tuyeres were "Unliking this view plausible, on March 17th, Nos. 3 and 4 tuyeres were drawn 3 inches previously. This was done with the view of directing more blast along the walls to prevent ore-sand accumulating in such large quantities. It was found to work satisfactorily, and, later on, the nozzles were dispensed with; the belly-pipe being clayed into the butt and air blown through the nose of the 5-inch tuyeres, although the belly-pipes were 44 inches in diameter"

pipes were 4½ inches in diameter." For the remainder of the month of March (from the 21st), the furnace worked fairly well, giving good results, averaging about 60 gross tons of iron a day.

iron a day.
Under date of March 22d, the notes state that "Holes drilled over No.
6 and No. 2 tuyeres show little or no dirt, and about 30 inches of brick.
The dirt appears to run mostly from No. 5 to No. 3 tuyere."
The "dirt troubles," as they are now termed, continued through April, 1881, with more or less frequency, sometimes being very bad, although the yield of the furnace was kept up to from 350 to 425 gross tons per week, and no remedy that could be applied seemed to prevent their occurrence. At the suggestion of several furnace managers, the experiment of a 5-foot diameter bell in place of one of 7-foot diameter was tried, and on April 25th the furnace was stopped and the change made."
It proved to be of no benefit whatever, but rather the reverse; it did not remove the cause of the "dirt troubles," neither did it make them any worse. So far as they were directly concerned, the conditions remained unchanged; but the solven y data hereafter.
The irregularities consequent upon the dirt accumulations continued

The irregularities consequent upon the dirt accumulations continued through the year 1881.

through the year 1881. The total product for the year 1881 was 18,290 gross tons of iron; 93:28 per cent of which was foundry and gray forge, 3:15 per cent mottled, and 3:57 per cent white iron; the ores yielded an average of 47 per cent. The fuel per ton of iron (all anthracite coal) was 1:46 gross tons (3270 pounds), and there was used an average of 0:9125 ton of limestone per ton of iron; the average revolutions of the engine 11.7 = 8233 cubic feet of air per minute (engine measurement without allowances); average pressure, 6:7 pounds at furnace; the heat of blast averaged 896 degrees; stoppages, 439 minutes ner week : tuveres lost, 12.

at furnace; the heat of blast averaged 556 degrees; stoppages, 459 minutes per week; tuyeres lost, 12. April 6th, 1892.—The 5-foot bell was dropped into the furnace purposely and the 7-foot bell restored; the smaller bell was in use about one year, and the difference in results attained with the two sizes shows as follows :

eter of bell	. Average burden.	yield of ore.	age gross ton.
7 feet.	3305 lbs. per 2000 lbs. coal.	451 per cent.	392.3
5 "	2740 " " "	47.9 **	328.8

Returning to the use of the 7-foot bell again, the yield of furnace increased and the fuel per ton of iron was reduced. The "dirt troubles" continued through 1882, but were less severe. The manager learned in a measure to foretell their coming, and knew better

On May 15th. 1882, the coils around the bosh of the furnace commenced On May 15th, 1882, the coils around the bosh of the furnace commenced to leak, owing to breakage of elbows connecting them with the feed and discharge-pipes, necessitating turning off the water and allowing the coils to burn out. These coils had been in use for nearly a year and a half and had held the walls in fair shape up to this time. Their position is shown in the sketch of the furnace; vide Transactions, Vol. XIII., page 497. The brick-work showed the effect of the loss of water cooling immediately, and it was a doubtful matter for a month or two whether it would be possible to keep the furnace in blast. All around the fur-nace, from the mantle to the tuyeres, the brick became very hot, cracks opened, through which the blast and gas blew, and pressure averaged very low, running down to 2 or 3 pounds in the furnace with 11 or 12 revolutions of the engine. Finally the furnace closed up the cracks, making its repairs internally; the pressure increased to 4 and 5 pounds, and the manager felt quite relieved. During 1882, one fourth coke to three fourths anthracite coal was used; this helped to reduce the intensity of the "dirt trouble," and as the manager became used to them, learning to expect them, they ceased to cause anxiety.

cause anxiety.

cause anxiety. The total product for 1882 was 19,762 gross tons of iron, 93.2 per cent being foundry and gray forge, 4.1 per cent mottled, and 2.7 per cent white iron; the fuel consumption (one quarter coke) was 1.4 tons (3136 pounds), and the limestone used was 0.92 ton per ton of iron; the air per minute was 8233 cubic feet; average pressure of blast, 4.6 pounds; blast tem-perature, 900 degrees; stoppages per week, 431 minutes; tuyeres lost, 7. The year 1883 gave less trouble and anxiety than either of the preced-ing years. It seemed that the larger the furnace became worn above the bosh, the less difficulty was experienced in the crucible. The bottom of the furnace began to fill up this year; the furnace was blown in on a

\* Vide Transactions, Vol. XIII., pages 526 to 529, Discussion on Bells.

sandstone bottom ; this cut away very rapidly, and the iron trough was lowered fully 18 inches. During 1883, the trough was raised first inches and then 6 inches more, making a total of 1 foot. It remained the iron notch after the bottom ceased to cut down. The product for the year 1893 was 21,676 gross tons of iron, 94.76 per cent white iron. The average yield of ore was 50 2 per cent : consump-tion of fuel (three quarter anthracite, one quarter coke), was 1<sup>2</sup>2875 gross tons (2844 pounds), and 0<sup>3</sup>75 ton of limestone was used per ton of iron the air per minute (engme measurement) was 8374 cubic feet; average pages, 494 minutes per week; ; uyeres lost, 12. The white iron made this year was of a peculiar nature, the fracture being somewhat similar to spiegel, very uneven, divided up into carried as much silicon as the gray forge quality, about  $\frac{1}{10}$  of one per cent. In the pudding-furnace, it acted very much like gray forge iron requiring quite as much work and yielding a tough fibrous bar. For out out so a tot of gray metal ; the carbon in the latter would reduct the ore to metallic iron, lowering the grade of the following cast. It firstil larger, the slag would be of the peculiar white iron, white one or two beds of gray metal ; the carbon in the latter would reduct the remainder of the cast being gray forge or even No. 2 iron. If firstil larger, the slag would be come raw and the whole cast would be white iron, who beds of gray mind, hosing the peculiar appearance of spiegel. white iron of the ordinary kind, losing the peculiar appearance of spiegel

spiegel.
During December, 1883, an extra set of boilers was completed and connections made for steam, gas, and water. This helped the furnace very materially in 1884; previously it was not possible, for want of steam, to give the furnace all the air demanded by its increased size. The new set of cylinder boilers consisted of three upper boilers, 48 inches in diameter by 52 feet long, with necks connecting them with three lower boilers 36 inches in diameter and 52 feet long, and avoided the necessity of stopping the furnace for two weeks a year to clean out the scale.
During 1884, the output was 22,892 gross tons of iron, or an average of over 440 tons per week. There was not a week in the year that the product fell below 410 tons, except when obliged to make long stops to repair the hot blast ovens, which became troublesome this year.
The ores yielded 50°2 per cent. The consumption of fuel (one quarter coke), was 1°2875 gross tons (2884 pounds), and 0°7375 ton of limestone was used per ton of iron; the average consumption of air per minute (engine measurement) was 8972 cubic feet; average pressure, 6°76 pounds; average temperature of blast, 851 degrees; stoppages, 322 minutes per week; tuyeres lost, 13.
The '' dirt troubles'' continued occasionally, but were of less intensity, and seldom gave rise to any serious difficulty.
The iron made was 95'4 per cent foundry and gray forge, 2°2 per cent mottled, and 2°4 per cent white iron. The largest weekly product of the year was 516 gross tons. Mr. Cook expected to blow out for repairs in the spring of 1885; but as the results obtained were so satisfactory, he decided to run until fall, taking his chances with the ovens, which were liable to give out at any time or might last several months. The mains in one oven were exposed, and, although the arches had been patched During December, 1883, an extra set of boilers was completed and con-

he decided to fun until fall, taking his chances with the ovens, which were liable to give out at any time or might last several months. The mains in one oven were exposed, and, although the arches had been patched several times, he could fix nothing permanently; in the other oven, nearly all the pipes were in a bad condition. These ovens had been in constant use for nearly ten years, with no costly repairs whatever, and of course could not be expected to last much longer without thorough over-hauling, particularly as the furnace had in its earlier history passed through a series of troublesome experiences. causing short and unsatisthrough a series of troublesome experiences, causing short and unsatis-factory campaigns. They were constructed to heat about 5000 cubic feet of air per minute, having a total heating surface of 2508 square feet. For the last seven years, from 8000 to 9000 cubic feet of air were driven through them, giving a back pressure of from 3 to 4 pounds, which was a land measure of the pressure of the pressure of the pressure of the seven years. dead weight on the engine, and represented a considerable loss of steampower.

The work for 1885, to the close of the blast, on September 1st, was as follows: Iron made, 20,997 gross tons, an average of 514 tons per week; the ore averaged 54.9 per cent; fuel consumed (one fourth coke), 1.0875 gross tons (2436 pounds), and 0.6375 ton of limestone was used per ton of iron: the air per minute averaged 9844 cubic feet; the pressure average, 6 pounds ; temperature of blast, 813 degrees ; stoppages, 487 minutes

per week. The iron made was 95'1 per cent foundry and gray forge, 2'5 per cent motiled, and 2'4 per cent white iron. Tuyeres lost, 10. The best monthly work averaged 570 gross tons per week, the ores averaging 59 per cent; fuel consumption (one fourth coke), 0'95 gross tons (2128 pounds), and 0'60 ton of limestone was used per ton of iron; the average blast temperature was 843 degrees; stoppages, 344 minutes per week.

per week. The largest weekly yield of the blast was 615<sup>1</sup>/<sub>1</sub> gross tons, with a con-sumption of 0.95 gross ton of fuel and a blast temperature of 841 degrees. The total product of the blast was 101,335<sup>1</sup>/<sub>2</sub> gross tons of iron in 245 weeks, or a general average of 418 6 gross tons per week. With the advent of warm weather, July and August of 1885, great difficulty was experienced on account of the constantly recurring break-outs of einder around the tuyeres and in the jams between the tuyeres, and

outs of cinder around the tuyeres and in the jams between the tuyeres, and of gas coming from the top of tuyeres and mantle. It became necessary to flood these portions of the brick-work with water, in order to assist the air in cooling them.

the air in cooling them. The tuyeres began to sink at the nose, and it became almost impos-sible to hold them up, as there was scarcely any brick-work left to sup-port them, the tuyere-houses being more or less cracked. With the return of the cold weather, the furnace would, probably, have filled up again and made her own repairs; but as Mr. Cook had arranged to reline the stack, and had worked up all the stocks by Sep-tember 1st, he blowing down was successful. The ball and houser having here

The blowing down was successful. The bell and hopper having been left in position, with the aid of Mr. W. J. Taylor's water-spray arrange-ment, every thing was kept cool, and the stock melted out to within a

Year inded.	s tons of iron de.	entage of foun- r and gray ge grades.	age yield of 38. (Per cent.)	consumption r ton of iron. bunde.)	Character of fuel,	estone per 1 of iron. ross tons.)	age air per nute. (Cubic et.)	age tempera- re of blast egrees) F.	Weekly stop-	pages.	res lost.	age pressure blast. (Pounds.)
	Gros	Perc	Avei	Fuel Pe		Lim (G	Avei	Ave (D	hrs	min.	Tuye	Aver
Dec. 15. 1881.	18,290	93.28	47.0	3,270	Anthracite.	0.912	8,233	896	7	19	12	6.7
Dec 15, 1882.	19,762	93.20		3,136	1 34 Anthracite	0.9:20	8,233	900	7	11	7	4.6
Dec.15, 1883.	21,676	94.76	50 2	2,884	34 Anthracite	0.875	8,374	869	8	14	12	5.0
Dec.15, 1884.	22,892	95.40	50.2	2,884	34 Anthracite	0.737	8,972	851	5	22	13	6.76
Sept. 1, 1885.*	20,9971/6	95.10	54.9	2,436	Anthracite	0.637	9.844	813	8	07	10	6.0
Totals and aver- ages.												

RECORD OF BEST WEEKLY WORK.

YEARS.	Size of bell in feet.	Gross tons of iron made.	Gross tons of fuel per ton of iron.	Average yield of ore. Per cent.	Average temperature of the blast. Degrees.
1881 1881 1882 1883 1884 1884	757777	$\begin{array}{r} 433\frac{1}{9}\\ 407\frac{1}{9}\\ 453\frac{1}{9}\\ 480\frac{1}{9}\\ 516\\ 615\frac{1}{9}\end{array}$	1.2500 1.3000 1.2500 1.1000 1.1500 0.9625	44:5 51:5  58:3	806 875 800 825 833 840

The stock line at full charge was ten feet in diameter. The average

The stock line at full charge was ten feet in diameter. The average ore mixtures were as follows: DURING 1881.—Thirty to 40 per cent Boyertown magnetites, twenty to thirty per cent hematites, ten to twenty per cent Jersey magnetites, ten per cent mill cinder, ten per cent Seisholtzville magnetite. DURING 1882.—Thirty to fifty per cent Boyertown magnetites, ten to twenty per cent hematites, twenty to thirty per cent Jersey magnetites, ten per cent mill cinder, ten per cent Seisholtzville magnetites. DURING 1883.—Fifteen to fifty per cent Boyertown magnetites. DURING 1883.—Fifteen to fifty per cent Boyertown magnetites, ten per cent hematites, twenty to forty per cent Jersey magnetites, ten per cent hematites, twenty to forty per cent Jersey magnetites, ten per cent of mill cinder, fifteen per cent forge cinder, ten per cent Seisholtzville or New York magnetites.

or mill choice, infecen per cent forge childer, ten per cent Seisnonzville of New York magnetites. DURING 1884.—Fifteen to forty per cent Boyertown magnetites, ten to fifteen per cent hematites, twenty to thirty per cent Jersey magnetites, ten per cent mill cinder. ten per cent "Blue billy," † ten per cent Seis-holtzville magnetites. During the latter part of the year, twenty-five per cent Elba ores were used with the smaller percentage of Boyertown ore

ore. DURING 1885.—Fifteen to thirty per cent Boyertown (stopped mining), twenty to forty per cent Elba, ten per cent "Blue billy," ten per cent Jersey magnetites, ten per cent mill cinder, ten to fifteen per cent Seis-holtzville, five to ten per cent hematites (occasionally). To give an approximate idea of the general composition of the ore charges, the following representative analyses are presented :

COMPOSITION.	Seisholtz- ville.	Boyerstown roasted	Mill cinder.	Jersey magnetites. Fine.	Jersey magnetites Coarse.
Silica Alumina Lime	12:900 2:800 1:400	12:500 2:450 13:230	24 90 3.55	12:370 2:700 2:100	14.75 7.00 4.20
Magnesia Irov Phosphorus Sulphur	2:810 47:025 :060	3.750 44.000 -045 -500	51·10 0·80	3'200 49'700 0'078 0'500	58.00 0.50 trace

In absence of absolute data as to the corrected volume of air actually

\* Eight and a half months ; the furnace year was from December 15th of one year to he same date of the next year. † Residuum for roasted pyrites used in manufacturing sulphuric acid.

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delivered to the furnace, the following statement has been prepared to show the approximate consumption of air at atmospheric pressure per ton of iron and per pound of fuel (engine measurement, with no deduction for loss) during the blast :

	Air per ton of iron. Cubic feet.	Air per pound of fuel. Cubic feet.
1881	. 235,771.8	77.5
1882	. 2.20,429.4	70 3
1883	. 202,821.1	73.7
1884	201.610.1	70.4
1885	192.094.0	78.8

### OFFICIAL STATEMENTS AND REPORTS.

### Osceola Consolidated Mining Company.

The following statement, just issued, shows that during 1885 the surplus of the company has been reduced from \$231,530.20, as it stood on January 1st, 1885, to \$102,281.60 on January 1st of the present year. This was due to the heavy expense connected with the moving of the mill, which was decided upon early in the year, owing to the exorbitant rates charged by the Mineral Range Railroad Company for transporting the rock from the mines to the stamp mill, on Portage Lake, a distance of twelve miles. The stamp mill was moved from Portage Lake to Torch the rock from the mines to the stamp mill, on Portage Lake, a distance of twelve miles. The stamp mill was moved from Portage Lake to Torch Lake, and the company participated in the building of a rairoad to con-nect its mines with that point. A most favorable site was found and purchased, and on the 20th day of May last, the stamp mill was stopped and the work of removal begun. On the 17th day of November follow-ing, the mill resumed work at its new location, with the new railroad, called the Hancock & Calumet Railroad Company, running regu'ar rock trains from the mines. The mine is now in a condition of equipment equal to any mine in the district for economical production. During this change, the opening work of the mine was prosecuted with all vigor, and almost a year's reserve was added to the visible supply of pro-ductive ground. The old mill-site, with its dock and warehouses, car-penter's and blacksmith's shops, barn and five dwelling-houses, is still left. This property is valuable, and should be in demand. These remarks explain how the surplus of the company has been decreased. The work of moving the mill and setting it up on its new site cost, altogether, \$63,659.78. The other construction work that was necessary was new engine and plant at No. 3 shaft, and moving the former engine there to No 4 shaft, and providing pump-house and pump on West Amygdaloid, which has amounted to \$22,606.05; and the expense of keeping up the openings in the mine while the mill was moved, was \$46,076.60; making an aggregate sum of \$132,342.43, which was taken

almost entirely from the surplus. The itemized statement of business for 1885 is as follows :

From sales of 1.939.169 pounds copper at 10.75 ce From sales of real estate From interest receipts	ents\$208,558.65 3,052 25 2,852.09 231,530.20
Expenses at the mine were	\$445,993.19 213,674.08 43,771.68 86,265.83
Total expenses	\$343,711.59
Leaves balance of assets, January 1st, 1886	\$102,281.60

AMERICAN COAL CONTRACTS OF OCEAN STEAMSHIPS AT NEW YORK, 1885.

The Coal Trade Journal gives the following list of steamship lines sailing from New York, and the amounts of American coal purchased by them, presumably during the year 1885. Many of the transatlantic lines purchase much of their coal for both voyages in England, and this may account for the small amount purchased by the National, State, White Star, and other lines here. The figures are supposed to be tons of 2240 pounds, though the fact is not stated. It will be noted that Clear-field coal, under the fostering freights of the Pennsylvania Railroad, has, to a great extent, displaced Cumberland, which is generally believed to be the better fuel.

Clearfield " Clearfield " West Virginia "		h.
Total	.929,000 tons	1
Name of steamship line. Supplied by Anchor LineR. Hare Powel & Co Atlas Line Berwind, White & Co	Clearfield	Tons. 50,000 30,000
Cromwell Line	Cumberland Clearfield Cumberland	20,000 15,000 75.000
French Line	Clearfield	40,000 60,000 70,000
Inman Line	4.6 4.4	30,000 20,000 15.000
North German Lloyd SS CoConsolidation Coal Company N. Y., Havana & Mexican SS. Co.Berwind, White & Co	Cumberland Clearfield	30,000 120,000 25,000
Relps Wrothers & Co. Quebec Steamship Company R B. Wigton & Sons Red Star Line	**	30,000 15,000 35,000
Ratonal Line	46 46	25,000 10,000 10,000
Sunpson, Spence & Young Arkell & Douglass	66 66	10,00 2,00 1 <sup>-2</sup> ,00
Busk & Jevons	Cumberland Clearfield	5,00 30,00 30,00
Pacific Mail Company	West Va.	10,00
Gomez & Parsons	Clearfield	150,00

Total tons.....

### WELL-BORING BY STEAM WITH A SPRING-POLE.

### Written for the Engineering and Mining Journal by Benjamin Smith Lyman

Written for the Engineering and Mining Journal by Benjamin Smith Lyman. Until about 1878, the use of the spring-pole, so convenient in boring deep wells of two inches or two and a balf in diameter by hand, was impracticable with steam-power, owing to the violent jerking action of the pole that would have shaken a machine to pieces. But at that time, the difficulty of employing steam was first successfully obviated by add-ing what is called "the little-pole," invented, it is said, by Job Evans, a Welshman; and now in general use in Northeastern Ohio and perhaps elsewhere. There was no patent to hinder ; and if there had been, it might possibly have been evaded by using some other kind of spring, such as a soft wagon-spring. The following account is prepared from observation in September, 1884, of the practice of Mr. John Shoaf, of Coalburg, Trum-bull County, Ohio, an experienced driller of wells in that region, and from information given by him. Some of the tools and arrangements are not by any means pecular to the use of steam with a spring-pole; but it may be worth while to make brief mention of them also, as a more complete guide or as a reminder of what very recent practice finds best after long experience. His little-pole (as shown in the figure) was 15 feet long, "middling

experience. His little-pole (as shown in the figure) was 15 feet long, "middling long," four inches in diameter at the forward end, and two inches and two thirds at the other; and hung a foot and a half below the spring-pole by two clamps, one nine feet and a half behind the other, and the forward one three feet from the forward end of the pole, which was four feet and a half behind the upper end of the spring-pole and the bore-hole, and was attached to the top of the pitman. The length of the little-pole varies; a length of sixteen feet is "plenty long," but the part behind the hinder clamp is unnecessary, so that twelve or thirteen feet would do. would do.

behind the hinder clamp is unnecessary, so that twelve or thirteen feet would do. The forward clamp was an iron band three inches and a half wide and five eighths of an inch thick, open at the top, where it extended a couple of inches above the spring-pole, and was tightened by two small bolts with nuts. It was closed below the little-pole, but in Mr. Shoaf's opinion it would bettre be open there too, so that it might be tightened with screws and nuts. The space between the two poles was filled by a block of wood about four inches thick and about eighteen inches long, with two wooden wedges above to tighten it. A couple of iron pins, one before and one behind the iron band, loosely keep the block in place. The hinder clamp is simply two iron bands two inches wide by three eighths thick, fitting the spring-pole above, and united at the top by a small bolt with a nut screwed tight, and tightened in like manner just below the spring-pole. but so as to leave a space of about three inches between them, in which the little-pole rests between two bolts that pass through two out of four pairs of holes in the bands and leave some play for the little-pole. There is a small iron pin passing down through the little-pole just behind the lower of the two bolts, and hidden in the figure by the nearer iron band of the clamp. The little-pole must not be wedged tight there; but a weight may be suspended from the hinder end of the pole, such as a chain, with or without a heavy piece of iron laid in a loop of it, to prevent the pole from jumping too violently; and to keep the chain from sliding off, a wooden pin passes through the little-pole near its end. Sometimes, instead of a clamp of that kind, there is a long iron pin that passes vertically through the spring-pole and is strung with round blocks of wood crise-cross, to keen the two poles apart.

its end. Sometimes, instead of a clamp of that kind, there is a long iron pin that passes vertically through the spring-pole and is strung with round blocks of wood criss-cross, to keep the two poles apart. The forward end of the little-pole is bound with a wide iron band through which passes vertically a bolt with a screw and nut at the top, and with a fork below crossed by a three-quarter inch pin that goes through the head of the pitman. Behind the forward clamp, a loop of small rope hangs from the little-pole, to hold up the lower end of the pit-man with crossed by a screw the screw and nump, with man when off its crank, so as to allow of hoisting the sand-pump with the windlass. The little-pole is carried about from one boring field to another.

the windlass. The little-pole is carried about from one boring field to another. The spring-pole, however, is not carried any great distance, and is cut fresh for each field. Ours happened to be forty-two feet long and about ten inches in diameter at the butt and four at the top; though Mr. Shoaf would prefer one of about fifty feet. But the length of forty-two feet was enough for holes 200 feet deep, and too great for the shallow holes in hand at the moment. The pole was of beech, but ash is a very good material, and so is bickory. At the butt, it was held to the ground by a couple of stakes about four feet long, in notches cut in its side at a foot from the end, and a couple of small loose logs were laid as weights upon the stakes to keep them in position. The spring-pole was set at an angle of about fifteen degrees with the horizon, resting at about twenty-two feet from the butt upon two props of forked logs, at right angles with one another and about at right angles with the pole. The props, called "the forks," then, were just behind the little-pole. They were placed quite behind, because the holes were shallow and the boring-rods therefore light, and greater springiness was needed in the somewhat too heavy spring-pole. The forks were set about half a foot into the ground, and one, or sometimes both, had a stake driven in below, to prevent settling too deep and to aid in the adjustment of the spring-pole so as to bring the upper end of the pole was cut off just above a natural fork, and was so laid as to make a vertical notch, that was enlarged by burning with a hot iron to 1% inches wide and 2% inches deep, so as to let the chain slide easily through, from which hung by a hook at the end the drill-rods with a swivel at the top seven inches high by 5% inches wide and an inch thick. The chain was of one quarter-inch iron in links an inch and a half long, and was about 24 feet long, with a rope about ten feet long at the outer end; and it was wound around the spring-pole in very long

thick. The chain was of one quarter-inch from in firsts in finch and a half long, and was about 24 feet long, with a rope about ten feet long at the outer end; and it was wound around the spring-pole in very long loose coils near the upper end, but in shorter tighter ones farther down. The jerking of the rods gradually tightens the loose coils at the top, and as the hole deepens, the chain is let out more and more; and no temper screw is used screw is used.

10,000 screw is used.
 The rods were in general 13 feet long, but a length of "12 feet is plenty;" and they can be used in pairs, unscrewing only every other one.
 150,000 The sinker-rod, the first one to which the bit is attached, was 14 feet 7 inches long and 15 inches in diameter. Some short pieces of rod are needed; one of three feet and one of six feet would be convenient, and together they would be nine feet, and could," as the hole deepens, be

replaced by one of 12 feet, the full length. The swivel should be attached replaced by one of 12 feet, the full length. The swivel should be attached to a piece about 9 feet long; a short swivel is always making bother by striking its collar against the top of the pipe inside which the rods move, and which rises a foot or so above the surface of the ground. Each rod has a collar about an inch long at half a foot to a foot from the upper end, so that the iron fork or "sow" may catch there and hold the rods while unscrewing. The space from the collar up to the shoulder just below the screw at the end of the rod is one inch square, to receive the unrough. The rod is rod is not contained a strike the rod is one inch square to receive the below the screw at the end of the rod is one inch square, to receive the wrench. The rest of the rod is round except a short square place for the wrench close above the socket at the lower end. The screw at the upper end of the rod is 1§ inches long by one inch in diameter. For screwing or unscrewing, one long heavy wrench is taken in each hand, and caught on the rods near the joint, the left hand above for unwrenching and below for tightening, and then with jerks the hands are brought toward each other. This apparatus answers for holes 300 feet deep; but for a greater depth, so much time is lost in screwing and unscrewing that a rope and jars must be used, though with greater difficulty in recognizing the char-acter of the material bored through. A derrick, then, without the use of the rope and jars, is only necessary

acter of the material bored through. A derrick, then, without the use of the rope and jars, is only necessary for hoisting the rods and pipe and the sand-pump, and for these holes of small diameter is a light movable affair. It is simply three poles 24 feet long (a foot less is "plenty"), four inches and a half in diameter at the butt, and less than two at the top, and stand about 14 feet apart at the butt. Mr. Shoat's poles were of maple, and had served three years. They are bound with iron at the top, and have a hole there an inch and a quarter in diameter at six inches from the end for an iron pin,  $25_{\frac{1}{2}}$ inches long by  $\frac{1}{4}$  inch in diameter, which unites the three poles. From the pin, also hangs the iron pulley of eight inches in diameter and  $14_{\frac{1}{4}}$ the pair, also hangs the iron puncy of eight inches in diameter and  $1_4$ inches wide in the clear for a hempen rope  $1_{\frac{1}{2}}$  inches in diameter. A little below the pin, a ring of rope rests loosely upon the three poles, and the double lengths of rods, sometimes with a swivel at the top, are pushed through the ring when hoisted out of the bore-hole, and so, after unscrewing below, are stood upon the ground ready to be screwed on again and let down. Two men can set up the derrick, us indeed the whole work is attended to by the two. The pole near the engine has a horizontal hole through it parallel with the other two butts, to hold an iron rod, say a wrench-handle, some four feet from the ground, for the two men to raise the pole by.

Sometimes, with a stronger derrick, the boiler is hoisted up to load upon a wagon. It must be loaded on a wagon to go any distance (if it has no wheels of its own); but Mr. Shoaf takes off the hind-wheels of the wagon, and lets the axle down on the ground, and so loads the boiler on; and for short distances, drags the boiler on a stone-boat. His boiler on; and for short distances, drags the boiler on a stone-boat. His boiler is an upright tubular one, and with its engine weighs seventeen hundred-weight without any water. It needs two barrels of water a day. He would prefer a horizontal boiler on wheels. His is called four horse-power, "but is really about three and a half," with a piston four inches in diameter and six inches stroke; yet has bored 208 feet deep without difficulty. It is the pulling up of the rods that needs the power, and that could be arranged for greater depths with a bigger wheel and a little loss of time. Still Mr. Shoaf would prefer a six horse-power engine, the next size larger. Any engine of sufficient power will do, say one for a threshing-machine. The belt-wheel of the engine had a diameter of ten inches, and with a belt 3½ inches wide moved the belt-wheel of the windlass or "jack," 131 inches in diameter, with the jack seven feet from the engine, a measure

inches in diameter, with the jack seven feet from the engine, a measure that is of course unimportant. The belt-wheel of the jack by gearing on the same axle, 18 teeth to 58, moved the axle of the crank of the piton the same axle, 18 teeth to 38, moved the axle of the crank of the pit-man; so that there were about four revolutions of the engine to one stroke of the boring-rods. Sometimes the larger belt-wheel is three feet in diameter, and then cogs are not used. The rods made from 45 strokes (while the boiler pump was working) to 68 strokes a minute, or perhaps more sometimes. The pitman cranks had three holes 2½ inches apart, but the middle one was in use and gave a radius of six inches. The rods, however, had a stroke of about 18 inches. The pitman was 48 inches long and 11 inches in dimetor through the pain part of its length. Whe but the middle one was in use and gave a radius of six inches. The rods, however, had a stroke of about 18 inches. The pitman was 48 inches long and 14 inches in diameter through the main part of its length. The jack was of oak, four inches by four, planed down for the horizontal pieces, and three by four for the uprights, tied together with iron rods five eighths of an inch in diameter; and needs to be very solid. It was three feet across by four feet long and 24 feet high; but "should be only two feet eight inches across, so as to load into a wagon conveniently." It was held firmly to the ground by four forked stakes two feet and a half long and some three inches in diameter, and is braced well apart from the engine by a nearly horizontal bar of wood wedged tightly between the foot of the jack and an upright wooden bar set against the engine frame. The part of the axle of the pitman crank that is within the jack was five inches and a half in diameter, of wood, for the half-inch rope of the sand-pump or the larger rope of the drill-rods. Each axle has also a removable hand-crank of iron. The "tackle rope," for hoisting the drill-rods, is one inch or 14 in diame-ter and about 37 feet long, and has at the end an iron that is called either the "J-hook," from its shape, or the "grab-hook." This is shaped like a letter J viewed from the side, a foot long and four inches wide and an inch square near the upper end, but having the booked part double, a fork 14 inches wide by 24 inches deep. It catches upon the boring-rods below the shoulder; and has a "tag-rope" a quarter of an inch in diameter and some fifteen feet long, to guide it by when high in the air.

the air.

In Northeastern Ohio, where the glacial drift, or "surface," is often very deep (sometimes 33 feet or even more), a gas-pipe, 24 inches inside diameter, is put down to the solid rock before the derrick is set up and diameter, is put down to the solid rock before the derrick is set up and the steam boring begun. To start with, an auger, 33 inches long by four inches in diameter, shaped in the main part (21 inches long and half an inch thick) like a carpenter's auger, but with a straight, steeply inclined cutting edge 34 inches broad, is used. Sometimes also, but rather rarely, when the auger can not any longer be worked, a mud-bit is used 34 inches across the edge, for drilling in the surface before the pipe is put down. The iron rammer used in driving down the pipe is 44 feet long, two inches in diameter, besides a slighter handle about two feet long above a shoulder of 44 inches in diameter and about two inches thick. The blows are given upon a piece of pipe 21 inches long that is screwed upon the top of the rest to save them from getting battered.

The sand-pump was the same as usual with such holes, five feet long

The sand-pump was the same as usual with such holes, five feet long by 14 inches in diameter, with wooden valve-gear and leather valve; and "should be of galvanized iron, so that it can be cut up if it should get fast in the hole." The iron "sinker" above it, "rather too short and light," was 33 inches long altogether, of which 25 inches were an inch in diameter with a "jar" or link at the bottom of a quarter-inch iron, three inches long in the clear, which must be bent so as to bring the sinker into the middle of the hole. The "jars" for such narrow holes had each part 32 inches long, and were of the very best iron (Swedish); but they are used by Mr. Shoaf only for jarring a rod loose after unscrewing and removing as much as possible, and then screwing the jars on above. There was also a "grab," simply a tube for eight inches below with a sharpish edge somewhat flaring, to drive down upon a fallen rod to rescue it. Another grab, that costs \$15, is also flaring, and inside has a left-handed screw-thread cut for grabbing a fallen rod, and even uncrewing it. For the forge, besides a small anvil, there was simply a pair of black-smith's bellows 27 inches wide, fitting with its nozzle snugly into a piece of iron pipe two feet long that reached to the middle of a temporary fire-place made with earth on some small knoll near each bore-hole. "A portable forge for drillers with revolving fan costs \$16 or \$18, and lasts longer than the bellows, and is more convenient." A piece of chain, ten feet or less, of iron an inch in diameter and links then it is fast in the hole. Sometimes even the spring-pole is turned around and used as a lever with the chain fastened to its butt end. When the top of the pipe is only a couple of feet below the surface of the ground, it may sometimes be raised by driving a stake into it, winding a



chain around the stake, and prying up by degrees until the chain can be put around the pipe itself, so as to hoist it with the windlass by hand.

nand. There was a wooden handle for keeping the rods turning while boring, four feet and a half long and two inches in diameter at the ends and about 2½ inches square in the middle, and capable of being clamped to any place on the rod by a nut (with a strong iron wrench of its own, 19 inches long) upon an inch screw that passed through the middle of the handle, and with a hook at the other side pressed the rod against an iron plate (on the wood) nine inches long by 2§ inches wide and one sixteenth of an inch thick of an inch thick.

of an inch thick. There were two iron rod-wrenches,  $2\frac{1}{2}$  feet long, shaped like a letter J,  $1\frac{1}{2}$  inches wide around the jaws, and an inch thick ; a slighter, small wrench, about a foot long, of three-quarter inch round iron, for use when rods had already been loosened ; an iron fork or "sow," with a handle a foot long and seven eighths of an inch in diameter, and the fork at avery obtuse angle with it seven inches deep and flaring at the outer end, "rather answering"

obtuse angle with it seven inches deep and flaring at the outer end, "rather answering." Besides the tools already mentioned, there were a shovel, a crow-bar, an ax, an auger ( $1\frac{1}{6}$  inches), a hammer and a coarse file for the forge, a gauge of iron plate for the bits ( $2\frac{6}{6}$  inches, and, when the hole has become deep,  $2\frac{1}{4}$  inches), a cold-chisel mounted as a hammer, a pair of pincers (jaws 2 inches by  $\frac{1}{4}$  inch), about three wrenches for the various muts, a monkey-wrench, an oil-feeder, an oil-jug, a wooden bucket, two headless oil barrels for water, a six-foot length of  $1\frac{1}{4}$ -inch rubber hose with perforated tin end about three inches long, for pumping water from the barrel into the boiler, a stone-boat for hauling water, etc., a tool-box ( $3\frac{1}{2}$  by 1 by 1 foot) for the smaller articles, with a till, and "there ought to be a sledge:" also, "the water-barrel ought to have a pipe to warm the water in winter." Mr. Shoaf's whole plant cost about \$400, of which the engine cost

Mr. Shoaf's whole plant cost about \$400, of which the engine cost \$265, the jack \$55, the forge bellows \$6.50, the belt \$4. A set of joints (socket and screw, with about six inches of rod adjoining) cost from 1882 to 1884, \$2.50, but used to cost \$4. Wells are bored ("drilled") with steam by contract in Northeastern Ohio for 40 or 45 cents a foot for the first hundred feet, and 20 or 30 cents a foot more for the next hundred, or even an advance of ten cents a foot for every ten feet beyond the first hundred. Mr. Shoaf and his partner have bored as much as 100 feet in two days and a half, and 47 feet in a single day ; but that is very exceptional, and sometimes the rock is extremely hard. NORTHAMPTON, MASS., Dec. 3, 1885.

Beton Shaft Lining .- At a deep sinking at Osterwald, sandstone rings put together in two segments have been used instead of cast-iron cribs. Two thicknesses of rings are laid, the upper one having a small overhang inside. This gives room for an internal wooden ring by which the lower ring is provisionally strengthened. When the next length of walling below is finished, the wooden ring is removed, and the length of waining below is mnished, the wooden ring is removed, and the hollow space is filled up with a ring cast in cement. The joints of the crib are wedged with wood. The walling is built with sandstone, and the space behind is filled with concrete. A cast-iron tube with a valve opening upward is fixed in the concrete behind the crib, to allow water collecting behind it to pass upward and so relieve the pressure. These cribs are considerably cheaper than those of cast-iron.

### OSWALD J. HEINBICH.\*

The name of Oswald J. Heinrich first appears among the members of the Institute in the first volume of its *Transactions*, which records that he was elected at the Boston meeting, in February, 1873. That name has stood ever since upon our catalogue of active members. It has appeared frequently in the reports of our debates. It has been attached to many interesting and important professional papers. Henceforward it must hold a place, silent but significant, in the pathetic, lengthening list of our departed. From a present power, it is suddenly transmuted into a sacred memory. To how many of us this change brings a keen personal sense of loss, I need not say. All the older members of our body will certainly both mourn and miss him, whose joyous presence was the very incarnation of that good fellowship which has inspired our history, while his store of practical experience and wisdom, reinforced by wide and deep scientific study, and placed freely at the service of his brethren, illustrated no less the other and more serious purpose of our existence as a society. Mr. Heinrich was born in Saxony, April 22d, 1827, and was, therefore, at the time of his death, which occurred at Drifton, Pa., February 4th, the Institute in the first volume of its Transactions, which records that

Mr. Heinrich was born in Saxony, April 23d, 1527, and was, therefore, at the time of his death, which occurred at Drifton, Pa., February 4th, 1886, nearly fifty-nice years old. This long period he had so filled with varied activity that, reflecting upon his career, one might well have been led to think him older, while the elasticity and perennial youth of his spirit, and the hale vigor of his body, would have induced the contrary belief.

belief. His father was the secretary of the late King Johann, of Saxony; and the son received the advantage of an excellent education, first at an academy in Dresden, and subsequently at the famous Royal School of Mines at Freiberg, then at the hight of its glory. The elder Weisbach was pursuing with enthusiasm that twofold career of instruction and original investigation which redounded so greatly to his own credit and the credit of the institution : and other great men, each in his own sphere. original investigation which redounded so greatly to his own credit and the credit of the institution; and other great men, each in his own sphere, were worthily doing their part to create the modern arts of mining and metallurgy. I mention Weisbach alone in this connection, because young Heinrich was his favorite pupil. Those of us who recall the brilliant and genial professor in his later years can imagine what must have been the joy of companionship with him in his prime. Teacher and pupil had much in common, and it is not surprising that they became intimate became intimate.

Heinrich was twenty-one years old when the wave of political revolu-tion swept over Germany. Like all the high-spirited young men of his time, he was caught by it—a not unwilling swimmer. Side by side with his friend and fellow-student Zeuner, afterward an Oberbergrath and director of the Freiberg school, he fought on the barricades. The disasdirector of the Freiberg school, he fought on the barricades. The disas-trous result of that movement is matter of history. Indirectly it was a great benefit to this country, though it seemed but a calamity to the Fatherland. It brought to our shores a host of refugees, the most noble and ambitious spirits of Germany, who came as exiles for Liberty's sake, and bestowed upon their adopted country a rich treasure of art, science, and enthusiasm. This was the best contribution the old world had ever made to the new since the landing of the Pilgrims. Among these later pilgrims was Heinrich, who came in 1850, and after getting married, proceeded at once to Tennessee. There he faced with a stout heart and ready hands the difficulties of his new situation. He was not ashamed to work : and as bricklayer, painter, cabinet-maker, etc., he earned his ready hands the difficulties of his new situation. He was not ashamed to work; and as bricklayer, painter, cabinet-maker, etc., he earned his living in Tennessee. Afterward he moved to Raleigh, N. C., and again to Augusta, Ga., where he practiced as an architect. In 1854, he opened an office in Richmond, Va., as architect and mining engineer. To these professions he added the work instruction at the Richmond Mechanics' Institute and in private classes, in drawing, water-color painting, and mathematics

Institute and in private classes, in drawing, water-color painting, and mathematics. At the outbreak of the rebellion, a commission in the confederate army was offered to him; but this he refused, not desiring to take up arms against the Union. But he could not get away from the South, where all that he had in the world was involved; and perhaps it is fair to infer that the prospect of a second exile for political reasons was not as attractive to him in mid-life as a similar outlook had been in youth. At all events, he accepted a technical position in the service of the confede-rate government, which secured to him the privileges of a non-com-batant. He took charge of important mining and manufacturing operations, including the making of gunpowder, and was also employed in the construction of fortifications for the defense of Richmond. In the last year of the war he was superintendent of the confederate iron mines at Buckhannon, West Va. The collapse of the Southern cause left him at that place, entirely destitute. But he still possessed at Richmond a large and valuable geological collection, the accumulation of many years, illustrating the mineral resources of the Southern States. This was noted as the finest collection of the kind, had received several prizes, and was regarded with peculiar pride and affection by its collector was noted as the finest collection of the kind, had received several prizes, and was regarded with peculiar pride and affection by its collector and owner. Leaving his family at Buckhannon, and taking a few copper coins, the store of his children's "savings-banks," he made the long journey to Richmond on horseback, arriving at last to find that his great collection had been destroyed in the burning of part of the city attend-ing its evacuation by the confederate government and its occupation by ing its evacuation by the confederate government and its occupation by

ing its evacuation by the confederate government and its occupation by the federal troops. Undismayed by this culminating disaster, he reopened his office as architect and engineer in the half-ruined capital, and began life anew. It was about this time that I first met him, making his acquaintance through the late Dr. Justus Adelberg, a man of the same class as Heinrich, and, like him, a refugee of the days of '49. Drawn together by our common love for our Saxon *alma mater*, Freiberg, Mr. Heinrich and I speedily cemented a friendship which was to me a source of pleasure and of instruction for twenty years. In him I found the first of many of our profession who saw the new, the only opportunity for the South in the development of its industry, which would at once repair the waste and assuage the bitter memories of war. With an undying zeal, to the end of his life, he urged this course, and contributed in every possible way to its advancement. In the autumn of 1865, he went back to Buckhannon to bring his family; and here he encountered the hardest blow of all, arriving in

\* Read before the American Institute of Mining Engineers, at Pittsburg, February 16th, 1886, by R. W. Raymond, New York City.

time to witness, September 30th, the death of his wife, who had been the beloved companion of so many years of adventure and vicissitude. He was a warm lover of wife and children and home. More than once, during the days of war, he had run the gauntlet between the fires of the two armies, swimming swollen rivers, threading mountain passes, and following secret trails, only to snatch a few hours with that dear circle. Now he made a more peaceful but more lonesome journey, descending the larges fiver to Richmond in a camplebeat and hearing with him the body Now he made a more peaceful but more lonesome journey, descending the James River to Richmond in a canal-boat, and bearing with him the body of his wife. The Richmond Gesanguerein, of which he was for many years the president, sang over her grave her favorite songs; and the chapter of happiness and hardship in his life was closed. How little seemed the hardship and how great the happiness, those who have heard him talk of those early days can testify. In after years, he married again, and his affectionate disposition was happily mated, and his home was happy, though the children had grown and gone, and the morning romance was over

romance was over. In 1868, Mr. Heinrich became superintendent of the Wythe lead mines

In 1868, Mr. Heinrich became superintendent of the Wythe lead mines at Austenville, West Va., where he remained long enough to repair the effects of bad management and to make important new discoveries of ore. In carrying out this work, he exposed his life with characteristic recklessness, since the necessary careful survey of the dilapidated under-ground workings obliged him to labor in ground already caving. In 1869, he took charge of the Midlothian colliery. It was while he occupied this position that he became a member of the Institute; and our *Transactions* show the extraordinary difficulty of his work and the extraordinary ingenuity and courage with which he conducted it. His paper on the Midlothian colliery in Vol. I. presents a thrilling picture of the hand-to-hand fight with danger and death in which he was for years engaged. I well remember the impression produced by his graphic

the hand-to-hand fight with danger and death in which he was for years engaged. I well remember the impression produced by his graphic description of this prolonged encounter—so free from boastfulness, yet so full of the joy of battle and of victory. In 1875, he resigned his position at Midlothian, and went to Goderich, Canada, to take charge of the operations there in deep boring for salt. Already in Virginia, he had made extensive and careful use of the dia-mond drill; and his papers on that subject continue to this day the best course of accourte information for the engineer. In the following year Already in Virginia, he had made extensive and careful use of the dia-mond drill; and his papers on that subject continue to this day the best source of accurate information for the engineer. In the following year, he visited Europe to inspect salt-works and study cognate questions. While there, he received from his old friend Gerstenhöfer the agency for certain inventions connected with the ammonia process for the manufac-ture of soda; and after his return, he labored hard to secure the introduction of that process in the United States. While he did not per-sonally succeed in starting any enterprise of the kind, it has been done with signal ability by Mr. W. B. Cogswell, another of our members; and the views and arguments of Heinrich have been fully corroborated by the results of the experiment. On this subject also, he has left in our *Transactions* the evidence of his lively interest in technical progress. In 1878, he accepted the directorship of the Industrial School for Miners and Mechanics, established at Drifton, Pa., by Mr. Eckley B. Coxe. Mr. Coxe was also a Freiberg graduate, and had been in his day, as Heinrich had been before him, a favorite pupil of Weisbach. He could scarcely have found a better man to carry out his views than Heinrich; and cer-tainly the veteran engineer could not have found for his old age a pleasanter harbor—I will not say of rest, for rest was impossible to him ; but of peace and freedom. Here he remained to the end ; and of his work here he gave, as was his praiseworthy custom, a record to us, in his paper on the Drifton School. His interest in the development of the South, particularly of Virginia, continued unabated. That State he knew thoroughly—" every cow-path in it." he used to say: the geological map of the State which he con-

His interest in the development of the South, particularly of Virginia, continued unabated. That State he knew thoroughly—" every cow-path in it," he used to say ; the geological map of the State which he constructed was the best in existence ; and his comprehensive knowledge of its resources is shown in his paper on the Mesozoic Formation in Virginia, in Vol. VI. of our *Transactions*. It was not given to Mr. Heinrich to achieve wealth, or to link his name with any one great work of engineering. Indeed, the mining engineer's task is not essentially constructive. The problems he solves, the difficulties he overcomes, the results he produces are in their immediate nature transitory. His highest achievement is the economical destruction of the cruder form of matter that it may be sent forth in a higher form, to be lost in use. His "production" is for "consumption." Yet, if there be a structure of human society, rising like a noble edifice, to which every advance in the comfort, intelligence, and industry of the mother of arts, and the inseparable sister of civilization, is indeed a builder and not merely a destroyer. In this noble work, our departed brother wrought bravely, skillfully, zealously; and it is with an honest pride as well as with a deep and true sorrow that we speak above his bier the last *Glück auf* ? the last Glück auf!

#### BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of bookbuyers, give the retail price?]

- In senang works for inter, with parameter, for the order that for the order to the buyers, give the retail price i]
  Architectural Studies. Part III. Thirteen Designs for Stables. Edited by F. A. Wright, Architect. New York: William T. Comstock, 6 Astor Place. 1886. Size of Plates, 11 by 8 inches, 2 pages of letter-press. \$1, sent by mail free of postage to any part of the world.
  Elementary Graphic Statics and the Construction of Trussed Roofs. A Manual of Theory and Practice. By N. Clifford Ricker, M. Arch., Professor of Architecture, University of Illinois; Fellow of the American Institute of Architects, and of the Western Association of Architects. New York: William T. Comstock, 6 Astor Place. 1885. Svo, pages 158 (including Index), 115 cuts, and folding Table. \$2.
  Gold Mines and Mining in California. A New Gold Era Dawning on the State. Progress and Improvements Made in the Business. Perfected Methods, Processes, and Machinery. Vast Extent of Auriferous Territory; Rich and Varied Character of Deposits; a Country Abounding with the Elements of Success ; Grand Field for the Profitable Investment of the World's Surplus Capital. San Francisco : George Spaulding & Co. 1885. Svo, pages 349. (No Table of Contents, no Index., Pages 145-56 in duplicate; 171-72; followed by 171-72). \$1.50.
  The Practice of the Improvement of the Non-Tidal Rivers of the United States, with an Examination of the Results thereof. By Capt. E. H. Ruffner, Corps of Engineers, U.S.A. New York : John Wiley & Sons. 1886. Svo, pages 196 (including Index). \$1.25.

### MODERN AMERICAN METHODS OF COPPER SMELTING \*

By Edward D. Peters, Jr., M.E., M.D.

CHAPTER XII.

ORE SMELTING FOR COARSE METAL.

After the removal of the pigs of matte from the molds by the furnace-helper, assisted by a second man, the sand should be raked over with an iron rake, and all coarse pieces returned to the next charge. The fragments of slag from the slag-bed may be thrown over the dump, but the plate slag should be resmelted entire, and every pig of slag, when cool, should be carefully examined for prills. It is more advantageous to charge a furnace by the side door than by means of a honver above the reover largening and distribution

this more advantageous to charge a turnace by the side door than by means of a hopper above the roof, as the proper leveling and distribution of the heavy charges now used are almost impracticable by means of the rabble, while, when charged with a shovel, every pound of ore can be thrown just where it is needed. In order that no time be wasted, the helpers from other furnaces assist in charging, at least four men being required. The work is exceedingly hot and laborious, as the entire pro-merculable dependence in from the fifteen minutes to prove depute of s should be completed in from ten to fifteen minutes, to avoid waste of time and fuel.

The tapping of the metal should occur as seldom as possible, as the influence of the molten matte upon the fresh charge is very favorable, and prevents that per-istent adherence to the bottom that is one of the chief causes of delay

In case a charge should adhere in this manner, it is usually better to In case a charge should adhere in this manner, it is usually better to skim it as soon as a few hundredweight of clean slag can be obtained. If the direct contact of the flame for half an hour or more still fails to raise the old charge entirely, the work should not be unreasonably delayed, but the fresh charge should be distributed in such a manner as to leave bare those portions that adhere most closely, and which will usually be loosened by this double period of firing. Those portions of the hearth subject to the most excessive heat and wear, such as the bridge and side walls, should be thickly covered with ore, even to the extent, if necessary, of heaping three fourths of the charge upon a comparatively limited area, if such practice be found con-ducive to the quickest fusion and greatest capacity.

charge upon a comparatively limited area, if such practice be found con-ducive to the quickest fusion and greatest capacity. In charging a mixture composed of various ingredients, the succession in which they are thrown upon the hear h is by no means a matter of indifference. With a mixture of calcined pyrites (or matte), raw quartzose ore, and rich slag (a very common charge), the calcined ore should be thrown upon the hearth, which it protects by its want of con-ductivity ; the quartzose ore should come next, while the very fusible slag should surmount the whole. In this way, want of conductivity of the calcined ore is prevented from delaying the fusion, as it would if it covered any of the other substances, and is made positively useful in pro-tecting the hearth. tecting the hearth.

The size to which ore should be crushed for reverberatory smelting depends upon its fusibility; very quartzose ore being benefited by pass-ing a 4-mesh screen, while basic or sulphide ores may be of almost any sonable size.

reasonable size. Very fine crushing should be avoided, both on account of excessive formation of flue-dustas well as of its quality of becoming so compact as to resist the highest temperatures.

After fusing any calcined ferruginous material for several days, the hearth will be found covered with slimy masses of reduced iron, which, to a certain extent, may be beneficial as a protection to the bottom, but when beyond a certain limit, must be removed by persistent firing, assisted when necessary by a small charge of raw sulphurets, which will rapidly float up and dissolve the accretions. Several thousand pounds of metal are often obtained in this manner from an apparently empty furnace.

furnace. Every metallurgist should be capable of personally judging of the con-dition of his furnace bottom, as the shrewd smelter may gain great credit for speedy smelting by skinming his charges before they are really com-pleted, while the honest furnace-man who waits until his hearth is clear before throwing the new charge may receive undeserved blame. The amount of detail connected with the management of a reverbera-tory smelting-furnace is almost endless, and while it may be an easier under the charge of inexperienced men, it is an infinitely greater attain-ment to be a thoroughly skillful reverberatory furnace smelter than to have equal facility in the management of the blast-furnace.

#### SMELTING FOR WHITE METAL.

As the production of the higher grades of matte, of which white metal (from 70 to 75 per cent) may be regarded as the type, by means of the fusion of calcined coarse metal with quartzose ores, presents no sufficient dif-ferences from ore smelting to demand especial notice in this very brief treatment of the subject, the older process of concentrating metal with-out the intervening calcination need be alone considered under this head hea

This process is termed "roasting" by the English smelter, and denotes the gradual fusion of the course metal in large pigs, on the hearth of a reverberatory furnace, with the abundant admission of air.

reverberatory furnace, with the abundant admission of air. It is seldom practiced in the United States on account of its extreme slowness and consequent great consumption of fuel and labor, but pos-sesses the advantage of great simplicity of plant. dispensing as it does with the entire crushing and calcining paraphernalia. Despite the simplicity of the process, much experience is required to obtain the best results, as the exact degree of temperature at the differing stages of richness of the product has much to do with the rapidity of the concentration

concentration.

Concentration, Experience has taught that the rapidity of this concentration stands in exact proportion to the richness of the matte operated upon. The explanation of this is, that the sulphur, which is almost the sole foreign constituent of the richest mattes, is very easy of oxidation, while the iron, which increases with the decrease of copper, oxidizes with much expected difficulty. greater difficulty.

The writer has given much attention to this subject in connection with futile efforts to effect what M. Manhès has now accomplished with his

Bessemerizing process. The following table gives the result of his experiments, which extend over several years, many of them having been conducted for the Orford Copper and Sulphur Company while in its employ.

Great pains was taken in all instances to insure the correct sampling It will be understood that the matter was charged in the sbape of large and ass

pigs; melted down during the time indicated (in most instances about five hours), and retained in a molten condition (in both stages with the free admission of  $\sin$ ) for varying periods, samples being taken from time to time—after thorough stirring—to determine the progress of the concentration.

TABLE OF MATTE CONCENTRATION BY OXIDIZING FUSION- PERCENTAGES OF COPPER IN FRACTIONS OMITTED.

tte charged.	hen fully nelted. 5 brs.	beurs.	nours.	ours	hou s.	hours.	hours.	hours.	hours.	hours	hours.	heurs.	hours.	hours.	hours.	hours	hours.	hours.	hours.
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-											-								
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92	96	90	98	99															
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#### THE MAKING OF BLISTER COPPER.

This very beautiful and economical operation is entirely of English origin, and though virtually belonging under the head of "Matte Con-centration," presents so many important peculiarities as to demand separate notice.

rate notice. The furnace used for this purpose, while an ordinary reverberatory, as regards size and shape, should be very strongly ironed, to withstand the large charges used in our modern practice, while its bottom should be smelted in with peculiar care, and should be thoroughly saturated before use with metal of the same grade as blister copper (from 96 to 98 per cent), to prevent the certain annoyance from the rising of bits of the peorer matte just at the completion of the process, and the consequent adultera-tion of the whole charge of blister, which will require still further oxida-tion to remove the impurities. The metal is charged in large pigs, the total weight depending princi-

tion to remove the impurities. The metal is charged in large pigs, the total weight depending princi-cipally upon its grade : for as a full bed of blister copper (from 6 to 10 tons) is usually desired as most economical, it is evident that a much greater weight of blue metal (62 per cent) will be required than of white metal (75 per cent); while pimple metal (83 per cent) and regule (88 per cent) will lose still less in the process. The technical names just enumerated apply to various grades of matte, each of which has certain invariable characteristics, which distinguish it with certainty. The percentages given therewith are not about the but

it with certainty. The percentages given therewith are not absolute, but are subject to considerable variation, the writer giving such average figures as his own experience has determined for him.

As both economy and a due regard for the furnace bottom prevent the blister charges from covering too long periods of time, it is necessary to shorten the same by using either a less weight of matte, or insisting upon a higher grade at the outset The latter is the proper choice, as a small charge is almost certain to injure the furnace bottom by leaving a portion of it exposed to the direct

heat of the flame.

The most advantageous length for the working-off of a blister charge must depend largely upon local circumstances. From twenty-four to thirty-six hours will finish a full charge (eight tons) of rich pimple metal (TO BE CONTINUED.)

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

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

File Yorkowicki, Sa Mason (1998) For the parameter of the paramet

to himself, George H. Nichols, and William H. Fichions, an of place.
335,820. Boiler-Fue Cleaner. John L. Kelley, Erle, Pa.
335,840. Drip-fup and Self-Oling Attachment for Bearings. Antonio C. Pessano, Philad-Iphia, Pa. Assignor to George V. Cresson, same place.
335,879. Apparatus for Converting Steel Tires into Bars or Billets. Clifton B. Beach, Cleveland, Ohi.
355,900. Rock Drill. J. mes E. Denton, Hoboken, New Jersey.
335,901. Foot for Rock-Drills. James E. Denton, Hoboken, New Jersey.
335,905. Apparatus for Forming Sheet Metal by Electro-Deposition. Moses G. Farmer, New York City.
335,935. Soaking-Pit for Steel Ingots. John Gjers, Middlesborough-on-Tees, England.
335,935. Method of Reducing Old Steel Railroad Rails to Steel Plates. Bernard Lauth, Howard, Pa.
335,936. Electrical Igniter for Gas-Engles. Jacob C. Niswell, Medford, Mass., Assignor to the Wiswell Electric Mining Machinery Company, Portland, Me.

<sup>\*</sup> Copy-right 1885, by the Scientific Publishing Company.

### FURNACE, MILL AND FACTORY.

The Wiswell Electric Mining Machinery Company. of Boston, Mass., has been so successful in the sale of its mills, which are now in operation in all the mining camps of this country, that the question of having the machinery also manufactured in San Francisco and Denver is under consideration. The company has a number of orders on hand, and is negotiating for others

The National Tube-Works Company at McKeesport, Pa., has awarded the contract for an addition to the works that will almost double the capacity. This improvement has been necessitated by the considerably increasing business, particularly a demand for large The mill has six lap-welding furnaces, and four pipe. more will be added. It is understood that the force will be greatly increased upon the completion of the addition.

It is reported that the North Chicago Rolling-Mill Company, South Chicago, Ill., is engaged in making 10,000 tons of steel rails, to be laid side by side with English hammered rails as a test of superiority.

The interest of John W. Mumper, in the Barre Forge and Furnace property, in Huntingdon County, Pa., was sold on the 12th inst., at sheriff's sale, and was bought by Mrs. Mary A. Mumper, who is a judgment creditor, for \$32,000. The property embraces more than 17,000 acres, on which are the iron-works and ore mines and all the buildings and machinery necessary for operating them. As mentioned in the ENGI-NEERING AND MINING JOURNAL of January 23d, it was bought in 1874 for \$170,000, and a large sum of money has since been expended on it in improvements.

The new furnace of the Millerton Iron Company at Irondale, Dutchess County, New York, has started up successfully.

The machine-shop and foundry business carried on by Messrs. Samuel L. Moore & Son at Elizabeth and Centreville, New Jersey, will hereafter be carried on by the Samuel L. Moore & Son's Company. The new organization will settle all the accounts of the former firm, and will continue the business in the same satisfactory manner.

The Vesta Furnace (anthracite) at Watts station, Pa., which has been out of blast for years, has been leased by J. A. Denny, of Harrisburg, and will be put in blast at once.

The nail-works at Crescent, Pa., operated by the Standard Nail Company of Philadelphia, were burned on the 17th inst. Loss \$40,000.

After an idleness of some six months, the Calumet Iron and Steel Company has just opened its Siemens-Martin open-hearth steel plant at Cummings, Ill., with a capacity of 60 tons a day, the product of which is steel castings of all kinds, merchant bar steel, and steel slabs for nails. Two of these furnaces are now in operation. The other two will go into operation as soon as the business demands it. The company has lately put in position in the steel mill a new set of blooming rolls and a powerful steam shears for rolling and cutting steel slabs. The mill for the manufacture of merchant bar iron, which went out of operation June 1st, 1885, on account of labor troubles, is expected to resume soon. It has now about 50 machines in operation in the nail factory, and is increasing the number daily.

The Tubal Cain Steam Forge and Manufacturing Company, Chicago, Ill., has been organized for the purpose of general manufacturing in the iron business ; capital stock, \$150,000 ; incorporators, Frederick J. Smith, John Mowat, John Bonner and J. W. Acker-

A force of men began filling the Glendon Iron Company's No. 1 furnace at Easton, Pa., on the 15th inst., and it is expected that it will be ready for blast on Monday next.

It is reported that a compromise was effected on the 13th inst. between Washburn & Moen, owners of the Baltom patents on barbed wire machines and barbed wire, and the American Barb Wire Company of St. Louis, Mo. It is said that the American Barb Wire Company has bought out all but the small unlicensed barbed wire manufacturing companies at St. Louis, and for the purpose of protecting consumers and to bring to a close the many suits now pending in the United States courts for infringements has effected a settlement and taken out a license.

The Swatara Furnace Company, of Harrisburg, Pa. has received a charter ; capital, \$26,000.

H. K. Porter & Co., of Pittsburg, have a number of

orders for logging locomotives. Among them is one small engine for the Troy Steel and Iron Company : one for Mississippi ; some engines for hauling larries on top of coke-ovens; one larger engine for the Soldiers' Home Railroad at Dayton, Ohio ; a third for a passenger road in Chicago ; one for a brick-yard on the Hudson ; and one for Canada.

### LABOR AND WAGES.

A strike occurred at the mines of the Cumberland Railroad and Coal Company at Spring Hill, Nova Scotia. It is reported that the trouble arose with the cutters working in the north slope complaining about the unsafe condition of the working places and demanding higher pay therefor. The demand not being promptly conceded, these men struck, and were supported by the whole of the employés. The difficulties were settled by arbitration on the 15th inst. The men's own committee examined the places in dispute and decided in the company's favor, and work was then resumed.

The Crane Iron Company, of Catasauqua, Pa., has conceded the ten per cent for which its employés struck last week, and work has been resumed.

It is stated that the Knights of Labor have compelled the Mount Waldo Granite Company, Bangor, Maine, to raise wages.

The nailers employed in the lower factory by the Weymouth Iron Company, East Weymouth, Mass., went to work on the 17th inst. The 10 per cent reduction went into effect on the 15th inst. The question of wages has not yet been adjusted, but is in the hands of the Knights of Labor for settlement.

The coal miners of Sangamon, Logan, Macon, and Menard counties will hold a meeting at Springfield, Ill., on February 20th, to consider the best method of purchasing miners' supplies. They have been buying mostly of mine owners, but think the prices too high.

The wages of the men at the Coleraine Iron-Works. at Redington, Pa., have been advanced 10 per cent. This company has two furnaces in blast.

The miners at Loomis & Snively's mine, No. 4, Bevier, Mo., struck on the 16th inst., against a reduction of 2 cents a ton in the price of mining coal.

The strike in the coke regions of Pennsylvania con tinues. Seventy-three delegates constituted the strikers' convention at Scottdale on the 18th inst. Colonel Schoonmaker and several other operators were present. Colonel Schoonmaker promised the men that, if they would return to work at once and a new syndicate was formed for another year, the price of coke would be advanced and the wages increased on April 1st; but the Hungarians and Poles obstinately demanded all or nothing, and it was decided to continue the strike indefinitely. It is stated that Laughlin & Co., owners of two coke-works near Bradford, in the Connellsville region, have granted the ten per cen advance demanded by the men.

The men at the Blandon Rolling-Mill, Blandon, Pa. struck, owing to an objectionable order of the superintendent forbidding the use of water and scales in puddling. A number of the strikers have been paid off, and arrangements are making to secure other men to take their places, with the view of starting the mill next Monday.

It is stated that a compromise has been effected between the strikers at the Mingo (Ohio) Nail-Works and the proprietors of the concern which is satisfactory to both parties.

#### TRANSPORTATION NOTES.

The Chicago & Northwestern Railroad will open up the Lost River mining country in Idaho. The route so far is marked out from Fort Fetterman to cross Snake River at Eagle Rock ; thence probably it will pass uear Mud Lake, to some point on Birch Creek ; thence to pass near the sinks of Little and Big Lost River : thence to cross Big Lost River in the neighborhood of Arco, and follow, as nearly as feasible, the old Blackfoot road, by way of Champagne, Martin, Vance's, Fish Creek, Little Wood River ; and pass somewhere on Lower Wood River Valley to Camas Prairie, and thence on toward the coast.

### COAL TRADE NOTES.

ALABAMA. The Pratt Coal and iron Company, near Birmingham, intends to put up 300 more coke-ovens this summer

At a meeting of the owners of land in the Warrior

coal-field, held at Birmingham, to which we referred last week, a committee was appointed to ascertain the wishes of all the owners regarding the manner of consolidation, and to report at a meeting to be held there March 11th.

It is reported that negotiations are pending for the formation of a syndicate that will buy up coal lands along the line of the Louisville & Nashville Railroad. PENNSYLVANIA.

#### ANTHRACITE.

Operators in the Shamokin District are making improvements that will increase the number of employés and the shipping capacity of the collieries. At the Henry Clay Colliery, the breaker has been tern down, and work is progressing 1apidly on the new structure, which will contain the most improved machinery. Railroads are constructing from this breaker to the Big Mountain and Peerless collieries, and all coal mined at these places will be prepared for market at the Henry Clay. At the Sterling Colliery, a new slope is to be sunk and additional pumps in position to guard against spring floods. At Burnside, a tunnel is to be driven to new veins at Bellmore. The operators are about to strike the Mammoth vein. A new seam has just been reached at the Monitor Colliery. The water will be pumped from the old Coal Ridge Colliery, and one of the thickest veins in the region will thus be again worked. This mine was submerged ten years ago. At Ashland, the work of putting North Ashland Colliery in shape for resumption is going on rapidly. An application has been filed for a charter for th Bernice Coal Company of Philadelphia, with \$250,000 capital.

#### BITUMINOUS.

The Barclay Coal Company reports its income from rent of railroad and royalty on coal for the month of January, \$6326.

### TEXAS.

The Denison Co-operative Mining and Manufacturing Company has sunk a new shaft, and the prospects for a large supply of coal are encouraging.

# GAS AND OIL NOTES.

Exports of refined, crude, and naphtha from the following ports, from January 1st to February 13th :

rom Boston Philadelphia Baltimore	1886. Gallons. 358,452 12,943,752 1,484,679	1885. Gallons. 782,652 8,494,466 798,792
New York	45,720,397	41,465,384
Total exports	60,507,280	51,541,294

DAKOTA.

At the annual meeting of the Black Hills Oil Company, it was decided to vigorously prosecute work and develop the property of the company.

#### INDIA. BURMAH.

Among the mineral resources of this newly acquired British territory is petroleum. It has been known to commerce as Rangoo oil, receiving its name from the port of shipment The wells, however, are situated at Yenan-Gyoung, latitude 20° 18', and longitude 95°, and at Payan, in Upper Burmah. They occur over considerable area, are very numerous, and appear  $t_0$ have been worked 2000 years. The wells are of a rude character, 4 feet 6 inches square, and from 250to 350 feet deep. According to Bradstreet's, the late estimates of their production are from 10,000 to 12,000 tons. Owing to excessive royalties and ignorance as to the process of refining, this oil has been un. able to compete with American oil. The import from Upper Burmah into British Burmah, however, in 1880, was valued at \$300,000. It appears that, with approved American machinery and the American system, there is a great future before this industry.

### NEW YORK.

According to press dispatches, the civil suit for conspiracy brought by the Buffalo Lubricating Oil Company, Buffalo, against the Standard, the appeal of the Standard against the General Term decision has been dismissed with costs. Judge Haight, at Buffalo, ordered that the Lubricating Company have an execution drawn in its behalf. The case has been hotly contested. The Lubricating Company asked \$50,000 damages, and the trial jury gave them \$20,000.

### PENNSYLVANIA.

A charter has been granted to the Mahoning Natural

Gas Company, of Lawrence County ; capital stock, \$250,000.

The Supreme Court decided, on the 15th inst., the case of the City of Pittsburg, appellant, vs. the People's Natural Gas Company. The judgment of the lower court, granting a preliminary injunction against the city, to restrain it from interfering with the United Gas Company now laying its pipes, was affirmed in a short per curiam opinion.

The company that has been formed at Pittsburg for the purpose of adopting natural gas for illuminating purposes, to which we referred in our issue of last week, has made a contract with Mr. Harley, who has a process by which natural gas can be turned into an illuminant with from 25 to 30 candle-power to an ordinary gas-jet. He is to put up the test apparatus, and if he proves that his process is as good as he says it is, then the contract made with him is good. If, however, it is a failure, the contract is void.

Operations have been resumed at the test gas well at Snyder station, near Blairsville, after being idle a considerable length of time. A party of local capitalists formed a syndicate with a capital of \$2000 to test the question as to whether there is oil beneath the gas, or gas in sufficient quantity for piping purposes. The well when abandoned had been put down several hundred feet. It will be put down 1700 feet now if necessary.

#### WISCONSIN.

A company has been organized, with a capital of \$50,000, by parties in Grant County, to prospect for oil at Annaton. A similar enterprise was started some twenty years ago, and \$30,000 were spent in the purchase of lands, but no prospecting was ever done.

## GENERAL MINING NEWS.

### ARIZONA.

YAVAPAI COUNTY.

TIP TOP. A Chicago company has bought the Tip Top mill at Gillett, and will remove it to the town of Tip Top, and put it up on the creek below the dump of It has bought the low-grade ores remainthe mine. ing on the dumps, and will proceed to work them.

## CALIFORNIA

INYO COUNTY MODOC CONSOLIDATED. - The superintendent reports. under date of the 2d inst., that the ore-body in Lookout is still opening up. From foot to hanging, there are four and a half feet of clean ore. Daily output, five tons. They are compelled to work six-hour shifts on account of bad air, heat and dust. The usual amount of high-grade ore is extracted from No. 3 Consolidated and South Lookout. They will start the furnace as soon as sufficient material is on hand. SIERRA COUNTY.

YOUNG AMERICA.-During January, \$14,000 were produced. Owing to the heavy fall of snow at the mine, considerable delay occurred in the delivery of ore to the mill, which accounts for the falling off from the amount realized in December.

### CENTRAL AMERICA.

HONDURAS. A company has been organized in Pennsylvania to work the Platero mine in the Yuscaran Mineral Dis-

#### trict.

#### COLORADO. CLEAR CREEK COUNTY.

During January, forty-three cars, containing 584 tons and 250 pounds of ore, were shipped from the Georgetown depot, valued at \$75,000.

#### GILPIN COUNTY.

BUFFALO.-This company has completed sinking 100 feet in the main shaft on the Freiberg mine since the erection of a new and commodious shaft-house and the placing of a new plant of machinery. The shaft is down 400 feet, plats have been cut, and levels east and west have been commenced.

### LAKE COUNTY

The Leadville Herald-Democrat reports the following:

AMIE .- The lessee who is working through the Amie No. 2 shaft is obtaining some fine iron ore, and shipments have begun. This shaft has been idle for a long time past.

COLONEL SELLERS .- The concentrating mill, re cently completed under the direction of D. W. Brunton, of Messrs. Taylor & Brunton, is the most expen-sive and best constructed in the district. The concen-

tration of the ore, with the exception of the slimes, is

contents of the headings, as a rule, being brought up to 60 and 70 per cent. The ore concentrated consists of sulphide of iron, zinc and lead, and the slight difference in the specific gravity of the different minerals makes the work of their separation no easy task. The mill has only been running a short time, but so far with succe

DENVER CITY.-A rich strike is reported. The min eral was discovered in an uprise situated about 100 feet northeast of the Denver City shaft.

DUNKIN .- The lessees of the lower workings are rapidly sinking the north shaft to greater depth. The shaft is about sixty feet below the second level, and in porphyry, heavily stained with iron.

### LAKE COUNTY

LA PLATA.-The smelter is running four of its five furnaces. The establishment is well provided with lead ores, and is receiving a temporary relief in the matter of drv ores from its own mines in California Gulch. The La Plata mine has recently disclosed a good streak of fair silver ore, low in lead, and the yield of the property is reported most satisfactory

LEE BASIN.-The new machinery for the pumping plant of the Wright shaft has arrived, and it is thought that work will be resumed before the close of this month.

SMALL HOPES .- At present, more attention is devoted to the development of the property than to the rapid extraction of ore, and the greater portion of the mine's yield is obtained in driving exploration-work and gleaning through the old workings. The old stopes about the Elkins and Denman shafts, still contain a great deal of high-grade ore. The ground here is heavy, and the timbers having stood for some time, are beginning to give way, and unless the ore remaining is removed at once, it will be lost, or can only be extracted at a greatly increased cost

WOLFE TONE.-This mine is said to be the largest shipper in the district, sending from 75 to 100 tons of ore a day to the smelters, and, while the mineral is of low grade, it nevertheless leaves a handsome profit.

#### OURAY COUNTY.

VANDERBILT.-This mine has been sold to Denver capitalists, it is said, for 100,000.

### SAN JUAN COUNTY.

SOUTHERN COLORADO BISMUTH AND SILVER MINING COMPANY.-It is stated that over \$50,000 of the bonds of the company have already been disposed of, and that the remainder of the \$90,000 offered will be taken before March 1st. Arrangements have beemade to redeem the property from the recent sheriff's sale under the judgment of Messrs. Bagley & Co,, of Denver, and as early as it is possible to do so in the spring, work will be resumed at the Sampson mine and the mill again started up.

## DAKOTA.

## LAWRENCE COUNTY.

CALEDONIA.-The official weekly report, dated February 8th, states that the drift on the 300-foot level has advanced 10 feet, making a total of 601% feet. The winze advanced 5 feet, making a total of 371/2 feet. The south drift advanced 81/2 feet ; total, 43 feet. The drift and winze are still in a good grade of ore. The ore produced from 425-foot level, 876 tons ; cave, 487 tons; total, 1363 tons. The net proceeds of bars Nos. 50 and 51 amounted to \$25,424.11.

ENTERPRISE .- The proceeds of the assessment just levied will be used to defray the expenses of sinking another fifty feet on the 100-foot shaft.

FATHER DE SMET.-The ore produced from the first econd, and third levels during the week ended February 8th was 2015 tons. The bullion production for January netted \$17,451.89.

IRON HILL,-The dividend declared by this company recently has created a boom in the stock, which is now quoted at Rapid City at \$2.35. Work continues at the mines, and bullion shipments are regularly made.

LIBERTY .- Contracts will soon be made for further developments, and arrangements completed for machinery.

RATTLER.-The company will sell 20,000 shares of the capital stock, and invest the amount realized in developing its property.

### PENNINGTON COUNTY

RAPID CITY GYPSUM MINING COMPANY .- This company, to which we referred in our issue of January 30th, has bought some 160 acres of land near Rapid City for \$2000. It is stated that this property coneffected by jigs, which do very clean work, the lead tains a large and valuable deposit of gypsum, and will north and south, and the vein, which appears to be a

be consolidated with other property in the same vicinity, recently secured. It is the intention of the company to develop the gypsum deposit throughout the winter in such a manner as to facilitate breaking and removing it in large quantities for crushing and calcining in the spring. Appliances necessary for the manufacture of plaster of Paris have been ordered.

#### IDAHO.

BELLEVUE-IDAHO.-Reports state that a body of rich ore has been struck in the lower levels of the Queen of the Hills mine.

### ILLINOIS.

A number of the leading stone quarry owners met at Chicago last week, and organized the Chicago Building Stone Company, with a cash capital of \$50,000. All the stone from every point controlled by the pool in the Desplaines Valley is to be shipped to this company, which is to dispose of it at a uniform price. Each town in the pool and each stone firm in each town is assigned its share of the stone product. The directors elected are E. T. Singer, of the Singer & Talcott Stone Company, Chicago ; D. E. Cornean, of the Cornean Stone Company, Lemont ; J. B. Moore, of the Excelsior Stone Company, Chicago ; Edwin Porter, of the Porter & Walters Stone Company, Joliet; J. G. Bodenschatz, of the Bodenschatz Stone Company, Lemont.

CHICAGO SMELTING AND REFINING-WORKS.-These works, which during the past six months have been overhauled, and many new inventions and improvements introduced for the economical desilverization of base bullion, have resumed operations, desilverizing and refining sixty tons of bullion a day, which is the present capacity. The supply of bullion is obtained from the American Mining and Smelting Company at Leadville, which owns the works, the Royal Gorge Smelter at Cañon City, under lease to the American Company, and the La Plata Smelter, which has contracted its bullion product for the next six months.

WHITE FAN SILVER MINING COMPANY .- This company has been organized at East St. Louis, to do a general mining business ; capital stock, \$500,000 ; incorporators, John W. Donaldson, John A. Dozier, and William W. Grave

### MARYLAND.

The manager of the Greenstone quarries reports more orders for green serpentine marble than can be filled. The orders come from all parts of the country.

### MEXICO.

SONORA REDUCTION COMPANY .- The suit of Spencer Stout against Governor C. Meyer Zulick, of Arizona, President of the Sonora Reduction Company, and other individuals connected with the management of the company, was decided by Judge Depue at Newark, New Jersey, on the 13th inst. The plaintiff based bis action for judgment on the ground that the certificate of organization was defective, and that the directors and members were individually liable for all indebtedness contracted by them for the corporation. Judge Depue decided that the incorporation was in proper form, and that, according to the laws of New Jersey, under which the incorporation was made, the individual officers and directors were not hable. The company, whose works are in Mexico near the Arizona line, is bankrupt and recently, on application of creditors, F.W. Stevens, of Newark, was appointed receiver. The capital stock was \$250,000.

### MICHIGAN.

#### COPPER MINES.

OSCEOLA.-Among the improvements to the mill, is an electric light apparatus, which is to be put in at

TAMARACK .--- The shaft-house is to be lit by electricity as soon as the plant can be put in place.

PENINSULA COPPER MINING COMPANY. -- At n neeting of this company, held at Chicago, Mr. S. D. North was elected president, and the capital stock was reduced from 100.000 to 40.000 shares. The company has not decided what action it will take in regard to working the property, but it is generally believed the mine will soon resume operations.

#### IRON MINES

CALEDONIA IRON COMPANY.-The annual meeting was held at Florence, Wis. This company has a lease in the southwest quarter of section 17, 43-31, in the Michigamme region, near Crystal Falls. The property has been tested to some extent. The formation is

true one, widens with depth. Every assay taken shows the ore to be a Bessemer. For some time, the property has been idle, but arrangements have been made with Messrs. Foley and Adams, of Negaunee, and Hon. J. A. Hubbel, of Houghton, who will put in machinery, thoroughly test the property, and mine some ore during the coming season. Work has already begun, as mentioned in our last issue.

IRON CLIFFS.—At the annual meeting, William H. Barnum resigned the position of general manager of the company. He is succeeded by John Abeel, of New York.

JIM PASCOE.—A resolution was adopted at the annual meeting, held on the 12th inst. at Marquette, asking for a voluntary contribution of \$1 a share (the stock being non-assessable) to pay up debts and put the company in condition for active mining work. In case this is not paid in, the directors are instructed to sell the company's property, consisting of machinery, etc., and surrender the lease, with the view of reorganizing on a better working basis. The indebtedness of the company amounts to less than \$1000, and it is more than probable that the contribution asked for will be promptly paid.

LAKE ANGELINE.—The sinking of a new shaft has begun. It will be sunk to a depth of 300 feet before any mining is done from it. Its location is about 400 feet southwest of A shaft, and it will penetrate the hard ore-deposit. The diamond drill that has been working to test the ground for the location of the shaft has been taken out of the mine, and will remain idle for a time.

## MONTANA.

LEWIS & CLARKE COUNTY. CHRISTMAS GIFT.—The company has again placed upon the market at Helena a block of 4500 shares of its treasury stock, to be sold at 30 cents a share, par value \$3, non-assessable, the proceeds of which go to the further development of the mines. Over \$4000 have already been expended in building machinery, shafts, drifts, and levels upon the property, and so far the prospects have been satisfactory. The shaft upon which developments are conducted is down about 145 feet. Work is rapidly pushed.

MONTANA COMPANY, LIMITED.—The production during January is said to have been the largest on record. Sixty stamps working thirty days crushed 3456 tons, yielding \$100,831.19.

#### SILVER BOW COUNTY.

ORIGINAL.—This mine, which has lain idle for nearly a year and a half, has been leased by Woodman & Manory, who have begun work. The shaft is 400 feet deep. The 100-foot level is driving east and some stoping is done; but as yet, they have not got fairly under way.

#### NEVADA. ESMERALDA COUNTY.

ESMERALDA CONSOLIDATED. — Every thing is working smoothly at the company's mines at Aurora. The mill was to start up last week. The first stockholders

### meeting will take place in London on the 25th inst.

LINCOLN COUNTY. BULLIONVILLE SMELTING COMPANY.—The reduction-works are now running successfully. The works include a large Stetefeldt furnace, two revolving roasters, a leaching plant of ten redwood tubs, and a furnace for melting the sulphides. The company

#### intends to work custom ores also. NYE COUNTY.

It is reported that the gold mines near Grantville, owned by John Centras, have been sold to R. S. Law, of San Francisco, for \$20,000. Work is to begin at once.

STOREY COUNTY-COMSTOCK LODE.

From reports of the Virginia City Chronicle, we take the following :

BEST & BELCHER AND GOULD & CURRY.—The surface of the water in the Osbiston shaft is now down below the 2000 level. The main pump is working smoothly, and draining the shaft at the rate of between 18 and 20 feet every twenty-four hours.

CHOLLAR.—The vein of low-grade quartz lying west of the south lateral drift on the 3100 level will be prospected with a diamond drill before drifting is resumed.

CONSOLIDATED CALIFORNIA & VIRGINIA.—During a the week ended February 6th, there were extracted a from above the 1750 level 892 tons of ore, which was shipped to the Morgan mill. The average value, a according to assays, was \$15.22 a ton. From above

the 1550 level, 1654 tons of ore were extracted and shipped to the Eureka mill during the same period. This latter gave an average assay value of \$13.01 a ton. During the week, bullion valued at \$64,136.69 was shipped to San Francisco.

OVERMAN.—Three shipments of ore were made during the week ended the 6th inst., aggregating 170 tons. This ore was stoped out between the 150 and 200 levels. There is still a large quantity remaining on the dump awaiting shipment. The bullion resulting will probably be converted into coin to pay the sum of \$8824 claimed as royalty by the Sutro Tunnel Company, for the recovery of which the papers preliminary to a suit, as mentioned in our last, have been filed.

YELLOW JACKET.—The daily ore-shipments have been increased to 120 tons, and will be further augmented when the three additional Golden Gate concentrators ordered for the Brunswick mill have been set

### NEW MEXICO. GRANT COUNTY.

CARBON.—Work has stopped on this mine at Fleming. The owners have expended a good deal of money in prospecting for ore, but without success. Up to the time when work was stopped, they had found little or no ore, and had had a continual fight with the water, which poured into the shaft in great volume.

#### SOCORRO COUNTY.

The Billing smelter at Socorro produced 312 tons of base bullion during January. The establishment has two furnaces and one roaster in operation.

### NORTH CAROLINA.

It is reported that a large marble quarry in Mitchell County has been sold to Northern capitalists for \$95,000.

### MONTGOMERY COUNTY.

APPALACHIAN.—This company, which is composed of English capitalists, is working a small tract of some 60 or 70 acres, adjoining the Russell mine. This lode is prospecting and developing by means of crosscuts and draughts, and it has been proved to a depth of more than fifty feet. The ore is of good grade, ranging from \$8 to \$15 a ton, and is practically free from sulphurets. But little machinery has been employed as yet, but it is thought that larger works will soon be erected.

RUSSELL.—Work continues with satisfactory results, and bullion shipments are made to London.

STEELE.—Machinery has arrived and is erecting. In the mean time, work is progressing rapidly underground. Several shifts are employed, opening new ground, and clearing and timbering such of the old work as may need repairing.

### ROWAN COUNTY.

GOLD HILL.—Work is still going on in these old gold mines. They have recently struck a "shattered" lode or ore-body of from 8 to 10 feet in width in the 740-foot level of the Randolph shaft. This ore was cut about 30 feet from the shaft in an angle of the level.

YADKIN CHLORINATION-WORKS.—These works, near Salisbury, are doing a fair amount of work now. Ores from Guilford, Davidson, and Mecklenburg have been sent to the works for treatment.

#### UNION COUNTY.

ALTAN.—This mine is in operation, and, in fact, is the only mine worked at present in the county. A small stamp mill has been erected and will be running soon. The prospects are favorable.

### NORWAY.

Although the low prices that in the year 1885 have ruled for a great many metals naturally have had a serious effect upon the Norwegian mining industry, yet the output in some instances shows an increase on previous years, and, should things soon improve, a further extension is looked for in several directions. The output of silver during 1885 has shown a steady The place of honor must, of course, be given to the celebrated old Kongsberg silver mines, which have during the past year yielded about 7200 kilograms of fine silver, against 6817 kilograms in 1884, and 6300 kilograms in 1883. The price, however, says a correspondent of the Iron Monger, has receded, and the result of the action of the American Congress is likely to bring further changes. A royal commission has recently handed in its report, which recommends a considerable extension of the Kongsberg works. The proprietors of the Vinoren mines have recently found some good ore. Of the Northern mines, the Veffen Mining Company has not been able to find of business.

new veins, and has been confined to the working of some old ore. The neighboring Jacob Knutsen mine has, however, done well. At Hiteren, the limited capital has greatly stood in the way of active and remunerative work. The price of copper has been steadily declining, and for the latter half of the year has only been about 80 kroner per 100 kilograms. In consequence of this, it is under contemplation at the Roeros copper mines to reduce the expenses connected with the production. Several expensive melting process have, in consequence, been abandoned, and the proprietors have also adopted the electrolytic system. Roeros has also an important article for export in sulphur ore that contains copper, and which is principally drawn from the Arvedal pit. The means of transport have, however, hitherto been a great obstacle to the proper development of this industry, and a railroad from the mine to the Drontheim line has, therefore, been decided upon. The Vigsnaes copper mines have somewhat reduced their business on account of the low prices. Good veins are, however, constantly forthcoming. The best copper ore is melted down on the spot, the more sulphuric ore is exported. The Aamdals mines, in Thelemarken, are now beginning to reap the benefit of their new machinery, purchased and fixed within the last few years. The working expenses have been considerably reduced by this, and there seems to be ore enough for a great number of years. On the Dalen farm, pure silver and pure copper were found during 1884, to what extent has not yet been ascertained. It is now in the hands of a French company, which is continuing the work. At the Hangsund copper mines, which have been lying idle for several years, work has been recommenced on foreign account. It is not intended to melt down the ore there, but to export it. The price of nickel has also ranged very low, and this has reduced the working of the mines. The nickel mines at Evse, which are now worked on foreign account, have had good ore, containing as much as 4 per cent of the metal. The Ringerike mine has kept only comparatively few men at work. The Bamble mine, which is holding a considerable stock, has not been worked in the past year. The Senjen Company has also reduced its working. Still, several new mines have been started in anticipation of better prices. The zinc mine at Sorde, in Uysykke, has shown no improvement during the year. In the neighborhood of Drontheim, manganese ore has been found ; but whether this will prove worth working, has not yet been ascertained. There is, however, a likelihood of the ore existing in considerable quantities. The working of the apatite mines at Odegaarden, in Bamble, which is owned by a French company, was almost entirely suspended at harvest-time, about 300 men being then paid off. This was, no doubt, partly owing to the large stock held-something like 1,000,-000 kroner worth-which they do not want to force upon the market at the present low prices. When the market improves, more active work will undoubtedly

#### PENNSYLVANIA

be resumed.

EAST PENNSYLVANIA MINING AND SMELTING COM-PANY.—A charter has been issued to this company, of Doylestown, Bucks County; capital, \$20,000.

UNITED STATES SMELTING COMPANY,—This company, which was organized at Philadelphia with a capital of \$40,000, has been granted a charter.

#### NORTHAMPTON COUNTY.

DANIELSVILLE SLATE COMPANY.—A charter ha<sup>S</sup> been granted to this company, of Bangor, with a capital of \$100,000.

#### UTAH.

### BEAVER COUNTY.

MONTE CRISTO.—At this mine, in South Star District, good ore is extracted and haule i now to Minersville, to be worked at the Monte Cristo mill, to start up soon.

#### SALT LAKE COUNTY.

DARLINGTON.—This company has been organized at Salt Lake City, with a capital stock of \$2,500,000, 100,000 shares. The stock is assessable, but at no time shall an assessment exceed twenty cents a share. The private property of the stockholders shall not be liable for the company's obligations. The property consists of the Darlington and Woodside mines or mining claims, situated in Little Cottonwood Mining District. Fifty years is named as the corporate existence, and Salt Lake City is to be the principal place of business.

#### WASHINGTON COUNTY.

CHRISTY.-This company has done remarkably well during the past month, the mill having run regularly without a break, turning out \$23,554 worth of silver bullion.

STORMONT.-The mill lost ten days last month by reason of floods in the Virgin River, and bad roads between the mines and mill; as a consequence, but \$9000 worth of ore was crushed. The output of bullion during February will, in all probability, exceed that of any month during the past year. The main incline on the Buckeye and Savage is down 120 feet below the 600 level. The mines are producing b tween thirty-five and forty tons of ore a day, and the stopes on the fifth level in the Buckeye are looking well and furnishing considerable high-grade ore.

#### WISCONSIN.

KISSINGER.-This company has been incorporated at Milwaukee for the purpose of doing a general mining business. The incorporators are J. P. Kissinger, A. F. Mueller, and Christian Ternskes. The capital stock is \$200,000.

SOUTH SUPERIOR IRON COMPANY .- Messrs. J. A. Wood, C. V. Bardeen, and Benjamin Heinmann have incorporated this company, which will have its offices at Hurley, and will conduct a general mining business anywhere in the State or elsewhere. The capital stock is \$1,000,000.

#### WYOMING. LARAMIE COUNTY.

A company has been formed at Cheyenne to develop the mines in the Silver Crown District, twenty miles west of Cheyenne. A large amount of capital is to be

set to work immediately.

### MARKETS.

#### Silver.

	NEW	YORK,	Friday	Evening,	rep. 19.
	London.	N. Y.		London.	N. Y.
DATE.	Fence.	Cents.	DATE.	Pence.	Cents.
Feb. 13	465%	10134	Feb. 17	4634@%	102%

1	5 46% 6 4611-16	101%	18 19	46%	102%
The	advance in	the midd	le of th	e week	was caused
by the	Indian Cou	incil bills l	naving b	rought	t more than

the previous week ; but since then, the London market has declined.

Foreign Bank Statements.-The governors of the Bank of England, at their regular weekly meeting, reduced the bank's minimum rate of discount from 3 to 2 per cent. During the week, the bank gained £355,048 bullion ; and the proportion of its reserve to its liabilities was raised from 471% to 481/2, against 48 per cent at this date last year, when the bank's rate for discount was 4 per cent. The weekly statement of the Bank of France shows gains of 14.257,000 france gold, and 5,615,000 francs silver. The statement of the Imperial Bank of Germany shows a specie increase for the week of 9,490,000 marks.

Copper.-The situation remains as last week. The market is quiet, and prices short. No change. Lake, 11.40@111/2c. ; Orford and Baltimore, 101/2@10%c.

Chili Bars are quoted at £39 17s. 6d. @£40, and Best Selected at £44 10s., as by cable advices to the Metal Exchange.

Tin .- The market has been firm ; prices have ranged from 20.50@20.75c.

The market in London is £92 7s. 6d. for spot, and £92 15s.@£92 17s. 6d. for three months.

Lead.-A fair business has been done during the week. The market is firmer, and sales have been made at prices ranging from 4.75@4.85c. Foreign lead has been in fair demand at these prices, and 90c. is now asked.

Soft Spanish lead is quoted in London to-day £12 17s. 6d. ; English, at £13 5s.

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

There has been a remarkable improvement in our market, and prices now rule as follows : 4.621/c. and 4.65c. There is a general disposition to buy ; scarcely any thing offered ; generally holders, anticipating better prices, have withdrawn from the market, and refuse to make sales for future delivery at present prices. Sales foot up 650 tons at 4.60c. and 4.65c.

Messrs. John Wahl & Co., of St. Louis, telegraph to us as follows to-day :

As predicted, our market has advanced slowly since that the advantage is with the sellers rather than the

our last report. No abatement is to be noted in the buyers. No. 2 iron is selling to-day at \$17 and \$17.50, demand, which is quite good. Sales during the early part of the week were at 4'50@4'55c.; during the latter part, 4.55@4.60c.; total transactions will probably sum up 1000 tons. Offerings are very light at the close. If this state of affairs continues during the suing week, the price will probably go still higher, although it appears generally conceded that the market has about reached highest water-mark. Spelter.-This metal is firmer-4'45@4'60c. for

Domestic ; 61/2@61/2c. for New Jersey ; and 5@5.10c. for Foreign. Silesian is quoted in London £15. Sheet-Zinc.-5@5%c. for Domestic.

Antimony .- Cable quotations report the price of Hallett's to-day at £35. Here, Hallett's is quoted at 9c, and Cookson's at 91/@91/c.

Nickel .- We quote nominally at 70c.

### IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 19. American Pig.-The market presents no new The demand is limited, but prices are features. maintained, while dealers generally are disposed to await the settlement of the coke strikes before making contracts.

The nominal quotations are: \$18@\$18.50 for No. 1 X; \$17@\$17.50 for No. 2; and \$16@\$17 for Forge. Scotch Pig.-We quote Coltness \$20.50@\$21: Summerlee, \$20@\$20.50; Glengarnock, \$19.50@\$20; Dalmellington, \$19; Eglinton, \$18.50.

Scotch Warrants as per cable advices 38s. 1d.@ 38s. 4d.; Coltness, 46s. 9d.; Langloan, 44s. 6d. Summerlee, 48s.; Gartsherrie, 42s. 6d.; Gleugarnock, 44s. 9d.; Dalmellington, 42s.; Eglinton, 39s. 9d.

Bessemer Pig.-Steady prices have prevailed. We quote : \$19@\$20 for Foreign, according to brand. Spiegeleisen -No changes have occurred, and we quote English 20 per cent at \$27@\$28; German, \$26.50@\$27.

Steel Rails.-Reports state that large orders have been placed, but nothing definite could be learned. Prices at Eastern mills remain at \$34@\$35.

Structural Iron and Steel.-We quote Angles 1.95@2c. delivered ; Tees, 21/4c. ; Iron Beams and Channels, 3c. for American from dock ; and Belgian, 2.60@2.75c. ; Steel Angles, 2.30@2.45c.

Plate Iron.-Common Tank, 1.95@2c. ; Refined, 2¼c.; Flange iron, 3.4@3.5c.; Extra Flange, 4@ 4.25c

Bar Iron.-There is a tendency toward higher prices in Refined, which we quote at 1.85@1.95c.; Common, 1.60@1.70c. Store prices are 10@20c. higher.

Steel Plates.-We quote 21/2c. for Tank ; 3@31/4c. for Boiler and Ship Plates ; 3%@4c. for Flanges ; 41/4 @5¼c. for Extra Flange and Fire-Box Plate.

Merchant Steel.-Our quotations remain, American Tool Steel 8@10c. ; special qualities, 12@18c.; Crucible Machinery, 4%@5%c. ; Bessemer and Open Hearth Machinery, 21/@21/2c.

Old Rails -We quote \$21.25@\$22 for Tees and \$22@\$22.50 for Double-Heads.

Old Steel Rails are quoted at \$19.

Scrap-Iron-\$21@\$22 for Selected Scrap.

#### Philadelphia, Feb. 18.

[From our Special Correspondent.]

Ore .- Some large contracts for foreign ore or extensions of old contracts are getting placed. Preparations are making for the mining of larger supplies of Jersev and Pennsylvania ores, and work will begin in a few days

Pig-Iron .- The features of the pig-iron market in brief are these : Good Forge is selling at \$17 ; a moderate brand is selling at \$16.50 ; and inferior iron has brought \$16. The market is very strong. There are inquiries in hand to-day for 1000-ton lots. The market as yet has not beer unsettled very much by the coke strike, because the settlement of that affair has all along been anticipated. It looks to-day to our pig-iron makers as though an increased supply of coke were only a matter of a few days. The pig-iron makers are not disposed to crowd buyers for business. They are satisfied with the way the market is going, and believe that in thirty days good Forge iron will command \$17.50, and No. 1 \$19.50. Sales are made now on a basis of \$17, and there are inquiries enough to indicate

with fair inquiry. Some makes of No. 1 command \$20. Foreign Iron.--Bessemer is quoted at \$19@\$20; Spiegeleisen, \$27@\$28. No business of any moment has been closed within a few days.

FEB. 20, 1886.

Muck-Bars .- The inside quotations for Muck-Bars are \$28.50. Three or four hundred tons have been sold since Monday, and there are inquiries from some parties for bars for which \$30 have been asked.

Blooms.-A number of inquiries for Blooms have been received within a week, and the manufacturers are looking for an increased business.

Manufactured Iron .- The tone of the market is very strong. The Association met on Tuesday. It was concluded, after a discussion of the whole case, not to advance prices. The puddlers are threatening to give trouble. The manufacturers think it is unwise to increase the cost of making iron by advancing the nominal price. The stores are selling at \$1.90; mills, \$1.80; Medium, \$1.60@\$1.70; and Common, \$1.50@ \$1.60. A fair amount of business is coming in daily. The mills in the interior seem to be picking up a good deal of business, and there is no complaint to make over things as they are or as to prospects.

Nails .- The nail-makers, since their meeting, have found demand rather backward, and explain it by saying that the prospects of resumption in the West have a great deal to do with it. They are holding firmly to the resolution, namely, \$2.40@\$2.50. There is some inquiry for car-load and larger lots ; but no sales will be made as long as there is any uncertainty as to the course that Western nail-makers will pursue.

Merchant Steel.-The merchant steel mills are doing very well, and prices are steady.

Hardware.-Leading hardware dealers report an improvement in inquiry during the past three or four davs.

Sheet-Iron.-Card rates are paid for small orders coming to hand for sheet-iron:

Plate Iron.-Quotations on plate iron are 190@ 2.10c.; Tank, 2@2.15c. Some little business has been ecured, but most of the firms are on the outlook and in need of more busines

Wrought-Iron Pipe.-There is no change in the situation.

Steel Rails .- Several large lots of steel rails have been ordered for May and June delivery, guessed at from 30,000 to 40,000 tons for the week, and there are still inquiries in hand that will probably result in business next week on the basis of \$34@\$35. The increased production of 150,000 tons will soon be under contract.

Old Rails .- There is a good deal of uncertainty as to old rails. Quotations are \$22@\$23 for Tees. More money is asked. Stocks are absolutely nil. Brokers are scouring the country for small lots under the stimulus of big prices. Foreign rails are quoted at \$22 for Double-Heads, but \$21.50 may be given.

Scrap.-Scrap is very scarce, but the supply is increasing. Quotations run from \$1.20@\$1.22 according to quality.

### COAL TRADE REVIEW.

## NEW YORK, Friday Evening, Feb. 19.

Statistics.

Production Anthracite Coal for week ended February 13tb. and year from January 1st : 1885 1856.

LOUD ON DOAD THE									
I UNE OF ACTU LDD.	Week.	Year.	Week.	Year.					
P. & Read. RR. Cc	200,819	1,079,318	138.476	1,049,486					
V. RR. Co	140.905	700,891	75,169	590,101					
D. L. & W. RR. Co.	97,755	676,639	64,803	437,768					
). & H. Canal Co.	96,578	521,723	48,155	354,814					
Penna, RR.:									
N.& West Br.RR.	26,578	160.242		141.769					
S. H. & W. B. RR.	3.583	18,391		13,919					
P & N. Y. RH	10.475	144,109	5.910	42 975					
Penna, Coul Co	18.684	119,365		78,083					
Shamokin Div. N.									
C. RR	*14.000	94.778	13,429	88,279					
Lykens Valley	*9,500	55,022	7,171	55,704					
Totai	618,877	3,570.648	353,113	2,852,898					
Increase	265,764	717,750							
Uecrease		**** *****							

### \* Estimated

The above table does not include the amount of coal coin sumed and sold at the mines, which is about six per cent of the whole production

Production for corresponding period :

Production Bituminous Coal for week ended February 13th, and year from January 1st :

Tons of 2000 pounds, unless otherwise designated.

### THE ENGINEERING AND MINING JOURNAL.

			18	80
	Week.	Year.	Week.	Year.
hile. & Erie RR	82	250		
Cumberland, Md	29,598	225,573	34,861	217,306
Barclay, Pa	3,702	27,337	4.559	31,453
"Broad Top, Pa.				
. & Broad Top RR.	6,376	32,561	2,698	18.556
ast Broad Top		******		******
Clearfield Region.	Pa.			
now Shoe	3,138	17,774	3,531	26,112
arthaus (Keating)	1,965	12,317	1,583	7.753
yrone & Clearfield	52,875	314,674	58,670	370,449
Alleghany Region	, Pa.			
allitzin & Moun-				
tain	16,556	73,408	9,801	62,186
	114 000	800.004	115 800	P00 013

WESTERN SHIPMENTS.

Pittsourg Kegion.	ra.			
West Penn RR	4,477	27,705	4,420	32,715
SouthwestPenn.RR.	2,772	12,978	1,539	13,027
Pennsylvania RR .	5.763	28,622	4,247	23,701
Westmoreland Re	gion, Pa.			
Pennsylvania RR	33,140	156,483	13,036	143,002
Monongahela Reg	ion, Pa.			
Pennsylvania RR	4,385	20,255	3,220	23,771
Total	50.537	246,043	26,462	236,216
Grand total	164,829	949,337	142,165	970,031
And a second sec				

Considerable gas-coal shipped East, of which no divi-ion is made in report.

The Norfolk & Western Railroad Company reports the shipments of Pocahontas Flat-Top coal for the week ended February 13th. 1886, and year from January 1st as follows, tons of 2000 p. unds: 1886–Week, 12,911; year, 88,873. 1885–Week, 10,822; year, 57,357. Decrease, 1886–Week, 2089; increase, year, 31,516.

Production of Coke on line of Pennsylvania RR. for week ended February 13th, and year from January 1st :

Tons of 2000 pounds.

	1	580		885
	Week	Year.	Week.	Year.
Allegnany Region.	2,823	21,968	3,136	24,199
West Penn. RR	2.116	11.714	56	606
Southwest Penn.RR	12,333	161.001	34,272	216.973
Penn. & W. Region	7,586	36,907	5,322	32.551
Monongabela	1,248	6,821	871	7,953
Pittsburg Region. Snow Shoe	935	4,663	427	2,658
Total	27,041	243,074	44,084	284,940

### Anthracite.

Another week of mild weather and dull trade ha passed, with the result of bringing about a resump tion of the decline in prices. The companies claim to have made no change ; but individual operators, who always lead the cut, are selling for the best price obtainable. We hear of them selling Stove coal at \$3.15@\$3.20 f. o. b., or even less. If the present weather continues, and a combination is not promptly formed, still lower prices will prevail.

We understand that a complete combination plan, fixing percentages, etc., and satisfactory to the other companies, was submitted to the Delaware & Hudson Canal Company and the Delaware, Lackawanna & Western Railroad Company, and met with a freezing reception in both instances. These companies, it is said, are referring to their January production as an evidence of what they should have and are entitled to. The result of this effort has thrown a wet blanket over the trade, and where hope prevailed a week ago, despondency now rules.

We have seen this condition of affairs so often that we do not look upon it as having especial significance. The opposition to the combination plan is so far due to the individual prejudices of the presidents of the companies. This may be carried to a certain extent ; but as the opposing companies are dividend-payers, and can not be such except with a combination, it is not probable that it will be long before the stockholders of the companies will come to the front and demand that the presidents make an it by taking the best prices obtainable. We are inclined arrangement, even though it be at a concession. to think that those who do not keep reasonably close to Stockholders understand the difference between no dividends and 6 or 8 per cent per annum, but do not understand the individual differences between the managers of the several companies. The best portion of the work of forming a combination has been performed. It can be no great period of time before it is completed. In the mean time, however, some company may become impatient and attempt to force a settlement by making a sharp cut in prices or taking some similar action.

Mr. John H. Jones, official accountant, furnishes the following statement of the anthracite coal tonnage for the month of January, 1886, compared with the same period last year. This statement includes the entire production of anthracite coal, excepting that consumed Big Vein collieries in the Clearfield District, monopo- notwithstanding this, prices rule higher in Buffalo than

by employés, and fo about the mines :	r steam a	nd heating	3	purpose <sup>s</sup>
COMPANIES.	Jan., 1886.	Jan., 1885.	1	Differ- ence.
Phila. & Reading RR	700,173	601,970	<u>I</u> .	98,203
Del Lack & West PP	446,497	340,745	I.	105,752
Del. & Hud. Canal Co.	313.086	164.997	î.	148.089
Pennsylvania RR	232,521	208,599	Ī.	23,922
Pennsylvania Coal Co.	83,586	64,005	I.	19,581
N. Y., L. E. & W. RR	65,648	23,068	L	42,580
Total	2.338.271	1.641.803	I.	696,468

The stock of coal on hand at tide-water shipping points, January 31st, 1886, was 779,004 tons; on December 31st, 1885, 754,545 tons; increase, 24,459 tons.

That the trade should have taken so much coal during mild weather, and while purchasing in a hand-to-mouth way only, is a great surprise, and does much to justify the expectations of a largely increased business for the year.

The reorganization of Reading does not seem to have made any progress during the week, excepting that the woods appear to be full of charitable syndicates bent on this object. The Drexel-Morgan syndicate has met with a hitch, and will have to retrace its steps and remodel its plan. Mr. Gowen is only speaking in a general way of what he is doing, but there is a belief that he is accumulating a backing of considerable power, although whether it will be sufficient to carry through the reorganization in opposition to the Drexel-Morgan syndicate is still a question in many minds

Messrs. F. A. Potts & Co. have moved from No. 110 Broadway to No. 26 Broadway, the new building of the Standard Oil Company. The firm, although now occupying as pleasant, commodious, and well-appointed offices as any in the trade, leaves the old stand and its associations with reluctance. Mr. F. A. Potts began business thirty-two years ago in the offices he has just left.

We quote f. o. b. as follows for ordinary free burning coals :

	Lump	\$2.80@\$2.85
5	Steam' oat	2.80@ 2.85
	Broken	2.75@ 2.80
•	Egg	2.75@ 2.80
)	Stove	3.15@ 3.25
5	Chestnut	2.85@ 3.00
	Pea	1.50@ 2.00
	Buckwheat	1.25@ 1.50
	Dust	1.00@ 1.10

#### Bituminous.

There is a fair amount of business doing in this fuel. although shippers do not seem to have fitted them elves to the new conditions under the pool. The Pennsylvania Railroad announces \$2.05 as the tolls on coal from the Clearfield District to South Amboy. As shipping expenses are 15 cents a ton, the price alongside in this city should be not far from \$3.25 a ton. We are aware that coal can be bought for less money, yet we think the chances favor an advance. No change has been announced in the details of the bituminous coal pool as published by us last week. There are some disbelievers in the ability to hold it together and make it successful in its operations; but we think the best elements in the trade have much confidence in it, and are doing all they can to make it a success. Like all similar efforts at the beginning of their existence, it is not working with the smoothness that it is hoped will follow later. There are apparent evidences of bad faith, and one shipper suspects another. This may lead some to expect an open rupture, and discount the programme of the pool may be punished by the railroads before the year is over. There is a bottom to every thing, and, from present appearances, that bottom in the bituminous trade, speaking for at least a few years to come, was reached last year.

The movements of Messrs. Berwind, White & Co. or properly speaking now, the Berwind-White Coal Mining Company, a close corporation representing the operations of the old firm, are closely watched. We think we may safely say that this concern is as anxious to maintain prices and have the pool succeed as any other firm or company in the trade. It mines more bituminous coal than any other firm or company in the United States, at least ; it owns and operates eighteen

lizing nearly all of that vein, which carries the best coal of the district. It mined in January, which was a poor month, owing to interruptions by floods and snow, 170,000 tons, or at the rate of over 2,000,000 tons a year. It is folly to suppose that it is in favor of the prices of last year, and not in favor of an advance.

### Buffalo,

[From our Special Correspondent.] If a new pool arrangement, when completed, is kept, and it proves satisfactory to the parties concerned, the prospects for the anthracite coal trade for 1886 are assured to be good. Eastern anthracite men are reported to be firm in their views, which are of a buoyant character. Many of our dealers take the subject of the future of the trade in a very philosophical manuer. As usual, to get an item from them is like trying to extract juice from a nearly dried-up lemon.

My opinion is, that the reported anthracite pool arrangement is a *canard*. There are too many difficulties in the way, and those difficulties can not be explained in the limited space at my disposal. That the prospects for a pooling syndicate are at present very dubious can not be doubted.

In regard to the following telegram, received here a day or two since, our coal men profess to know nothing of the subject referred to : The coal combination has been agreed upon, and the production for 1886 will be 34,000,000 tons of anthracite. The percentages are changed but little. Reading agreed to a slight reduction. The Pennsylvania will have eleven per cent instead of eight ; and Erie gets a little more. The Reading's action was taken without consulting Gowen. Again: Although the different coal companies have taken no action looking to an advance in the price of coal, the impression gains ground that rates will be uniformly advanced within fourteen days.

What think you of another dispatch received from Philadelphia, which says that the anthracite coal combination will be formed not later than this month, and that all the companies will be members of it ? Also, that the bituminous coal interests expected, at their adjournment last week, to have their pool arranged by the first of next week ? With regard to the latter report, I have reasons for stating that the desired consummation is a possibility. But who knows what a day may bring forth ! It all depends upon the question of the freight quota.

Freight representatives of leading Western railroads met Tuesday last, principally to talk over coal matters, as it was charged that several cuts had been made. Harwas restored by the agents promising to sin no more.

Hopeful news has just been received from Scottdale, Pa. It is that the Connellsville coke syndicate has agreed to pay the striking drawers the advance asked on March 15th, on condition that they return to work at once. The proposition was favorably received by the delegates (representing 7000 men), and an answer will be given on or before Monday next. It is to be hoped that the terms will be accepted and the strike be declared off.

The natural gas question is sleeping awhile, pending the report of the committee of eight appointed by the mayor to visit places where natural gas is used, and to investigate the workings of the system. The selection of citizens made by the mayor meets with the approval of the public.

By the bye, the citizens of Erie, Pa., have granted a local company the right to lay pipes and deal in natural gas. Cleveland is making a move in the same direction, as the citizens opine that it will be "the fuel of the future." A well-informed (?) man claims that artificial gas can be manufactured from Pittsburg lump coal in Cleveland at 10c. per 1000 feet, or even less, as a ton of soft coal will yield from 42,000 to 44,000 feet of gas.

The Commercial Advertiser of this city on Monday last published the following leader :

### "FUEL FOR BUFFALO.

"At this particular time, it is of interest to inquire why the price of coal is higher in this city than at other points in this vicinity. Buffalo is one the largest coal-distributing centers in the country. About 400,-000 tons are consumed here annually, and last seas a million and a half of anthracite were shipped West by lake alone. The receipts of all kinds of coal here last year must have reached about four million tons. The facilities for bringing coal here, and caring for it when here, are the best that can be provided. But

Feb. 17.

**Feb.** 20, 1886.

### NEW YORK MINING STOCKS.

#### DIVIDEND-PAYING MINES.

### NON-DIVIDEND-PAYING MINES.

	Нібн	EST A	ND LO	WE87	PRIC	MA	R SHA	RE A	r wH	ICH S	ALES	WERE			HIGH	EST AN	TD LO	WEST	Paici	ES PEI	R SHA	RE AT	WHI	CB SA	LES	FERE	
NAME AND LOCATION OF COMPANY.	Fet	. 13.	Feb.	15.	Feb	. 16.	Feb	. 17.	Feb.	18.	Feb	. 19.	SALES.	NAME AND LOCA- TION OF COMPANY.	Feb	13.	Feb.	. 15.	Feb.	16.	Feb	. 17.	Feb.	. 18.	Feb.	19.	SALES.
	Ħ.	L.	Ħ.	L.	H.	L.	H.	L,	H.	L.	Ħ.	L.			Ħ.	L.	R.	L.	Н.	L.	H.	L.	H.	L.	H.	L.	
Alice Mon			1 70				1 75				1.70		750	Albion	1												-
Amie Con., Co		******										1		Alta										*****		******	*******
Argenta														American Flag											** * * * *		
Bassick, Co			.10										100	Barcelona, G													
Belle Isle, Ne	*****				** ***						1.1.1.12			Bechtel Con., G		*****											
Bodie Cons., Ca	1.20	1.20	1.25		1,35	1.20	1.35		1.50		1.00	1.50	8,77 0	Belvidere		** * * * *							*****	*****	*** **	*****	
Bulmor Co	45		·····	*****		******	*****	*****	50				1 005	Beicher.	******			*****	*****	*****	*****	*****	1 05	**-**	*****	*****	* ** **
Cal R H	8.00		.20		.20		2 05	200	2 00	1 00	2.05	1.95	2 140	Rig Pittshurg 8. L.		*****		*****	*****	*****			1.40	*** **	*****	******	2600
Castle Creek.	.09		*****				2.00	10.00		4.00			600	Bowman Silver								*****	* * * * * *	*****			*******
Chrysolite, Co														Bull-Domingo, s.L.													
Colorado Central	2.40				2 35		2.35		2.35				3,400	Central Ariz'na, 8.	,09				.09		.09				.09		1,100
Cons. Cal. & Va., Ne	2.15		2.15		2.15		2.30		2.35	2.25	2.30		6,700	Chollar													
Crown Point	** *													Cons. Imperial		** **				**** *			**** *		******	*****	
Funcka Cong No	1 45		.80		0.00						1 42 410		100	Con. Pacine		****			*****	*****			******		.10	* . * * **	100
Father de Smot Dk	9.80	*****	9 50		0 80	0 50	0.00	** **	0.05	+ 4 . 3	2 50	9 00	000	Decetur	*****	*****			*****	******		*****			*** **	* ****	*****
Freeland	4.00	*****	4.00		1 50	6.00	1.00		1 50		4.00	4.00	740	Durango G						******		*****	** ***				*******
Gold Stripe, Ca					1			******					100	Eastern Oregon						*****		*****		******	*****	******	*******
Gould & Curry, Ne														Goodshaw, G													
Grand Prize, Ne														Harlem M.& M.Co.													
Green Mountain, Ca									*** **					Harshaw													
Hale & Norcross, Ne	2.00				2.30				2.20				950	Kossuth										******			*** ***
Hall-Anderson, N. S.			00.00				00 00	liner				*****		Lacrosse, G	. 12				.11	.10		*** **	*****			*** **	3,300
Horn-Silver Ut			20,00		2 75	*****	9 75	18.70	*****		9 95	2 65	890	tariposa Frei					*****	*****			******	*****		** ***	*******
Independence Ne	*****				0.10		0.10	0.00	*****		0.10	0.00	010	Verican G 8		*****			*****	•	1.10		40	******	* - * * **	******	900
Iron Silver, Co	*****		2 40		2.45		2.45			******			800	Mono	3.95				4 10	*****	.00		.10	**. ***	4.50	* ****	600
Leadville C., Co			.26					1					250	New Pittsburg											1.00		000
Little Chief, Co				1					,30				1.800	North Standard, G.		1											
Little Pittsburg, Co			.28	.27					.29				600	N. Horn-Silv'r, &L.													
Martin White, Ne														Dri'nt'l & Miller, s					*****						****	******	
MOULTON								******						Plutus									3.05	3.00	3.05	*****	600
Navajo, Ne	*** **			*****	*****	*****	OF	*****	*****				000	Potosi			10			*****				*****			200
Ontario Ut		*****			90 50		20 95	00 00	****			******	90	Red Elophant		*****					1	******		*****		******	9 700
Ophir.	*****	*****	******		100.00	******	40 40	40.00	** ***			*****	00	Ridge.				* ******	*		.00	**** *	.00	******	****		10,100
Osceola														Silver Cliff. s	.06		0	8	.06		1 .08	.08					3,000
Plymouth														Sonora Con													
Quicksilver Pref., Ca.			22.00	21.00	23 50	22.00	23.75	23.50					1,200	South Bodie, G													
" Com., Ca							7.00						100	South Bulwer, G.													
Quincy					* **		** **						1.000	South Hite									+ + + + + + + +				******
Severe No	.80		.80	1	.80		,80		1 10				1,300	South Pacine												*****	*******
Sierre Novede No	170		*****		1.00	******			1.10	******	25		1 800	Mog 9 5 9 6	* *****									****		*****	**** ***
Silver King, Ar.		*****		*****	6 64	*****	6 75	*****					155	Sutro Tunnel	15		0	10	10	*****	10		20	* ****	10	** **	8.600
Spring Valley, Ca					0.00		0.70							Tamarack	1	1		1	1.20								0,000
Standard, Ca			1.05								1.20		125	Tioga													
Stormont, Ut														Unadilla, s													
Tip Top, Ar														Union Cons., G. 8.					.69				.65				1,000
Ye low Jacket									1.00				200	Utah													
	1		1	1		1	1		1	1	1	1	1		1	1		1	1	1	1	1		1	1	1	

Dividend shares sold, 32,773. Non-dividend shares sold, 21,700

anywhere in this part of the State. The lists published faith, and apply the proper restrictions as to pressure, by coal dealers for January gave the rate on stove and chestnut at \$5.25 a ton. At the neighboring village of Batavia, these same grades are now selling at \$4.25-just one dollar a ton less. The rates at Rochester are a trifle higher than at Batavia, and at Oswego they are \$4.85.

"Is there any good reason why coal should be a dollar a ton higher here than at Batavia ? None at all, except that the dealers have formed a close corporation, and by a system of fines and penalties have abolished competition in the interest of high prices. In view of this fact, the 'solemn protest' of the coal dealers against the introduction of natural gas fuel becomes a matter of much public interest. The reason for their opposition can readily be understood. If the Natural Gas Company is allowed to begin operations in Buffalo, the price of coal will have to come down, and lower prices is just what the dealers have been combining to prevent. Moreover, there is good reason to believe that the organization of the Producers' Fuel Supply Company is another move to keep up the price of fuel to consumers. The directors of this new company are as follows : Thomas Loomis, President of the Coal Dealers' Exchange ; C. M. Underhill, coal agent ; Millard F. Burns, coal dealer : T. Guilford Smith, coal dealer ; James Tillinghast and James F. Gluck, officials New York Central & Hudson River Railroad, heavy coal carriers; and C. B. Matthews, oil dealer.

" Is any tax-payer of Buffalo so verdant as to suppose that, if the supply of natural gas in this city, no matter how abundant it might be, were controlled by these gentlemen, there would be any reduction in the cost of fuel? Is it likely that they would injure their coal trade by furnishing cheap fuel in the shape of natural gas? But it matters not what the object of the organization of the Producers' Supply Company, the Commercial favors granting its petition, with proper restrictions. If it can obtain a supply of natural gas in Erie County, so much the better. What the people want is cheap fuel. The competition of gas will bring down prices, and competition between two rival gas companies would be apt to still further benefit consumers. The Commercial's advice is, to put all responsible applicants on the same footing.

restoration of pavements, etc., and nothing more. One of our manufacturing companies is kept busy with orders for gondola coal cars for the Buffalo, Rochester & Pittsburg Railroad ; also on 150 25-ton hopper bottom gondolas for the Fall Brook Coal Company, as well as several hundred box-cars of 25 tons each for the New York. Lake Erie & Western Railroad.

Our city, as a corporation, burns over 20,000 tons of coal annually, as follows: the Water-Works, 11,000; City and County Hall, 500; Fire Department, 1250 ; Police Department, 750 ; Poor Department for outdoor relief, 2500; and for the schools, 4000. Including manufacturers and private consumers, the estimated consumption here annually exceeds 400,000 tons. The advocates of cheap coal say, If we can save a dollar a ton, the gain to the citizens will be very large.

The joint committees of the Legislature at Albany have indorsed, by resolution, the Weber Canal bill. The sub-committee of the House Committee on Railroads and Canals at Washington has unanimously agreed to report the bill to the full committee. Nevertheless, the bill has many opponents. The opinion of the members of the Merchants' Exchange here will be expressed on Saturday next, at a special meeting to be held for that purpose.

Relative to the quantity of gas produced from coal, Mr. Robson, for many years an employé of one of our gas companies, says, understandingly, that good bituminous coal will make 8000 feet of good gas per 2000 pounds, or 9000 feet of good merchantable gas, or 10,000 feet not so good, and that is about all. You can not get both quantity and quality; when you get a large quantity, it is at the expense of quality.

The cutting of rates to dealers in the West and Canada is again reported. But it may be that the item I sent you two or three weeks since has been resurrected, enlarged, and remodeled.

#### Feb. 17. Boston. [From our Special Correspondent.]

There has been very little doing this week. Gossip has been very abundant, and has assured us over and over that every thing would soon be lovely, and Make them file ample bonds as evidence of good that the Pennsylvania Railroad had at last consented

to come into the combination of anthracite coal producers. A new and stronger combination has been described as among the immediate forthcoming events. Of course, this is the most important kind of information if true, and coal would be a good purchase at prices that have been ruling. It would be an easy matter for such a combination to lift prices 50 cents a ton, if the companies desired to do so. Present prices are not yielding cost of production. At the same time, dealers have not dared buy freely. There is too much chance for further demoralization. The only bull point has been the combination talk. It is a question whether so good a point will be relinquished by Wall Street speculators until it has served their purposes still further. The signs point to a new and strong combination March 1st or before, and anthracite coal appears to be a good purchase.

It must be borne in mind that prices have shown no improvement ; neither is there any thing in the nature of the demand or in the condition of tide-water stocks to warrant any better feeling.

There is no important movement in bituminous coal. The market has been badly unsettled by the Fitchburg Railroad contract. The gossip on this matter is, that the parties that took the contract did not really intend to take it, but were forcing down their competitors to a low point. Guesses at the price range at from \$3.10 @\$3.20 delivered. Probably the higher figure is nearer right. No wonder, then, that talk of a pool goes for very little. After such contracts, and with last year's pool fiasco fresh in mind, the average buyer will take little stock in a pool, if one is really formed. Cargo lots run from \$3.70@\$3.80 delivered. It is generally believed that the Lowell Road has not bought yet, despite rumors to the contrary.

Freight rates are firm. Not many vessels are coming forward except from New York. It is claimed that ressels are chartered for the season at less than the minimum rates of the Vessel Owners' Association. We quote rates exclusive of discharging :

York, \$1.15@\$1.25; Philadelphia, \$1.25@ New \$1.30 ; Baltimore, \$1.25@\$1.30 ; Newport News, \$1.20@\$1.25; Richmond, \$1.25; Cape Breton, \$1.60 @\$1.75 ; Bay of Fundy, \$1.40@\$1.50.

Retail trade is quiet, and prices are nominally unchanged.

The figures of the total exports of coal from the

United States for the year 1885 are now out. As compared with 1884, they show a falling off, but no marked changes. A falling off in price is noticeable in the amount received. Exports for 1885 were: 645,310 tons anthracite ; 540,736 tons bituminous total, 1,186,046 tons. Exports for 1884 were 643,066 tons anthracite ; 698,952 tons bituminous total, 1,342,018 tons.

### FINANCIAL.

### Mining Stocks.

NEW YORK, Friday Evening, Feb. 19. The market has been more active, and prices hav shown an upward tendency. The total transaction were 54,473 shares, showing an increase of 92 shares, as compared with the preceding week.

The favorites during the week have been the Cold rado stocks, which have been extensively dealt in Colorado Central shows the largest business, wit prices steady at from \$2.40@\$2.35. The company has now a large amount of stock in its treasury, and the proposition has been made to decrease th capital stock by the amount the company holds. Th question will be brought before the stockholders at special meeting soon to be held in this city. Freeland has been lower at \$1.50. Plutus has ruled at from \$3@\$3.05. The dividend that we predicted last week has been announced. The reports from Robinson Consolidated are encouraging, and, if rumor may be trusted, the dividend recently announced will soon be followed by another. The price is from 90@80c. Little Chief shows a large sale at 30c. a share. Lacrosse continues its large business at 10@12c. Red Elephant, at 3c. Silver Cliff, at 6@8c. Iron Silver remains at from \$2.40@\$2.45. Bassick, at 10c. Little Pittsburg, at 27@29c. Leadville, 26c. Dunkin, at 30c.

A movement for higher prices has prevailed with Bodie Consolidated, which went from \$1.20@\$1.55 Mono, from \$3.95@\$4.50. Bulwer is steady at from 45@50c. Standard, at from \$1.05@\$1.20. Quicksilver Preferred and Common have sold respectively at from \$21@\$23.75, and \$7.

The Comstocks show the usual transactions, the most prominent being Consolidated California & Virginia at from \$2,15@\$2.35. Hale & Norcross. \$2@ \$2.30. Sierra Nevada, 70@80c. Sutro Tunnel, 18@ 20c. Union Consolidated, 60@65c. Among the other Nevada stocks, Eureka shows sales at \$1.85@ \$2.

Caledonia has been very active at prices ranging from \$1.90@\$2. Father de Smet declined from \$2.60@\$2. Homestake has announced its usual dividend of \$50,000, making a total of \$3,218,750; the price has ranged from \$20@\$19.75.

Ontario holds its own at \$29@\$29.50, and with its brilliant record of regular monthly dividends amounting to \$7,175,000, it is a wonder that the price does not go still higher. Horn-Silver has been quiet at from \$3.75@\$3.60.

Silver King has ruled at \$6.63@\$6.75. Alice, at from \$1.70@\$1.75. Central Arizona sold at 9c.

The following securities were sold at auction at Philadelphia on the 17th inst. : \$5000 Tremont Coal Company 7s at 100 ; 25 shares of Philadelphia Company (natural gas), Pittsburg, Pa., 58.

### Coal Stocks.

The market has been deluged with bad news during the past week. Shipments of gold to a considerable amount, a break-up of the trans-continental pool, a hitch in the Reading reorganization syndicate, a failure to carry through a coal combination plan, and many other things of minor importance have been the depressing influences.

The cause of the decline in the coal stocks and the prediction of a further decline is the hitch in the operations of the syndicate. Insiders says this is not fatal, but will cause it to retrace its steps and remodel its plans. Past experience has taught the public that these shares are dangerous ones to sell short," and we think some flank movement may be made that will give those who attempt it now a bad scorching.

The sales of Lackawanna aggregate 456,935 shares at \$13534@\$127%, closing at \$128%. Delaware & Hudson, with transactions of 171,089 shares, at \$1081/2 @\$102%, closed at \$104%. Jersey Central ranged between \$56@\$51%, and closed at \$53%, with dealings has declared a dividend. No. 1) of ten cents a share, or

THE ENGINEERING AND MINING JOURNAL.

		e of	Quotat	Quotations of New York stocks are based on the equivalent of \$100. Philadelphia prices are quoted so much per share.											
	NAME OF COMPANY.	valu ares.	Feb. 13.		Feb. 15.		Feb.	16.	Feb. 17.		Feb. 18.		Feb. 19.		e s f b. 13t b. 19 18ive.
		Par	н.	L.	Н.	L.	Н.	L.	H.	L.	Н.	L.	H.	L.	S al Fe Fe Clu
	Barclay Coal Cameron Coal Col. C. & I Ches. & O. RR Consol. Coal.	50 10 100 100	241/2	24	15%	131⁄2 24	15% 25¼ 31½	141 <u>6</u> 24 <u>1</u> <u>6</u> 28	15 2514 1214 29	1434 2436 1134	1516	14%	15 24%	14%	6,209 7,522 210 500
	Del. & H. C D., L. & W. RR	100 100 50	1081/2	1061/8 1333/4	1081⁄2 135	10714	108 13456	10616	107% 134%	106¼ 132¼	10714	105% 130	105¾ 131	102% 127%	171,089 456,935
	Elk Lick Coal Co Lehigh C. & N.† Lehigh Valley RR.†	50	50%	5056 601/8	52 60¼	51	5216 6014	511/2	5216 601%	52	52 59%	5034			18,233 400
	L. & W. C. &. I Co Maryland Coal	10	141/2	14	1434	141/4	161/2	151/4	16	151/2	14	•••••			1,500
	Morris & Essex. New Central Coal N. J. C. RR.	10 10	0 1434 0 551/8	14 51%	15½ 56	15	1516	15 54%	15 551⁄2	14½ 53	541/4	52%	1373/4 131/2 533/8	51%	100 2.570 165,43
1	N. Y. & S. Coal Penn. Coal Penn. RR.† Ph & R. RR.*	5 10 10 10	0	551/2 24	55%	551	55%	551/4 948/	55%	5514	5516				7,26
3	Spring Mountain Westmoreland Coalt	55	0			~078					~**/8				

of 165,431 shares. Reading, with sales of 147,301 \$20,000, payable on the 27th inst., at the office, No. 39 Broadway. shares at \$26% @\$221/2, closed at \$23%.

The bituminous (Cumberland companies) have been more active than for a very long time past and not without cause. Outside of the benefits of the new coal pool. we expect other developments of a formidable character to those stocks. They will be worth watching, The dealings in consolidation coal aggregate 500 shares at \$31½@\$28, closing at \$29. Maryland, with sales of 1500 shares at \$14@\$161/2, closed at \$14. The transactions in New Central amounted to 2570 shares at \$151/2@\$131/2, closing at the latter figure.

#### Meetings.

The annual and special meetings of the following companies will be held at the times mentioned : Aztec Copper Company, No. 51 State street, Bos

ton, Mass., March 2d, at three o'clock P.M. Colorado Central Consolidated Mining Company, No. 48 Exchange Place, Room 26, New York City, twelve o'clock M., a special meeting for the purpose of determining whether the capital stock shall be diminished from \$3,000,000 to \$2,750,000, to consist of 275,000 shares, of the par value of ten dollars a share,

by the cancellation of 25,000 shares of the par value of \$250,000 now held in the treasury of the company. Intercolonial Coal Mining Company, No. 199 Commissioners street, Montreal, Canada, March 3d, at

twelve o'clock M.

National Mining and Exploring Company, No. 32 Pine street, New York City, March 2d, at half-past twelve P.M

New Pittsburg Mining Company, No. 23 Nassau street, New York City, February 25th, at twelve o'clock M.

Osceola Consolidated Mining Company, No. 69 Devonshire street, Room 20, Boston, Mass., March 11th, at twelve o'clock M.

Pennsylvania Railroad Company, Musical Fund Hall, Locust street, Philadelphia, Pa., March 9th, at eleven o'clock A.M.

Preston Coal and Improvement Company, No. 227 South Fourth street, Philadelphia, Pa., March 3d, at twelve o'clock M.

Ridge Copper Company, No. 60 Devonshire street, Boston, Mass., March 4th, at twelve o'clock M.

Susquehanna Gold Mining Company, No. 208 South Fourth street, Room 5, Philadelphia, Pa., February 24th, at two o'clock P.M., to submit the question of distributing assets and dissolving the corporation.

#### Dividends.

estake Gold Mining Company, of Dakota, has declared a dividend (No. 91) of forty cents a share, or \$50,000, payable on the 25th inst., at Messrs. Louns bery & Co.'s, No. 15 Broad street ; total dividends to date, \$3,218,750.

Ontario Silver Mining Company, of Utah, has declared a dividend (No. 117) of fifty cents a share, or \$75,000, payable on the 27th inst., at Messrs. Lounsbery & Co.'s, No. 15 Broad street ; total dividends to date, \$7,175,000.

ASSESSMENTS

Delinquent in office. When levied. ount Day of sale. COMPANY. No 
 Δ=

 33
 Feb. 1

 Mar. 5
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 1
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 Jan. 20

 33
 Jan. 6

 33
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 Feb. 1
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 </tr Alta, Nev.... Andes, Nev. Baltimore, Utah... Belcher Cons., Cal... Best & Belcher, Nev Bodie Tunnel, Cal... Buchanan, Cal... Chollar, Nev... Conlar, Nev... Courier, Utah... Enterprise, Dak... Enterprise, Dak. Far West, Dak. Forty Nine, Cal Jupiter, Utah... Hale & Norcross, Hale & Norcross, Nev. Johnson Gravel, Col. Lady Wash., Nev. Liberty, Dak. Mexican, Nev. Navajo, Nev. Ophir, Nev Decor Action Opbir, Nev. Peerless, Ariz Potosi, Nev Rainbow, Dak. Savage, Nev Seabury Calkins, Dak. Sierra Nevada, Nev. Union Cons., Nev... Nev.

#### Pipe Line Certificates.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week :

There was a sharp advance early in the week from 77 to 821/c., and a reaction to 778/4c., closing to-night at 781/8c. There was a break in refined to 7% c., and accompanying the rally in crude it was put up to 7%c. The Kane and Washington fields are slowly developing, and are the bear features. The pipe line deliveries are in excess of the receipts, and the stocks The production for grow smaller each month. January was about 2000 barrels less than in December. The following table gives the quotations and sales

at the Consolidated Stock and Petroleum Exchange : Opening. Highest. Lowest. Closing.

Feb

. 13	77	771/2	76%	76%	7,514,000	
15	771/8	79	77	79	3,908,000	
16	791/8	801/2	78%	79%	8,545,000	
17	79%	821/8	7956	815%	7,983,000	
18	8156	821	79%	801/4	11,985,000	
19	80	801/8	77	78%	6,448,000	
Total sal	les				46,383,000	

### Boston Copper and Silver Stocks. [From our Special Correspondent.]

### BOSTON, Feb. 18.

The firm tone of ingot copper has stimulated the market for the copper stocks this week, and quite a lively business has been transacted, especially during the past few days. In the early dealings, the market was tame, with no special indications of an advance ; but a large order for Franklin started the whole market, and it looks as though there might be a chance for the long-predicted boom in this class of stocks. Calumet & Hecla opened at \$218, declined to \$217, and then rapidly advanced to \$221, with sales of 175 shares, closing strong and in fair demand at the high est price. Quincy advanced from \$481/2@\$50, declined 81 which was, however, quickly recovered, and sold at \$5014 ; sales, 336 shares. Franklin, which sold on the 9th at \$101/2, opened with small sales at \$11, but advanced on large orders to \$1334, receding later to \$13 : sales, 3488 shares. Osceo'a was also in demand, and felt the influence of the advance, with sales of 365 shares at  $$15@$16\frac{1}{2}$ , closing at  $$15\frac{1}{2}$ . Atlantic, firm with sales at  $$10\frac{1}{2}$ , regular, and  $$10\frac{3}{4}$ , buyer 60; 225 shares. Huron advanced from \$134 (19th ult.) to \$21/4, and is in demand at \$21/4 bid ; sales, 450 shares. Pewabic sold at \$2 on the 13th, and advanced with the flood to \$3, closing at \$2%; sales, 800 shares. Allouez sold at 871/2c., and Ridge at 50c. Total sales for the week, about 6000 shares.

In silver stocks, Boston & Montana has been active, selling in the early dealings at \$81/2; but a large amount of stock being pressed for sale, it declined to  $7\frac{1}{4}$ ; sales, 3400 shares. Dunkin is also in good demand, and records an advance from 30@35c. Bonanza, dull at \$11/2. Crescent sold at 20c. Catalpa, at 40c.

At the Mining Exchange, Bowman is in better request, with sales at 20c. Milford advanced to 60c., and is very firm. The water-meter stocks have also been in demand, and sold up to 30@35c. for both New England and Standard.

San Francisco Mining Stock Quotations. Daily Range of Prices for the Week.

		CLOS	ING QU	OTATIO	NS.	
COMPANY.	Feb. 12.	Feb. 13.	Feu. 15.	Feb.	Feb 17.	Feb. 18.
Albiou						
Alpha						*****
Alta		.10	.10	.10	.10	.10
Argenta						
Bechtel			**** **			
Beicher		1.121/2	**** **	1.121/2		1.121/2
Belle Isle						112.23
Best & Belcher .		1.121/2	1.25	1.37%	1.25	1.37%
Bodie		** . ***	1.371/2	1.50	1.50	1 50
Bullion			**** **			
Bulwer				.45		.45
Chollar		. NO	.80	.85	.90	.85
Cou. Pacific		.20			.20	.15
Con. Cal. & Va		2.121/2	2.25	2 3716	2.25	2.25
Crown Point		1.1:16		1.21		1.1216
Day						
Elko Cons						
Eureka Cons		1.75	1.75	1.75	1.75	2.0.)
Exchequer				1		
Gould & Curry		70	.75	.80		.80
Grand Prize				1		
Hale & Norerose		0 1916	0.05	9 65	1.25	2.25
Independence		14. LIS /2				
Martin White						
Magican			05	30	30	35
Mono		2 8714		4.00	4 00	4 1916
Mount Highlo		1.0172	00:	2 75	3.50	1.1.1.1.1.2
Nondio		25	125	v.10	0.00	
Northum Polis		.00				
North Bally Lilo					**** **	
North Delle Isle.		4"	40	50	50	50
opnir		.2.)	, 21	0	,00	0
Overman		00		05	07	05
Potos1	**** **	.20	1.0."	1	1 1.12/	.30
Savage		1.1.2%	1.21	1.30	1.1.3%2	** ****
Scorpion		1		1		
Sierra Nevada		.65	.70	.70		.70
Silver King						· · * · ·
Тір-Тор					1	
Union Cons	1	.50	66.	.50	.55	.50
Utah		.6J		.60		
Wales Cons				1		
Yellow Jacket		1.00	1.00	1.00	1.00	.95
				1	1	

The following are the financial balances of th various mining companies on February 1st :

#### Cash on hand.

Potosi Best & Belcher Bulwer *Con. Cal. & Va †Chollar Crown Point Exchequer	\$1,414.711 8,068.08 18,216.15 96,445 92 7,974.54 26 497.16 6,209.02	Gould & Curry Hale & Norcross #H 'mes heale n Occidental. Ophir	\$20,615.84 20.123.65 12,196.56 3,799.64 1,931.27 4,574.75

And \$52,077.60 in unsold bullion. Monthly e spenses partly raid. +With balance of assessment yet to come in; in-dottedn.ss at bank, \$3741.3.2 ; Unsold bullion, \$31,746.93; liabilities, \$3075.

### The following companies had an indebtedness :

 Peer
 \$7.041.03

 leprics
 \*40,902.72

 Cricker
 12,727.22

 Atoion
 .265.000.00

\* Less \$314.02 in unsold bullion.

Unlisted Stocks and Foreign Quotations. We give below the most reliable quotations obtainable for unlisted stocks and quotations on outside and foreign exchanges :

NAME OF COMPANY.	Location.	Price.	Where quoted.
Adams, s. L	Colo	\$4@\$5	Unlisted
Believue, s. L	Idaho	\$5	Unlisted
Big Bend H'dr'lc, G.	Dak	. \$5 .	Unlisted
Bird's Eye Creek, G.	('al	\$6.25@\$7.50	London
Bonanza King, G	Cal	\$10	Unlisted
California, G	Colo	87c.@\$1.12	London
Col. United, s. L	Colo	\$15 6246(0)\$16.8716	Loudon
Fb'th'dt & Mon't'r,s	vev	\$1.12@\$1.37	London
Elkhorn, G. s.	Mont	\$10	Unlisted
G I len River, G	Cal	\$116*	Paris
<ul> <li>Partes Civiles</li> </ul>	ai	\$+6*	Paris
Grauite alt, s	Mont	\$21	St. Louis
Helene, G & L C	Mont	£2	Helena
Honorine, s L	Utah	75c.	Unlisted
Kohiuoor & Don-			1
aldson, G. S	Colo	750.@\$1	London
La Plata, S. L	Cole	\$1.25@\$1.50	London
Lexing on, G S	Mont	\$12.50	Paris
" Org'niz'is' shares	Mont	50c.	Paris
Montana, Lt., G. S	Mont	\$18.75@\$20	Lendon
New Albion, G	N. S	\$5@\$0.25	London
New Emma, s	Ucsh	\$1.37@\$1.6?	L ndon
N-W Hoover Hill, G.S	N. C	\$1.50@\$2	London
Plumas Eureka, G.	Cal	\$3.73@\$5	London
Richmond Cons.L	Nev	\$20@\$21.15	London
Ruby & Dunder-			
oerg, G	Nev	51. 5@ \$2.25	London
Flerra Buttes, G	Cal	50.0236 056 8716	London
St. Joseph's, L	M.J	\$7@\$7.50	Unlisted

Foreign quotations are per mail advices \* The above quotations were given July 5th, 1885. Sinc the

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# $\mathbf{MAPS}.$

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